Legal and Moral Aspects of Human Embryonic Stem Cell Research

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Summary

This thesis is concerned with two different aspects of human embryonic stem cell research: legal and moral. These are not two distinct areas; the law cannot regulate this controversial area of science without the input of morality. There is not one moral viewpoint on the use of human embryos in scientific research and as such this thesis discusses several different moral viewpoints before moving on to consider how the law takes into account these wide ranging and diverse stances. The science of human embryonic stem cell research is discussed briefly so as to ensure that the reader comprehends the science that the law is seeking to regulate and over which there is so much ethical debate.

The majority of this thesis then considers the legal aspects of human embryonic stem cell research. The focus is upon the human embryo and human embryonic stem cell interface; how the legislation which governs human embryo research has been used to subsequently regulate human embryonic stem cell research. The examination of the legal aspects of human embryonic stem cell research starts with a historical chapter on how the legislation came into force. This is necessary so as to understand how and why we regulate human embryonic stem cell research as we do and what the legislation does, before moving onto the finer detail. The role of research ethics committees, the HFEA and the UK Stem Cell Bank in human embryonic stem cell research are all analysed in depth, problem areas highlighted and solutions suggested. An analytical discussion of the reform process which led to the *Human Fertilisation and Embryology Act 2008* is the last step in the examination of the regulation of human embryonic stem cell research. Finally comparisons are made to the State of California, USA which was the first US state to permissively fund stem cell research.

The law stated is correct as of the 13th November 2008 when the *Human Fertilisation and Embryology Act 2008* received Royal Assent.

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Glossary

2001 Regulations – *Human Fertilisation and Embryology (research purposes) Regulations 2001* SI2001/188

Artificial gametes – also known as *in vitro* derived gametes or pluripotent stem cell derived gametes. These are stem cells which have differentiated into gametes

Blastocyst – Early human embryo

BBSRC - Biotechnology and Biological Sciences Research Council

BMA – British Medical Association

CIRM – The California Institute for Regenerative Medicine (U.S. State funding body)

Clinical Trials Regulations - *Medicines for Human Use (Clinical Trials) Regulations 2004*

CNR – Cell Nuclear Replacement, also known as SCNT and therapeutic cloning. The nucleus of a somatic cell is combined with an enucleated oocyte

Commons Amendments – *Human Fertilisation and Embryology Bill [HL]* HL Bill 83, 54/3

COREC – Central Office for NHS Research Ethics Committees

Donaldson Report - *Stem Cell Research: Medical Progress with Responsibility. A Report from the Chief Medical Officer's Expert Group Reviewing the Potential of Developments in Stem Cell Research and Cell Nuclear Replacement to Benefit Human Health* (2000) Department of Health

Draft Bill - *Human Tissue and Embryos (Draft) Bill* CM7087 Department of Health (2007)

Embryo – product of a fertilised egg (either with sperm or by cell nuclear replacement)

Enucleated oocyte – an egg which has had its nucleus removed

EU Tissue and Cells Directive – *Directive 2004/23/EC of the European Parliament and of the Council of 31 March 2004 on setting standards of quality and safety for the donation, procurement, testing, processing, preservation, storage and distribution of human tissue and cells* [2004] OJ L102/48

EU Directive - *EU Directive 2001/20/EC of the European Parliament and the Council of 4 April 2001 on the approximation of the laws, regulations and administrative provisions of the Member States relating to the implementation of good clinical practice on the conduct of clinical trials on medicinal products for human use* L121/34 OJEC

Extra-embryonic cells – the cells which make up the trophoblast and the placenta

February Bill - *Human Fertilisation and Embryology Bill [HL]* HL Bill 70, 54/3

Fertilisation – the fusion of egg and sperm to produce a blastocyst

GAfREC – Governance Arrangements for NHS Research Ethics Committees

Gametes – eggs and sperm

GIFT – gamete intra-fallopian transfer

hESC – human embryonic stem cell

HFEA – The Human Fertilisation and Embryology Authority

HFE Act – *The Human Fertilisation and Embryology Act 1990*

HFE Act 2008 – *The Human Fertilisation and Embryology Act 2008*

HGAC – Human Genetics Advisory Commission

HTA – The Human Tissue Authority

HT Act – *The Human Tissue Act 2004*

Human reproductive cloning – the aim is the creation of a whole person through the use of the CNR technique and implanting the resulting embryo into a uterus, done to satisfy the reproductive desires of another person

Human therapeutic cloning – creation of an embryo by the CNR technique for research/therapeutic purposes only

ICOC – Independent Citizen's Oversight Committee. Governing body of the CIRM (U.S. body)

ICSC – Intra-cytoplasmic sperm injection

IPS Cells – induced pluripotent stem cells. Somatic cells are encouraged to differentiate into a stem cell like state

In vitro – outside of the body

In vivo – within the body

In vitro derived gametes – see artificial gametes

IUI – Intra-uterine insemination

IVF – *In vitro* fertilisation

IVM – *in vitro* maturation

January Bill – *Human Fertilisation and Embryology Bill [HL]* HL Bill 25, 54/3

June Bill - *Human Fertilisation and Embryology Bill [HL]* HL Bill 120, 54/3

LREC - Local research ethics committee

MRC – Medical Research Council

MREC – Multi-centre research ethics committee

Multipotent – capable of differentiating into limited cell types

New Bill - *Human Fertilisation and Embryology Bill [HL]* HL Bill 6, 54/3

NHS – National Health Service

NIBSC - National Institute for Biological Standards and Control

NIH – The National Institute for Health (US body)

NPSA – National Patient Safety Agency

NREA – National Research Ethics Adviser

NRES – National Research Ethics Service

Oocyte – human egg, female gamete

Parthenogenesis – reproduction without the use of sperm, eggs divide and develop without the introduction of sperm

Pluripotent – capable of differentiating into almost any cell type, with the exception of the extra-embryonic cells

Primitive streak – Normally occurs around the fourteenth day of development after creation of an embryo. The formation of the primitive streak signifies a unique genetic individual as it is the start of the spine and brain

Proposition 71 – *California Stem Cell Research and Cures Bond Act.* Californian legislation authorising State funds to be spent on human stem cell research (US legislation)

RAFT – Regulatory Authority for Fertility and Tissues

RATE – Regulatory Authority for Tissues and Embryos

REC – Research Ethics Committee

RCOG – Royal College of Obstetricians and Gynaecologists

SCRO committee – Stem Cell Research Oversight committee (US body)

SCNT – Somatic Cell Nuclear Transfer. See CNR above

Somatic Cell – adult cells, any cell that contains the full chromosome content

Sperm – male gamete

Stem cell – a cell capable of self-renewal and differentiation into another cell type

Stem cell line – a collection of stem cells which are self-renewing and genetically identical

Totipotent – capable of differentiating into all cell types including extra-embryonic cells

Warnock Report – *Report of the Committee of Inquiry into Human Fertilisation and Embryology* (1984) DHSS Cmnd 9314

UKECA – United Kingdom Ethics Committee Authority

UKNSCN – The UK National Stem Cell Network

UK Stem Cell Bank – the body which stores and distributes human stem cell lines

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Introduction

Stem cell research is undoubtedly going to increase our knowledge about basic cell biology considerably, but this is not the benefit of stem cell research that excites most people. The really exciting thing about stem cell research is in the therapeutic potential of stem cells.[1]

Embryonic stem cell research is perhaps the most controversial ethical issue of the new century. This is not surprising. It promises unprecedented potential benefits to human health but arguably comes at the expense of violating the most fundamental moral virtue – the right to life.[2]

As can be seen from the above quotes human embryonic stem cell research is an area of science which could potentially revolutionise healthcare, but equally it is an area of science which raises complex ethical questions, ones which it is highly problematic if not impossible to reach agreement upon. It is also an area of science for which it is difficult for the law to regulate.

Science

Adult stem cell research and therapies have been in existence for several decades, the most commonly known adult stem cell therapy being bone marrow transplants. However, human embryonic stem cell research is a relatively new area of research, albeit one which has grabbed the attention of scientists, the media and the public alike.

The science of human embryonic stem cell research has progressed at a phenomenal rate since 1981 when mouse embryonic stem cells were first isolated by Sir Professor Martin Evans working at Cambridge University and for which he was recently awarded the Nobel Prize for Medicine.

Work was initially carried out with animal studies and it was not until 1998 that the now famous Professor James Thomson at the University of Wisconsin reported the successful isolation of human embryonic stem cells.

Since 1998 human embryonic stem cell research has gathered pace, with developments reported almost daily. Human embryonic stem cell research is not an

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[1] Holm, S., *Going to the Roots of the Stem Cell Controversy* (2002) 16(6) Bioethics 493-507 at pg 496

[2] Bagaric, M. and McConvill, J., – *Embryonic Stem Cell Research: The Principal Ethical Issue – When Does Life Begin?* (2003) 12 (1) Nott. L.J. 1 at pg 1

isolated area of research; other developments made with human embryos have shaped the research paths taken. For example the birth of Dolly the sheep, the first cloned mammal, has allowed scientists to develop the cell nuclear replacement technique so as to then derive human embryonic stem cells, opening up the possibility of creating patient specific stem cells.

Human embryonic stem cell research is precisely that; research. Still in its infancy human embryonic stem cell research does have the potential to cure or create therapies for many diseases and conditions which affect the world's population. Which disease will have a cure or therapy first is impossible to foresee although scientists are working on a vast and diverse range of illnesses from Parkinson's to diabetes, sight loss to replacement heart cells. It is still likely to be a number of years before such research progresses to the clinical trials stage, let alone widespread medical applications, but if the research continues at the pace which it has done so far it must surely be only a matter of when, not if, embryonic stem cell therapies will be available. The science of human embryonic stem cell research is discussed in Chapter 1.

A particular property of human embryonic stem cells, their pluripotency, makes them so attractive scientifically. The significance of the pluripotent nature of human embryonic stem cells is that they have the potential to develop into almost any cell type of the human body, hence the potential capability to revolutionise healthcare. However it is the source of these pluripotent stem cells, the human embryo, which makes this research so ethically controversial.

Ethics

Human embryonic stem cell derivation normally involves the destruction of the human embryo (although note the work in the USA involving single cell biopsy of human embryos, although the embryos in question were left to perish).[3] It is this destruction of the human embryo, or lack of fulfilling its potential to become a human being that upsets and perturbs many people.

As will be seen in Chapter 2, which discusses the ethics of destructive embryo research, there is no clear moral dividing line on the status and respect which should be

[3] Klimanskaya, I., *et al. Human embryonic stem cell lines derived from single blastomeres* 444 Nature 481-485

afforded to the human embryo. The range of opinions on the moral status of the human embryo is enormous, even those who claim to come from the same ethical standpoint will vary. For example, Gradualists may all recognise that the human embryo will gradually gain respect and status as it develops but may attach significance to different points of biological development, e.g. the formation of the primitive streak or quickening. I aim to discuss broadly some of the different ethical stances on the moral status of the human embryo whilst also recognising the diversity of those opinions.

The opponents of human embryonic stem cell research are vociferous in their opinions whilst those who may hold views which pertain to the middle ground or lean to the more liberal persuasion are not seen to be as vocal. This is particularly true when looking at the campaigns which were ongoing throughout the reform process of the *Human Fertilisation and Embryology Act 1990* (for example, refer to the vocal campaign by Comment on Reproductive Ethics, which has a strong web presence as well as submitting evidence to a number of Government reports into the matter).[4] Whilst opponents of human embryonic stem cell research may appear to be more vocal upon the matter, the supporters are not without a voice. The UK National Stem Cell Network (UKNSCN) was established in July 2006 to promote research and disseminate information and has submitted evidence to the Government on several occasions.[5] The ethical issues are discussed in Chapter 2. Within the Chapter the five main moral viewpoints (Deontologist, Consequentalist, Liberal, Moderate and Gradualist) are examined to determine how each one would answer the questions 'when does life begin to matter morally?' and 'Is an embryo a person?' This examination of the moral status of the human embryo is then taken a step further by considering if the law respects and incorporates the diverse moral opinions surrounding the status of the human embryo.

Law

While the ethical debates may continue to rage, both academically and publicly, the legislation of the United Kingdom has taken a clear stance on the permissibility of human embryo research and human embryonic stem cell research. Embryo research and

[4] Comment on Reproductive Ethics http://www.corethics.org/index.php (accessed 09/09/08)
[5] *About UKNSCN: Mission* UKNSCN http://www.uknscn.org/aboutuknscn.html (accessed 13/10/08)
UKNSCN Newsletter Issue 1, Autumn 2007
http://www.uknscn.org/downloads/pdfs/UKNSCNNewsletterIssue1.pdf (accessed 13/10/08)

human embryonic stem cell research are allowed within a defined set of limits, for specific research purposes, up to 14 days development of the embryo (post-creation) and only where the use of embryos is necessary and desirable. The interface between human embryo research and human embryonic stem cell research is an interesting one to examine; whilst the focus of this thesis is upon the regulation of human embryonic stem cells it is impossible to examine the regulation without reference to human embryo research, primarily due to the fact that the legislation which governs human embryo research has been subsequently used to largely regulate human embryonic stem cell research.

The path to statutory control was not a quick or easy one. Some eight years passed from the creation of the Warnock Committee until the passing of the *Human Fertilisation and Embryology Act 1990*. The road to legislation is discussed in Chapter 3.

Human embryonic stem cells were discovered eight years after the enactment of the *Human Fertilisation and Embryology Act 1990.* As such the legislation of the United Kingdom has been both amended and subjected to liberal interpretation by the judiciary to take into account the scientific developments so as to ensure that all research involving human embryos, regardless of the manner of their creation, is strictly regulated.

As the science has continued to progress rapidly the legislation needed to be revised and updated and the *Human Fertilisation and Embryology Act 1990* has undergone reform. The path to new legislation has been long and arduous. The first five documents from 2004-2006 are discussed in Chapter 7. 2006-13th November 2008 is discussed in Chapter 8. As at the time of completing this thesis the discussion of the *Human Fertilisation and Embryology Bill* had just been concluded with the *Human Fertilisation and Embryology Act 2008* receiving Royal Assent on the 13th November 2008.[6] The majority of the provisions will come into force in October 2009.[7]

Scientists are not able to commence research as and when they see fit provided that they stay within the bounds of the legislation. Scientists must apply to the statutory regulator, the Human Fertilisation and Embryology Authority (HFEA), for a licence for

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[6] Hansard House of Lords, 13th November 2008, Royal Assent – Human Fertilisation and Embryology Act 2008, Volume 705, Column 832 http://www.publications.parliament.uk/pa/ld200708/ldhansrd/text/81113-0008.htm#08111379000023 (accessed 20/11/08)

[7] *HFEA Chair welcomes Royal Assent of HFE Act* (13/1/08) http://www.hfea.gov.uk/en/1746.html (accessed 20/11/08)

such work and prior to that must normally seek and gain approval from a Research Ethics Committee. These two bodies are discussed in Chapters 4 and 5.

Equally whilst the *Human Fertilisation and Embryology Act 1990* along with the HFEA and Research Ethics Committees may govern embryo research it does not control research upon the subsequently derived stem cell lines. This is the role of the UK Stem Cell Bank and is discussed in detail in Chapter 6.

Finally it should be remembered that, although the United Kingdom was the first country to bring into force permissive legislation on embryo research, it is not the only country which has done so. The final chapter of the thesis, Chapter 9, looks at the State of California in the United States. California is an interesting place to compare to the United Kingdom as it was the first State to enact legislation which went against the Federal position of not providing funding for human embryonic stem cell research. Californian legislation is fascinating to compare to the UK legislation as there is far greater emphasis upon funding of human embryonic stem cell research, rather than strictly regulating it. The research for this final chapter was primarily undertaken during a five week trip to the University of California, Berkeley as a visiting scholar during May/June 2007.

This thesis aims to give the reader a comprehensive overview of the regulation of human embryonic stem cell research in the United Kingdom, examining problems with that regulation and suggesting ways forward. While this thesis is very much concerned with the regulation of human embryonic stem cell research such a piece of work would not be complete without an explanation of the science involved as well as an examination of the ethical problems surrounding the moral status of the embryo.

The focus of this thesis is upon the interface between embryo research and human embryonic stem cell research. The legislation pertaining to embryos has been used to regulate the creation of, access to and research upon human embryonic stem cells. It is necessary to understand how the legislation which controls research upon embryos has also been used to regulate embryonic stem cells.

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Chapter 1 - The Science

Although this thesis is predominantly concerned with the legislation surrounding human embryonic stem cell research, it is important to understand the science which lies behind the need for legislation.

To understand human embryonic stem cell research it is necessary to explain certain scientific terms and processes. This chapter seeks to explain those processes in lay terms, to enable the reader to follow the scientific progress and developments and to understand the need for legislation to regulate this sensitive area of research.

Human embryonic stem cell research, within the United Kingdom, is permitted to be performed upon two different sources of embryos, those donated for research that are surplus to fertility requirements, and those which are created specifically for research.[8] Embryos which are donated after fertility treatment have been created by *in vitro* fertilisation. Embryos which are created specifically for research can either be created by *in vitro* fertilisation or by the cell nuclear replacement process.

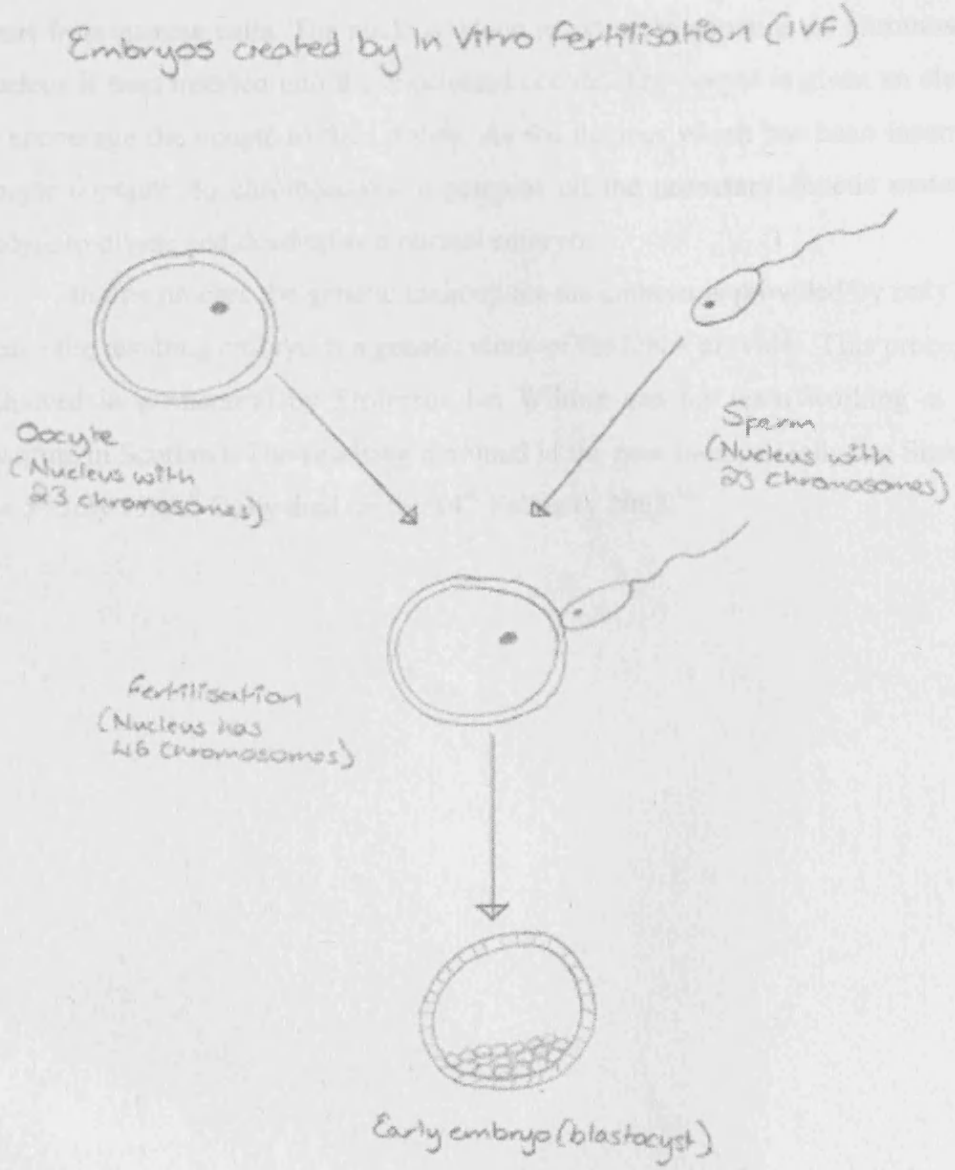
Embryos created by *in vitro* fertilisation (IVF)

Embryos created by *in vitro* fertilisation (IVF) refer to human embryos which are created outside of the human body, within the laboratory. For the process of Intra-Cytoplasmic Sperm Injection (ICSI) sperm is mechanically inserted into an oocyte, and in IVF sperm is mixed with the oocyte, thereby replicating natural fertilisation within the laboratory.

The nucleus of human gametes, oocytes and sperm, contains 23 chromosomes each so that upon fertilisation the newly formed cell, the embryo, contains 46 chromosomes, the exact number required for normal human development. The genetic makeup of the embryo comes from two different sources – the two gamete providers.

IVF embryos used for research which have been donated after fertility treatment are often referred to as 'spare', 'surplus' or 'supernumerary' embryos.

[8] Refer to Chapter 3 for a full discussion of the legislation which permits research upon these two sources of embryos



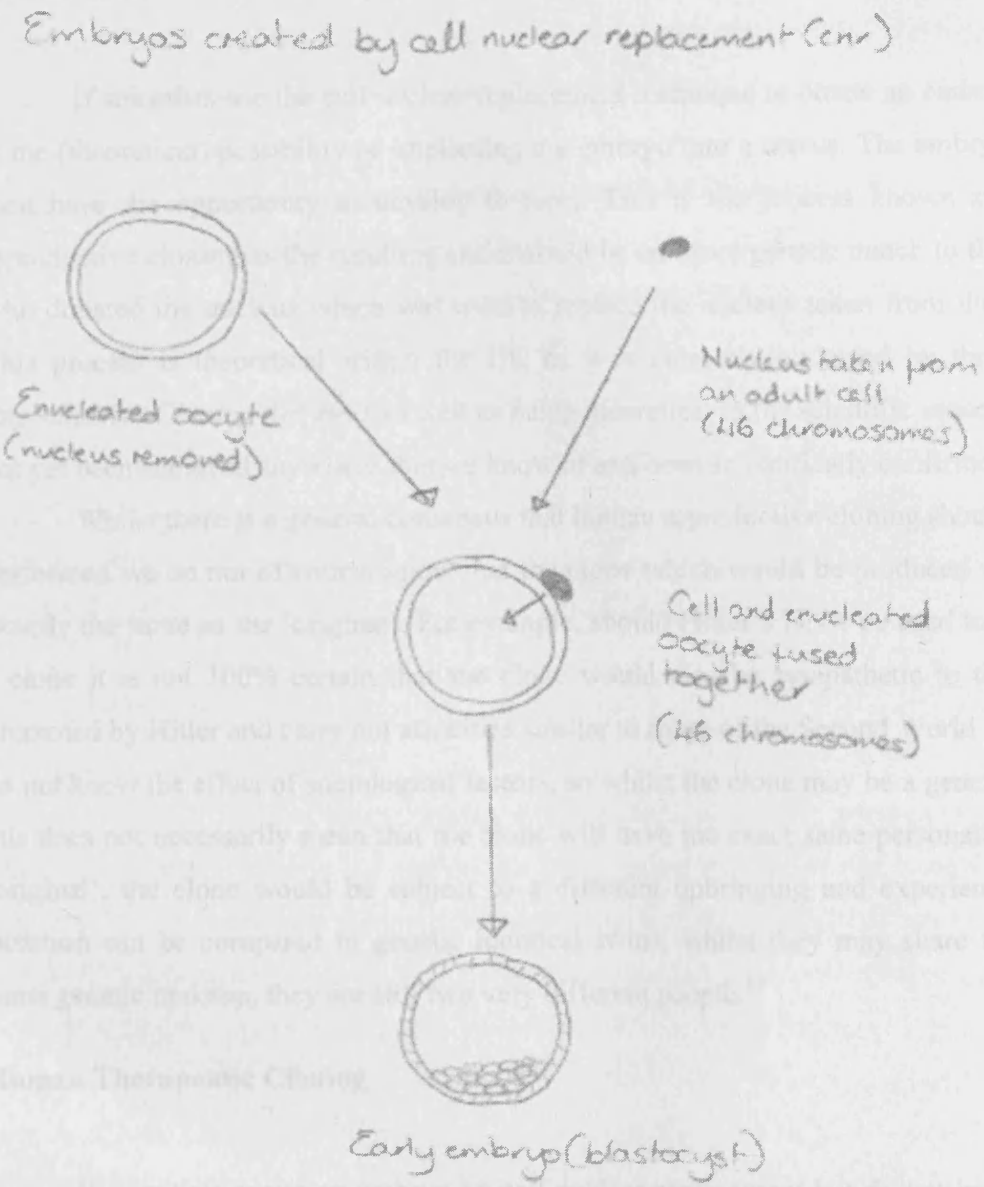
Embryos created by cell nuclear replacement (CNR)

Embryos created by cell nuclear replacement (CNR) or somatic cell nuclear transfer (SCNT), as the process is also called, do not involve the use of sperm merely oocytes in their creation. In the process of cell nuclear replacement scientists take an oocyte and extract the nucleus which consists of 23 chromosomes. The oocyte is then referred to as an enucleated oocyte – it is effectively an empty shell. Scientists then

extract the nucleus of a somatic cell, that is to say an adult cell of any part of the body apart from gamete cells. The nucleus which is extracted contains 46 chromosomes. This nucleus is then inserted into the enucleated oocyte. The oocyte is given an electric shock to encourage the oocyte to then divide. As the nucleus which has been inserted into the oocyte contains 46 chromosomes it contains all the necessary genetic material for the oocyte to divide and develop as a normal embryo.

In this process the genetic makeup for the embryo is provided by only one donor, hence the resulting embryo is a genetic clone of the DNA provider. This process was first achieved in a mammal by Professor Ian Wilmut and his team working at the Roslin Institute in Scotland. The resulting mammal is the now famous Dolly the Sheep, born on the 5th July 1996.[9] Dolly died on the 14th February 2003.[10]

[9] *Cloning - A life of Dolly* Roslin Institute http://www.roslin.ac.uk/publicInterest/cloning.php (accessed 19/02/08)
[10] *Cloning – A life of Dolly: Dolly's Final Illness* Roslin Institute http://www.ri.bbsrc.ac.uk/publicInterest/DollyFinalIilness.php (accessed 22/07/08)



This process is often referred to as cloning. Terminology for cloning includes human reproductive cloning, human therapeutic cloning, cell nuclear replacement and somatic cell nuclear transfer. Further explanation is found below.

Human Reproductive Cloning

If scientists use the cell nuclear replacement technique to create an embryo, there is the (theoretical) possibility of implanting the embryo into a uterus. The embryo would then have the opportunity to develop to term. This is the process known as human reproductive cloning as the resulting child would be an exact genetic match to the person who donated the nucleus which was used to replace the nucleus taken from the oocyte. This process is theoretical within the UK as it is currently outlawed by the *Human Reproductive Cloning Act 2001* as well as being theoretical in the scientific sense as it has not yet been achieved anywhere that we know of and been scientifically confirmed.

Whilst there is a general consensus that human reproductive cloning should not be performed we do not of course know that the clone which would be produced would be exactly the same as the 'original'. For example, should Hitler's DNA be used to produce a clone it is not 100% certain that the clone would also be sympathetic to the ideals promoted by Hitler and carry out atrocities similar to those of the Second World War. We do not know the effect of sociological factors, so whilst the clone may be a genetic clone, this does not necessarily mean that the clone will have the exact same personality as the 'original', the clone would be subject to a different upbringing and experiences. The situation can be compared to genetic identical twins, whilst they may share the exact same genetic makeup, they are still two very different people.[11]

Human Therapeutic Cloning

If scientists create an embryo by cell nuclear replacement but do not implant the embryo into a uterus, the scientists may be able to perform research upon the embryo. The exact areas of permitted research are discussed in later chapters when considering the legislation regarding human embryos. The creation of embryos by the cell nuclear replacement technique for (limited) research purposes is permitted in the UK by the *Human Fertilisation and Embryology Act 1990.*

When research is performed upon embryos created by cell nuclear replacement this process is known as human therapeutic cloning. The reason for this is that the results

[11] For an interesting discussion of this argument refer to Harris, J., *Clones, Genes and Immortality: Ethics and the Genetic Revolution* OUP (1998)

of the research will hopefully have therapeutic benefit, not to the embryo upon which the research is performed due to the restrictions preventing implantation (as discussed in later chapters) but may have therapeutic benefit to already existing and future members of society.

Whilst the term 'therapeutic cloning' is used predominantly in the public press it is somewhat misleading. Scientists prefer the term 'somatic cell nuclear transfer' or 'cell nuclear replacement' to refer to the scientific process used to create these embryos as it is felt that 'reproductive cloning' and 'therapeutic cloning' are misleading phrases to use. The term 'cell nuclear replacement' is used throughout this thesis. The research which is being undertaken at this present time does not currently have any therapeutic benefits to society at large. Embryo research is still predominantly that, at the research stage. Benefits to be reaped from such research will hopefully appear sometime in the future, but until that happens, such research is purely research, not therapeutic.

The Primitive Streak

As will be seen in later chapters of this thesis, in the UK research is permitted upon human embryos up to the appearance of the primitive streak, this is taken to have occurred by the fourteenth day of development after fertilisation (if it has not already occurred by this date). The primitive streak is the point at which twinning can no longer occur as it is the point at which cells within the embryo group together to form a neural tube, this is the start of the spine and brain. It is at this point which it can be said that we have a unique individual. Prior to the primitive streak forming it is possible for the embryo to split into twins, triplets etc. [12] Equally, after division the embryo may recombine back into one embryo.[13]

The Blastocyst

From the point of creation the embryo will go through several different developmental stages. The point at which stem cells are normally extracted is around five

[12] For a useful discussion of the primitive streak refer to *Report of the Committee of Inquiry into Human Fertilisation and Embryology*, (the Warnock Report) Cmnd 9314

[13] For an interesting discussion of this idea refer to Harris, J., *Ch X The Irredeemable Paradox of the Embryo* in *Enhancing Evolution* (2007) Princeton University Press

to six days after creation. At this point the embryo is referred to as a blastocyst and consists of around 150-200 cells with some cells having grouped together to form the inner cell mass which will go on to develop into the embryo.[14] It is from the inner cell mass that the stem cells are extracted. The term 'creation' is used here rather than 'conception' or 'fertilisation' due to the discovery of cell nuclear replacement and the ability to create human embryos by methods other than fertilisation.

Human Embryonic Stem Cells

The desire to extract stem cells from embryos is due to their huge potential to develop into almost any other cell of the human body. Embryonic stem cells were first discovered in mice by Sir Professor Martin Evans in 1981, human embryonic stem cells were first successfully extracted by James Thomson of the University of Wisconsin in 1998.[15]

There is great excitement surrounding human embryonic stem cells due to their pluripotency, which is their ability to develop into almost any cell and tissue of the human body. The discovery of these cells could have huge implications for how diseases and illnesses are treated medically. There is the potential to grow particular types of cells to be placed into the human body and replace those that are missing. Examples are brain nerve cells to treat Parkinson's, pancreatic islet cells to treat diabetes and photoreceptor cells to treat diseases of the retina.[16]

If the human embryonic stem cells were to be extracted from cloned embryos there is also the possibility of creating patient specific stem cells for treatment. This would be done by using the patients DNA, for example by extracting the nucleus from a skin cell, and then implanting that nucleus into an enucleated oocyte. The resulting embryo would be a genetic match to the patient and so any stem cells which were extracted from the embryo would also be a genetic match to the patient. This could be very important where the risk of rejection is undesirable.

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[14] Korobkin, R with Munzer. S. R., *Stem Cell Century: Law and Policy for a Breakthrough Technology* (2007) Yale University Press at pg 8

[15] Refer to Evans, M.J. and Kauffman, M.H., *Establishment in culture of pluripotent cells from mouse embryos* (1981) 292 Nature 154 and Thomson, J., et al., *Embryonic stem cell lines derived from human blastocysts* (1998) 282 Science 1145-47

[16] For information on the photoreceptor work refer to Klassen, H and Reubinoff, B., *Stem cells in a new light* (2008) 26(2) Nature Biotechnology 187

Pluripotent/Totipotent/Multipotent

As already mentioned the desire to create and derive human embryonic stem cells is due to their pluripotency. To say that a cell is pluripotent is to say that it has the ability, in the right conditions, to develop into almost any cell type or tissue of the human body. We say almost any cell type as pluripotent stem cells are unable to develop into the extra-embryonic cells, those that would form the placenta. Cells which can develop into any cell type of the human body including the extra-embryonic cells are known as totipotent stem cells.

In contrast cells which are known as multipotent stem cells have a far more limited capability to develop into other cell types. Generally adult stem cells will only be able to develop into the cell type for which they are programmed, for example bone marrow will produce only blood stem cells. The ability for self-renewal is highly important, particularly when the human body is consistently renewing and replacing many vital cells every second. However the usefulness of these multipotent stem cells is limited in terms of research for cell types outside of those for which the stem cells are programmed to produce.

Alternative Sources of Stem Cells

Adult stem cells are frequently referred to as an alternative to human embryonic stem cells. Most commonly referred to as a desirable alternative by the pro-life lobby these stem cells are generally not pluripotent, rather they are multipotent meaning that they do not have the potential to change into as many cell types as embryonic stem cells. It is for this reason that human embryonic stem cell research has progressed alongside the work being undertaken upon adult stem cells. However it must be noted that work is being undertaken to explore the possible pluripotency of adult stem cells, for example refer to the work of Catherine Verfaillie.[17]

Almost any stem cell which is not embryonic is defined as an adult stem cell; this includes cord blood stem cells, stem cells extracted from aborted foetuses, stem cells

[17] Jiang Y, Jahagirdar BN, Reinhard RL, Schwartz RE, Keene CD, Ortiz XR, Reyes M, Lenvik T, Lund T, Blackstad M, Du J, Aldrich S, Lisberg A, Low, WC, Largaespada DA, Verfaillie CM., *Pluripotency of mesenchymal stem cells derived from adult marrow* (2002) 418 Nature 41-9

extracted from bone marrow etc. The exception is induced pluripotent stem cells which appear to be a completely new type of stem cell.

Currently the majority of scientific research which involves the extraction of human embryonic stem cells will destroy the embryo in the process of extraction. As the science has progressed, and progressed rapidly (many advances having been made during the writing of this thesis), alternative ways of creating embryos have come to light. Some have been pursued in a bid to overcome the controversy of using embryos for such research. Alternative ways of creating embryos include:

- Through the use of artificial gametes
- Parthenogenesis
- Entities created by tetraploid complementation
- *In vitro* maturation of oocytes (IVM)
- Chimeras
- Embryo biopsy
- Altered nuclear transfer
- Induced pluripotent stem cells

The possible use of artificial gametes for research and treatment is discussed elsewhere in this thesis in respect of the reform which the UK legislation is undergoing. For explanation artificial gametes are gametes from stem cells, i.e. stem cells have been extracted from embryos and have then been encouraged to develop into eggs or sperm. Whilst not yet achieved with human embryonic stem cells there has been success with mice resulting in live births.[18] This could help some couples to overcome fertility problems whilst using their own genetic makeup. Artificial gametes is the term used throughout this thesis although the reader should be aware that they are also referred to as pluripotent stem cell derived gametes and *in vitro* derived gametes.[19]

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[18] Nayernia K, Nolte J, Michelmann HW, Lee JH, Rathsack K, Drusenheimer N, *et al.,* (2006) *In vitro-differentiated embryonic stem cells give rise to male gametes that can generate offspring mice* Dev Cell 11:125-132 http://www.cell.com/developmental-cell/fulltext/S1534-5807(06)00248-6 (accessed 15/06/09)
Nicholl, H., *Stem Cell Sperm Success* 17th July 2006, Bionews http://bionews.org.uk/new.lasso?storyid=3107 (accessed 14/9/06)

[19] Harvey, E., *Scientists argue for freedom to develop sperm and eggs from stem cells* 21st April 2008, Bionews http://www.bionews.org.uk/new.lasso?storyid=3807 (accessed 22/04/08)

Parthenogenesis is also referred to as a 'virgin birth'. Parthenogenesis merely requires the use of oocytes which are encouraged to divide and multiply without the introduction of sperm or other genetic material. A relatively common phenomenon in the animal world, research into this method of reproduction for humans is being conducted.

Entities created by tetraploid complementation involve embryonic stem cells combining with helper cells to form an entirely new organism consisting of both tetraploid and diploid cells. The tetraploid cells form the extraembryonic cells and tissues and as such the organism is incapable of implantation.[20]

The *in vitro* maturation of oocytes is used in conjunction with *in vitro* fertilisation or cell nuclear replacement. The maturation of oocytes *in vitro* allows the use of very immature oocytes to be used for research or fertility treatment. This is not really an alternative way of creating embryos; rather it is a method to help along the maturation of oocytes in preparation for fertilisation.

Chimeras and hybrid embryos have been in the UK news a lot recently due to the UK Government's intention to specifically allow the creation of hybrid embryos for research purposes in the new legislation as well as stating that it is permitted under the current *HFE Act*. Chimeras or hybrids involve the use of animal gametes and human DNA to create embryos. Scientists are able to create hybrid embryos by using an animal egg, removing the nucleus and then inserting the nucleus from a human cell. This is the cell nuclear replacement technique but uses animal eggs rather than humans and has recently been achieved at Newcastle.[21] The reason for scientists wishing to pursue this avenue for research is the severe shortage of good quality human eggs for research. By using animal eggs it overcomes the egg supply problem whilst ensuring that valuable research can continue. Chimera embryos in contrast use one human gamete and one animal gamete, e.g. human sperm and an animal egg. The resulting embryo would be half human and half animal. No licence has been issued for this type of work within the UK.

Whilst the researchers who have requested (and been granted) licences to undertake this work emphasise that any resulting embryos and stem cells will not be used in therapeutic treatments of humans (although this does not appear to have been banned

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[20] Denker, H-W., *Potentiality of embryonic stem cells: an ethical problem even with alternative stem cell sources* (2006) 32 J.Med. Ethics 665 at 669

[21] *Hybrid Embryos Statement* Newcastle University, 1st April 2008 http://www.ncl.ac.uk/press.office/press.release/content.phtml?ref=1207065299 (accessed 18/04/08) *Hybrid Embryos: FAQs* Newcastle University, 1st April 2008 http://www.ncl.ac.uk/press.office/press.release/content.phtml?ref=1207063854 (accessed 18/04/08)

under the new legislation) there will undoubtedly be much debate as to whether these can be considered to be truly human.[22] Also to be determined is the affect of mitochondria and the influence that the animal mitochondria remaining in the cell will have upon the human DNA. One research centre has recently been granted a licence by the HFEA to undertake cell nuclear replacement with pig eggs but to also replace the pig mitochondria, apparently truly using the pig egg as a shell only.[23]

Embryo biopsy or single cell biopsy is one possibility for extracting stem cells without the destruction of the embryo. One team in the US has shown that it is possible to extract a single cell from a developing embryo and to extract stem cells from that single cell.[24]

Altered nuclear transfer was suggested by William Hurlbut to the US Presidents Council on Bioethics as a solution to the ethical issues surrounding the human embryo. His suggestion was that scientists should alter the gametes before they fertilise, so that the resulting embryos are unable to develop beyond a few days as they cannot form the trophectoderm layer.[25] Of note is that there are papers against this 'solution' showing that it is not a solution at all – the resulting embryo is still a human embryo.

Induced pluripotent stem cells are perhaps one of the most exciting scientific advances since the news of the birth of Dolly the sheep. Developed by Shinya Yamanaka and his team at Kyoto University a method has been discovered whereby normal cells, such as a skin cell, have been reverted to a stem cell state, with properties very similar to that of embryonic stem cells.[26] The ability to revert human skin cells to an embryonic like stem cell state was announced in November 2007. Currently these induced pluripotent stem cells (often referred to as IPS cells) are liable to cause cancers due to the use of retroviruses in the process and so are still at a very early stage of developmental research, they could not yet be used in clinical therapeutic applications in humans due to the risk of

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[22] Refer to the work currently being carried out at King's College London and at the University of Newcastle-Upon-Tyne *Current Research Projects* HFEA http://www.hfea.gov.uk/en/374.html (accessed 03/03/08)

[23] *The generation of human embryonic stem cells by transferring a human cell into recipient pig eggs* Clinical Sciences Research Institute, University of Warwick, 30th June 2008 HFEA http://www.hfea.gov.uk/en/1699.html (last accessed 28/07/08)

[24] Chung.Y., *et al., Human Embryonic Stem Cell Lines Generated without Embryo Destruction* (2008) 2(2) Cell Stem Cell 113-117

[25] Refer to *Alternative Sources of Human Pluripotent Stem Cells: A White Paper of the President's Council of Bioethics* (2005) The President's Council on Bioethics http://www.bioethics.gov/reports/white_paper/alternative_sources_white_paper.pdf (accessed 03/03/08)

[26] Takahashi, K *et al., Induction of Pluripotent Stem Cells from Adult Human Fibroblasts by Defined Factors* 131(5) Cell 861-872, 30th November 2007 (accessed 03/03/08)

causing cancers. There is already research going on to overcome this problem with IPS cells.[27]

These IPS cells are a very interesting development as the creation of these types of stem cells are not plagued with the ethical and moral dilemmas which surround human embryonic stem cell research. In respect of embryo research in the United Kingdom there could be an argument that the use of embryos for stem cell research is no longer 'desirable or necessary' due to an ethically acceptable alternative source of stem cells in the form of these IPS cells. If that argument was successful then the HFEA would find it practically impossible to authorise any use of embryos for stem cell research where the use of IPS cells was a viable alternative. The HFEA is already taking into account the advances in the alternative methods of creating pluripotent stem cells.[28]

Interestingly IPS cells appear to be a whole new category of stem cells, neither embryonic nor adult they fall outside of statutory regulation and the control of the UK Stem Cell Bank. The development and use of IPS cells alongside the more established adult and embryonic stem cell lines will be interesting to see.[29]

Conclusion

This chapter is designed to briefly introduce the reader to the terminology used in connection with human embryonic stem cell research. As has been discussed the area of stem cell research is a complex area scientifically with many different sources of stem cells available for such research. As will be shown in subsequent chapters the UK legislation has had to work hard to regulate this up and coming area of science; the scientific developments which have occurred over the last few years have affected how the legislation is interpreted, been amended and now reformed.

The progress in this area of science has been rapid, the impetus for research being the potential of stem cell science to revolutionise healthcare as we know it. The range of

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[27] Zhou, H., *et al., Generation of Induced Pluripotent Stem Cells Using Recombinant Proteins* (2009) 4(5) Cell Stem Cell 381-384
Cyranoski, D., *Stem-cell therapies closer to clinic* Nature News 28th May 2009 http://www.nature.com/news/2009/090528/full/news.2009.525.html (accessed 15/06/09)

[28] Refer to the HFEA Scientific and Clinical Advances Group Paper *Alternatives to embryonic stem cells* SCAG (02/08)04 http://hfea.gov.uk/docs/2008-02-21_SCAG_paper_-_alternatives_ES_cells.pdf (accessed 05/07/08)

[29] For a discussion of the effect of IPS cells upon human embryonic stem cell research refer to Hammond-Browning, N., *Legal and Ethical Considerations of Induced Pluripotent Stem Cells* (forthcoming) Medical Law Review

illnesses, diseases and conditions which are being researched in conjunction with stem cells is enormous; this shows the potential of stem cells to not only help in one area but in all parts of the human body. Whilst there is huge pressure and expectation on the stem cell scientists to deliver the cures and therapies which are expected, the delivery date for these solutions is some what distant in the future.

Although progress has been rapid human embryonic stem cell research is still developmental, experimental and a work in progress. The therapeutic application of stem cell treatments may be futuristic at this moment in time, but the regulation of the research which is currently ongoing is vital, so as to retain public confidence and trust in human embryonic stem cell research. Later chapters look in detail at this regulation. The path to regulation has not been smooth, principally due to the disagreements over the protection and moral status to be afforded to the human embryo, the source of these valuable stem cells. The following chapter examines those different ethical arguments and considers how the legislation has respected and incorporated the diverse ethical opinions.

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Chapter 2 – The Ethics of Embryo Research

Introduction

Whilst the physical developmental stages that the foetus undergoes during pregnancy are now well documented and agreed upon, it cannot be said that there is agreement as to the moral status which should be attached to the physical development of the foetus. Views vary from the one that life begins at the moment of conception and should be protected from then on to the opposite end of the spectrum that respect for life does not begin until some point after birth. In the middle there are those who believe that the foetus has a 'special status' but that does not mean it has the full status of a human being, rather, that protection increases as the foetus develops.

The ethics of embryo research, the moral status afforded to the embryo and the morality of destroying embryos for the benefit of others could easily be a complete PhD thesis by itself! What I seek to do in this chapter is to give a brief overview of some of the different ethical and religious positions before moving on to consider if the law incorporates and respects those diverse ethical opinions. Whilst I discuss the different ethical viewpoints as separate concepts this is not to say that these viewpoints stand alone, indeed it would be wrong to do so. The Deontological approach is often discussed in connection with the Conservative approach, whilst Utilitarianism and Liberalism often go hand in hand.

The second part of this chapter considers whether the law concerning embryo research and human embryonic stem cell research incorporates these diverse ethical opinions.

The Moral Status of the Embryo/Foetus[30]

The ethical, philosophical and religious arguments over the respect to be afforded to the embryo concern both the potentiality of the embryo and whether an embryo can be

[30] I do not profess to be an expert in Philosophy or Ethics, however what I attempt to do is give the reader a simplified overview of the different ethical and religious approaches towards the moral status of the embryo and foetus

considered to be a person. One example of a discussion of the embryos potentiality can be found in Jeff McMahan's detailed analysis of *'Problems at the Margins of Life'*. McMahan discusses potential in terms of 'identity-preserving potential', whereby *"...X has the potential to become Y only if X and Y would be identical"* and 'nonidentity potential' which is *"...when X has the non-identity potential to become Y (or a Y), Y will not, when it exists, be identical with X..."*[31] McMahan concludes that *"...the early fetus's potential to become a person is not identity-preserving but is only nonidentity potential. It therefore has no interest, and no time-relative interest, in becoming a person."*[32] This almost mathematical approach to potential is one way of looking at the issue, as previously mentioned there are several different approaches towards this question; the five main approaches are discussed below.

The Deontological approach

The most prominent Deontologist is Immanuel Kant (1724-1804) and his theories continue to generate great discussion and debate. Kant devised the Categorical Imperative which was designed to form the basis of all moral obligations. Kant formulated his Categorical Imperative in a number of ways but the one which is most relevant tells us to

> *Act in such a way that you always treat humanity, whether in your own person or in the person of any other, never simply as a means, but always at the same time as an end.*[33]

As Mappes and DeGrazia note, *"In Kant's view, every person, by virtue of his or her humanity (i.e. rational nature) has an inherent dignity. All persons, as rational creatures, are entitled to respect, not only from others but from themselves as well."*[34] It is this idea of respect for persons that is applied to the human embryo and which causes huge amounts of debate and division amongst commentators.

Some commentators may apply Kant's Categorical Imperative to embryos to mean that we should never treat embryos as an end (i.e. use them for what they can provide), rather we should treat them as a means themselves. In this sense we should treat

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[31] McMahan, J., *The Ethics of Killing: Problems at the Margins of Life* (2002) OUP at p304
[32] *Ibid.* at p308
[33] Translated by Paton, H.J., *The Moral Law,* (1964) Hutchinson & Co. (Publishers) Ltd at p32
[34] Mappes.T.A. and DeGrazia.D., *Biomedical Ethics* (2006) McGraw-Hill 6th Ed. at p18

embryos as though they are persons, had full moral status and take all possible steps to protect them and help them fulfil their potential to become full human beings. If this approach was enshrined in legislation human embryo research including work to derive human embryonic stem cells, would be prohibited.

In contrast, some commentators may agree with Kant's idea that we should never treat others merely as a means and yet still come to the conclusion that embryos may be researched upon and destroyed in the process. This is due to the issue of the respect to be afforded to people. As such it needs to be discussed what level of respect must be afforded and to whom – are embryos people to whom we need to show respect?

Downie and Telfer expand upon the idea of respect for persons when they state that:

> *...the meaning of the injunction to treat and regard people not merely as a means but also as ends is that we ought to treat them as valuable in themselves and not only as useful instruments...to respect a person as an end is to respect him for those features which make him what he is as a person and which, when developed, constitute his flourishing.*[35]

But what are the features of persons that make this respect possible? Why do we treat persons as an end and never simply as a means? Gregory Vlastos discusses the idea of differentiating people due to their merits and achievements. Although we may accord additional respect (over and above what we may accord to 'mere mortals') to people due to particular merits which they display, Vlastos acknowledges that it is each individual's 'human worth' which justifies the expression that *"...men are 'ends in themselves'."*[36] It is the intrinsic value of people which we value and respect by never using people merely as a means. As Vlastos continues, *"In all cases where human beings are capable of enjoying the same goods, we feel that the intrinsic value of their enjoyment is the same. In just this sense we hold that (1) one man's well-being is as valuable as any other's* [and] *(2) one man's freedom is as valuable as any others."*[37] His example of giving assistance to the drowning man, irrespective of his merits, demonstrates how we believe we should each value our fellow man.[38]

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[35] Downie, R.S. & Telfer, E., *Respect for Persons* (1969) George Allen and Unwin Ltd at pg 15
[36] Vlastos, G., *Human Worth, Merit and Equality* in Feinberg, J., (Ed) *Moral Concepts* (1969) Oxford University Press pp.141-152 at pg 147
[37] *Ibid.* at pg 150
[38] *Ibid.* at pg 147

So for Vlastos it is the fact that we are human, the well-being and freedom to which we are entitled and the value which we have as humans which warrants the respect which should be given to each and every one of us.

Paton analyses the Kantian theory in terms of applying to rational beings. As he states *"[Rational agents] alone can have an unconditioned and absolute value, it is wrong to use them simply as a means to an end whose value is only relative."*[39] Kant himself holds that the power to act in accordance with certain laws is a power which can only be found in rational beings and as such, *"...every rational being, exists as an end in himself, not merely as a means for arbitrary use by this or that will, whether they are directed to himself or other rational beings, always be viewed at the same time as an end."*[40]

This concept of recognising rational beings as moral beings is further discussed by Patricia Clark who notes that *"People should be treated as ends in themselves because we are all part of a moral community: the Realm of Ends. This is not a physical community but is a way of recognising all other people as moral beings."*[41]

An extension of the rational beings argument is put forward by Downie and Telfer who discuss the specific features which differentiate people from other beings. They discuss why we take a certain attitude towards other people and go on to discuss why it is that we take the attitude that persons are valuable and so should be respected. The discussion which follows states that the respect that is due to persons is possible thanks to the human capacities of self-determination, rule making, minimal sensitivity and our possession of rational will. The possession of rational will, *"the ability to govern one's conduct by rules...to adopt rules which one holds to be binding on oneself and all rational beings"* and the ability to be self-determining are seen to give the intrinsic value to human personality.[42]

As Downie and Telfer themselves conclude:

> *...'respect for persons as ends' refers to an attitude...ways of treating persons. To respect a person as an end is to value or cherish him for what he is – and that is a*

[39] Paton, H.J., *The Moral Law* (1964) Hutchinson & Co. (Publishers) Ltd at pg 33
[40] *Ibid.* at pg 95
[41] Clark, P., *An Outline of Kant's Moral Theory* Cardiff University Philosophy Handout
[42] Downie, R.S. & Telfer, E., *Respect for Persons* (1969) George Allen and Unwin Ltd at pg 21

> *possessor of a rational will, where 'rational will' refers to the abilities to be self-determining and rule-following...to respect such a person is to make his ends one's own...and to take into account in all one's dealings with him that he too is self-determining and rule-following.*[43]

Attfield discusses the concept that *"...the well-being and flourishing of all morally considerable entities are of intrinsic value."*[44] The development of certain essential capacities will contribute to the well-being and flourishing of moral entities. Essential capacities *"...may be defined as essential capacities of a species, if and only if a species would forego its current identity in the absence of any of these capacities from most of its members."*[45] Attfield notes that essential capacities of humans includes *"...freedom, choice and responsibility. To this we can add that...human beings have essential capacities for practical reasoning in general...and for linguistic communication and perception, and probably for skilled production and creativity."*[46] He further notes that a case is made for:

> *...the intrinsic value of self-determination (the ability to take decisions of our own), of the ability to devise rules, and of being responsible for our beliefs, attitudes, and actions, all on the basis of the intrinsic value of the development of essential capacities*[47]

It can be inferred from Attfield's arguments that in the absence of all of these capacities a being cannot be recognised as human and as such makes respect for persons impossible and would equally allow the use of that being as merely a means to an end. It is the recognition of the essential capacities which makes respect possible and helps us to follow the Kantian maxim to never treat persons merely as a means but always as an end in themselves.[48]

If followers of Kant's Categorical Imperative hold that respect for persons is only possible where persons possess capacities such as rational will and self-determination,

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[43] *Ibid.* at pg 37
[44] Attfield, R., *Value, Obligation and Meta-Ethics* (1995) Value of Inquiry Book Series at pg 45
[45] *Ibid.* at pg 48
[46] *Ibid.* at pg 51
[47] *Ibid.* at pg 63
[48] Note that a substantial part of this section was submitted to the Philosophy Department of Cardiff University as a non-assessed essay as part of the module *Ethics: History and Theory*. This module was studied as a non-registered student. My thanks to Professor Robin Attfield for his comments upon the essay

they will hold that the human embryo is not a person and can therefore be researched upon and used to derive human embryonic stem cells.

The Utilitarian or Consequentalist approach

The Utilitarian or Consequentalist approach is so called as decisions are taken based upon an assessment of the consequences of the action. In assessing what action to take a person must assess all of the possible consequences of those actions and then choose the action which produces the greatest good or least amount of harm. The action itself which is to be undertaken is less relevant than the resulting consequence in the decision process. This contrasts to the Deontological approach whereby it is the action itself which determines the route taken, rather than the consequence of that action.

Applying this approach to the moral status of the embryo and the morality of embryo research, particularly where embryos are destroyed in the process, it can be seen that Utilitarians will, broadly speaking, support embryo research where the good consequences of that research (huge potential health benefits to others) will outweigh the bad consequence of the research upon the embryo (the destruction of the embryo).

This is an initially appealing approach to take towards embryo research for many people as it seems to value the maximum good being done with the least amount of harm. However, care needs to be taken when applying a strict Utilitarian approach; that is to say that the initial appeal of this approach to the average person may also be its hindrance in being accepted by more people. The application of the maxim 'the maximum good with the least amount of harm' could lead to situations whereby it was acceptable to kill and research upon very young children for the benefit of older siblings with proven records of potential, for example. Most people would recognise that what needs to happen is a balancing of people's rights and interests in deciding what action to take to obtain the greatest benefit. This would correspond more with the Gradualist viewpoint, as discussed below.

Authors who have taken a Utilitarian or Consequentalist approach at some point in their writings include R.M. Hare and Dame Mary Warnock, amongst others.

For Dame Mary Warnock there was no issue with taking a Utilitarian approach as the 'harm' done to the embryo for the 'benefit' of others was so small as to be irrelevant:

Embryos at the very early stages after fertilisation can themselves experience no pain...There can thus be no question of balancing the pain of the embryo used for research against the pleasure or easement of pain experienced by infertile or by future unborn children. There is no contest....There could be nothing morally wrong about a procedure which produced manifest benefits to many, with no countervailing harms to anyone.[49]

Hare also agrees that the Utilitarian approach would be the best one to be enshrined in Law. By looking at the benefit which may be achieved through embryo research, including destructive embryo research, it would be possible to sanction embryo research. What is interesting to note is that Hare has taken account of the implications of applying a Utilitarian approach to other forms of research, besides embryonic. Accordingly he makes the suggestion to *"...grade the harms done by experimentation from zero in the case of sperms to a very high figure in case of (viable) infants (one that would forbid all but negligible harm), and balance these against the good expected from experiments."*[50]

A strict Utilitarian approach towards the moral status of the human embryo may be the solution, it would permit the use of human embryos to derive stem cells; however if this approach is taken with the human embryo care will need to be taken in extending or applying this approach to other moral questions and situations.

The Conservative/Catholic approach

The Conservative approach is also the approach adopted by the Roman Catholic Church, although that is not to say that all those who hold a conservative position upon the moral status of the embryo are also Catholics. The Conservative approach towards the human embryo is to hold that the embryo is a person from the moment of conception and as such deserves full protection from that moment onwards.

Pope John Paul II made it clear that in the Roman Catholic view human life begins from conception and as such it deserves respect and protection from that moment on:

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[49] Warnock, M. Baroness., *The Enforcement of Morals in the Light of New Developments in Embryology* (1986) 39 C.L.P. 17 at p20

[50] Hare. R.M., *When Does Potentiality Count? A Comment on Lockwood* (1988) 2(3) Bioethics 214-226 at p224-5

...the Church has always taught and continues to teach that the result of human procreation, from the first moment of its existence, must be guaranteed that unconditional respect which is morally due to the human being in his or her totality and unity as body and spirit: "The human being is to be respected and treated as a person from the moment of conception; and therefore from that same moment his rights as a person must be recognized, among which in the first place is the inviolable right of every innocent human being to life."...[51]

This approach was repeated by the subsequent Pope. Pope Benedict XVI addressed a conference in Rome on stem cells where he reiterated the Church's stance of *"...full respect for the human being from conception."*[52]

There are a number of authors who have adopted this Conservative approach as the correct one to take in respect of the issue 'when does life begin?', 'what respect must be afforded to the embryo?' and 'when and how must respect be shown to the embryo?' A useful discussion of the Deontological and Consequentalist approaches towards the issue can be found in Bagaric and McConvill's article, *'Embryonic Stem Cell Research: The Principal Ethical Issue – When Does Life Begin?'* What is interesting about this article is that after analysing the different approaches Bagaric and McConvill *"...err on the side of conservatism."*[53] For these authors (and many others) *"...the most coherent logical point at which life begins appears to be at conception."*[54] For Sikora *"The obligation not to prevent the existence of future generations is supported by what is perhaps a more fundamental question – that it is prima facie wrong to prevent the existence of anyone with reasonable prospects for happiness."*[55]

For most Conservatives, it is the potential of the embryo to develop into a full human person that requires them to treat the embryo in the same way as a person. The embryo is a full human being with potential, not a potential human being. The idea that we should treat others as we would want to be treated ourselves raises it head again here. The argument is that we would not have wanted to be aborted or researched upon

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[51] Pope John Paul II., *The Unspeakable Crime of Abortion* reproduced in Mappes.T.A. and DeGrazia.D., *Biomedical Ethics*, 6th Ed., (2006) McGraw-Hill at p457-459 at p459

[52] Benedict, Pope XVI., *Address of His Holiness Pope Benedict XVI to participants of the Symposium on the theme: Stem Cells: What Future for Therapy? Scientific Aspects and Bioethical Problems* Augustinianum Institute, Rome, Italy, 14-16 September 2006, reproduced in (2008) 41 Cell Prolif (Suppl. 1) 4-6 at p5

[53] Bagaric, M and McConvill, J., *Embryonic Stem Cell Research: The Principal Ethical Issue – When Does Life Begin?* (2003) 12(1) Nottingham Law Journal 1 at p17

[54] *Ibid.* at p17

[55] Sikora, R.I., *Is it Wrong to Prevent the Existence of Future Generations?* in Sikora. R.I. and Barry. B. (Ed) *Obligations to Future Generations* (1978) Temple University Press at p112

therefore we should not abort or research upon other embryos. The potentiality of the embryo protects its status.

If this approach was enshrined in the legislation, the human embryo would be granted full moral status from the moment of creation and as such work to derive stem cells would be prevented.

The Liberal Approach

At the opposite end of the moral spectrum to the Conservative or Catholic approach is the Liberal approach towards the human embryo. Many Liberals do not ascribe moral status to the human embryo or foetus until birth; a few may even delay attaching that moral status until sometime after birth. As Mappes and DeGrazia note *"The liberal, of course, does not mean to deny that a fetus is biologically a human fetus. Rather, the claim is that the fetus is not human in any morally significant sense; that is, the fetus has no significant moral status. This point is often made in terms of personhood."*[56] This is clearly stated by Schuklenk who notes that *"There is an important distinction between membership of our species, on the one hand, and personhood on the other."*[57]

Warren views sentience as being the thing which gives us intrinsic value and which makes us eligible for respect:

> *Sentience is the ultimate source of all moral rights; ...sentience is a necessary and sufficient condition for the possession of moral rights. It does not follow from this that all sentient beings deserve to have their interests given equal weight in moral considerations. All* people *have equal moral rights, but it is only people who have* full *moral rights.*[58]

Warren goes on to dismiss the Utilitarian approach that the goal of morality is to maximise happiness, rather in her opinion the *"...aim of morality should be to maximize the extent to which each actual...person's interests are promoted."*[59] So for Warren (and others) the intrinsic value of potential people is not realised until they become conscious

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[56] Mappes. T.A. and DeGrazia. D., *Biomedical Ethics*, 6th Ed., (2006) McGraw-Hill at p450-451

[57] Schuklenk, U., *How not to win an ethical argument: Embryo stem cell research revisited* (2008) 22(2) Bioethics ii-iii at pii

[58] Warren, M., *Do Potential People Have Moral Rights?* in Sikora. R.I. and Barry. B. (Ed) *Obligations to Future Generations* (1978) Temple University Press at p22 and 23

[59] *Ibid.* at p24

and we can then promote that person's interests and recognise their intrinsic value. When exactly a person becomes conscious is another point which is open to debate, some would claim from conception (although this is not accepted by the majority of people), others at some point during gestation, alternatively it is upon birth or even it is contended at some point later in development after birth. The level of consciousness is also a point for debate, what type of consciousness is required so as to be considered a person? Whilst sentience is normally acquired during the foetal stages, self-consciousness is usually attained after birth, although at what point is open to debate.

In another article concerning the morality of abortion Warren discusses *"...the traits which are most central to the concept of personhood..."* and notes five traits: consciousness, reasoning, self-motivated activity, capacity to communicate and the presence of self-awareness.[60] Whilst Warren notes that not all of these traits may be found in all humans what is important is that if a being lacks all of the above traits then they cannot be said to be a person in the moral sense. As such *"...to ascribe full moral rights to an entity which is not a person is as absurd as to ascribe moral obligations and responsibilities to such an entity."*[61] Harris has argued for allowing research upon human embryos up until the end of the third trimester as *"Nine months development leaves the human embryo far short of the emergence of anything that could be called a person, far short of an individual capable of valuing its own life or possessing any of the capacities that would be required for such valuing."*[62]

Shaw also takes a permissive, liberal stance towards embryo research, even going so far as to state that *"Embryo experimentation and therapeutic cloning are...not merely permissible, but obligatory."*[63] For Shaw the arguments against embryo research do not withstand ethical analysis and as such the failure to undertake such research is a failure to help lessen future human suffering.[64]

Another Liberal approach, which is particularly relevant for pro-abortion arguments, is to take into account the relationship which the embryo has with the woman carrying the embryo. Most pro-abortionists would use this to show that the embryo's

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[60] Warren, M., *On the Moral and Legal Status of Abortion* in Mappes.T.A. and DeGrazia.D., *Biomedical Ethics*, 6th Ed., (2006) McGraw-Hill at p457-466 at p461
[61] *Ibid.* at p462
[62] Harris, J., *The Value of Life: An Introduction to Medical Ethics* (1985) Routledge Publishing at p129
[63] Shaw, D.M., *Moral Qualms, Future Persons, and Embryo Research* (2008) 22(4) Bioethics 218-223 at p223
[64] *Ibid.* at p222

interests (if any) cannot override those of the woman who has full legal and moral rights. A different perspective upon the liberal view is to discuss the embryo's relationship with the womb. This is most relevant for embryos created in the laboratory. One such commentator, Agar, uses the importance of the existence of a womb to distinguish between implanted and unimplanted embryos, to the extent that the absence of a functional relationship with a womb marks embryos morally suitable for human embryonic stem cell research.[65] Holbrook also takes a similar approach in comparing the moral status of the implanted and unimplanted *in vivo* embryo, the frozen embryo and other *in vitro* embryos.[66]

As can be seen the Liberal approach can take many different forms, each commentator finding their own significant point which supports their view that embryos and foetuses are not to be accorded respect until birth or for some even later.

By not according moral status to the early human embryo, human embryonic stem cell derivation and research could be performed, possibly for any reason. Whilst this approach may be well argued for from an academic perspective, it does not sit so well with the more cautious majority of the general public.

The Gradualist/Moderate approach

For those who do not hold views at the opposite ends of the Conservative/Liberal spectrum there is a middle ground which is acceptable to many. Often referred to as the Gradualist approach this is the attitude which is enshrined in the *Human Fertilisation and Embryology Act 1990* and has been continued in the new legislation, the *Human Fertilisation and Embryology Act 2008* which received Royal Assent on the 13th November and comes into force in October 2009.

The Gradualist approach is to view the embryo with increasing respect as it passes through the developmental stages up until birth. The level of respect which may be accorded to the embryo at each stage may vary from person to person but by the time the foetus is due to be born nearly full respect is recognised, with full respect being granted upon birth.

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[65] Agar, N., *Embryonic Potential and Stem Cells* (2007) 21(4) Bioethics 198-207 at p199

[66] Holbrook, D., *All Embryos are Equal? Issues in Pre-Implantation Genetic Diagnosis, IVF Implantation, Embryonic Stem Cell Research and Therapeutic Cloning* (2007) 21(1) International Journal of Applied Philosophy

This Gradualist approach allows embryo research and embryonic stem cell research to happen but only up until a certain developmental point. The cut off point adopted by the legislation and generally agreed with by Gradualists is the formation of the primitive streak in the embryo, thereby signifying a unique genetic being (up until this point twinning is possible).

As already mentioned the Gradualist approach is not easily defined, some people would accord greater respect upon implantation, quickening, sentience, viability, moments before birth and any number of different stages in between.

An example of moral status being conferred upon implantation is the discussion by Cameron and Williamson. They do not argue that upon implantation respect is absolute, rather that upon implantation, as the potential to develop becomes a reality, so too does the embryo begin to acquire respect. As they state,

> *We believe that it is no longer possible to identify a single time (such as fertilisation) at which an embryo acquires respect as a future person. In view of the new technologies, the process of development of the individual can be regarded as beginning at implantation. This would clearly state that cells in culture that are not used for implantation and have not been manipulated to form an embryo, do not deserve respect.*[67]

Lockwood however argues that it is potential plus identity that counts morally and as such brain development is the key to the attaching of moral status to the human embryo. Before the brain is 'able to sustain distinctively mental processes', which can be 'definitively ruled out during the first eight weeks from conception' *"one might perhaps conclude that there is no moral basis for conferring upon the human embryo or foetus any right to protection during those eight weeks."*[68]

In contrast, Holm does not look to a particular point at which an embryo will begin to attain a greater moral status than previously, rather he argues that

> *...although human life is intrinsically valuable at all stages of life, it generally becomes more valuable during the development from fertilized egg to adult human being...On a gradualist analysis of the moral status of the human being through its developmental stages, destroying embryos is always wrong to some*

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[67] Cameron, C and Williamson, R., *In the World of Dolly, when does a human embryo acquire respect?* (2005) 31 J. Med. Ethics 215-220 at p218

[68] Lockwood, M., *Warnock versus Powell (and Harradine): When Does Potentiality Count?* (1988) 2(3) Bioethics 187-213 at p208

degree and cannot be done just for any kind of benefit. One great advantage of a gradualist analysis applied to stem cell research is that it can explain why destructive use of embryos for stem cell production is less problematic than the destructive use of fetuses, or infants.[69]

Warren also does not look for a particular point at which embryos gain moral status; rather she puts forward a multi-criterial analysis of moral status.[70] In her opinion *"Each of the uni-criterial theories fail, not because it selects a criterion of moral status that has no validity, but because no single criterion can represent all of the relevant considerations."*[71] By applying Warren's seven principles of moral status to embryos it can be seen that Warren's Gradualist, multi-criterial approach permits embryo research.

As can be seen from just these few quotes the Gradualist approach is one which varies from person to person, one scientific point, such as the implantation of the embryo or the development of the brain, will hold different moral relevance for each person. The different moral relevance granted to the different scientific (and in some cases social) milestones by Gradualists can be at least partly explained by the fact that a Gradualist's moral compass is dependent upon each individual's moral upbringing and their understanding of the science.

The Gradualist approach of slowly granting increasing respect and moral status to the developing human embryo allows stem cell derivation, embryo research and embryonic stem cell research to occur as it is recognised that the human embryo has a moral status but that it is not absolute and solidified from the moment of creation. As Holm notes the application of the Gradualist approach to human embryonic stem cell research does show why embryonic research is far less problematic than research upon foetuses, infants and beyond.

Conclusion

The ethical debate will continue and will absorb additional features, such as equity and access of patients in under-privileged societies to high technology and expensive health care. The fundamental question, over whether a six-day old

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[69] Holm, S., *The Ethical Case against Stem Cell Research* (2003) 12 Cambridge Quarterly of Healthcare Ethics 372-383 at p376

[70] Warren, M.A., *Moral Status: Obligations to Persons and Other Living Things* (1997) OUP Chapter 6

[71] *Ibid.* OUP at pg176-7

blastocyst embryo is a human entity or not, cannot be resolved when the arguments stem from different philosophical premises.[72]

What was once the miracle of having a child has become medicalised and more scientific. Science has proven that for life to occur we require gametes, egg and sperm and that it is the moment of conception when life in the scientific sense starts as the embryo has the potential to develop into a human being. Of course the various different philosophical and religious standpoints view this moment differently, for some the important point is identifying when the soul enters the body, for others it is reaching a point when the embryo no longer has the 'potential' to become a human, rather that it has the chance to be born alive and survive.

The advent of cloning has shown that it is not necessary to have an egg and a sperm to create an embryo but that is a whole different argument about whether a cloned embryo is even a person! (And one which is discussed in many articles, for example refer to Cameron and Williamson.)[73] The accepted position is that a cloned embryo can be regarded as a person, although not genetically unique, however neither are twins, triplets etc and we do not regard them as non-persons!

This has been a brief discussion of the different ethical viewpoints on the moral status of the embryo. What follows is a discussion of the legislation in England and Wales; does it incorporate these diverse ethical opinions?

Does the Law in England and Wales concerning embryo research incorporate diverse ethical opinions?

Introduction

The law in England and Wales concerning embryo research, the *Human Fertilisation and Embryology Act 1990*, is considered by many countries to be a model to be followed in outlining their own embryo research legislation.[74] The *HFE Act* permits

[72] Hearn, J., *Stem cell frontiers: Science, ethics and regulation* (2007) 15(1) Journal of Law and Medicine 32-35 at p34

[73] Cameron, C and Williamson, R., *In the World of Dolly, when does a human embryo acquire respect?* (2005) 31 J. Med. Ethics 215-220 at p218

[74] Hereafter referred to as the *HFE Act*

embryo research within a defined set of limits, thereby taking a controlled but permissive stance. The permitted research purposes are discussed in greater detail in Chapter 3.

Although the legislation carefully controls the research which is undertaken with human embryos, there are many opponents of embryo research who would like to see such research outlawed and as discussed above there are many different approaches towards the moral status of the human embryo. So how did the legislation come to take such a permissive stance in an area which still raises controversy and around which there is a vast range of diverse ethical opinions?

The Warnock Committee

To understand how the *HFE Act* came about it is necessary to go back to 1982 when the *Committee of Inquiry into Human Fertilisation and Embryology* was established. Known as the Warnock Committee after its chairman, Dame Mary Warnock, the terms of reference of the Committee were:

> *To consider recent and potential developments in medicine and science related to human fertilisation and embryology; to consider what policies and safeguards should be applied, including consideration of the social, ethical and legal implications of these developments; and to make recommendations.*[75]

The Warnock Committee considered a wide range of issues relating to human fertilisation and embryology including surrogacy and artificial insemination. In respect of embryo research the Warnock Committee was asked to consider if human embryo research should be permitted.

A large amount of evidence was submitted by those with an interest in the remit of the Committee and was considered by the members of the Warnock Committee in helping it to reach its conclusions. The evidence which was submitted to the Warnock Committee is held in the House of Commons Library. Nearly 300 organisations submitted evidence and there were nearly 700 submissions from the public, all of which was taken into account by the Warnock Committee. Of course each organisation and

[75] *Report of the Committee of Inquiry into Human Fertilisation and Embryology* (The Warnock Report) (1984) DHSS Cmnd 9314 at Para 1.2

member of public has their particular concern so not every piece of evidence discusses the embryo research element of the Warnock Inquiry.

Evidence submitted to Warnock

The author of this thesis has examined the evidence which was submitted to the Warnock Committee. The research at the time (September 2005) was concerned with another element of this PhD thesis and so this section is based upon the evidence from which either copies were made or relevant notes. This section is based upon a total of 94 pieces of evidence which were submitted to the Warnock Committee prior to publication of the Report and it is from this information that the central ethical question in relation to human embryonic research is approached: 'When does life begin to matter morally?'

The central ethical question relating to human embryo research is undoubtedly the problem concerning the moral status of the human embryo. However, upon examination of the evidence not all submissions are concerned with this ethical question.

Of the 94 pieces of evidence, 32 support embryo research, 35 are against embryo research, whilst the remaining 27 are either inconclusive or their opinion is unknown.

The 'when does life begin?' question is apparently of more concern to those groups who oppose embryo research upon the basis that the human embryo is a person from fertilisation, often referred to as the Conservative approach. For example refer to the comments made by the *Catholic Bishops' Joint Committee on Bio-Ethical Issues*, which state that:

> *...at the time of conception there comes into existence a new life. There is a union in which a living cell from the father fertilizes a living cell from the mother. That union, a transmission of life, is the beginning of new life....Each such new life is the life not of a potential human being but of a human being with potential.*[76]

Evidence submitted by the University of Southampton Faculty of Law also point to fertilisation as *"...being undoubtedly the starting point of meaningful life as we know*

[76] *Written evidence to the Inquiry and Responses to the Report of Human Fertilisation and Embryology* (1985) DHSS House of Commons Library Dep 1497 In Vitro Fertilisation: Morality and Public Policy. Evidence submitted to the Government Committee of Inquiry into Human Fertilisation and Embryology (the Warnock Committee) by the Catholic Bishops' Joint Committee on Bio-Ethical Issues, on behalf of the Catholic Bishops of Great Britain at Page 6, Paragraph 8

it" and as such experimentation upon human embryos is *"...wholly unacceptable and should be prohibited by law."*[77]

Additionally, the Nationwide Festival of Light, in its detailed consideration of the human embryo concludes that:

> *...the only humane ethical position...is to treat the human embryo at any and every stage of its development with the respect due to human life at all later stages,... 'Human life' must therefore refer to the human life from conception."*[78][And as such] *"...Deliberate destruction of the embryo represents the taking of 'innocent' human life.*[79]

Not all groups who oppose embryo research do so on the basis that the human embryo is a person from fertilisation and so deserving protection from that point onwards. Some oppose research on the basis that, although the embryo is not a person from fertilisation, the embryo has the potential to become a human being. Examples of this approach can be found in submissions from the Welsh National School of Medicine and from CHILD.

A different approach to the argument that the human embryo has the potential to become a human being can be found in the submission made by the Council of Reform and Liberal Rabbis. The Council takes a Gradualist approach when it states that:

> *Not only is there a morally valid distinction between potential and actual human life, but the value of the embryo itself may be deemed to increase gradually, from zero to "infinity", between conception and birth.*[80]

Whilst the Council recognises that the use of embryos for medical research would involve the destruction of potential human life they conclude that research could be justified provided that certain conditions are fulfilled:

> *(a) that the purpose of the research is the prevention of suffering; (b) that there is, additionally, a good prospect that the research may ultimately lead to the saving of life; (c) that the research is only carried out during the very earliest stages of the embryo's gestational life; (d) that the embryo is treated with the respect due to*

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[77] *Ibid.* The University of Southampton, Faculty of Law, 19th May 1983
[78] *Ibid.* Nationwide Festival of Light, February 1983, page 12
[79] *Ibid.* Nationwide Festival of Light, February 1983, page 13
[80] *Ibid.* Council of Reform and Liberal Rabbis, 20th May 1983, Page ii

that which, though not a human person, has the potential to become a human person.[81]

Other groups oppose embryo research upon the basis that the embryo is incapable of consenting to the research, for example, the Joint Ethico-Medical Committee of the Catholic Union of Great Britain and the Guild of Catholic Doctors note that:

Ethical clinical research is regulated by the informed consent of the volunteer. Experimentation on human embryos is, in our view, rendered unethical and unacceptable by the fact that they are not able to comply with the consent or volunteer principle.[82]

This approach is supported by the 'The Responsible Society – Family and Youth Concern' group and the Royal College of General Practitioners. In contrast, the Episcopal Church, General Synod Committee for Social Responsibility discusses the issue of consent by the embryo for research to take place and at what point human life begins but concludes that all human material may be deemed to have an agent who could give or withhold consent for research.[83]

In contrast, the groups who favour embryo research do not appear to be as concerned with discussing the moral status of the embryo in reaching their conclusions.

However, it needs to be made clear that although there is a substantial number of groups who support embryo research, there is a clear desire to impose limits upon the research, the most often stated limit being that the research should only be undertaken where it will benefit the embryo itself, be reimplanted and have the opportunity to develop into a human being.

Examples of this approach can be found in submissions from The Presbyterian Church of Ireland, the United Free Church of Scotland and The Baptist Union of Great Britain and Ireland. The United Free Church of Scotland states that:

...eggs originally fertilized for reimplantation into the mother (in excess of the number actually so used) may serve for experimentation so long as they could still be used as "spares" to achieve a successful pregnancy.[84]

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[81] *Ibid.* Council of Reform and Liberal Rabbis, 20th May 1983, Page vii
[82] *Ibid.* Joint Ethico-Medical Committee of the Catholic Union of Great Britain and the Guild of Catholic Doctors, Page 7
[83] *Ibid.* Episcopal Church, General Synod Committee for Social Responsibility, Paragraph 12
[84] *Ibid.* United Free Church of Scotland, Appendix B

Not all groups support the implantation of human embryos after research has been conducted upon them. The committee of the Soroptimist International of Colwyn Bay and District categorically states that:

> *The manipulation of human embryos to be forbidden if there were any intention to implant the resulting embryo in the womb.*[85]

The National Association for the Childless (NI) is also in agreement with this approach to embryo research as the majority of the Association's members

> *...felt that spare embryos...which would be destroyed anyway may be used for experiments provided that:- (a) the embryos are destroyed at an early stage and before they become recognisable human beings...*[86]

Other groups support embryo research on the basis that there is potential to either help infertility and/or detect and prevent hereditary diseases. Taking a more Consequentalist approach generally these comments are made without the detailed consideration and reference to the moral status of the human embryo which can be found in the submissions made by groups opposing embryo research, for example refer to the submission made by the Department of Medicine, University of Leeds:

> *All agreed that research into the therapeutic aspects of human fertilisation, and particularly research into treatments for infertility and prevention of clearly defined inherited disease should continue...*
> *As to experimentation upon embryos the Department felt this should be strictly controlled by law unless the committee were able to decide at what gestational age a developing embryo takes on the rights of a human being*[87]

Overall, from the submissions which support embryo research there is a call for strict guidelines to control the research being undertaken and that it should not be permitted beyond a certain stage of development of the embryo. The exact stage at which research should be permitted up until varies from submission to submission. Some agree

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[85] *Ibid.* Soroptimist International of Colwyn Bay and District, Paragraph headed 'Research on spare human embryos'
[86] *Ibid.* National Association for the Childless (NI), 18th February 1983, Paragraph headed 'Experimental Use of Human Embryos'
[87] *Ibid.* Department of Medicine, University of Leeds, 19th January 1983

with the BMA and MRC guidelines which were in force at the time of the Warnock Inquiry and which recommended fourteen days development. Twenty-one days development is suggested (when the embryo differentiates) and up to the pre-implantation stage is also suggested.[88]

As can be seen from the few different submissions which have been quoted from the range of opinions put forward by many varying groups and individuals is immense with each one taking a slightly different approach to the difficult ethical questions of 'when does life begin to matter morally?' and 'should we permit research upon human embryos'. It is also difficult to put each opinion into an 'ethical category', such as Consequentalism. As can be seen from the earlier discussion of the different ethical viewpoints, the groups are not clear cut and variations can be found within each 'ethical category'.

So how did the Warnock Committee consider and take into account all of these different ethical opinions concerning embryo research?

The Warnock Report

It is in Chapter 11 of the Warnock Report that we find the discussion concerning human embryos and research upon them. The Warnock Report first looks at the early development of the human embryo with a detailed but clear discussion of the stages of development from the scientific point of view. The Warnock Report then moves onto note that the question of when life or personhood begins receives many different responses and "*...that the answers to such questions in fact are complex amalgams of factual and moral judgements.*"[89] However, the Warnock Committee does not provide definitive answers to these questions, as the Report states:

> *Instead of trying to answer these questions directly we have therefore gone straight to the question of how it is right to treat the human embryo.*[90]

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[88] *Ibid.* Refer to the Lothian Health Board (February 1983) for the twenty-one day suggestion and the University of Glasgow, Faculty of Medicine (15th February 1983) for the suggestion of not permitting research beyond the preimplantation stage, page 2

[89] *Report of the Committee of Inquiry into Human Fertilisation and Embryology* (The Warnock Report) (1984) DHSS Cmnd 9314 at Para 11.9

[90] *Ibid.* at Para 11.9

The Warnock Committee notes the different views taken in relation to research upon human embryos, summarising in five paragraphs the range of arguments both for and against the use of human embryos. These range from the view that the human embryo has the same status as a child or an adult due to its potential for human life, to the opposite end of the spectrum that the human embryo is merely a collection of cells which has no potential for development unless it implants into a uterus and therefore should be accorded no protected status. Further consideration of the legal position of the *in vivo* embryo leads to the conclusion that the *in vitro* embryo is not afforded the same legal status as a living child or adult.

The Warnock Committee then goes on to state that *"The status of the embryo is a matter of fundamental principle which should be enshrined in legislation. We recommend that the embryo of the human species should be afforded some protection in law."*[91] The Report goes on to state that although the embryo is to be afforded some protection in law this does not mean that it cannot be waived in certain circumstances, and as such the majority of the Committee felt that research should not be totally prohibited.[92] Due to the special status which the Warnock Report accords to the human embryo conditions are attached to research being performed upon human embryos. These include the requirement that handling of embryos is only permitted under a licence, no human embryo may be kept alive or researched upon beyond fourteen days after fertilisation and that no embryo which has been used for research should be transferred to a woman.[93] Fourteen days development was chosen as the cut-off point for it is around this time that the primitive streak normally occurs in embryos and it is this point which marks the individual development of the embryo.[94]

The Warnock Report therefore does not answer explicitly the question of 'when does life begin to matter morally?' rather it considers all of the different ethical viewpoints which have been submitted to it and provides the human embryo with a special status without actually defining the moral status of the human embryo. However, it could be said that the Warnock Committee implicitly answer the ethical question – by allowing research to be performed only within the first fourteen days of development the

[91] *Ibid.* at Para 11.17
[92] *Ibid.* at Para 11.18
[93] *Ibid.* at Para 11.18 and 11.22
[94] *Ibid.* at Para 11.22

Warnock Committee accord a Gradualist status to the human embryo – as the embryo develops it should receive better legal protection due to its increasing humanness.[95]

That the human embryo should be afforded some protection in law is agreed with by all members of the Committee, although the subsequent conclusion that this protection is not absolute and will therefore allow research in limited circumstances is not favoured by all members of the Committee. The majority of the Warnock Committee were satisfied that research could go ahead although they did not want to *"...see a situation in which human embryos are used frivolously or unnecessarily used in research but...the treatment of infertility...could not have taken place without such research; and that continued research is essential, if advances in treatment and medical knowledge are to continue."*[96] The Report also notes that *"...the research in question would be mainly for the alleviation of infertility and the prevention of hereditary disease."*[97] By suggesting that research would be limited to reasons such as infertility the Warnock Committee was reinforcing not only the Gradualist status which it had implicitly accorded to the human embryo but also to the type of scientific research which was being done at the time of the Report and to what was perceived by the general public as an acceptable reason to use embryos. This opinion was not shared by all members of the Committee and three members of the Committee take the view that the special status of the human embryo is due to its potential for development and as such nothing should be done to prevent its implantation. In the view of these three members it is *"...wrong to create something with the potential for becoming a human person and to deliberately destroy it."*[98]

The Warnock Report has cleverly avoided answering definitively the fundamental ethical question concerning the moral status of the human embryo whilst at the same time reaching a position which would allow research to continue in limited circumstances, thereby appeasing those who favoured embryo research. By taking this approach the Warnock Committee effectively pays lip service to the moral arguments that the human embryo is a human being with potential and should be protected from fertilisation.

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[95] Thanks to John Coggon who highlighted the implicit answer approach

[96] *Report of the Committee of Inquiry into Human Fertilisation and Embryology* (The Warnock Report) (1984) DHSS Cmnd 9314 at Para 11.18

[97] *Ibid.* at Para 11.26

[98] *Ibid.* at Expression of Dissent B, Para 3

As will be seen, the recommendations made by the Warnock Report were to form the basis of the legislation in the United Kingdom which governs human fertilisation and embryology.

Post-Warnock Report

The publication of the Warnock Report in July 1984 generated considerable public debate and controversy, in particular in relation to the provisions concerning embryo research. As such, the UK Government was not ready to enact legislation and a Consultation Paper was published in December 1986.[99] Within the Consultation Paper it was stated that "*The Government recognises that deeply-held moral beliefs help to determine attitudes towards the question of embryo research...*" and accordingly took a position of neutrality during Parliamentary debates and allowed MP's to take a free vote on this issue.[100] The position of neutrality was further reflected in the fact that the Consultation Paper stated that alternative sets of draft clauses would be presented to Parliament – one which would give effect to the Warnock Recommendations, the other would prohibit all research except that which was intended to benefit the embryo.[101]

The Consultation Paper summarised the different ethical approaches taken towards the human embryo and research upon it. The arguments in favour of research are framed under the heading 'Suggested benefits of research' whilst the opposing side is found under the heading 'Arguments against research'. Although the Government stated that it was taking a position of neutrality, the way that the ethical arguments in favour of research are framed, in relation to possible scientific advances, seemed to weight the Consultation Paper towards allowing embryo research.

The 1987 White Paper, *Human Fertilisation and Embryology: A Framework for Legislation*, continued to recognise the ongoing debate surrounding the status of the human embryo although at this point in the legislative process the ethical arguments both for and against embryo research are summarised in two paragraphs.[102] The recognition of what was now seen to be the two opposing arguments concerning embryo research is

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[99] *Legislation on Human Fertility Services and Embryo Research, A Consultation Paper* (1986) DHSS CM46

[100] *Ibid.* at Para 57

[101] *Ibid.* at Para 59

[102] *Human Fertilisation and Embryology: A Framework for Legislation* (1987) DHSS Cm259 at Para's 28 and 32

found in the alternative draft clauses, one permitting research (within defined limits) and the other prohibiting it.

The later *Human Fertilisation and Embryology Bill [H.L.]* contains clauses which would allow human embryo research if passed in Parliament but of course does not contain any further reference to the ethical arguments on the status of the human embryo. The point of Consultation Documents and White Papers is that the ethical arguments and opposing views can be aired and discussed before the draft legislation is brought forth for debate. The fact that members of Parliament had a free vote on the Bill shows that there was still considerable ongoing public and parliamentary debate concerning this issue.

Finally, the *Human Fertilisation and Embryology Act* was enacted in 1990. The parliamentary free vote resulted in embryo research being permitted in limited circumstances as recommended in the Warnock Report.

The Human Fertilisation and Embryology Act 1990

The *HFE Act* brought into force the recommendations made by the majority of the Warnock Committee – to allow embryo research for specified research purposes and that the research could not continue beyond the fourteenth day of development of the embryo, or the appearance of the primitive streak, which ever occurs first.

By following the recommendations of the Warnock Report the *HFE Act* effectively still leaves open the question of the moral status of the human embryo. The legislation does not accord a moral status of the embryo; rather it implies a gradual status, it protects the embryo in certain circumstances, through the prohibition of certain activities and preventing research past fourteen days development.

One senior legal academic, Douglas J. Cuisine, recognised back in 1983 that it would be possible for the law to legislate on the matter of embryo research without defining the moral status of the human embryo. As he stated:

> *It is possible for the law to say what ought or ought not to happen to these embryos without actually defining their status...*[103]

[103] Douglas J. Cuisine, Senior Lecturer in Law, University of Aberdeen, 18th March 1983, *Written evidence to the Inquiry and Responses to the Report of Human Fertilisation and Embryology* (1985) DHSS House of Commons Library Dep 1497

Whether this is the correct approach to take towards such a profound ethical dilemma is of course open to debate. However, when read in light of other UK legislation, namely the *Abortion Act 1967*, the approach taken towards embryo research in the *HFE Act* is the most sensible approach to take. The situation would have been somewhat bizarre if embryos created through natural fertilisation were not protected and could be aborted, whilst embryos created by *in vitro* fertilisation were protected by legislation and had a right to implantation.

While the legislation veers away from definitively deciding the ethical questions, the *HFE Act* can undoubtedly be seen to be a victory for those who supported research, although the groups who favoured research only where the embryo would be implanted subsequently may not have been as happy with the resulting legislation.

Post-HFE Act 1990 – Reform

Although the legislation took the approach of saying what research could be performed on human embryos, without explicit reference to the moral status of the embryo, the debate has continued to rage. The *HFE Act* has now undergone reform, due partly to the advances which have been made in the area of human embryo research.

Numerous documents relating to the reformation of the *HFE Act* have been published. The first was the House of Commons Science and Technology Committee Report, *Human Reproductive Technologies and the Law*, published in March 2005. This Report came about due to the Government's lacklustre response to the Science Committee that it was keeping this area of law 'under review'.

The Science Committee looks at the status of the human embryo in Chapter 3 of its report. It recognises that there are three principal views on the status of the embryo:

a) *That the embryo is a human life and therefore is entitled to conferral of full human rights;*
b) *That the development of personhood is a gradual process but that the embryo is entitled to some protection; and*
c) *That the embryo is no more than a collection of cells, albeit with the potential to develop into a human being.*[104]

[104] *Human Reproductive Technologies and the Law* Fifth Report of Session 2004-05, House of Commons Science and Technology Committee HC 7-I at Chapter 3, paragraph 24

Upon brief consideration of each of these positions, the Committee recognises that the Warnock Report adopted the Gradualist approach and that this remains valuable in today's society. As the Report goes onto state:

> *...we believe that it represents the most ethically sound and pragmatic solution and one which permits in vitro fertilisation and embryo research within certain constraints set out in the legislation.*[105]

Although the Science Committee expressly accepted that "*At the heart of any review of assisted reproduction legislation is the fundamental question of the status to be accorded to the human embryo*" the Committee goes on to deal with this fundamental ethical question very briefly within its report.[106] This is possibly because society is today generally accepting of embryo research within the defined limits set by the legislation.

In the response to the Science Committee Report the UK Government noted the Committee's support of the Gradualist approach and responded by stating that it had "*...no plans to bring forward proposals that would alter the legal status of the human embryo.*"[107] The Government was clear in its response that the ethical questions surrounding the status of the human embryo were not open for debate again.

Whilst the Science Committee was seeking and hearing evidence for its report, the Department of Health also announced its own review of the *HFE Act*, although it waited for the Science Committee Report to be published first to help inform its own review. The Department of Health undertook a public consultation on many different aspects of the *HFE Act*. Although the consultation was concerned with many aspects of the legislation the Consultation document makes it very clear that the status of the embryo is not up for discussion. Within the introduction of the Consultation document it states that:

> *While many of the [Science] Committee's recommendations call for changes to the law, the Committee considered that the basic foundations of the HFE Act remain sound. This included the approach taken in the Warnock Report to the status of the human embryo...*[108]

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[105] *Ibid.* at Chapter 3, paragraph 28
[106] *Ibid.* at Chapter 3, paragraph 24
[107] *Human Reproductive Technologies and the Law:* Government Response to the Report from the House of Commons Science and Technology Committee (2005) CM6641 at Para 2
[108] *Review of the Human Fertilisation and Embryology Act 1990: A Public Consultation* (2005) Department of Health at Para 1.10

The Government does not intend that the review of the HFE Act will open up those fundamental aspects of the legislation which are widely accepted in our society or which have been recently debated and conclusively resolved in Parliament. These include the creation and use of embryos for research...[109]

Therefore, the Consultation document made it very clear that as far as the Government was concerned the ethical issue on the status of the human embryo was resolved and not up for discussion.

In December 2006 the Government published its White Paper with proposals for revised legislation.[110] Within the White Paper it was reiterated that the status of the human embryo as ascribed to it in the *HFE Act* was not to be altered – the special status of the human embryo was actually described as one of the bedrocks of the existing legal scheme.[111]

Since the White Paper a Draft Bill was published for consultation (May 2007) followed by the Bill itself in November 2007.[112] Whilst the Bill was subjected to several amendments one provision which was not the subject of great debate was the retention of the fourteen day limit for research upon the embryo. The Bill and now the *Human Fertilisation and Embryology Act 2008* has continued the Gradualist approach of the *HFE Act 1990* by allowing research for a limited number of reasons and for a limited time period, hence respect for the embryo increases as it develops. As will be seen in the later discussion of the research purposes in the new Act, these have been expanded due to the changing social consensus of when it is acceptable to use human embryos for research as well as due to the scientific advances made since the Warnock Committee considered the issues in the early 1980's although it is important to note that the frivolous use of embryos is still not permitted.

It was therefore clear that the Government intended that new legislation regulating human embryos was to continue the Gradualist approach adopted by the Warnock Committee in 1984 and which has formed the basis of the UK legislation for the past 18 years.

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[109] *Ibid.* at Para 1.13

[110] *Review of the Human Fertilisation and Embryology Act: Proposals for revised legislation (including establishment of the Regulatory Authority for Tissue and Embryos)* (2006) Department of Health CM 6989

[111] *Ibid.* Foreword

[112] *Human Tissue and Embryos (Draft) Bill* (2007) Department of Health CM7087 http://www.official-documents.gov.uk/document/cm70/7087/7087.pdf (last accessed 05/07/08)
Human Fertilisation and Embryology Bill [HL] HL Bill 6, 54/3
http://www.publications.parliament.uk/pa/ld200708/ldbills/006/2008006.pdf (last accessed 9/11/07)

Conclusion

In considering the law which regulates embryo research in England and Wales it is clear that it does not respect diverse ethical opinions on the status of the human embryo. It would be impossible for the law to regulate a situation as delicate and sensitive as embryo research and respect all of the diverse opinions which surround this issue.

The ethical debate concerning the status of the human embryo occurred to its fullest extent in the 1980's – first in evidence considered by the Warnock Report, then in debates concerning the subsequent Consultation, White Paper and Bill. However, upon enactment of the *HFE Act* the position has become very clear – the law respects and incorporates the ethical opinion of those who agree with embryo research in limited circumstances – where the research is for a specified purpose and the embryo is not implanted after research has been performed. Limits upon the type of research which can be performed as well as the imposition of a time limit have appeared in the legislation due to the recognition that the human embryo has a special status; whilst this status is not absolute this does not signify that the human embryo can be used for frivolous matters. The continuation of this approach will no doubt persistently frustrate those with opposing ethical standpoints although it is hard to see why the law would change its current protective stance towards human embryos. The majority of the public appear content with the current regulatory scheme and without more overwhelming support the chances of overturning this legal position in the future are remote.

In considering all of the different ethical opinions, and the variations within each category it is difficult to see how the legislation could ever find a position which would be acceptable to all. At first sight, the debate surrounding human embryo research appears to divide people, moving people to take one of two extremes with only a few taking the middle ground. What is interesting to note though is that the UK legislation has followed the middle ground and has not allowed itself to be led by those with extreme views on the moral status of the embryo. Holm sums up the position succinctly:

> *...no country currently has legislation that is consistent with any philosophically respectable view of the moral status of the embryo, and it is worth noting that no country has legislation that is consistent with either of the two polar opposites,*

i.e. that the embryo has full moral status, or that it has none at all...What is therefore likely to happen is a slow, incremental movement, probably towards a more liberal regulation of ES cell research.[113]

[113] Holm, S., *Embryonic stem cell research and the moral status of human embryos* (2005) Reproductive Medicine Online Vol 10, Supp. 1 63-67 at p67

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Chapter 3 - The United Kingdom and the Path to Regulation

Introduction

The birth of Louise Brown in 1978, the first so-called 'test-tube baby', brought into the public forum the new reproductive technologies which up until that point were relatively unknown and unheard of. Following the 'miracle' birth of Louise Brown concerns were voiced about the ethics and legality of such technologies and questions were raised over their regulation. In response to these concerns the Government established the Committee of Inquiry into Human Fertilisation and Embryology in July 1982. This Committee was headed by Mary Warnock (now Dame Mary Warnock) and the report which ensued, the *Report of the Committee of Inquiry into Human Fertilisation and Embryology*, is now commonly referred to as the Warnock Report.[114]

Within the sphere of Medical Law the Warnock Report is perhaps one of the clearest reports to read and yet it also had the most far reaching implications. It formed the backbone of what was to eventually become the *Human Fertilisation and Embryology Act 1990* as well as the later *Human Fertilisation and Embryology Act 2008* and has since been considered to be the starting point of all the United Kingdom's legislation on human fertilisation and embryology.

There is a very strong interface between embryo research and human embryonic stem cell research. Human embryonic stem cells were unheard of in 1978 when Louise Brown was born; yet the legislation which came about as a result of the successful use of IVF has since been applied to and shaped the research being done with human embryonic stem cells. As such it is vital to understand the legislation pertaining to human embryo research; in analysing the current legal standpoint of the United Kingdom towards human embryonic stem cell research it is vital to first consider both the content and the impact of the Warnock Report.

[114] And will continue to be referred to as such throughout this work

The Warnock Report

As Mary Warnock notes in her presentation of the Report, the *Committee of Inquiry into Human Fertilisation and Embryology* was established in July 1982 "*...to examine the social, ethical and legal implications of recent, and potential developments in the field of human assisted reproduction.*"[115] The terms of reference expand upon this statement:

> *To consider recent and potential developments in medicine and science related to human fertilisation and embryology; to consider what policies and safeguards should be applied, including consideration of the social, ethical and legal implications of these developments; and to make recommendations.*[116]

The Committee continued to clarify what the scope of the Inquiry was to be.[117] In summary the scope of the Inquiry was to clarify two particular words – 'embryology' and 'potential' within the context of the new assisted reproductive technologies. The members of the Committee recognised that the pace at which science was progressing would make it difficult to predict the effects science would have on the future. Therefore they took the approach of reacting to what they knew and what they could foresee.[118] As will be seen later this has implications in the debate surrounding the legality of human cloning and human embryonic stem cell research.

The Warnock Report covered a wide array of issues ranging from surrogacy and artificial insemination to the storage of human gametes and embryos. The principal areas of the Warnock Report which are of concern in relation to human embryonic stem cell research are Chapters 11, 12 and 13. These cover respectively *Human Embryos and Research, Possible Future Developments in Research,* and *Regulating Infertility Services and Research.* Chapter 13 of the Warnock Report is discussed in Chapter 5 of this thesis – the Human Fertilisation and Embryology Authority.

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[115] *Report of the Committee of Inquiry into Human Fertilisation and Embryology* (The Warnock Report) (1984) DHSS Cmnd 9314 at Pg iv
[116] *Ibid.* at Para 1.2
[117] *Ibid.* at Para's 1.3-1.5
[118] *Ibid.* at Para 1.5

Chapter 11 – Human Embryos and Research

Prior to the Warnock Report no single body had been asked to consider the question whether human embryo research should be allowed. This was the question which the Committee was asked to consider and in order to answer it the Committee had to look at the early stages of human embryonic development.[119]

Paragraphs 11.2 to 11.7 clearly explain the early stages of human embryonic development and the Committee defined the point of fertilisation as being when "*...the egg and sperm unite to become a single cell.*"[120] Once the Committee explained the early development of human embryos they continued on to consider the arguments both for and against the use of human embryos in research. This acceptance of when and how fertilisation occurs and how human embryos come into existence would in the future have far reaching implications for research involving embryos created by cell nuclear replacement (cloning). Of course it is to be borne in mind when reading the Warnock Report that it was written in 1984 when the concept of cloning was seen as somewhat futuristic and highly unlikely along with the fact that the cell nuclear replacement technique was not known about. That is not to say that the Warnock Committee did not consider cloning at all, in fact it was examined at Paragraph 12.11. Of note though is that the common day concept of cloning, of replacing the nucleus of an unfertilised egg, is not mentioned. The method of cloning which was examined was the division of an embryo at a very early stage of development to produce identical twins, rather than producing a cloned embryo of someone who already (or has already) existed.

Note however that the concept of cloning through cell nuclear replacement was brought to the attention of the Warnock Committee, albeit in relation to animals and through using a fertilised egg (rather than an unfertilised egg which the process now uses).

> *There are two methods of producing clones, genetically identical individuals, in animals. The first involves the destruction of the nucleus in a fertilised egg and its replacement with a diploid nucleus from an individual selected for cloning. This is the type of cloning which gives rise to the science-fiction spectre of unlimited clones of purpose-selected individuals. The technique has been applied to*

[119] *Ibid.* at Para 11.1
[120] *Ibid.* at Para 11.2

amphibians but, among other complications, successful development of the embryo requires the serial transfer of a diploid nucleus which has been obtained from an embryonic source. In our present state of knowledge about embryology and the control of differentiation, this cannot be regarded as a feasible procedure for man in the foreseeable future.[121]

Although the ethics of human embryo research and how the Warnock Committee considered the different ethical opinions has been discussed in the previous chapter, mention needs to be made briefly of these issues here.

The problem for many people was, and still is, the fact that the development of *in vitro* fertilisation has led to the creation of human embryos which may have no chance of being transferred to a uterus and therefore not have a chance to implant and develop. The Warnock Report clearly summarises the principal arguments against the use of human embryos in research:

Put simply, the main argument is that the use of human embryos for research is morally wrong because of the very fact that they are human...The human embryo is seen as having the same status as a child or an adult, by virtue of its potential for human life.[122]

The Warnock Report also raises the point that many people fear that scientists are tampering with the creation of human life, that they are 'playing God'. However this fear was probably adequately addressed in the Committee's consideration of the introduction of a new statutory licensing authority (which is discussed in Chapter 5 of this thesis).

In contrast the Committee acknowledges that the views in support of the use of human embryos in research differ when considering the reasons why such research is supported. These range from the view that human embryos are not human persons and therefore do not need protecting (the Liberal approach) to the more popularly held view that human embryos are entitled to some protection but that respect cannot be absolute (the Gradualist approach). The respect which the human embryo deserves must be weighed against the potential benefits which could be obtained through such research (the Consequentalist approach). It is also noted that human embryos cannot always be

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[121] Comments of the Royal College of Pathologists, Feb 1983, pg 1 *Written evidence to the Inquiry and Responses to the Report of Human Fertilisation and Embryology* (1985) DHSS House of Commons Library Dep 1497

[122] *Report of the Committee of Inquiry into Human Fertilisation and Embryology* (The Warnock Report) (1984) DHSS Cmnd 9314 at Para 11.11

substituted for animal cells thereby requiring the use of human embryos in some situations.[123]

Possibly the most important part of the Warnock Report is the discussion by the Committee of the legal status of the human embryo. The succinct discussion of the legal status of the human embryo clearly explains that the human embryo has **no** legal status; it is not protected by the law. Notwithstanding this, the Committee does note that there is some protection for human embryos *in vivo* which can be found in the *Offences Against the Person Act 1861* read in conjunction with the *Abortion Act 1967, Infant Life Preservation Act 1929* and *Congenital Disabilities (Civil Liability) Act 1976.*[124]

The Committee concluded that the human embryo should be afforded a special status and that human embryo research should not occur where animal products could be used. Although the Committee recommended that the human embryo should be given some protection in law the members recognised that this did not mean that research should be totally prohibited. However, the research which did occur should be stringently monitored and have strict controls due to the special status of the human embryo. Consequently the Committee recommended that research and handling of human embryos should only be permitted under licence and that unauthorised use should constitute a criminal offence.[125] This is the Gradualist approach which has been discussed in greater detail in the preceding Chapter.

Whilst the majority of the Committee agreed with the recommendation that research should be permitted upon human embryos it was agreed that it was necessary to impose a time limit upon keeping human embryos alive *in vitro.* A time limit was needed due to the recognition that the human embryo had a special status, even if this was not absolute. It was recognised that it would be the job of the proposed statutory licensing body to not only ensure that other research material was not available (principally animal materials) but to also limit the length of time for which an embryo could be kept alive *in vitro.* Although the Committee recognised that "*...the timing of the different stages of development is critical...*", they also recognised that "*...biologically there is no one single identifiable stage in the development of the embryo beyond which the in vitro*

[123] *Ibid.* at Para 11.15
[124] *Ibid.* at Para 11.16
[125] *Ibid.* at Para 11.18

embryo should not be kept alive."[126] However, the Committee had to take a precise decision in order to allay public fears.

Various time limits were proposed by the groups who submitted evidence. The majority of groups who agreed with research and proposed a time limit agreed with the Medical Research Council recommendation of fourteen days.[127] In contrast other groups went as far as suggesting that twenty-one days would be an appropriate time limit, prior to organogenesis.[128] In the end the Committee's view was to use the development of the primitive streak as the appropriate marker, this normally develops about fifteen days after fertilisation, and as such "*This marks the beginning of individual development of the embryo.*"[129] Consequently the Committee recommended that no live human embryo (which will not be transferred to a woman) is to be allowed to develop beyond fourteen days after fertilisation. This does not include any time when the embryo is frozen. It was also recommended that embryos which have been used for research should not be transferred into a woman and that it was to be a criminal offence to use embryos beyond fourteen days growth.

There was further conflict from the groups who submitted evidence as to the source of human embryos for research, where such research was to be permitted. The conflict was between 'spare' embryos, i.e. those embryos which had been created for use in fertility treatments but which were no longer needed for treatment purposes, and those embryos which could be created specifically for research purposes. One statement which summarises the general opinion is:

> *"Spare" embryos <u>should</u> be used and not wasted (assuming the 'parents' have consented) but they should not be created specifically for any purpose other than to conceive a child.*[130]

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[126] *Ibid.* at Para 11.19

[127] For example refer to the Welsh National School of Medicine, 20th April 1983 *Written evidence to the Inquiry and Responses to the Report of Human Fertilisation and Embryology* (1985) DHSS House of Commons Library Dep 1497

[128] *Ibid.* Refer to the Lothian Health Board, February 1983 and The Royal College of Physicians of Edinburgh, January 1983

[129] *Report of the Committee of Inquiry into Human Fertilisation and Embryology* (The Warnock Report) (1984) DHSS Cmnd 9314 at Para 11.22

[130] Evidence submitted by CHILD to the Warnock Committee on the 24th February 1983 *Written evidence to the Inquiry and Responses to the Report of Human Fertilisation and Embryology* (1985) DHSS House of Commons Library Dep 1497

The Committee finally concluded that the issue was one for legislation to decide rather than the proposed statutory licensing body and subsequently recommended that, irrespective of the source of embryos, research should not be permitted after the fourteenth day of fertilisation.[131]

This was of relevance to human embryonic stem cell research; if the Warnock Committee had taken a firm stance against creating embryos specifically for research this may have dramatically slowed human embryonic stem cell research. In some research projects there is a need to derive stem cells from embryos which display specific traits, e.g. cystic fibrosis. If there were no 'spare' embryos available for research which showed this particular trait then the research would happen falteringly as and when 'spare' embryos were found that could be used.

Chapter 12 - Possible Future Developments in Research

It has already been noted above that the common day concept of cloning involving cell nuclear replacement was not considered by the Committee under their discussion of cloning. However, they did consider the concept of what they termed 'virgin birth' under the paragraph on Parthenogenesis. [132] This term describes the reproductive process whereby a gamete develops into a new individual without fertilisation although the consideration of such a technique appears to involve the stimulation of growth through the application of some substances, rather than the genetic manipulation of a gamete. Either way the Committee did "*...not believe that such a development will take place in the foreseeable future.*"[133]

Although the development of a gamete into a human embryo has not been successful through applying stimulating products (although parthenogenesis has been used to stimulate the division of unfertilised eggs[134]) it has been successful through the genetic manipulation of a gamete. This is the process of nucleus substitution and

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[131] *Report of the Committee of Inquiry into Human Fertilisation and Embryology* (The Warnock Report) (1984) DHSS Cmnd 9314 at Para 11.30

[132] *Ibid.* at Para 12.10

[133] *Ibid.* at Para 12.10

[134] Advanced Cell Technology reports world's first human embryo clone - Cibelli, J.B., Lanza, R.P. and West, M.D. with Ezzell, C. *The First Human Cloned Embryo* 24th Nov 2001, Scientific American 286(1):44-51, 2002 http://www.sciam.com/article.cfm?articleID=0008B8F9-AC62-1C75-9B81809EC588EF21&catID=4 (accessed 6th June 2005) Reported by the BBC *Controversy over human embryo clone* 26th November 2001: http://news.bbc.co.uk/1/hi/sci/tech/1676234.stm (last accessed 6th June 2005)

principally this has been done through the replacement of the nucleus of an unfertilised egg with the nucleus of a cell taken from another cell (not necessarily from a fertilised egg). This is the current concept of cloning. The process was first successfully achieved in mammals by the Roslin Institute in Edinburgh with the announcement of the birth of the now world famous Dolly the Sheep in 1996.[135] This was a mere twelve years after the Warnock Committee had firmly stated that they could not see such a development in the foreseeable future. The process has also been successfully recreated in human embryos. The first claim of success in cloning a human embryo was from The Advanced Cell Technology Company based in the United States. They reported their work in Scientific American.[136] However this first reported attempt at producing a human embryo clone received a note of caution from Dr Wilmut at the Roslin Institute as the clone did not develop past the six cell stage.[137] Since that first reported attempt there have been subsequent reports of successful attempts to clone human embryos. These include the first UK success which was achieved by Newcastle University scientists in conjunction with the Newcastle Centre for Life.[138]

The final point to note in relation to Chapter 12 of the Warnock Report is that the Committee considered the possibility of nucleus substitution. This is the process described above. The Committee considered the process in relation to fertilised eggs whereas today we know that the process can be performed with unfertilised eggs. What is important here is that although the Committee felt that "*...nucleus substitution would raise more fundamental questions...*" they do not note in the Report what those fundamental questions would be or consider whether this is something which could in reality happen.[139] They recognised the possibility of producing clones in this way could lead to the production of "*...immunologically identical replacement organs by growing*

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[135] *Cloning - A life of Dolly* Roslin Institute, http://www.roslin.ac.uk/publicInterest/cloning.php (accessed 19/02/08)

[136] Cibelli, J.B., Lanza. R.P. and West. M.D with Ezzell, C. *The First Human Cloned Embryo* 24th November 2001 Scientific American 286(1):44-51, 2002 http://www.sciam.com/article.cfm?articleID=0008B8F9-AC62-1C75-9B81809EC588EF21 (accessed 6th June 2005)

[137] Dr Wilmut quoted in the BBC news report *Controversy over Human Embryo Clone* 21st November 2001 http://news.bbc.co.uk/1/hi/sci/tech/1676234.stm (accessed 6th June 2005)

[138] Stojkovic. M., Stojkovic. P., Leary. C., Armstrong. L., Herbert. M., Nesbitt. M., Lako. M., Murdoch. A. *Derivation of a human blastocyst after heterologous nuclear transfer to donated oocytes.* (2005) 11(2) Reproductive Biomedicine Online 226-231 http://www.rbmonline.com/4DCGI/Article/Detail?38%091%09=%201872%09 (Extract accessed 6th June 2005, full article accessed 2nd February 2007)

[139] *Report of the Committee of Inquiry into Human Fertilisation and Embryology* (The Warnock Report) (1984) DHSS Cmnd 9314 at Para 12.14

the organ in an embryo in which the nucleus had been replaced by one taken from the person for whom the replacement organ is intended."[140]

The fact that the Warnock Committee considered that nucleus substitution would raise 'fundamental questions' is particularly interesting in light of the later acceptance by both the Courts and the Government of the inclusion of the cell nuclear replacement technique within the statutory definition (for further discussion of this matter see below). Whilst various reports and a subsequent court decision considered that cell nuclear replacement embryos were included in the legislation, there was not a great deal of debate about the fundamental issues of including such embryos, possibly due to the fact that the use of cell nuclear replacement embryos in conjunction with stem cell research could provide cures for many illnesses and diseases.

Although the Warnock Report recommended that human embryos should be permitted to be used in research (subject to strict controls) there was sufficient dissent within the membership of the Committee to warrant the inclusion of *'Expression of Dissent: B. Use of Human Embryos in Research'*. The inclusion of this expression of dissent by three members of the Committee accurately reflects the current day attitudes of society towards the use of human embryos in research.

The dissenting members of the Committee, Madeline Carriline, Professor John Marshall and Jean Walker, all agreed with the other Committee members that the human embryo had a special status but then departed from the majority thinking as to what this special status actually signified. They recognised that the question "When does life begin?" is not an accurate phrasing of the moral question facing most people when deciding upon the use of human embryos in research. They rephrased the question to read "*At what stage of development should the status of a person be accorded to an embryo of the human species?*"[141] However the dissenting members did not believe that the special status of the human embryo and the protection which it is to be afforded by the law depends on the decision as to when it becomes a person. They recognise that the human embryo has a special status due to its potentiality; the "*...potential for development to a stage at which everyone would accord it the status of a human person.*"[142] The dissenting members firmly believed that it was "*...wrong to create something with the potential for*

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[140] *Ibid.* at Para 12.14
[141] *Ibid.* at Para 2, Expression of Dissent: B. Use of Human Embryos in Research
[142] *Ibid.* at Para 3, Expression of Dissent: B. Use of Human Embryos in Research

becoming a human person and then deliberately destroy it."[143] They continued on to state that whilst they supported the creation of human embryos with the aim of implanting them, thereby being permitted to attempt to fulfil their potentiality, they were firmly against using 'spare' embryos or deliberately created embryos in experimentation and research. As they succinctly state, "*Because embryos have the potential to become human persons neither the relief of infertility nor the advance of knowledge justifies their deliberate destruction.*"[144] This reflected many opinions of the time and continues to reflect many modern day opinions and criticisms of the United Kingdom's stance on human embryo research.

Finally it should be noted that although the majority of the Committee agreed that research should be permitted on human embryos there was a further expression of dissent concerning creating embryos specifically for the purposes of research. *'Expression of Dissent: C. Use of Human Embryos in Research'* was signed by four members of the Committee who, although they agreed with permitting research on human embryos, expressly disagreed that "*research should be permitted on embryos brought into existence specifically for that purpose or coming into existence as a result of other research.*"[145]

Since this Expression of Dissent various figures have been reported on the number of embryos created specifically for research. Between 1991 and 1998 only 118 embryos were created specifically for research (compared to 48,444 which were created for other reasons and donated to research). A further reference to the number of embryos created specifically for research is found in the House of Commons. Dawn Primarolo, on the 3rd December 2007, stated that only 2 embryos had been created specifically for research since 1999.[146] This figure is obviously incorrect when compared with the more recent and reliable figures available from the HFEA which show that between 2005 and early 2007 a total of 429 embryos were created specifically for research. This figure represents 5% of the total number of embryos used in research.[147] Whilst these relatively low numbers will of course not appease those completely against creating embryos specifically for research, it is hoped that it would at least ease some people's concerns

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[143] *Ibid.* at Para 3, Expression of Dissent: B. Use of Human Embryos in Research
[144] *Ibid.* at Para 7, Expression of Dissent: B. Use of Human Embryos in Research
[145] *Ibid.* at Expression of Dissent: C. Use of Human Embryos in Research
[146] Hansard – House of Commons, Written Answers, 3rd December 2007, Human Embryo Experiments, Volume 468, Column 1005W
[147] Figure 4 *Human Embryo Research in the UK 2006/2007* HFEA http://www.hfea.gov.uk/docs/HFEA_Human-Embryo-Research-06-07.pdf (accessed 16/06/09)

over embryos being consistently used as a means to an end. It is noted that these figures are not completely up to date; however a recent request for the latest data from the HFEA has not received a response.[148]

Post-Warnock

Legislation on Human Fertility Services and Embryo Research: A Consultation Paper

Whilst the Warnock Report was generally well received by the Government it was felt that further consultation was needed. It took some two and a half years for the Government to publish its consultation paper, *Legislation on Human Fertility Services and Embryo Research.*[149] As the Consultation Paper notes the publication of the Warnock Report and the introduction of three Private Members Bills to prohibit embryo research had all generated "*...considerable debate both on the principle of allowing any such research and the definition of circumstances in which it might be permissible.*"[150] In addition the Government recognised that "*...the range and complexity of the issues raised by the Warnock Report and the strength and diversity of opinion expressed make it desirable that there should be a further period for consultation before any legislation is drafted.*"[151]

Of particular relevance to this thesis are paragraphs 45-60 of the Consultation Paper which are concerned with the issue of research involving human embryos. To ensure that the proposals were fully debated the Government had taken care in framing the proposals to take into account the diversity of views.

The suggested benefits of continued controlled research include:

a) *Improving the treatment of infertility:*
b) *Gaining further knowledge about factors leading to congenital disease:*
c) *Developing more effective forms of contraception:*
d) *Detecting gene or chromosome abnormalities before implantation.*[152]

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[148] Personal electronic communication to the HFEA 24th October 2008
[149] *Legislation on Human Fertility Services and Embryo Research: A Consultation Paper* (1986) DHSS Cm46
[150] *Ibid.* at Para 45
[151] *Ibid.* at Para 4
[152] *Ibid.* at Para 48

It is also noted that those who support embryo research do not generally accept the proposition that embryos should have the same full human status as a child from the moment of conception.[153]

In contrast the principal argument against embryo research is noted as "*...embryos from the point of conception have the same human status as that of a child or an adult.*"[154] Therefore it is improper to conduct research upon them which will lead to their eventual destruction. "*The embryo should be seen as fully human because of its potential for human life, the right to life being the most fundamental of all human rights...destruction of an embryo is tantamount to murder...*"[155]

It is also suggested that research should only be carried out on an embryo where it could benefit from the research, in the sense that the research would enhance the potential of the embryo for development to a possible birth.[156]

A further argument against human embryo research is that the introduction of a fourteen day rule would not result in any worthwhile research on hereditary diseases as the embryo would not have developed sufficiently in this period. There are also fears that many scientists would later argue to raise the cut-off point. Additionally it is argued that most research could easily be carried out in animal studies.

The Consultation Paper also recognises that there are many who do not clearly fall into the pro- or anti- groups, as some would allow limited research and believe that it ought to be controlled. Others have endorsed the view that 'spare' embryos could be used for research but that scientists should not be allowed to create embryos specifically for research. The majority appear to agree with the fourteen day limit although some felt that this should be reviewed in the future.

What does come out of this Consultation Paper is that the majority of respondents to the Warnock Report did want regulation as the lack of statutory controls was a deeply unsatisfactory situation to be in. Of course the diversity of views on the subject matter results in a diversity of opinions as to what rules exactly the regulation should impose.

The approach taken by the Government towards legislation on embryo research is a position of neutrality. It proposed in the Consultation Paper to offer to Parliament

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[153] *Ibid.* at Para 51
[154] *Ibid.* at Para 52
[155] *Ibid.* at Para 52
[156] *Ibid.* at Para 53

alternative sets of draft clauses. One would follow the recommendations of the Warnock Report whilst the other would prohibit all research which was not intended to benefit the individual embryo. The idea of proposing alternative clauses is to allow a full debate and a free vote on the contentious issue of permitting human embryo research.[157]

Human Fertilisation and Embryology: A Framework for Legislation[158]

The consultation period for the paper *Legislation on Human Fertility Services and Embryo Research* ended in June 1987 and the Government published the White Paper, *Human Fertilisation and Embryology: A Framework for Legislation* in November of that same year.

In the opening paragraphs of the White Paper the need to define an embryo was recognised. It states that the

> *Government proposes that legislation should apply to embryos created in vitro (i.e. by mixing sperm and eggs together in a dish), from the point at which fertilisation is completed. The start of cell division would be taken to be proof that the process of fertilisation has ended.*[159]

This is interesting to note as the moment or process of fertilisation was not defined in the White Paper, and if the moment or process of fertilisation had not been specifically referred to in the final legislation it could have saved the time and effort involved in the *Quintavalle* cases which disputed whether cell nuclear replacement embryos fell into the remit of the Human Fertilisation and Embryology Authority. The case is discussed below.

The discussion of embryo research can be found in paragraphs 28 to 42 of the White Paper where it is considered that "*The key distinction in the debate surrounding embryo research appears to be between the use of an embryo with the intention of achieving...a successful pregnancy...and its use for other reasons (e.g. improvement of knowledge about disease).*"[160] In light of this conflict over the use of human embryos in research the Government formulated two alternative draft clauses:

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[157] *Ibid.* at Para 58-60
[158] *Human Fertilisation and Embryology: A Framework for Legislation* (1987) DHSS Cm259
[159] *Ibid.* at Para 7
[160] *Ibid.* at Para 29

Prohibiting research:

> *It will be a criminal offence to carry out any procedures on a human embryo other than those aimed at preparing the embryo for transfer to the uterus of a woman; or those carried out to ascertain the suitability of that embryo for the intended transfer.*

Permitting research:

> *Except as part of a project specifically licensed by the SLA, it will be a criminal offence to carry out any procedures on a human embryo other than those aimed at preparing the embryo for transfer to the uterus of a woman or those carried out to ascertain the suitability of that embryo for the intended transfer.*[161]

In the same paragraph it also assures that the provisions would not make it an offence to store embryos with the intention of using them for future transfer to a woman, nor would it be illegal to allow embryos to perish where they are not to be transferred (for example because an abnormality had been detected).

Concerning the time limit on the use of embryos in research it was recognised that this would obviously only be needed if Parliament subsequently voted to permit research on human embryos but that the recommendation of an upper time limit was needed should this eventuality occur. The proposed time limit in the Warnock Report is documented in the White Paper as being the most controversial recommendation to come from the Warnock Committee. At the date of the White Paper it was stated that no human embryo had been kept alive *in vitro* for more than eight or nine days but equally it recognised that this time period could be extended in the near future.[162] Whilst it recognised that Parliament would take its own view the Government decided to accept the Warnock Report recommendation and that if research was permitted "*the Government ...proposes that the Authority will not be able to give a licence for the use of embryos beyond fourteen days or after the appearance of the primitive streak, whichever is the earlier.*"[163] It continues on, "*The period will be measured as fourteen completed days from the time at which egg and sperm are placed together for fertilisation (excluding periods of storage in an arrested state of development).*"[164]

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[161] *Ibid.* at Para 30
[162] *Ibid.* at Para 31
[163] *Ibid.* at Para 33
[164] *Ibid.* at Para 34

The White Paper goes further than the earlier Consultation Document as it suggests that certain areas of research should be expressly prohibited due to public concerns about possible future developments involving human embryos. Whilst the Warnock Report considered any such developments to fall within the remit of the proposed statutory licensing authority, who would issue guidelines on those areas which it considered ethically unacceptable and should not be licensed, the Government proposed that legislation should specifically prohibit such activities but with the ability of Parliament to make exceptions to these prohibitions if new developments were appropriate. The areas which it suggests should be prohibited are the genetic manipulation of the embryo, the creation of hybrids, and trans-species fertilisation.[165]

In relation to the proposed prohibitions what is interesting to note at this stage is that paragraphs 37 and 38 of the White Paper specifically state that the practice of "*...the artificial creation of human beings with pre-determined characteristics through modification of an early embryo's genetic structure*" and "*producing artificially two or more genetically identical individuals by nucleus substitution (sometimes known as cloning)*" would be prohibited by the Bill and make such practices a criminal offence. It also notes that no such work involving cloning is known to be carried out at present although it might theoretically be achieved.

The second specific prohibition involving the artificial production of two or more genetically identical individuals by nucleus substitution was not carried through to the Bill or the resulting Act. As will be seen the Act prohibited cloning in the form as it was known at the time (the replacement of a nucleus of a cell of an embryo). It did not prohibit nucleus substitution of a single cell, which it would appear that it could have done by prohibiting the artificial creation of genetically identical individuals through nucleus substitution.

Human Fertilisation and Embryology Bill [H.L.]

Two years on from the White Paper *Human Fertilisation and Embryology: A Framework for Legislation,* the Government published its *Human Fertilisation and Embryology Bill.*[166]

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[165] *Ibid.* at Para 36-42

[166] *Human Fertilisation and Embryology Bill* [H.L] (1989)

The first point to note is that the Bill continues the definition of an embryo as espoused in the earlier White Paper. The definition of an embryo is found in Clause 1 subsection 1 where it states that:

> *References in this Act to an embryo, except where otherwise stated, are to a live human embryo where fertilisation is complete and, for this purpose, fertilisation is not complete until the appearance of a two cell zygote.*

So again it leaves the ambiguity as to the exact process of fertilisation and what this involves for legal as well as scientific purposes. At the time of drafting the Bill it was not foreseen that this would cause a problem in the future, however as will be seen from the later discussion this particular definition of an embryo was to prove problematic. Although the definition is very similar to that found in the White Paper there is one noticeable difference; the White Paper specifically referred to 'embryos created *in vitro* i.e. by mixing sperm and eggs together in a dish' whereas the Bill refers to 'live human embryos where fertilisation is complete'. The more direct reference to fertilisation and the removal of 'embryos created *in vitro*' was to lead to a Court challenge which could have altered the path of human embryonic stem cell research (see below for a discussion of the case).

The *Human Fertilisation and Embryology Bill* expanded upon the proposed activities which it was felt should be specifically prohibited by legislation. The activities governed by the proposed Act are covered in Clause 3 of the *Human Fertilisation and Embryology Bill*:

> *Clause 3(1) No person shall-*
> *(a) bring about the creation of an embryo, or*
> *(b) keep or use an embryo,*
> *except in pursuance of a licence.*
> *(2) No person shall place in a woman –*
> *(a) a live embryo other than a human embryo, or*
> *(b) any live gametes other than human gametes.*
> *(3) A licence cannot authorise –*
> *(a) keeping or using an embryo after the appearance of the primitive streak,*
> *(b) placing an embryo in any other species of animal,*
> *(c) keeping or using an embryo in any circumstances in which regulations prohibits its keeping or use, or*
> *(d) replacing a nucleus of a cell of an embryo with a nucleus taken from a cell of any person, embryo or subsequent development of an embryo.*

(4) For the purposes of subsection (3)(a) above, the appearance of the primitive streak is to be taken to have appeared in an embryo not later than the end of the period of 14 days beginning from the day when the gametes are mixed, not counting any time during which the embryo is stored.

It appears that Clause 3(3)(d) of the *Human Fertilisation and Embryology Bill* specifically prohibits cloning. However, it merely prohibits the replacing of a nucleus of a cell of an embryo – i.e. where fertilisation is complete. It does not appear to foresee the replacing of the nucleus of an egg with the nucleus from another cell. It has therefore not continued the prohibition of nucleus substitution mentioned in the White Paper (as discussed above). This has implications in relation to human embryonic stem cell research which will be discussed later on.

It should also be noted that Clause 3(4) continues the Warnock Report recommendation of imposing a maximum fourteen day time limit on research.

As with the Warnock Report the *Human Fertilisation and Embryology Bill* continues to discuss many other areas such as surrogacy and the powers of the proposed Statutory Licensing Authority. What is of relevance to this work however is Schedule 2 of the *Human Fertilisation and Embryology Bill* which discusses activities for which licences may be granted by the Statutory Licensing Authority.

The main provisions of Schedule 2 which concern us are those contained in Paragraph 3:

Schedule 2, Paragraph 3 – Licences for research

3(1) A licence under this paragraph may authorise any of the following –

(a) bringing about the creation of embryos in vitro, and

(b) keeping or using embryos,

for the purposes of a project of research specified in the licence.

(2) A licence under this paragraph cannot authorise any activity unless it appears to the Authority to be necessary or desirable for the purpose of –

(a) promoting advances in the treatment of infertility,

(b) increasing knowledge about the causes of congenital disease,

(c) increasing knowledge about the causes of miscarriages,

(d) developing more effective techniques of contraception, or

(e) developing methods for detecting the presence of gene or chromosome abnormalities in embryos before implantation,

or more generally for the purpose of increasing knowledge about the creation and development of embryos and enabling such knowledge to be applied.

(3) A licence under this paragraph cannot authorise altering the genetic structure of any cell while it forms part of an embryo, except in such circumstances (if any) as may be specified in or determined in pursuance of regulations.

...

(5) No licence under this paragraph shall be granted unless the Authority is satisfied that any proposed use of embryos is necessary for the purposes of the research.

Of particular interest here is sub-paragraph 3 which specifically prohibits the '*altering of the genetic structure of any cell whilst it forms part of an embryo*'. Again, in relation to cloning and human embryonic stem cell research, it would seem that the replacement of the nucleus of an egg falls outside the remit of the *Human Fertilisation and Embryology Bill*. It does not prohibit human embryonic stem cell research as such, merely not seeming to cover human embryonic stem cell research which involves cloned embryos.

Human Fertilisation and Embryology Act 1990

The *Human Fertilisation and Embryology Act 1990* was enacted on the 1st November 1990.[167] There were no substantial changes made to the *Human Fertilisation and Embryology Bill* although that is not to say that the *HFE Act* had a smooth passage through Parliament. As can be seen from Hansard the provisions concerning human embryo research were the most contentious of all of the provisions.

The fundamental issue of conscience in the Bill relates to whether embryo research should be allowed within closely defined limits or prohibited altogether. That topic has occupied most of the time of the House on Second Reading.[168]

The relevant provisions discussed above in the *Human Fertilisation and Embryology Bill* were all enacted more or less as formulated in the Bill. However the definition of an embryo was expanded upon to include *'an egg in the process of fertilisation'*, and so now reads as thus:

Section 1(1) In this Act, except where otherwise stated –

[167] Hereafter referred to as the HFE Act

[168] Sir Geoffrey Howe, 2nd April 1990, *Hansard* HC Volume 170, Column 986

(a) embryo means a live human embryo where fertilisation is complete, and
(b) references to an embryo include an egg in the process of fertilisation, and, for this purpose, fertilisation is not complete until the appearance of a two cell zygote.

This was probably introduced as a means of providing protection to eggs which had not yet reached the appearance of the two cell zygote. Additionally, further statutory protection was provided by Section 3(3)(a) which prohibits *'keeping or using an embryo after the appearance of the primitive streak'*. According to Section 3(4) of the *HFE Act* *"...the primitive streak is to be taken to have appeared in an embryo not later than the end of the period of 14 days..."* This section prevents scientists from (legally) working on embryos which have developed past this point. Whilst the majority of the public now favours embryo research it appears that it is the strict controls which are applied to scientists working with embryos that have increased public confidence and acceptance of such work.[169] For the purpose of human embryonic stem cell research, stem cells are normally extracted at around five to six days development, at which point the embryos are destroyed. Therefore, in respect of human embryonic stem cell research, the fourteen day limit is adequate as it does not hinder embryonic stem derivation and subsequent research.

Schedule 2, Clause 3(3) of the *Human Fertilisation and Embryology Bill* became Schedule 2, Paragraph 3, sub-paragraph 4 in the *HFE Act* but continues to prohibit the alteration of the genetic structure of any cell whilst it forms part of an embryo; this does not prohibit the cell nuclear replacement technique which was developed a few years after the enactment of the *HFE Act,* however, it equally does not specifically include the process of cell nuclear replacement as a method of creating embryos for research. When read in conjunction with the definition of an embryo contained in section 1(1) it can be seen, admittedly with hindsight, that these definitions and the resulting grey area in relation to the cell nuclear replacement technique would later be challenged in the Courts, and as discussed below, was challenged as such a mere eleven years after enactment.

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[169] Refer to the 2003 MORI poll which found that around 56% of people are supportive of the use of human embryos for research into treatments for serious diseases and fertility but not for most other types of research. *Seven In Ten Members Of The Public Support The Use Of Embryos For Medical Reasons* MORI Poll 8th April 2003 http://www.ipsos-mori.com/content/seven-in-ten-members-of-the-public-support-the-use.ashx (last accessed 4/11/08)

The *HFE Act* placed onto a legislative footing, for the first time, five permitted areas of research involving human embryos. A licence must first be obtained from the statutory licensing authority set up under the *HFE Act* – the Human Fertilisation and Embryology Authority (HFEA). The HFEA may give a licence to create, keep or use embryos and permit research where it is desirable or necessary for a specified purpose. The permitted areas of research are contained in Schedule 2, paragraph 3(2):

> *(a) promoting advances in the treatment of infertility,*
> *(b) increasing knowledge about the causes of congenital disease,*
> *(c) increasing knowledge about the causes of miscarriages,*
> *(d) developing more effective techniques of contraception, or*
> *(e) developing methods for detecting the presence of gene or chromosome abnormalities in embryos before implantation,*
> *or for such other purposes as may be specified in regulations.*

The limitation of embryo research to these permitted purposes carried through the approach adopted by the Warnock Committee; the human embryo has a special status that is not absolute but also cannot be overridden for any frivolous reason. The above permitted research purposes were also those which were being looked into by the scientific community and were deemed to be acceptable, non-frivolous reasons for overriding the moral status of the human embryo.

The Act continues on to state that:

> *Purposes may only be so specified with a view to the authorisation of projects of research which increase knowledge about the creation and development of embryos, or about disease, or enable such knowledge to be applied.*[170]

At the time of enactment human embryonic stem cell research was not conceived of. The first stem cells had been extracted from mice in 1981 by Sir Professor Martin Evans at Cambridge but it was not until 1998 that the first human embryonic stem cells were successfully extracted by James Thomson at the University of Wisconsin. Upon inspection of the permitted purposes for human embryo research it becomes apparent that the majority of human embryonic stem cell research would not have been permitted under the original five permitted purposes. Importantly, the Government had added to the Act the proviso that other purposes could be specified in regulations at a later date, if it was

[170] Schedule 2, Paragraph 3(3) HFE Act 1990

felt that further purposes were needed. This was vital in allowing human embryonic stem cell research and, as will be seen later in this work, regulations were indeed used to permit such research to be licensed by the HFEA. As will be seen, the use of regulations to extend the permitted research purposes is an excellent example of the legislation governing embryo research being used to allow the derivation of stem cells and subsequent research.

1990 Onwards

The *HFE Act* is seen by many countries to be a progressive and liberal piece of legislation and elements of the Act have been used as a framework for legislation elsewhere.[171] The provisions of the Act apparently worked in harmony with scientists for a number of years allowing them to progress with important research whilst also maintaining a system of checks and balances.

The birth of Dolly the Sheep in 1996, which was announced in 1997, re-sparked both public and academic interest in the regulation of scientists and their research. Dolly the Sheep was the product of the work of Dr Ian Wilmut and his team at the Roslin Institute in Scotland. She was produced after 277 attempts to create and grow a clone through the cell nuclear replacement technique. As the first ever successful production of a mammal clone this raised in the public mind the fear that scientists could and would produce a human clone in the near future. Initially the public fears were unfounded as it was thought that cloning fell into the remit of the *HFE Act*, as seen by the Governments assertion as such in June 1999, and would therefore be prohibited.[172]

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[171] Examples include Belgium, Canada and Spain. Refer to *Stem Cell Policy: World Stem Cell Map* for a map showing the policies of different countries http://www.mbbnet.umn.edu/scmap.html (accessed 23/11/08)

[172] *Government Response to the Report by the Human Genetics Advisory Commission and the Human Fertilisation and Embryology Authority on Cloning Issues in Reproduction, Science and Medicine* 1999/0383 Department of Health http://www.dh.gov.uk/PublicationsAndStatistics/PressReleases/PressReleasesNotices/fs/en?CONTENT_ID=4025446&chk=0zNabK (accessed 05/07/08)

Human Genetics Advisory Commission Paper – Cloning Issues in Reproduction, Science and Medicine

Following the scientific breakthrough of Dolly the Sheep, the Human Genetics Advisory Commission and Human Fertilisation and Embryology Authority held a consultation exercise on cloning. This was due to the national, as well as international, concern that the technology used to clone Dolly could be applied to human beings. The paper was a comprehensive overview of the legal, ethical and scientific situation in 1998. It discussed the two different methods of cloning – embryo splitting and nuclear replacement.

Whilst not specifically referring to human embryonic stem cell research the paper was of relevance due to the desire to extract stem cells from cloned embryos, allowing for the creation of stem cells which are a genetic match to patients who had donated the genetic material to create the clones in the first place.

Of particular relevance here is Section 5: Legal Framework. As the paper states:

> *The nuclear substitution of an embryo, or any cell whilst it forms part of an embryo is expressly prohibited by the HFE Act. Embryo splitting and nuclear replacement of eggs are not expressly prohibited, but as both involve the use or creation of embryos outside the body, they fall within the HFE Act and therefore come under the jurisdiction of the HFEA.*[173]

As can be seen it was accepted by the relevant bodies that embryos created by cell nuclear replacement fell within the remit of the *HFE Act*. This view was subsequently confirmed in the Donaldson Report, *Stem Cell Research: Medical Progress with Responsibility*, and accepted by the Government in their response to that report.

[173] HGAC Paper *Cloning Issues in Reproduction, Science and Medicine* (1998) Department of Health http://www.advisorybodies.doh.gov.uk/hgac/papers/papers_c.htm (last accessed 13/08/08)

Stem Cell Research: Medical Progress with Responsibility. A Report from the Chief Medical Officer's Expert Group Reviewing the Potential of Developments in Stem Cell Research and Cell Nuclear Replacement to Benefit Human Health[174]

The Expert Group was set up by the Government following the publication of the joint report from the Human Genetics Advisory Commission and the HFEA *Cloning Issues in Reproduction, Science and Medicine.*[175] The Report which ensued, *Stem Cell Research: Medical Progress with Responsibility. A Report from the Chief Medical Officer's Expert Group Reviewing the Potential of Developments in Stem Cell Research and Cell Nuclear Replacement to Benefit Human Health* (hereafter referred to as the Donaldson Report due to the presiding Chief Medical Officer Professor Liam Donaldson) provides a comprehensive analysis of the issues involved in stem cell research and cell nuclear replacement.

The Expert Group was asked "*...to undertake an assessment of the anticipated benefits of new areas of research using human embryos, the risks and the alternatives and, in the light of that assessment, to advise whether these new areas of research should be permitted.*"[176] The Donaldson Report provided a wide-ranging overview of the then current situation (in the year 2000) concerning the potential benefits of stem cell research along with the ethical and legal considerations which had to be taken into account. The ethical considerations are dealt with elsewhere in this work.

The Expert Group was concerned with determining if it would be acceptable to increase the number of research purposes permitted at the time under the *HFE Act.* In consideration of this the Expert Group had to deliberate whether embryos created by cell nuclear replacement were controlled by the *HFE Act.* Continuing the stance taken by the Human Genetics Advisory Commission and the HFEA the Expert Group obviously considered that embryos created by cell nuclear replacement did fall under the control of the *HFE Act.* This stance can be seen from the following extracts from the Report:

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[174] (2000) Department of Health

[175] *Stem Cell Research: Medical Progress with Responsibility. A Report from the Chief Medical Officer's Expert Group Reviewing the Potential of Developments in Stem Cell Research and Cell Nuclear Replacement to Benefit Human Health* (2000) Department of Health at Chapter 1.1

[176] *Ibid.* Executive Summary, point 1

Research involving the creation of an embryo by cell nuclear replacement is not prohibited under the 1990 Act provided it is for one of the existing specified research purposes. In such circumstances, the HFEA would consider each application for a research licence on its merits and would need to be satisfied that the creation of an embryo by cell nuclear replacement was necessary for the purposes of the research.[177]

Provided that the necessity of using embryos created by cell nuclear replacement is clearly demonstrated...with proper consent of the donors and under the regulatory control of the Human Fertilisation and Embryology Authority, the Expert Group was willing to support it.[178]

Chapter 3 of the Donaldson Report which discusses the legal considerations, also continues in this vein. Whilst discussing embryos created *in vitro* it does not distinguish between those created in the 'normal' manner, i.e. through the process of fertilisation using eggs and sperm, to those created by cell nuclear replacement involving merely eggs. The Expert Group then makes the recommendation that:

Recommendation 1:
Research using embryos (whether created by in vitro fertilisation or cell nuclear replacement) to increase understanding about human disease and disorders and their cell-based treatments should be permitted, subject to the controls in the Human Fertilisation and Embryology Act 1990.[179]

It is apparent throughout the Donaldson Report that the Expert Group was of the opinion that embryos created by cell nuclear replacement were governed by the *HFE Act* and consequently the research regulations and prohibitions applied accordingly.

The discussion of cell nuclear replacement embryos and the applicability of the *HFE Act* are important to human embryonic stem cell research as the desire is to extract stem cells from an embryo which is a genetic match to a patient, permitting the extracted stem cells to be used in treatment of the patient without the risk of rejection. Of note though is the discussion in the Donaldson Report of the research purposes permitted under the *HFE Act*. Whilst the use of cell nuclear replacement embryos for human embryonic stem cell research is important to scientists, the research can equally be undertaken with embryos created by *in vitro* fertilisation. What needs to be considered is,

[177] *Ibid.* Executive Summary, point 14
[178] *Ibid.* Executive Summary, point 28
[179] *Ibid.* Recommendation 1 at Chapter 5.10

if human embryonic stem cell research (with either *in vitro* fertilisation or cell nuclear replacement embryos) could actually take place, was it permitted under the research purposes as found in the *HFE Act*? As discussed earlier, upon inspection of the five permitted areas of research it could be said that human embryonic stem cell research was not permitted under the *HFE Act*. However, the Donaldson Report does not agree with that analysis, it states that:

> *Research involving the use of embryos to extract stem cells is permitted currently under the 1990 Act provided that the research is for one of five specified purposes.*[180]

It is somewhat difficult to see how the extraction of human embryonic stem cells is necessary or desirable for the purposes of either promoting advances in the treatment of infertility, increasing knowledge about the causes of congenital disease or miscarriages, helping to develop more effective techniques of contraception or helping to develop methods for detecting the presence of gene or chromosome abnormalities in embryos before implantation. Human embryonic stem cell research occurs as scientists and researchers wish to use the extracted stem cells in patients, not to fulfil one of the purposes as laid out in the *HFE Act*. The Donaldson Report does note that a research licence for one research project had been granted at the time of writing which fell into the permitted research purposes. So it seems that some research projects involving human embryonic stem cell research would fall into the five research purposes. However, the Donaldson Report goes on to state that the creation or use of embryos for research to improve the understanding of, or the treatment of, non-congenital diseases could not be authorised under the *HFE Act* although affirmative regulations could be used to extend the permitted research purposes.[181] This was recommended by the Expert Group within their discussion of Recommendation 1 of the Report. [182] As discussed later the Government did make use of these affirmative Regulations to extend the permitted research purposes.

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[180] *Ibid.* at Chapter 3.9
[181] *Ibid.* at Chapter 3.12
[182] *Ibid.* at Chapter 5.10

Government Response to the Recommendations Made in the Chief Medical Officer's Expert Group Report "Stem Cell Research: Medical Progress with Responsibility"[183]

It is clear in the Government's response to the Donaldson Report that the Government agreed with the Expert Group's conclusion that embryos created by cell nuclear replacement were also subject to the regulation found in the *HFE Act*. The Government accepted in full the Expert Group recommendations and expanded upon its position in relation to each recommendation.

In considering the research purposes contained within the *HFE Act* the Government thought that it would be appropriate to extend the research purposes due to the potential medical benefits which could arise from research to extract human embryonic stem cells from very early embryos. As such the Government stated that:

> *...the Government accepts that such an extension should be made to allow for research to increase understanding about human disease and disorders and their cell-based treatments.*[184]

It therefore seems clear that although some human embryonic stem cell research could be undertaken as it would fall within the original five permitted research purposes, there was a need to extend the research purposes to allow further human embryonic stem cell research to occur. This corresponded with the position adopted by Warnock that there should be some limits upon the type of research being performed; equally it corresponded with the social consensus which had changed over the decade as to what it was permissible to use human embryos for. In this manner the special moral status of the human embryo was still recognised, as was the fact that the moral status of the human embryo is not absolute. As will be seen in the later discussion, the decision to extend the research purposes to allow and use human embryonic research to investigate human disease and disorders, rather than limiting the research to fertility and the embryo itself, would be somewhat controversial.

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[183] (2000) Department of Health CM 4833

[184] *Government Response to the Recommendations Made in the Chief Medical Officer's Expert Group Report "Stem Cell Research: Medical Progress with Responsibility"* (2000) Department of Health CM 4833 at pg 3, Recommendation 1, point 2

Continuing the discussion of Recommendation 1 in relation to cell nuclear replacement embryos, the Government commented that:

> *The Report explains that research using embryos created by cell nuclear replacement has unique potential benefits in terms of understanding how to produce compatible tissue for treatment and how adult cells might in future be reprogrammed...we have assessed carefully the scientific and ethical case presented in the Report and conclude that such research should be allowed, but only under the very stringent safeguards set by the 1990 Act.*[185]

Again this is supporting the commonly held opinion of the time that the *HFE Act* regulated all embryos, regardless of how they were created. However, this was soon put into doubt with the judicial review action initiated by Bruno Quintavalle, director of the Pro-Life Alliance; this was in direct response to the Donaldson Report.

Quintavalle

The *Quintavalle* cases challenged the definition of a human embryo and whether embryos created by cell nuclear replacement fell into the legislative definition. Why is this case so important? Because the extraction of stem cells from cell nuclear replacement embryos is considered to be the Holy Grail of science. Whilst stem cell research could have continued with embryos produced by *in vitro* fertilisation, the desire was, and still is, to extract stem cells that are a genetic match to a patient which can be achieved by extracting stem cells from cloned embryos. If the Courts had decided that embryos created by cell nuclear replacement were not included in the legislative definition the search for the Holy Grail could not have continued in the United Kingdom.

In 2004 this process was claimed to have been achieved by a Korean scientist, Hwang Woo-Suk, and was heralded as a major breakthrough and huge step forward for stem cell research.[186] Hwang has subsequently been discredited and stepped down from his posts as his work was proven to be fraudulent, so the Holy Grail is still being sought.

There are two main points to the Pro-Life Alliance case. First they contested whether an embryo created by cell nuclear replacement fell within the definition of an

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[185] *Ibid.* at pg 3, Recommendation 1, point 3

[186] Hwang, W-S *et al., Evidence of a Pluripotent Human Embryonic Stem Cell Line Derived from a Cloned Blastocyst* (2004) 303 (5664) Science 1669-1674 (Retracted)

'embryo' under section 1(1) of the *HFE Act* and secondly, in the alternative, that if such an embryo did fall into the definition then section 3(3)(d) of the *HFE Act* renders cell nuclear replacement unlawful.

At first sight it seems strange that the Pro-Life Alliance would be the instigators of this case. The Pro-Life Alliance is a group which is opposed to human cloning. If their argument that embryos created by cell nuclear replacement did not fall into the remit of the *HFE Act* was correct, then this would leave their creation, and subsequent research upon them, unregulated. However, upon closer inspection the purpose of the Pro-Life Alliance in bringing this case was obvious. As Herring notes, "*The Alliance hoped that if its arguments were accepted by the courts, then Parliament would be compelled to address the subject, leading, they anticipated, to a complete legislative ban on all forms of cloning.*"[187]

The High Court

The case was first heard by Judge Crane in the Queens Bench Division.[188] The central issue hinged upon the definition of an embryo in the *HFE Act* which reads as:

> *Meaning of "embryo", "gamete" and associated expressions*
> *1(1) In this Act, except where otherwise stated -*
> *(a) embryo means a live human embryo where fertilisation is complete, and (b) references to an embryo include an egg in the process of fertilisation, and, for this purpose, fertilisation is not complete until the appearance of a two cell zygote.*

The Pro-Life Alliance contended that as an 'embryo' created by cell nuclear replacement was not the product of fertilisation it could not therefore be '*an embryo where fertilisation is complete*' thereby not falling into the Section 1(1) definition. In contrast the defendant, the Secretary of State for Health, argued for a purposive construction of the statute:

> *It argues that the essential concept is 'a live human embryo'. The subsection should be read as if the words were, in effect, 'a live human embryo where [if it is produced by fertilisation] fertilisation is complete.'*[189]

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[187] Herring, J and Dr Chau, P-L., *Cloning in the House of Lords.* (2003) 33 Fam LJ 663 at p663
[188] *R (on the application of Quintavalle) v Secretary of State for Health* [2001] 4 All ER 1013
[189] *Ibid.* at Para 45, Pg 1021

Prior to the legal challenge by the Pro-Life Alliance, the Government had stated that 'embryos' produced by cell nuclear replacement fell into the remit of the *HFE Act* and Judge Crane noted that this viewpoint had been reiterated in several authoritative Government Reports, including the Donaldson Report and the Government response to that Report.[190]

Although the Government had previously asserted that 'embryos' created by cell nuclear replacement were within the remit of the *HFE Act* Judge Crane felt unable to agree. Although reluctant to leave 'embryos' created by cell nuclear replacement outside of regulation he stated, "*I decline any invitation to attempt to rewrite any of the sections of the 1990 Act to make them apply by analogy to organisms produced by CNR.*"[191]

> *...With some reluctance, since it would leave organisms produced by CNR outside the statutory and licensing framework, I have come to the conclusion that to insert these words would involve an impermissible rewriting and extension of the definition.*[192]

The reading of the Act given by Judge Crane is by all accounts the most sensible, logical and literal interpretation to take. It is widely accepted that 'embryos' created by cell nuclear replacement do not involve fertilisation in the normal accepted sense and logically this means that they are outside of the regulation of the *HFE Act.* Understandably this caused considerable concern and the Government was swift to react with the *Human Reproductive Cloning Bill* (discussed in detail later on) which came into force on the 4th December 2001. Whilst not outlawing the process of cell nuclear replacement *per se* it prohibited the placing of such an embryo created other than by fertilisation into a woman. As this legislation did not prevent the creation of embryos by

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[190] *Stem Cell Research: Medical Progress with Responsibility. A Report from the Chief Medical Officer's Expert Group Reviewing the Potential of Developments in Stem Cell Research and Cell Nuclear Replacement to Benefit Human Heath* (2000) Department of Health. For example see Para 14, Chapter 3.3 and Recommendations 1 and 2
Government Response to the Recommendations Made in the Chief Medical Officer's Expert Group Report "Stem cell Research: Medical Progress with Responsibility" (2000) Department of Health CM 4833. See response to Recommendations 1 and 2

[191] *R (on the application of Quintavalle) v Secretary of State for Health* [2001] 4 All ER 1013 at Para 61, pg 1024

[192] *Ibid.* at Para 62, pg 1024

cell nuclear replacement in the first place it was vital for the issue to be resolved by the courts whether such embryos were within the remit of the HFEA.

The Court of Appeal

The case soon found its way to the Court of Appeal[193] where the Secretary of State for Health challenged Judge Crane's decision under four heads:

> *(1) unforeseen scientific developments can carry with them the necessity to strain statutory language; (2) the purpose of the legislation is of prime importance; (3) no countervailing considerations conflict with a purposive construction; (4) incoherence of other parts of the 1990 Act is no bar to a purposive construction of s1(1).*[194]

In view of the first argument the Court of Appeal found that Lord Wilberforce's authoritative dissenting speech in *Royal College of Nursing of the UK v Dept of Health and Social Security* [1981] 1 All ER 545 at 564-565 provided guidance as to how to deal with unforeseen scientific developments. Lord Phillips of Worth Matravers MR then phrased the relevant question as

> *...the court has to ask, not what would Parliament have enacted if it had foreseen the creation of embryos by CNR, but, do such embryos fall plainly within the genus covered by the legislation and will the clear purpose of the legislation be defeated if the extension is not made?*[195]

According to the Master of the Rolls, the purposive interpretation made by the Court of Appeal is further also supported by Human Rights Act 1998.[196]

In considering the genus of an embryo created by cell nuclear replacement the Master of the Rolls considered that *"...it is this capacity to develop into a human being that is the significant factor and it is one that is shared by both types of embryo."*[197] When linking the genus covered by the legislation to the clear purpose of the legislation the honourable judge continued on to state that,

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[193] *R (on the application of Quintavalle) v Secretary of State for Health* [2002] 2 All ER 625
[194] *Ibid.* at Para 22, pg 632
[195] *Ibid.* at Para 27, pg 633
[196] *Ibid.* at Para 27, pg 633
[197] *Ibid.* at Para 34, pg 634

To the question of whether it is necessary to bring embryos created CNR within the regulatory regime created by the 1990 Act in order to give effect to the intention of Parliament, there can be only one answer. It is essential. There is no factor that takes embryos created by CNR outside the need, recognised by Parliament, to control the creation and use of human organisms.[198]

As the Court of Appeal notes the *HFE Act* was designed to bring the creation and use of embryos within a regulatory regime which would control and restrict the permitted activities.[199] It is principally for this reason that the Court of Appeal felt that they had to interpret the legislation to include embryos created by cell nuclear replacement; otherwise the regulatory regime set up by Government would fail. This was reiterated by Lord Justice Buxton who stated that

...the purpose of the legislation was to protect and to make provision in respect of embryos, they being seen as a form of life particularly deserving of protection and control; and to bring dealing with such forms of life within the control of the newly set up Human Fertilisation and Embryology Authority. That purpose should extend, and there is no reason why it should not extend, to embryos created by CNR as to embryos created by what I would call orthodox fertilisation.[200]

The final two arguments submitted by the defendant against Judge Crane's decision were briefly considered by the Master of the Rolls who felt that there were no countervailing considerations which would conflict with a purposive construction of the Act and the small amount of incoherence in the Act, as some sections would not apply to embryos created by cell nuclear replacement, was not significant.

Concerning the second point before him, Lord Phillips of Worth Matravers MR considered the argument that if embryos created by cell nuclear replacement were within the definition of an embryo in the *HFE Act* then the process was prohibited under section 3(3)(d) of that Act.

Section 3(3)(d) of the Act states that:

3 (3) A licence cannot authorise –
(d) replacing a nucleus of a cell of an embryo with a nucleus taken from a cell of any person, embryo or subsequent development of an embryo.

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[198] *Ibid.* at Para 38, pg 635
[199] *Ibid.* at Para 36, pg 635
[200] *Ibid.* at Para 56, pg 638

The argument was quickly dismissed as the learned judge could *"...see no basis for arguing that an unfertilised egg, prior to the insertion of the nucleus under the cell nuclear replacement process, is required to be treated under the Act as if it is an embryo."*[201] The section in question was designed to prohibit genetic manipulation of an embryo already in existence and so outlawed the process of cloning as known in 1990. In the process of cell nuclear replacement there is no embryo until after the oocyte has had its nucleus replaced with the nucleus of another cell containing the full set of chromosomes. Therefore the Court of Appeal felt unable to apply section 3(3)(d) to embryos created by cell nuclear replacement.

The Court of Appeal decision has since been severely criticised both academically and, later legally, in the House of Lords. Herring and Chau provide a clear discussion of the problems with the approach taken by the Court of Appeal which include a shift in interpretation from ascertaining the will of Parliament at the time of enacting the legislation to *"...how would Parliament have wanted the courts to interpret the legislation given the situation the court is now faced with?"*[202] As Herring and Chau note if the Court of Appeal had considered Parliament's will at the time of enactment it was *"...unlikely that Parliament intended cloning to be regulated in the same way as other embryos created using medical assistance."*[203]

The House of Lords

The House of Lords heard the case over a year after the Court of Appeal.[204] The outcome is the same as that of the Court of Appeal although the reliance of the Court of Appeal upon the Human Rights Act 1998 to support their purposive construction is criticised and rejected by the House of Lords.

Lord Bingham of Cornhill correctly states that:

> *The basic task of the court is to ascertain and give effect to the true meaning of what Parliament has said in the enactment to be construed....The court's task,*

[201] *Ibid.* at Para 51, pg 637
[202] Herring, J and Dr Chau, P-L., Case Commentary: *Are Cloned Embryos Embryos? – The Queen on the Application of Quintavalle v The Secretary of State for Health* (2002) 14 CFLQ 315 at pg 322
[203] *Ibid.* at pg 321
[204] *R (on the application of Quintavalle) v Secretary of State for Health* [2003] 2 All ER 113

within the permissible bounds of interpretation, is to give effect to Parliament's purpose. So the controversial provisions should be read in the context of the statute as a whole, and the statute as a whole should be read in the historical context of the situation which led to its enactment.[205]

Lord Bingham of Cornhill continued on to explain that he could see no inconsistency between the rule that statutory language retains the meaning that it had at the time of enactment and the rule that a statute is always speaking. This is particularly relevant where legislation concerns fast moving scientific technology. The House of Lords approved Lord Wilberforce's speech in *Royal College of Nursing of the UK v Dept of Health and Social Security* [1981] 1 All ER 545 at 564-565 where it was stated that when a case involves fast-moving or new technology a court can consider if the new state of affairs falls within the *"...same genus of facts as those to which the expressed policy has been formulated."*[206]

The House of Lords obviously felt that it would go against the clear purpose of Parliament if embryos created by cell nuclear replacement were left outside the scope of the legislation. This is reiterated by all of the Law Lords at some point, for example see:

Lord Bingham of Cornhill:

Can Parliament have been intending to distinguish between live human embryos produced by fertilisation of a female egg and live human embryos produced without such fertilisation? The answer must certainly be negative, since Parliament was unaware that the latter alternative was physically possible....this was an act passed for the protection of live human embryos created outside the human body. The essential thrust of s1(1)(a) was directed to such embryos, not to the manner of their creation, which Parliament (entirely understandably on the then current state of scientific knowledge) took for granted.[207]

While it is impermissible to ask what Parliament would have done if the facts had been before it, there is one important question which may permissibly be asked: it is whether Parliament, faced with the taxing task of enacting a legislative solution to the difficult religious, moral and scientific issues mentioned above, could rationally have intended to leave live human embryos created by CNR outside the

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[205] *Ibid.* at Para 8, pg 118

[206] *Royal College of Nursing of the UK v Department of Health and Social Security* [1981] 1 All ER 545 at 564-565 as reproduced in the House of Lords decision of *R (on the application of Quintavalle) v Secretary of State for Health* [2003] 2 All ER 113

[207] *R (on the application of Quintavalle) v Secretary of State for Health* [2003] 2 All ER 113 at Para 14, pg 120

scope of regulation had it known of them as a scientific possibility. There is only one possible answer to this question and it is negative.[208]

Lord Steyn:

...there is not a hint of a rational explanation why an embryo produced otherwise than by fertilisation should not have the same status as an embryo created by fertilisation. It is a classic case where the new scientific development falls within what Lord Wilberforce called 'the same genus of facts' and in any event there is a clear legislative purpose which can only be fulfilled if an extensive interpretation is adopted.[209]

Lord Millett takes a simpler approach to the interpretation of Section 1(1) of the *HFE Act*. What is clear from his judgment is that he does not believe that the phrase 'where fertilisation is complete' adds anything to the definition of an embryo, rather it is the fact that is it 'live' and 'human' which is of relevance when considering what an embryo is and the protection to be afforded to it.

The purpose of the opening words of the paragraph is not to define the word 'embryo' but rather to limit it to an embryo which is (i) live and (ii) human. These are the essential characteristics which an embryo must possess if it is to be given statutory protection. The important point is that these characteristics are concerned with what an embryo is, not how it is produced.[210]

The concluding words of the paragraph ('where fertilisation is complete') have a different function. They do not describe the essential characteristics of an embryo, and do not form part of the definition of the word 'embryo'. They merely indicate the stage of development which an embryo must reach before it qualifies for protection.[211]

For the House of Lords the function of a purposive construction of Section 1(1) was to give effect to Parliament's intention of regulating the creation, use and storage of human embryos, and this, they felt applied irrespective of how the embryos were created. This was a contentious point as Parliament had deliberately taken steps to outlaw cloning, albeit in the form known at the time of drafting the statute. As noted earlier this prohibition is found in section 3(3)(d) of the *HFE Act*. The House of Lords did not consider that this section prohibited the creation of embryos by cell nuclear replacement

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[208] *Ibid.* at Para 15, pg 120-121
[209] *Ibid.* at Para 26, pg 126
[210] *Ibid.* at Para 45, pg 129
[211] *Ibid.* at Para 46, pg 129

as it specifically prohibited the genetic manipulation of an already existing embryo, clearly not including the process of cell nuclear replacement which does not involve an embryo, only an oocyte.

However, if the Law Lords were willing to include embryos created by cell nuclear replacement into the definition of an embryo in section 1(1) it is no stretch of the imagination that they could equally have found that the creation of embryos by cell nuclear replacement was prohibited by section 3(3)(d). In *Royal College of Nursing of the UK v Department of Health and Social Security*[212] Lord Wilberforce stated that:

> *...when a new state of affairs, or a fresh set of facts bearing on policy, comes into existence, the courts have to consider whether they fall within the parliamentary intention. They may be held to do so, if they fall within the same genus of facts as those to which the expressed policy has been formulated. They may also be held to do so if there can be detected a clear purpose in the legislation which can only be fulfilled if the extension is made.*[213]

The Law Lords could have utilised Lord Wilberforce's dictum in interpreting section 3(3)(d) if they had been willing to interpret the technique of creating embryos by cell nuclear replacement as falling into the same genus of the technique described in the legislation. Parliamentary intention had clearly been to prohibit cloning, albeit in the form known at the time of drafting, and as such it could be argued that the legislation should have been interpreted to include the new scientific technique. In considering section 3(3)(d) the Court concerned itself with the 'genus of facts' rather than the purpose of the legislation. If it had considered the purpose of section 3(3)(d) it may not have been so willing to interpret the section as not applying to embryos created by cell nuclear replacement.

It should also be noted that the Government had specifically mentioned nucleus substitution as a method desirable of prohibition although this was not carried through to the *HFE Act.*[214] Parliament had clearly tried to ban cloning at the time of enactment, why not include today's current process? Of course the issue here was that if the Law Lords

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[212] [1981] 1 All ER 545

[213] *Royal College of Nursing of the UK v Department of Health and Social Security* [1981] 1 All ER 545 at 564-565

[214] White Paper *Human Fertilisation and Embryology: A Framework for Legislation* (1987) DHSS Cm 259 See paragraphs 37 and 38 and comments made about these provisions under the relevant heading of this thesis

had applied Lord Wilberforce's dictum to the issue at hand, the result would have been the complete prohibition of all types of cloning, not just reproductive cloning. The Government had clearly stated that human reproductive cloning was undesirable and had taken steps to outlaw it prior to the House of Lords judgment. In contrast, therapeutic cloning was being strongly endorsed by the Government.[215] Lord Millett summarised succinctly the position of both Parliament and the House of Lords in relation to this provision:

> *Of course Parliament did not positively intend to prohibit CNR, the possibility of which it did not foresee. It might or might not have prohibited it if it had done so. But such considerations are irrelevant. Even if Parliament had intended to prohibit CNR it failed to do so. The court cannot give effect to Parliament's intention if the legislative text does not permit it. The only question is whether CNR falls within the statutory language. It manifestly does not.*[216]

This statement by Lord Millett at first sight appears to underline the point that the House of Lords were not in a position to strain the language of the legislation so as to be able to include cell nuclear replacement embryos within the section 3(3)(d) definition. However, it is the Court that decides if the text permits them to give effect to the intention of Parliament, not the text constraining the Court. It is simply a question of how far the text can be strained to reach the desired outcome. What becomes apparent upon reading the judgments is that the House of Lords wanted to give effect to the current Government's clearly stated aims and desires of permitting research upon cell nuclear replacement embryos whilst prohibiting human reproductive cloning. Therefore the House of Lords strained the parts of the language of the text they thought appropriate to give effect to the Parliamentary intention of 2003, rather than looking to the Parliamentary intention of 1990.

As the law stands today stem cell research and therapeutic cloning is governed by the *HFE Act* and the governing body the HFEA. Whilst the cases brought by the Pro-Life Alliance created for a brief while the legal lacuna that embryos created by cell nuclear

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[215] Refer to *Government Response to the Recommendations Made in the Chief Medical Officer's Expert Group Report "Stem cell Research: Medical Progress with Responsibility"* (2000) Department of Health CM 4833

[216] *R (on the application of Quintavalle) v Secretary of State for Health* [2003] 2 All ER 113 at Para 51, pg 130

replacement were not regulated by the HFEA, this has since been rectified by the House of Lords decision.

Criticisms

Overall, Judge Crane in the High Court should be praised for his logical and clear interpretation of the legislation. The literal interpretation which he applied gives effect to parliamentary intention at the time of enactment, that embryos created by fertilisation should be regulated. Although this literal interpretation would mean that there was no governing body regulating embryos created by cell nuclear replacement the legislation should have been left to the Government to alter as appropriate to include cell nuclear replacement embryos if that was desired.

Whilst it was necessary for the case to continue to the Court of Appeal and House of Lords the interim knee jerk reaction by the Government of enacting the *Human Reproductive Cloning Act 2001* only helped to confuse the situation further – not outlawing the creation of such embryos but merely prohibiting the placing of such embryos within a woman's body. The situation apparently being that anyone was free to create cell nuclear replacement embryos for research without regulation provided that they did not subsequently attempt to implant them.

The *HFE Act* is the most contentious piece of legislation currently in existence in the UK. The Government's action of implementing the *Human Reproductive Cloning Act 2001* can be criticised for being poorly thought out. Nonetheless the Government wanted to review the entirety of the *HFE Act* so it could be forgiven for taking what could be seen as an interim step whilst preparing for a thorough review and debate over new legislation.

While it was contested that embryos created by cell nuclear replacement were outside the remit of the *HFE Act* I believe that the situation created by Judge Crane's decision in the High Court was not as disastrous as first thought, although it is recognised that embryos created by cell nuclear replacement would have been left outside of statutory regulation.

If Judge Crane's decision had been followed by the higher courts, cell nuclear replacement embryos would have been left outside of the statutory definition as contained in section 1(1) of the *HFE Act* and no licence would have been needed from the HFEA to

create such embryos. There is only a need for a licence from the HFEA for research upon embryos, not oocytes.[217] Whilst a licence would have been needed from the HFEA if a researcher was intending to store the oocytes it was most likely that fresh oocytes would be used in the process.[218] It was therefore clear that if cell nuclear replacement embryos were left out of the statutory definition they were also outside of the HFEA's powers.

Whilst the *Human Reproductive Cloning Act 2001* had specifically outlawed the implantation of any embryos created other than by fertilisation it did not outlaw the creation of cell nuclear replacement embryos. The question which needed to be considered was how easily would researchers have been able to obtain the necessary oocytes to create cell nuclear replacement embryos? Where the researchers needed to use oocytes from NHS patients or NHS facilities to carry out the research they would have needed to obtain research ethics committee approval prior to starting such work (for more detail about NHS research ethics committees refer to Chapter 4). There would have been a very slim chance that a research ethics committee would give ethics approval to such work precisely due to the ethical issues involved and the clear Governmental opposition to such work. If an NHS research ethics committee had approved a project involving the creation of cell nuclear replacement embryos the researcher would then have been able to approach egg donors for consent to use their oocytes in such research. What were the chances that egg donors would have agreed to donate in such circumstances? The number of egg donors is relatively small and it is thought that only a tiny percentage of any of those donors would have agreed to give consent to their oocytes being used to create cell nuclear replacement embryos. The situation would be very similar even where a researcher did not need NHS research ethics committee approval, due to not using NHS patients or facilities, a very small number of oocytes, if any, would have been donated to research. The success rates of creating cell nuclear replacement embryos were also very low and far less likely to be successful with the tiny number of oocytes which may have been available.

Although following Judge Crane's decision in the High Court would have left cell nuclear replacement embryos outside of statutory control, from the discussion above, it is clear that the number of such embryos being created would have been tiny, if any.

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[217] Sch 2, Para 3(1) *HFE Act 1990*

[218] Storage licence for gametes or embryos is required under Sch 2, Para 2(1) *HFE Act 1990*

Researchers would also have been unlikely to be able to keep the embryos beyond a few days growth and were legally prohibited from implanting them into a woman.

The Government had worked fast in enacting the *Human Reproductive Cloning Act 2001* and, if it so desired, it could have enacted a similar piece of legislation which specifically stated that embryos created by cell nuclear replacement and all other methods were to be within the remit of the HFEA. This would have been another piece of interim legislation until such time as the review and reform of the *HFE Act* was completed. Finally note that regulations could not have been used for this purpose as the *HFE Act* did not provide regulation making powers in such a situation as this, and so primary legislation would have been needed as was the case with the *Human Reproductive Cloning Act 2001.*

The practical implications of leaving cell nuclear replacement embryos outside of the statutory definition was very much overlooked in the Courts reasoning and by the Government at the time of enacting the *Human Reproductive Cloning Act 2001.* In light of this it could be said that the concern expressed, and subsequent reaction, at the time was overblown and possibly disproportionate. In considering the important role which research ethics committees and donors themselves play in research projects it is hard to understand why this aspect was not taken into consideration by those involved in the public debates, legislative drafting and court cases.

A final criticism of the Court of Appeal and House of Lords approach to the problem laid before them is that not only did they take a very liberal purposive interpretation as to the definition of an embryo; they were not consistent in their legislative interpretations.

Whilst the judges took a very liberal purposive approach to interpreting the definition of an embryo contained in s1(1)(a) to include embryos created by cell nuclear replacement they took a literal approach to their interpretation of s3(3)(d) of the Act. Undoubtedly the literal approach would have been the correct approach to take to both sections; the statutory language could not be strained to include the modern day process of cloning. When the Government had obviously taken steps to include in the statute a prohibition concerning the process of cloning as known about in 1990, it seems somewhat bizarre that the Judges would then liberally interpret s1(1)(a) to include cloned embryos, thereby allowing their creation and research upon them. Whilst the approach taken by the Judges towards sections 1 and 3(3)(d) does appear strange and inconsistent

from a statutory interpretation point of view, it is understandable as the Judges did not want cloned embryos to be outside of statutory control. However, if the Judges had taken a closer look at the implications of Judge Crane's decision in the High Court, they may not have been so ready to take different statutory interpretative approaches to the two sections of the Act.

Brazier had earlier applied a literal interpretation to both sections 1 and 3(3)(d) which resulted, in her reasoning, to cell nuclear replacement embryos falling out of the legislative definition and as such outside of the remit of the HFEA.[219] Brazier correctly stated that a licence is required from the HFEA to create an embryo, and as such contended that the creation of a cell nuclear replacement embryo took it outside of the *HFE Act* requirements to obtain a licence as it did not involve fertilisation (as defined in section 1).

I would submit that the learned judges could have followed Judge Crane's decision in the High Court without endangering too much the workings of the HFEA and related legislation. The Government could then have either enacted interim legislation regarding cell nuclear replacement embryos in research or taken its time reviewing the Act, allowing for a full, free and frank discussion and vote on the issues involved.

Conclusions following Quintavalle

It is appropriate at this point to draw some conclusions for the future. The Government will undoubtedly face future challenges over its human fertilisation and embryology legislation. It would be advisable for the Government to relax and allow the HFEA to take the lead in regulating difficult issues. As can be seen from previous decisions the HFEA takes a reasoned and practical approach to the issues placed before it.[220]

The Government has very recently finished reviewing and reforming the *HFE Act* and one of the most difficult issues to resolve was the definition of an embryo in the new legislation.[221] The *Quintavalle* cases should have helped the Government to relax when

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[219] Brazier, M., *Regulating the Reproductive Business?* (1999) 7 Med. L. Rev. 166 at p189

[220] For example refer to the situation over which the Hashmi family sought guidance, support and regulation from the HFEA

[221] Refer to *Review of the Human Fertilisation and Embryology Act: A Public Consultation* Department of Health (2005) and to *Human Reproductive Technologies and the Law* Fifth Report of the Session 2004-05 House of Commons Science and Technology Committee Report HC 7-I

framing the new legal definition of an embryo as the decisions of the higher courts demonstrated that they were willing to stretch the genus of an embryo to include embryos created by methods unforeseen at the time of enactment. This is particularly relevant in the light of the possibility of creating embryos directly from stem cells.[222] As will be seen in Chapters 7 and 8 the Government took a broad definitional approach towards the human embryo which could help to prevent legal challenges, yet in respect of hybrid embryos the Government again took a precise scientific approach which may lead to a situation such as occurred in *Quintavalle*.

The challenge by *Quintavalle* was inevitable, as was the outcome in the House of Lords; however, the reasoning to reach the desired position is neither consistent nor well thought out. Additionally, the reaction by the Government of enacting the *Human Reproductive Cloning Act 2001* can be viewed as a purely interim action whilst the legislation is under review. In light of the ongoing experiments to create artificial gametes and wombs it is to be hoped that the Government does not again fall into the trap of enacting legislation which will need to be strained unduly by the Courts to achieve the desired end.

The Human Fertilisation and Embryology (Research Purposes) Regulations 2001, SI 2001/188

The *Human Fertilisation and Embryology (Research Purposes) Regulations 2001* were introduced by the Government following the recommendations made in the Donaldson Report. Prior to these regulations coming into force there were five permitted areas of research within the *HFE Act*. The regulations added an additional three further research purposes for which the HFEA could grant a licence. The regulations state that:

> ***Section 2.*** *- (1) The Authority may issue a licence for research under paragraph 3 of Schedule 2 to the Act for any of the purposes specified in the following paragraph.*
>
> *(2) A licence may be issued for the purposes of -*

[222] For a full discussion of the possibilities of creating embryos from stem cells refer to Holm, S., *Who should control the use of human embryonic stem cell lines: A defence of the donors' ability to control* (2006) Vol 3 (1-2) Journal of Bioethical Inquiry pg 55-68

(a) increasing knowledge about the development of embryos;
(b) increasing knowledge about serious disease, or
(c) enabling any such knowledge to be applied in developing treatments for serious disease.

These regulations were primarily introduced to permit stem cell research and therapeutic cloning which potentially could lead to enormous scientific advancements in cell-based treatments for a wide range of diseases and illnesses including Parkinson's disease and Alzheimer's.

The new Regulations were controversial as for the first time they allowed research upon embryos which would not directly benefit the embryos themselves or the provision of fertility services (for example, note that whilst many would not consider developing methods for the testing of gene abnormalities to be a benefit to the embryo, as the vast majority of such embryos will be discarded, there are some people who may prefer to know and prepare for an embryo which is affected by such an abnormality rather than go through amniocentesis and a possible miscarriage at a later date).[223] These were the limits which were discussed as far back as the early 1980's in the Warnock Report; they were linked to the science which was in progress at the time as well as the social consensus.

Whilst the majority of society has developed its views upon the acceptable uses of embryos, these regulations were still seen to be controversial. For example, note the opinion of the All-Party Parliamentary Pro-Life Group which stated that:

We consider that the regulations allow "pure" research on human embryos, without reference to clinical goals, for the first time.[224]

The use of affirmative regulations to introduce these three further research purposes has been criticised as it has been argued that the research purposes should have been introduced by way of an Act of Parliament, thus allowing detailed and thorough debate of the appropriateness and desirability of the extended research purposes.[225] However, the flexibility of regulations allows the Government to keep legislation up to date without undergoing a thorough review and consultation period; making the process

[223] Discussed with Professor Emily Jackson and Professor Aurora Plomer, 21st May 2009
[224] *Stem Cell Research: Report from the Select Committee: Evidence* House of Lords Select Committee, HL Paper 83(ii) Session 2001-02, pg 213, Para 1.3
[225] Plomer, A., *Beyond the HFE Act 1990: The Regulation of Stem Cell Research in the UK* [2002] 10 Med. L. Rev. 132

quicker and allowing the Government to respond faster to a particular legislative need. In response to the question as to why secondary legislation was being used to introduce the three research purposes, Yvette Cooper, the Under-Secretary of State for Health in 2000, stated that:

> *This is secondary legislation because Parliament considered the issue in detail in 1990, and set out a power in the Human Fertilisation and Embryology Act 1990 to extend the purposes of research in this way...Parliament clearly decided at that time to give power to its successors to extend the purposes of research through regulations.*[226]

As Yvette Cooper stated the Regulations permitted exactly what they were allowed to under Schedule 2, paragraph 3(3) of the *HFE Act* i.e. 'increase knowledge about the creation and development of embryos, or about disease, or enable such knowledge to be applied'. Although the *HFE Act* had laid out the circumstances in which it would be acceptable to use regulations to extend the permitted research purposes the new regulations did go further than was possibly anticipated when the regulation making power was put into the *HFE Act* in 1990. The regulation making powers were provided to extend the purposes for which research could be performed on embryos, not products of the embryos. The issue of using embryos to derive stem cells, to use those stem cells in research and for developing treatments was not debated in Parliament in 1990.

Human embryonic stem cell research is a controversial area of research and it is argued that the permission for such research to be undertaken should have been debated further in Parliament. Although it seems unfair to say that there was not detailed discussion of these Regulations. In the House of Commons alone there were in fact two five hour debates held on Friday 17th November and Friday 15th December 2000 followed by a further debate of nearly three and a half hours before voting on the Regulations on the 19th December 2000. This is an extraordinary amount of debate for a statutory instrument.[227]

Although generally welcomed, there have been a number of criticisms made of the Regulations. The House of Lords Select Committee was asked to review the Regulations in its report on stem cell research. It noted that there was a diversity of views towards the Regulations ranging from those who were opposed to research of any kind on

[226] *Hansard* HC 19th December 2000, Volume 360, Column 212
[227] *Ibid.* as noted by Yvette Cooper on the 19th December

embryos, those who felt that the Regulations raised new ethical issues in so far as the original purposes for research were restricted to reproductive research whereas the new Regulations are far more widely drawn, and finally, those who felt that there were no new issues arising from the introduction of these Regulations.[228]

This diversity of views can be seen in the Hansard reports of the debates which took place before the introduction of the *2001 Regulations*, and again in the split of 366 votes for and 174 votes against the *2001 Regulations* in the House of Commons (for further detail of the House of Lords Select Committee discussion of the *2001 Regulations* see below).

The *2001 Regulations* were a significant step further than the original research purposes as they acknowledged that there were other people now involved in the processes for which human embryos were being used. For example, there are the people who provide genetic material to create embryos by cell nuclear replacement, the scientists who are making disease models using embryonic stem cells and the involvement of bodies besides the HFEA, including amongst others the Medical Research Council and the Stem Cell Bank. The resulting stem cell lines are also outside of the control of the HFEA and other statutory control although no attempt has been made to bring human embryonic stem cell lines within statutory control as of yet. The original research purposes as contained within the *HFE Act* were limited to reproductive uses as that was the original and accepted use of human embryos when the debate occurred to its fullest in the early 1980's. The *2001 Regulations* shows the interface between embryo research and stem cells and how the evolving social consensus allowed human fertilisation and embryology legislation to be extended to cover a product of embryo research, human embryonic stem cells.

The Human Reproductive Cloning Act 2001

As previously mentioned the Government promptly enacted the *Human Reproductive Cloning Act 2001* after Judge Crane's decision in the High Court in *Quintavalle*. The Human Reproductive Cloning Act 2001 states that:

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[228] *House of Lords Select Committee on Stem Cell Research - Report* Session 2001-02, HL Paper 83(i) refer to Chapter 5.3 and 5.4

1 The Offence

(1) A person who places in a woman a human embryo which has been created otherwise than by fertilisation is guilty of an offence.

(2) A person who is guilty of the offence is liable on conviction on indictment to imprisonment for a term not exceeding 10 years or a fine or both.

The *Human Reproductive Cloning Bill* was introduced prior to Judge Crane's decision in *R (on the application of Quintavalle) v Secretary of State for Health* [2001] 4 All ER 1013. However, the outcome of that case forced the Government to act fast and it enacted the *Human Reproductive Cloning Act 2001* barely a month after the High Court decision. This was criticised by many as it was seen as a 'knee-jerk' reaction to the Court case and it was felt by some that it would have been better to wait for the appeal and also an anticipated report from the House of Lords Select Committee on stem cell research.[229]

The *Human Reproductive Cloning Act 2001* can be both praised and criticised. The subject matter of the Act is without question – it makes it a criminal offence to place in a woman a human embryo which has been created otherwise than by fertilisation. It is also very clever as it avoids defining the term 'embryo' and 'fertilisation' which could lend itself to the need for further legislation later down the line. Additionally as Grubb notes, *"...the wording avoids an even greater definitional problem. The 1990 Act covers embryos produced 'by fertilisation'; the 2001 Act covers all others, i.e. those produced 'otherwise than by fertilisation'."*[230] This should mean that there is no loop-hole in the legislation, thereby covering all future techniques of creating embryos which may presently be seen as impossible or even unheard of.

Another beneficial point to the Act is that it avoids *"...the pit-fall of introducing ambiguity into the existing legislative framework governing stem cell research."*[231] The legislative framework which is in place seems to appease the majority of people (although it is recognised that the pro-life lobby will never be content until all forms of research upon embryos is outlawed) as it allows potentially beneficial research to continue, to the delight of scientists and the public alike, whilst prohibiting human reproductive cloning. With the decision in the House of Lords that embryos created by

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[229] The *Human Reproductive Cloning Bill [H.L.]* Research Paper 01/104, refer to page 21 for comments on the timing of the Bill. Available at http://www.parliament.uk/commons/lib/research/rp2001/rp01-104.pdf (last accessed 13/08/08)

[230] Grubb, A., *Commentary: Reproductive Cloning in the UK, The Human Reproductive Cloning Act 2001* (2002) 10 Med L Rev 327 at pg 328

[231] Wood, Dr P and Good, Dr J., *Human Reproductive Cloning – Nipped in the Bud?* (2001) 151 NLJ 1760 at pg 1762

cell nuclear replacement are governed by the *HFE Act* and with the corresponding *Human Reproductive Cloning Act 2001* this allows valuable research to continue using the therapeutic cloning technique but allays most people's fears by criminalising human reproductive cloning.

There are however a number of issues which the Act does not address. Some of these are raised in the House of Commons Research Paper 01/104:

> *Members voiced concerns that the Bill does not go far enough. It does not prohibit implantation of cloned embryos into animals, not does it prevent creation of hybrid clones ie the placing of human DNA in animal eggs. The prospect was also raised that embryos cloned in the UK could be exported for implantation elsewhere.*[232]

Additionally, the *Human Reproductive Cloning Act 2001* only prohibits the placing of an embryo created otherwise than by fertilisation into a woman. It does not prevent the implantation of such an embryo into an artificial uterus or even into a man. The possibility of artificial uteri is no longer the work of science fiction and could become a workable possibility in the future.[233] After all, it was a mere six years after the enactment of the *HFE Act* that Dr Wilmut successfully produced the first clone, in a manner not envisaged at the time of enactment. The final problem which has been noted is that it may in the future be possible for a scientist to create a clump of cells from manipulated sperm and eggs which is not an embryo but which could grow and provide replacement tissues or organs for therapeutic purposes. It may be that the legislation does not prohibit the insertion of such a clump of cells into a woman.[234]

Furthermore, with the recent news that in work involving mice, where gametes were created from mouse embryonic stem cells which were then fertilised and produced seven baby mice, it needs to be questioned if the United Kingdom legislation covers such

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[232] The *Human Reproductive Cloning Bill [H.L.]* Research Paper 01/104, page 21. Available at http://www.parliament.uk/commons/lib/research/rp2001/rp01-104.pdf (last accessed 13/08/08)

[233] Note the work of Dr Hung-Ching Liu of Cornell University's Centre for Reproductive Medicine and Infertility who is developing an artificial womb which would allow embryos to grow outside of the body. McKie, R., *Men redundant? Now we don't need women either* The Observer, 10th February 2002, http://observer.guardian.co.uk/international/story/0,6903,648024,00.html (accessed 27/10/06)
Also note the apparent lack of scientific papers published on this topic, references to Dr Liu's work appear to be mainly by the press and web references, although the lack of scientific papers is by no means evidence that the work is not being undertaken.

[234] See Herring, J and Dr Chau, P-L., Case Commentary: *Are Cloned Embryos Embryos? – The Queen on the Application of Quintavalle v The Secretary of State for Health* (2002) 14 (3) CFLQ 315 at 324

artificial gametes and subsequent development.[235] It would appear that currently the *Human Reproductive Cloning Act 2001* would prohibit the implantation of an embryo created from artificial gametes provided that it was considered that the embryo had been created otherwise than by fertilisation. However, it is likely that the Courts would consider an embryo created by fertilisation involving one or two artificial gametes as 'a live human embryo where fertilisation is complete' thereby falling into the remit of the *HFE Act* and could be implanted (for further discussion of the reproductive use of artificial gametes refer to the chapters 7 and 8). If however, you could produce enough artificial sperm to perform artificial insemination *in vivo*, it is unclear where that procedure would be regulated.[236] With ongoing scientific work in this area, the creation and use of artificial gametes is an issue which will need to be addressed by the Government soon.

So whilst the *Human Reproductive Cloning Act 2001* does what it says, prohibit human reproductive cloning, it can be said that it only *currently* prohibits it. It is foreseeable that scientists could develop alternative methods for nurturing embryos through to birth without the assistance of a woman's uterus.

House of Lords Select Committee Report on Stem Cell Research, Session 2001-2002, HL Paper 83(i)

The call upon the Government to establish a Select Committee to report on the issues connected with human cloning and stem cell research was proposed by Lord Walton of Detchant during the debate of the *Human Fertilisation and Embryology (Research Purposes) Regulations,* and was passed without contention.[237] The remit of the House of Lords Select Committee on Stem Cell Research was "*to consider and report on the issues connected with human cloning and stem cell research arising from the Human Fertilisation and Embryology (Research Purposes) Regulations.*"[238] The resulting report

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[235] Nayernia K, Nolte J, Michelmann HW, Lee JH, Rathsack K, Drusenheimer N, *et al.,* (2006) *In vitro-differentiated embryonic stem cells give rise to male gametes that can generate offspring mice* Dev Cell 11:125-132 http://www.cell.com/developmental-cell/fulltext/S1534-5807(06)00248-6 (accessed 15/06/09) Nicholl, H., *Stem Cell Sperm Success* 17th July 2006, Bionews http://bionews.org.uk/new.lasso?storyid=3107 (accessed 14/9/06)

[236] Thanks to Søren Holm for his input on this point.

[237] *House of Lords Select Committee on Stem Cell Research - Report* Session 2001-02, HL Paper 83(i) at Para 1.12

[238] *Ibid.* at Para 1.15

was published on the 13th February 2002 and provides a comprehensive overview of the important aspects of human cloning and stem cell research including not only the status of the early embryo but also the potential advantages, limitations and commercial interests of human cloning and stem cell research.

The House of Lords Select Committee reviewed the stance taken by the Warnock Committee towards the status of the early embryo. It noted that the basic ethical arguments had not changed substantially since they were considered by Warnock and whilst considering those arguments the Select Committee found that "*Unless early embryos have an unconditional claim to protection, therefore, it would be wrong to rule out research involving them for such a purpose.*"[239] The Committee is clear that it agrees with the conclusion reached by the majority of the Warnock Committee concerning the status of the early human embryo and for which there was considerable public support.

Accordingly, the Select Committee also considered the fourteen day limit to research upon human embryos which was proposed by Warnock and subsequently carried through into legislation. As the Select Committee notes, the fourteen day limit seems to have been widely accepted and that research carried out under licence from the HFEA has also attracted little criticism from those who accept research upon early embryos. Additionally, the Select Committee received no evidence to suggest that a different limit would be appropriate if research were to continue. Therefore, the fourteen day limit was advocated as remaining the limit for research on early embryos.[240]

The 2001 Regulations

The *Human Fertilisation and Embryology (Research Purposes) Regulations 2001* extended the research purposes permitted under the *HFE Act*. The Select Committee considered that embryos created by cell nuclear replacement fell into the remit of the *HFE Act* and the *2001 Regulations* (although at the time of the House of Lords Select Committee Report it was noted that an appeal in *Quintavalle* was pending in the House of Lords which could have altered this position, in time it was established that the outcome of the House of Lords did not affect this opinion). The Select Committee considered that although the method of creation varied between embryos created by IVF and embryos

[239] *Ibid.* at Para 4.17
[240] *Ibid.* at Para 4.22

created by cell nuclear replacement, there was no ethical difference in their use for research purposes up to the fourteen day limit. However, as with embryos created by IVF the Select Committee recommended that embryos should not be created by cell nuclear replacement for research purposes unless there *"...is a demonstrable and exceptional need which cannot be met by the use of surplus embryos."*[241]

The Select Committee is critical of the *2001 Regulations* noting that the new research purposes are a step further than the 1990 research purposes (as discussed earlier):

> *The purposes in the 1990 Act are all related, one way or another, to reproductive medicine, whereas applications under the Regulations will be for research relevant to a range of serious diseases and for fundamental research that underlies it.*[242]

The House of Lords Select Committee raised two issues in relation to the drafting of the *2001 Regulations*. The first concerned the use of the term 'serious disease'. 'Serious disease' is not defined in the Regulations and whilst the Select Committee recognised that it would be somewhat difficult to frame an exhaustive list it did recommend that the Department of Health or the HFEA issue non-statutory guidance on the matter.[243] Clearer guidance would be useful, particularly as the term does not even make clear for whom the disease should be serious – the individual or society more generally.

The second issue of concern for the Select Committee was the application of the *2001 Regulations* to basic research. As the Select Committee noted, stem cell research was and still is at an early stage and a great deal of basic research will need to be conducted before a stage of applied research is reached. There is a question mark whether basic research to understand how cells behave falls into the research purposes of increasing knowledge about the development of embryos, or about serious disease, or applying knowledge to the development of treatments. This again shows how legislation designed to deal with embryos has been used and interpreted to apply to cells, going further than envisaged at the time of enactment.

Upon questioning, the HFEA replied that it had received counsel that:

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[241] *Ibid.* at Para 5.14
[242] *Ibid.* at Para 8.3
[243] *Ibid.* at Para 8.8

...where an application is directed at understanding how human stem cells behave and differentiate, such research "may be appropriately described" as being concerned with increasing knowledge about the development of an embryo (purpose (a) in the Regulations)...where such basic research moves beyond purpose (a), consideration will need to be given to whether it falls under purpose (b) (increasing knowledge about serious disease) or (c) (development of treatments for serious disease).[244]

An alternative approach is to consider "*...whether the legislative policy was judged to encompass basic research on human embryos (at any rate where such research is a necessary precursor to the development of therapies for serious diseases).*[245]

The Select Committee did not express an authoritative view as to which was the correct approach to take but did note that it would be somewhat perverse if the *2001 Regulations* recognised the development of treatments for serious disease but not implicitly incorporate basic research.[246] At any rate the Select Committee recommended (at Paragraph 8.15) that when the Government introduced new legislation, basic research, as a precursor to the development of cell-based therapies, should be expressly provided for.

Government Response to the House of Lords Select Committee Report on Stem Cell Research CM 5561

The Government Response to the House of Lords Select Committee Report on Stem Cell Research was supportive and agreed extensively with the majority of the recommendations made. The Government in its response went on to say that "*...the Government believes that the existing controls over embryo research in the 1990 Act and by ethics committees are sufficiently robust to allow the HFEA to oversee this aspect of embryology.*"[247]

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[244] *Ibid.* at Para 8.11
[245] *Ibid.* at Para 8.14
[246] *Ibid.* at Para 8.15
[247] *Government Response to the House of Lords Select Committee on Stem Cell Research* (2002) Department of Health CM 5561 at Para 5.14, pg 11

Of note though is the Government's response to the recommendations made by the Select Committee in relation to the *2001 Regulations* – the definition of 'serious disease' and applying the Regulations to basic research.

The recommendation to consider drawing up guidance as to what constitutes 'serious disease' was rejected by the Government, noting that the Health Ministers in both Houses did not believe that guidance would be helpful or practical. As every licence application is dealt with by the HFEA the Government states that such a list would be unnecessary.[248] The Government's response did not answer the question raised by the Select Committee of whether 'serious disease' applies to the individual or to society at large and the Government's intention of reviewing the situation "*as and when the number of research applications increase*" was unsatisfactory. The HFEA was effectively left in the situation of regulating embryo research but of also devising policy without adequate guidance from Government. This could lead to legal challenges in the future by groups who may contest that the HFEA has overstepped its role and remit.

Finally the Government's response to the query as to whether the *2001 Regulations* permitted basic research was unequivocal:

> *The Government agrees with the Committee that basic research as well as applied research should be allowed under the Regulations. The Government is confident that the research purposes laid down in the 1990 Act and amended by the 2001 Regulations will cover the type of research described by the Committee.*[249]
>
> *We will keep this aspect under review but at present have no reason to believe that legislation will be required for the foreseeable future.*[250]

Although the Government agreed to keep the situation under review it was clear that it did not believe that explicit legislation would be needed to cover basic research. Whilst it would be bizarre if the current legislation permitted applied research but not the preliminary basic research, it can be said that basic research is by no means explicitly covered by the legislative research purposes. As will be seen when the Government reviewed and reformed the legislation it sought to cover this issue in greater detail, so as to avoid future legal challenges and to satisfy the many who held the opinion that basic research was not covered by the legislation as it stood.

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[248] *Ibid.* at Para 8.8, pg 15
[249] *Ibid.* at Para 5.4, pg 11
[250] *Ibid.* at Para 8.15, pg 15

Conclusion

The journey from non-regulation to full statutory control of the human fertilisation and embryology services within the United Kingdom has been a lengthy and detailed process which has considered many controversial and morally divisive areas.

The resulting legislation, the *HFE Act,* is regarded by many as providing a comprehensive, yet workable, framework for regulating the use, creation and storage of human embryos and gametes and has been the basis for legislation in other jurisdictions. The *HFE Act* in conjunction with the *Human Reproductive Cloning Act 2001* and the *2001 Regulations* regulates and controls research upon human embryos which may be used to extract human embryonic stem cells.

Although not without its legal challenges and definitional problems, the legislation has worked well over the years in maintaining and building public confidence in an area of science which, although it could potentially provide us with cures for many diseases, is plagued by moral outrage and misinformation. The one area where the legislation falls down is in the regulation of the stem cells post-extraction. This was noted in the Donaldson Report and currently leaves stem cells outside of statutory control. This problem area is discussed in further detail later in Chapter 6 of this thesis. It is not surprising that human embryonic stem cells are outside of statutory control, after all, the legislation designed to govern human embryos was not intended to apply to stem cells. Using human embryo legislation to govern stem cells is a whole new ball game and one which the legislation has generally adapted well to even though this situation was unheard of and unforeseen in the 1980's when the legislation was being formulated, drawn up and debated upon.

The HFEA has also been successful in implementing the controls found in the Statutes although the application and licensing process is not without its faults and will be looked at in greater detail elsewhere in this thesis.

The road to statutory control was neither smooth nor quick, however, once reached the legislation has successfully regulated this controversial area of science.

Chapter 7 continues the legislative story; the intervening Chapters look at the current licensing and research processes and as such discuss the role of research ethics committees, the HFEA and the UK Stem Cell Bank.

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Chapter 4 - Research Ethics Committees

A research project involving human embryos has three bureaucratic obstacles it must overcome before it can proceed. It must have an HFEA licence, it must satisfy a local ethics committee and it must have funding.[251]

When a researcher is considering seeking research ethics committee approval prior to commencement of a research project he will have to decide which of the three different research ethics committees he must approach - the local research ethics committee, multi-centre research ethics committee or the in-house ethics committee. The HFEA requires that each research project is referred to a properly constituted ethics committee for ethical approval prior to the HFEA giving approval for a research licence. This requirement was previously to be found in the HFEA Code of Practice but following the publication of the 7th edition the requirement is now to be found only in the Guidance notes on completing all research licence applications.[252]

It should be noted that the need for research ethics committee approval prior to applying to the HFEA for a research licence is a requirement that the HFEA has introduced. Within the *HFE Act 1990* (and now the *HFE Act 2008*) there is no legal provision stipulating the need for research ethics committee approval for a research licence. There is only a legal requirement to obtain research ethics committee approval where work involves NHS patients or takes place in an NHS hospital (as discussed below). The bodies involved with embryo research and human embryonic stem cell research more specifically, have invented and imposed this additional level of control. It should be noted that it is not only the HFEA which requires research ethics committee approval but also the funding bodies. Interestingly one recent research licence application from the University of Newcastle upon Tyne to the HFEA for work involving the derivation of embryonic stem cell lines from hybrid embryos was successfully applied for

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[251] *Human Reproductive Technologies and the Law* Fifth Report of Session 2004-05 House of Commons Science and Technology Committee HC 7-I at Para 330, Pg 145

[252] Confirmed in private correspondence with the HFEA 15/11/07; *Regulation of Research on Human Embryos,* HFEA at Section 14, page 13, http://www.hfea.gov.uk/docs/2006_Guidance_Notes_for_All_Research_Licence_Applications.pdf (accessed 8/01/08) previously found in HFEA 6th Code of Practice, Para 10.6 http://212.49.193.187/cps/rde/xbcr/SID-3F57D79B-525847C4/hfea/Code_of_Practice_Sixth_Edition_-_final.pdf (accessed 5/5/06)
How to apply for a research licence, HFEA http://www.hfea.gov.uk/Research/Howtoapplyforaresearchlicence (accessed 5/5/06)

without research ethics committee approval. The research group was able to show that they would be using existing cell lines, therefore not involving NHS patients or facilities.[253]

Research ethics committees now fall under the remit of the newly formed National Research Ethics Service (NRES) which is discussed later.

The Declaration of Helsinki

The Declaration of Helsinki has been the cornerstone of biomedical research since its inception in 1964. It has been revised and amended several times since 1964, most recently in 2000.[254] It was not until the 1975 version of the Declaration of Helsinki that research ethics committees were mentioned as being a vital aspect of biomedical research involving human subjects although they were not referred to specifically as research ethics committees. The 1975 version stated that:

> *The design and performance of each experimental procedure involving human subjects should be clearly formulated in an experimental protocol which should be transmitted to a specially appointed independent committee for consideration, comment, and guidance.*[255]

This section of the Declaration of Helsinki was expanded in 1996 and again in 2000. The relevant section now reads as:

> *The design and performance of each experimental procedure involving human subjects should be clearly formulated in an experimental protocol. This protocol should be submitted for consideration, comment, guidance, and where appropriate, approval to a specially appointed ethical review committee, which must be independent of the investigator, the sponsor or any other kind of undue influence...*[256]

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[253] *Derivation of Embryonic Stem cell Lines from Interspecies Embryos produced by Somatic Cell Nuclear Transfer (R0179)* University of Newcastle Upon Tyne, Centre for Stem Cell Biology & Developmental genetics, Institute of Human Genetics http://www.hfea.gov.uk/1580.html (accessed 2/7/09) Confirmed in personal communication with Professor Emily Jackson 3rd July 2009, member of the HFEA

[254] See the World Medical Association website for the full text and dates of amendments http://www.wma.net/e/policy/b3.htm (accessed 10/8/06)

[255] Paragraph 2, *Declaration of Helsinki (1975)* available in the Bulletin of Medical Ethics (1999) Issue 150, pg 14

[256] Paragraph 13, *Declaration of Helsinki (2000)* http://www.wma.net/e/policy/b3.htm (accessed 10/8/06)

As can be seen there was a very soft law requirement to have ethics committees from 1975 onwards for biomedical research involving human subjects. The committees existed informally in the UK until 1991 when, as will be seen in the discussion below, the NHS formally constituted research ethics committees.

NHS Research Ethics Review

NHS research ethics review consists of Local Research Ethics Committees and Multi-Centre Research Ethics Committees. The development, functioning and problems of both are discussed along with reform which has occurred recently.

Local Research Ethics Committees

Local Research Ethics Committees were established in 1991 and must be approached for research ethics approval prior to the start of research where the project will involve the use of human subjects within the NHS.[257] Specifically the local research ethics committee must be consulted about any research proposal involving:

> *NHS patients...including those treated under contracts with private sector providers*
> *Fetal material and IVF involving NHS patients*
> *The recently dead in NHS premises*
> *Access to the records of past or present NHS patients*
> *The use of, or potential access to, NHS premises or facilities*[258]

Additionally, the local research ethics committee may also be approached to advise on the ethics of studies which does not involve NHS patients, records or premises.[259] It is important to note that NHS research ethics committees must always be approached when NHS patients or facilities are involved in the human embryonic stem cell research project, and can be approached when NHS resources are not involved. However, the HFEA and relevant funding bodies will normally require research ethics committee approval regardless of whether it is NHS or private resources which are going

[257] *Local Research Ethics Committees* (1991) Department of Health, HSG (91) 5
[258] *Ibid.* at Para 1.3
[259] *Ibid.* at Para 1.6

to be used. The attempt to impose this additional level of ethical control is not necessarily of beneficial use in human embryonic stem cell research projects and is discussed further below.

Research ethics committees have been described as acting *"...as an independent safeguard sitting between the researcher and the potential participant."*[260] Their purpose is to consider the ethics of proposed research projects which will involve human subjects.[261]

Composition

Local research ethics committees should have between eight and twelve members, of both sexes, from a wide age range. Members must be drawn from different backgrounds (scientific and lay membership is compulsory) allowing for a broad range of experience and expertise and can be appointed for between three and five years, with the appointment permitted to be renewed but only two terms of office should be served consecutively.[262] Additionally, the local research ethics committee is permitted to seek the advice of specialist referees to cover any aspect of a research proposal which lies beyond the expertise of the existing members.[263] This is very important as research is becoming increasingly varied and specialised, the chances of having a member with the requisite knowledge on the local research ethics committee may become more remote.

Multi-Centre Research Ethics Committees

In 1991 the Department of Health Guidance noted that where research was proposed to be undertaken in more than one geographical area, each local research ethics committee was free to take its own decision when considering a proposal. To eliminate unnecessary delay and to help conformity in criteria in reaching decisions, one local research ethics committee should be nominated to consider the issue on behalf of all the local research ethics committees.[264]

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[260] Pattinson, S., *Medical Law and Ethics* (2006) Sweet & Maxwell, at p362
[261] *Local Research Ethics Committees* (1991) Department of Health, HSG (91) 5 at Para 1.1
[262] *Ibid.* at Para's 2.4 – 2.5 and 2.10
[263] *Ibid.* at Para 2.10
[264] *Ibid.* at Para 2.18

Whilst the decision to allow one local research ethics committee to take the lead in considering a research proposal which would be performed in more than one area was in itself a reasonable one to take, it was not one that worked well. The delay and duplication of work involved in multi-area research lead to the creation of multi-centre research ethics committees in July 1997.[265]

Multi-centre research ethics committees will advise on research proposals which will be carried out in five or more local research ethics committees' geographical boundaries. Once an application for a research proposal has been approved by the multi-centre research ethics committee it is then sent to the local research ethics committee in every area which will be involved. The local research ethics committee then has an opportunity to accept or reject the proposal for local reasons.[266]

The idea of the multi-centre research ethics committees was to allow research proposals to be dealt with efficiently and on an equal criteria basis. In reality, the dual level approach to research proposals meant that many proposals were subject to enormous amounts of duplication, in terms of both work and time, to resubmit applications to all the relevant local research ethics committees after approval by the multi-centre research ethics committee.[267]

Research Governance Framework for Health and Social Care and Governance Arrangements for NHS Research Ethics Committees

The first edition of the *Research Governance Framework for Health and Social Care* was published by the Department of Health in 2001.[268] This was closely followed by the *Governance Arrangements for NHS Research Ethics Committee.*[269]

As Jackson notes:

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[265] *Ethics Committee Review of Multi-Centre Research* (1997) Department of Health, HSG (97) 23

[266] *Ibid.* at Para 3

[267] For example refer to Middle *et al., Ethics approval for a national postal survey: recent experience,* (1995) 311 BMJ 659 which identified personnel, time and expense as some of the problems in obtaining approval for a relatively simple postal survey on birth weight of children born in 1988

[268] *Research Governance Framework for Health and Social Care*, 1st edition published in 2001, 2nd edition published in 2005, Department of Health. The 2005 edition will be referred to throughout this work and can be accessed at: http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_4108962 (last accessed 10/01/08)

[269] *Governance Arrangements for NHS Research Ethics Committee* (2001) Department of Health http://www.dh.gov.uk/PublicationsAndStatistics/Publications/PublicationsPolicyAndGuidance/PublicationsPolicyAndGuidanceArticle/fs/en?CONTENT_ID=4005727&chk=CNcpyR (last accessed 10/01/08)

> *The new governance arrangements for research in the UK were...partly a response to the recognition that the procedures and powers of ethics committees were offering a far too fragmented, inconsistent and ineffective system for ensuring that high quality and ethically sound research is carried out in the UK.*[270]

Research Governance Framework for Health and Social Care

The *Research Governance Framework for Health and Social Care* applies to all research undertaken in or by the Department of Health and the NHS but is equally offered as a model for the governance of research outside of the NHS.[271]

Participants

The Research Governance Framework notes that the primary consideration in any research study must be "*The dignity, rights, safety and well-being of participants.*"[272] In relation to human embryonic stem cell research it can be questioned if research involving human embryos can ever be considered to be within the 'well-being of the participants' particularly as the embryos will not be subsequently implanted, denying them the opportunity and potential to develop normally. However, research ethics committees do not consider human embryos as 'participants' to a research study, participants are defined in the Research Governance Framework as:

> *Patient, service, user, carer, relative of the deceased, professional carer, other employee, or member of the public, who consents to take part in a study.*[273]

Clearly embryos are not considered to be research participants within the guidelines laid down in the Research Governance Framework, rather it is the donors of the gametes used to create the embryos which are to be used in the subsequent research who would be classed as the participants, and provided that their interests are protected

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[270] Jackson, E., *Medical Law: Text, Cases and Materials* (2006) OUP at p480

[271] *Research Governance Framework for Health and Social Care*, 2nd ed (2005) Department of Health at Para 1.2, 1.5 and 3.12.3. Hereafter referred to as the Research Governance Framework

[272] *Ibid.* at Para 2.2.1

[273] *Ibid.* Box C: A to Z of the main people and organisations involved in a health or social care research study, Pg 22

and informed consent is acquired, there is no dilemma in applying the purpose of protecting subjects in the Research Governance Framework to human embryonic stem cell research.

At Paragraph 2.3.4 the Research Governance Framework notes that special regulations govern the use of human embryos of which further information can be found in the Annex. Upon investigation, the Annex merely refers the reader to additional legislation and guidance (which has been discussed elsewhere in this work) without further explanation. It does not explain the role played by research ethics committees in licensing the use, storage or research of human embryos. This seems to muddy the waters in relation to obtaining research ethics committee approval prior to seeking a licence from the HFEA and although there is an element of co-operation between the two bodies (as required by the Research Governance Framework) it is not clear what exactly the role of each body is.[274]

Progress Reports

Research ethics committees have a number of responsibilities which they are required to fulfil; they must be independent and impartial when undertaking ethical review of the proposed research placed before them; they are not to provide legal advice as it is the researchers and health and social care organisations who have the responsibility not to break the law; and they are required to keep the progress of approved research studies under review.[275] The progress reports provided by the researcher to the relevant research ethics committee allows the committee to review its advice on the ethical acceptability of the study and, if needs be, to alter the advice given.[276]

Again the Research Governance Framework can be criticised for being vague in its guidance. Whilst progress reports provide a useful tool to keep checks upon the research project, there is no information provided as to the regularity with which these reports should be submitted; additionally data could easily be omitted from the progress report, thus not allowing the research ethics committee to properly review the project being undertaken. Although the idea of progress reports is a good one it appears to be

[274] *Ibid.* at Para 1.14
[275] *Ibid.* at Para 3.12.4, 3.12.6-8
[276] *Ibid.* at Para 3.12.8

relatively easy to overcome the burden of submission and concern about possible variation or revocation of the approval given to the project.

The lack of guidance specifically relating to human embryos once more confuses the situation for both the scientist and the interested observer. As will be seen, the HFEA makes it a requirement of any research licence that the person leading the research submits regular progress reports to the HFEA for review, allowing for variation or revocation of the licence. At first sight it would then appear that a scientist undertaking human embryonic stem cell research would have to submit two progress reports, one to the relevant research ethics committee and another to the HFEA.

Whilst the same progress report may be suitable to submit both times, thereby negating any additional administration, it does not alleviate the risk of the two bodies disagreeing over the research project once it is underway. For example, a research ethics committee may consider the number of embryos used in such a project as unethical and excessive and may wish to move to vary the advice given to prohibit exceeding a specified number of embryos. In contrast, the HFEA may be able to compare the number of embryos used to previous research projects and find that the numbers used are perfectly acceptable. Who is to take priority? It would appear that the HFEA would take priority as the body which actually gives the legal approval for the research project to go ahead; the research ethics committee merely gives the ethical approval before the scientific merits (and legal implications) are considered by the Licensing Committee of the HFEA. It is another complication to the area of ethical review prior to HFEA approval.

It does not appear that a research ethics committee has ever withdrawn its favourable ethical opinion for a research project involving human embryonic stem cells.[277] Although withdrawal of ethical approval has not yet happened this could of course occur in the future. As the Central Office for Research Ethics Committees (COREC, now superseded by NRES) acknowledges, a research ethics committee could unilaterally withdraw its opinion as it is independent of the HFEA, but that the research ethics committee may refer its concerns to the HFEA and seeks its advice.[278] Additionally, the HFEA has also confirmed that were a research ethics committee to

[277] Confirmed by COREC, personal communication 14th August 2006
[278] Thanks to COREC for clarifying this issue, personal communication 14th August 2006

withdraw its approval for a research project, the licence holder could not continue working with only HFEA approval.[279]

If an NHS research ethics committee withdrew its approval for a research project involving human embryonic stem cell research, and the HFEA did not withdraw its approval (although unlikely given the HFEA response mentioned above), it is likely that the NHS Trust body in whose jurisdiction the research project is being undertaken would refuse to allow the research to continue. Although it would seem that the HFEA would take priority concerning the approval of the research project, public opinion would require the NHS institution to halt the research whilst the conflict between the opinion of the research ethics committee and the HFEA are resolved. If the scientists involved attempted to continue their research within the NHS institution they would be subject to their employer's sanctions, not the sanctions of the research ethics committee. The research ethics committee does not have any powers to prevent a researcher from continuing with his work in the situation where research ethics committee approval has been withdrawn.

In contrast, the situation is less clear when dealing with a research ethics committee which has withdrawn approval for a research project being undertaken in a private institution. It would appear that if the private institution is happy for the research to continue with only the approval of the HFEA then there would be no potential sanctions from the employer for the researchers involved. If, however, the private institution preferred to halt the work the researchers would be subject to any sanctions their employer saw fit if they continued their work without the full support of their employer.

Governance Arrangements for NHS Research Ethics Committees

The *Governance Arrangements for NHS Research Ethics Committees* replaces the previous guidance found in HSG (91)5 and HSG (97) 23 which originally established Local Research Ethics Committees and Multi-Centre Research Ethics Committees.[280] The Governance Arrangements were introduced following the Research Governance

[279] Personal communication from Dr Richard Martin, Head of Information, HFEA, 9th November 2006
[280] *Governance Arrangements for NHS Research Ethics Committee* (2001) Department of Health at Preface, Para 7 Hereafter referred to as the Governance Arrangements

Framework which identified a need for review of research ethics committees.[281] Additionally significant changes were required following the EU Directive 2001/20/EC which put, for the first time, ethical review of clinical trials upon a statutory footing. The European Directive has since been adopted in the UK through the *Medicines for Human Use (Clinical Trials) Regulations 2004.*

The purpose of the Governance Arrangements is to provide a:

> *...standards framework for the process of review of the ethics of all proposals for research in the NHS and Social Care which is efficient, effective and timely, and which will command public confidence.*[282]

Role and Remit

The Governance Arrangements repeats the primary consideration of the Research Governance Framework by stating that the purpose of a research ethics committee in reviewing a proposal for a research project is "*to protect the dignity, rights, safety and well-being of all actual or potential research participants.*"[283] Research ethics committees should seek to balance the interests of all those people involved including the participants, the researchers and the concerned communities, although the research participants should always take priority. Again human embryos are not considered to be research participants according to the definition contained in the Governance Arrangements Glossary:

> *Participants:- patients, users, relatives of the deceased, professional carers or members of the public agreeing to take part in the study.*[284]

The Governance Arrangements gives further detail as to what particular types of research will always require ethical advice from a research ethics committee, including research which involves '*fetal material and IVF involving NHS patients*'.[285] Embryo research is not specifically mentioned in paragraph 3.1 as requiring ethical advice from an NHS research ethics committee, however it does state that:

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[281] *Ibid.* at Preface, Para 3
[282] *Ibid.* at Preface, Para 6
[283] *Ibid.* at Para 2.2
[284] *Ibid.* at Para 11.3
[285] *Ibid.* at Para 3.1(d)

Certain types of research specified under the Human Fertilisation and Embryology Act 1990, may not proceed without a licence from the Human Fertilisation and Embryology Authority, from whom further information may be obtained. Research Ethics Committee approval is also required. (See Section B)."[286]

Upon closer inspection of the Governance Arrangements it is obvious that there is no Section B, effectively making ethical review of embryo research (and human embryonic stem cell research) a circular process – the HFEA requires research ethics committee approval prior to considering the application for a licence to perform embryo research, the Governance Arrangements notes that further information may be obtained from the HFEA. The HFEA only states that research ethics committee approval is required, it does not provide any further information. It would be thought that information should be obtainable from both the research ethics committee from whom approval is being sought, and from the HFEA. What appears to occur here is that each body is passing the buck and no solid information seems to be accessible.

To whom an interested party may apply to for guidance over the ethical review of human embryonic stem cell research suddenly becomes very unclear. This is a major flaw with the Governance Arrangements. Whilst designed to provide clear guidance on research ethics committees, in relation to human embryonic stem cell research, in many respects it actually serves the opposite, in confusing who to apply to for ethical review, and the process to be followed.

Whilst the guidance is unclear and confusing this may be mitigated by the fact that the numbers of researchers involved in human embryonic stem cell research is very low. Any confusion will be quickly resolved as the researchers build up their expertise in dealing with the appropriate research ethics committee.

[286] *Ibid.* at Para 3.9'

Membership and Composition

The membership of a research ethics committee must be such that it can ensure that "*...tasks can be executed free from bias and influence that could affect their independence in reaching their decision.*"[287]

Members are normally appointed for five years and may be reappointed although it is preferred that a member does not sit on a specific research ethics committee for more than two consecutive terms.[288] Whilst the maximum number of members is set at 18, the minimum number required to constitute a quorum at a meeting is seven.[289] The reason for this is that it is recognised that members will also hold other positions and so may be unable to attend all meetings, although attendance at a minimum of two thirds of all scheduled meetings is expected.[290]

The membership is expected to be diverse with a broad range of experience and expertise whilst also reflecting the wider community with members from across the age groups and the sexes.[291] Importantly the requirement that there is a mixture of lay and expert members is carried through from the 1991 Local Research Ethics Committee Guidance. There is an additional requirement that at least three members are independent of any organisation where research under ethical review is likely to take place.[292]

Crucially the ability of the research ethics committee to seek expert advice has also been carried across from the 1991 Local Research Ethics Committee Guidance. The Governance Arrangements permits the Chair and Administrator to "*...seek the advice of specialist referees on any relevant aspects of a specific research proposal that lie beyond the expertise of the members.*"[293] In relation to human embryonic stem cell research this is very important; it is unlikely that a research ethics committee will have the relevant expert knowledge amongst its members to deal with an application for ethical review. Human embryonic stem cell research is an up and coming area of science with still a relatively small number of people claiming to have expert knowledge of the subject;

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[287] *Ibid.* at Para 5.1
[288] *Ibid.* at Para 5.10
[289] *Ibid.* at Para 6.1 and 6.11
[290] *Ibid.* at Para 5.5
[291] *Ibid.* at Para 6.1 and 6.2
[292] *Ibid.* at Para 6.3
[293] *Ibid.* at Para 6.10

scientific, ethical or legal. Additionally, the Governance Arrangements has extended greatly the range of specialist referees who may be referred to for advice:

> *These referees may be specialists in ethical aspects, specific diseases or methodologies, or they may be representatives of communities, patients, or special interest groups.*[294]

This has greatly expanded the potential number of specialist referees who may be approached for advice concerning human embryonic stem cell research. Whilst it may be scientists who are currently carrying out the work, potentially many patients may be affected by the outcomes of such research and the author of this thesis believes that it is important that special interest groups could be approached for advice on this significant matter. Although these special interest groups may be approached, it is unclear how regularly they are in fact approached, although COREC has advised that they are consulted where appropriate.[295] Of course, the research ethics committee may want to approach groups with opposing ethical perspectives which would allow the research ethics committee to come to a balanced decision.

Progress Reports

As indicated in the Research Governance Framework the research ethics committee can request progress reports from research projects which it has approved. The Governance Framework gives further guidance as to the regularity of such progress reports. At the time of approval the research ethics committee should indicate any progress reports which it will require *'from time to time'* along with a final report to be submitted within three months of completing the research project.[296]

The Governance Arrangements call upon the research ethics committee to require as a minimum an annual report from the researchers at which point the research ethics committee will reconsider its opinion.[297] The research ethics committee is at liberty to

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[294] *Ibid.* at Para 6.10
[295] Thanks to COREC for clarifying the use of special interest groups, personal communication, 14th August 2006
[296] *Governance Arrangements for NHS Research Ethics Committee* (2001) Department of Health at Para 7.26
[297] *Ibid.* at Para 7.27

request more frequent reports and conduct interim review where it is considered that the degree of risk requires it.[298]

The Governance Arrangements are to be commended for finally providing some guidance over the progress reports, although the guidance does not go far enough; upon closer inspection it can be seen to be as lacking as the guidance in the Research Governance Framework. There is no indication of what the research ethics committee should demand to see in the progress reports, what information the researchers are obliged to provide, or how and why the research ethics committee should review its approval. Again there is apparent cross-over between the HFEA and research ethics committees in requiring progress reports to be submitted to two bodies. This double reporting requirement arises due to the fact that research ethics committees do not treat human embryonic stem cell research as a special case and do not take into account the fact that progress reports will be required by another body which is fully capable of overseeing the work being undertaken. It can also be questioned what is the usefulness and necessity of these progress reports in light of the following information from the Governance Arrangements:

> *Other than by means of these required progress reports, the REC has no responsibility for pro-active monitoring of research, the accountability for which lies with the host NHS institution, but the REC may wish to be reassured of the process for such monitoring in certain specific cases.*[299]

If a research ethics committee has no responsibility for monitoring of research, why require the researcher to submit a progress report to the research ethics committee? The important point here is that the research ethics committee has no responsibility for the pro-active monitoring of research, therefore the committee is not required to undertake physical inspection of the work being undertaken, or to actively seek problems with the research project.

If the research ethics committee has no responsibility for pro-active monitoring of research, the usefulness of the progress reports can be questioned. How much information is a researcher actually going to provide within the progress reports? Would it not be preferable to submit the report to the NHS institution which is accountable for the

[298] *Ibid.* at Para 7.27
[299] *Ibid.* at Para 7.33

research being undertaken? Concerning human embryonic stem cell research the HFEA could step into the position of the NHS institution.

Whilst the majority of human embryonic stem cell research projects may involve an NHS institution, possibly due to the use of premises or access to NHS patients, and so there would be an accountable NHS institution, there may be a few projects which are privately funded and so would not report to an NHS institution. The Governance Arrangements has made it clear that NHS research ethics committees can be approached by bodies outside of the Department of Health or NHS. With the HFEA requirement that research ethics committee approval must be sought prior to an application to the Licensing Committee of the HFEA it seems somewhat strange that a privately funded human embryonic stem cell research project may need to submit progress reports to an NHS research ethics committee which does not and is not accountable for the monitoring of the research, in addition to the progress reports required to be submitted to the HFEA.

The Central Office for NHS Research Ethics Committees (COREC) and the United Kingdom Ethics Committee Authority (UKECA)

The Central Office for NHS Research Ethics Committees was established in 2000.[300] Its role is to provide

> *...help and leadership for RECs and the REC system by co-ordinating the development of operational and infrastructure arrangements in support of their work. This includes implementing standards to ensure national consistency, providing training for REC members and co-ordinators, identifying IT solutions for procedural management and establishing regional Offices for Research Ethics Committees (ORECs) to manage local RECs.*[301]

So COREC was designed to improve and coordinate the organisation of research ethics committees in the United Kingdom.

On the 1st April 2005 COREC became the responsibility of the National Patient Safety Agency but continued in its role of overseeing national research ethics committees.[302] COREC is designed to help research ethics committees, to speed up

[300] Hereafter referred to as COREC
[301] COREC website, *About Us* http://www.corec.org.uk/public/about/about.htm (accessed 3/7/06)
[302] Hereafter referred to as the NPSA

applications and to ease the administrative burden imposed by the application process. With the introduction of Standard Operating Procedures and the reduction in the number of research ethics committees it does appear that COREC is slowly winning the battle to establish a centralised and coherent research ethics committee system. The number of local research ethics committees has dropped from 197 in 2002 to 155 in April 2004 as local research ethics committees have merged.[303]

In May 2004 the *Medicines for Human Use (Clinical Trials) Regulations* came into force in the United Kingdom which implemented *EU Directive 2001/20/EC.*[304]

The Clinical Trials Regulations are concerned with clinical trials involving medicines for human use. Human embryonic stem cell research has not yet reached the clinical trials stage of its research process so the Clinical Trials Regulations will be mentioned only briefly here (if and when human embryonic stem cell research reaches the clinical trials stage it is envisaged that the Regulations will still be applicable although this of course is not certain).

Whilst the EU Directive and the Clinical Trials Regulations apply only to clinical trials of medicinal products for human use and not all projects requiring research ethics committee approval, COREC has agreed that the benefits introduced by the new law will be applied to the whole national research ethics committee system.

> *There is now a common system for application to research ethics committee's across the whole of the UK, with ethics committees working to one set of standard operating procedures, using standard paperwork and the same application form for all NHS research ethics committees.*[305]

A new United Kingdom Ethics Committee Authority has been established under Regulation 5 of the Clinical Trials Regulations.[306] The UKECA is responsible for establishing, recognising and monitoring research ethics committees which review clinical trials applications.[307] COREC worked with the UKECA in providing advice on the procedure for recognising research ethics committees capable of dealing with such

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[303] Central Office for Research Ethics Committee's (COREC) Annual Report, June 2004, at 1.5 and 4.4

[304] *EU Directive 2001/20/EC of the European Parliament and the Council of 4 April 2001 on the approximation of the laws, regulations and administrative provisions of the Member States relating to the implementation of good clinical practice on the conduct of clinical trials on medicinal products for human use* L121/34 OJEC Hereafter referred to as the Clinical Trials Regulations and the EU Directive

[305] Central Office for Research Ethics Committee's (COREC) Annual Report, June 2004, at Para 3

[306] Hereafter referred to as the UKECA

[307] *Medicines for Human Use (Clinical Trials) Regulations 2004*, Reg 5(1)

applications. The criteria for recognition are contained in COREC's 2004 Annual Report.[308]

The role of the UKECA was originally envisaged as overseeing clinical trials research ethics committees but the framework introduced by the Clinical Trials Regulations along with the work done by the UKECA in conjunction with COREC now applies nationally to all research ethics committees.

COREC has recently been incorporated into the National Research Ethics Service (NRES) and is discussed below. COREC (now NRES) and the UKECA are mentioned briefly here due to the role that they play in governing and overseeing research ethics committees who review applications for human embryonic stem cell research. The UKECA will play a greater role in the future when human embryonic stem cell research reaches the stage of clinical trials. Of note at this point is that although the UKECA appears to have been established, as it is referred to by NRES, there is a serious lack of information about it, no information can currently be located as to membership, remit or powers. It appears that the UKECA is a body in name only; it is NRES which carries out its functions. A personal request for information from COREC makes it clear that the membership of the UKECA is made up of the health ministers from England, Scotland and Wales together with the Department of Health and Personal Social Services in Northern Ireland.[309] Whilst the ministers would not carry out the functions of UKECA personally, and therefore it is likely that NRES is the body which carries out those functions, this is not entirely clear from the information which is available. It is to be hoped that the lack of information freely available online will be rectified.

Report of the Ad Hoc Advisory Group on the Operation of NHS Research Ethics Committees

A Department of Health Advisory Group was asked to report on the operation of NHS Research Ethics Committees and on the interface with other research approval processes.[310] The Advisory Group recognised that there are many problems with research ethics committees including lack of co-ordination and support, differing application

[308] Central Office for Research Ethics Committee's (COREC) Annual Report, June 2004, at Para 3.2
[309] Personal communication from COREC 14th August 2006
[310] *Report of the Ad Hoc Advisory Group on the Operation of NHS Research Ethics Committees* (2005) Department of Health at Pg 1 http://www.dh.gov.uk/assetRoot/04/11/24/17/04112417.pdf

processes, schedules and approaches to research issues.[311] This is a particular problem for human embryonic stem cell research applications. If a researcher becomes accustomed to one set of procedures, processes and forms but then moves to a different area governed by a different research ethics committee the researcher may need to learn a whole new set of procedures and forms.

The Advisory Group considered the 'perceived problems' with research ethics committees. These were:

- The remit of research ethics committee's
- Scientific and ethical review
- The operating system
- The application form
- Repeated requests for information
- Issues with workload and capacity
- Constitution and membership issues
- Inconsistency of decisions by research ethics committee's, and
- Challenges for members and administrators[312]

Of note here is the issue of scientific and ethical review. Many perceive research ethics committees as dealing principally with clinical trials and many applicants felt that research ethics committees had not understood their research.[313] Importantly the Report of the Advisory Group notes that research ethics committees are designed to deal with the ethical issues, not the scientific issues. Adequate scientific review should have been undertaken prior to application to the relevant research ethics committee. The Report of the Advisory Group notes that "*...Where peer review has taken place, the RECs should accept this in all but exceptional cases; if it has not taken place, the RECs should be able to refer the application, for scientific review purposes only, to a Scientific Officer based in COREC.*"[314] This then forms the basis of one of the recommendations made by the Advisory Group:

[311] *Ibid.* at Para 1.1
[312] *Ibid.* at Para 3.1-3.9
[313] *Ibid.* at Para 3.2
[314] *Ibid.* at Para 3.2

RECs should not reach decisions based on scientific review. In the unusual situation of a REC having reservations about the quality of the science proposed, they should be able to refer to COREC for scientific guidance.[315]

It seems a sensible suggestion that appropriate scientific review should occur prior to application to a research ethics committee. In terms of human embryonic stem cell research this does not occur to the extent which appears to be required in the Report of the Advisory Group. Whilst there is scientific review prior to the application going to the research ethics committee there is not peer review as seems to be required by the Advisory Group. The Advisory Group seems to advocate peer review, whereby the application is sent out to others for review prior to submission to a research ethics committee. The current system does not seem to be sufficient for the Advisory Group.

Currently NHS Trusts have a committee which will consider and sign off the scientific merits of a research proposal before it goes to the research ethics committee. Therefore the research proposal does not receive external peer review of its scientific merits but does get looked at by an appropriate committee before the ethics of the project are considered.[316] The external peer review of the scientific aspects of the application would occur after approval by the research ethics committee. As will be seen the HFEA sends all applications to perform human embryonic stem cell research out for peer review prior to granting a licence.

The United Kingdom is in need of a coherent and cohesive research ethics committee approval system. There does not appear to be any focus upon the workings of research ethics committees with the HFEA or other bodies. Within the Report of the Advisory Group there is comment made that human research does occur outside of the NHS, particularly in relation to the *Human Tissue Act* and the *Mental Capacity Bill*, but the Report is a very general look at how research ethics committees function. The Report of the Advisory Group may form the basis for an overhaul of the current research ethics committee system but does not provide any useful guidance to scientists conducting human embryonic stem cell research who wish to seek information about how in the future they are likely to proceed with an application.

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[315] *Ibid.* Recommendation 2

[316] Thanks to Søren Holm for clarifying this point

Implementing the recommendations of the *Ad Hoc Advisory Group: consultation*

In June 2005 the Ad Hoc Advisory Group on the Operation of NHS Research Ethics Committees made a total of nine recommendations; COREC under the control of the National Patient Safety Agency, wasted no time in bringing out an implementation plan for those recommendations and as such initiated a public consultation period.[317] This public consultation closed on Friday 21st April 2006, and the implementation plan was published in August 2006 (to be discussed below).

Concerning Recommendation 2 the Consultation Document notes that the Governance Arrangements are already quite specific that scientific review is outside of the scope of research ethics committees. It notes however that,

> *...research ethics committees can be drawn into the science when apparently inadequate design affects the ethical judgement. ...they do need evidence of the quality of the science in order to reassure themselves that the study has the potential to deliver benefits that justify risks, and that the design is ethically appropriate.*[318]

The Consultation Document proposes a 'triage' system designed to filter out applications which are of a poor scientific quality or design prior to the research ethics committee reviewing the application.[319] Research Ethics Advisers (a new post to be created under the Consultation Document) would advise applicants to withdraw their application and re-submit with better evidence of scientific review or a better explanation. Research Ethics Advisers, we are told, would be able to provide this advice based upon their experience of the type of evidence research ethics committees require and would also be able to make enquiries on behalf of the research ethics committee where there was uncertainty over the scientific validity of a proposal.[320]

This system would seem to be suitable for an application for research ethics committee review of a project involving human embryonic stem cell research. The

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[317] Implementing the recommendations of the *Ad Hoc Advisory Group: consultation* (2006) COREC http://www.corec.org.uk/consultation/ImplementationPlanConsultation.pdf Hereafter referred to as the Consultation Document

[318] *Ibid.* at page 9, Recommendation 2

[319] *Ibid.* for further details of the 'triage' system refer to Section 4.1.2 and 4.1.3

[320] *Ibid.* at page 10, Recommendation 2

Consultation Document clarifies how the system will work and potentially shorten the period of time currently involved in applying to a research ethics committee to only then discover that the material provided is inadequate. If a person was able to review applications at an early stage this would help to save time for all involved, helping to stop going back and forth between the researcher and the committee which may seek further evidence before consideration of the ethics of the research project.

Whilst an application for human embryonic stem cell research would then proceed to the Licensing Committee of the HFEA for scientific approval and hopefully the all important licence required to conduct such research, it is known that the level of scientific review required by the research ethics committee is less onerous than that required by the HFEA. Having said that, if the amount of scientific evidence required to be provided to the research ethics committee was the same as that to be provided to the HFEA, this would cut down on essentially making two distinct applications for the researcher. In that situation it could then be questioned the usefulness of two committees reviewing the same scientific evidence. What seems to come out of the Consultation Document is that there will in fact be scientific review of a research proposal by a Research Ethics Adviser before the application makes its way to the research ethics committee for ethical consideration. An application for human embryonic stem cell research would then be scientifically reviewed again by the HFEA prior to obtaining a licence.

Upon reflection what may actually occur under this proposed plan is that a Research Ethics Adviser would review the research application to check that there is enough appropriate scientific evidence for the research ethics committee to base its decision upon. Once approved by the research ethics committee the application would then proceed to the Licensing Committee of the HFEA for thorough scientific review, including two peer reviewers, before approval for the application went ahead.

Building on improvement: Implementing the recommendations of the *Report of the Ad Hoc Advisory Group on the Operation of NHS Research Ethics Committees*

Following the Consultation Document, an Implementation Plan was published in August 2006, titled 'Building on Improvement: Implementing the recommendations of

the *Report of the Ad Hoc Advisory Group on the Operation of NHS Research Ethics Committees.'*[321] The Implementation Plan discussed in detail how the recommendations made in the Governance Arrangements document would be brought into force.

Although Recommendation 2 of the Governance Arrangements recommended that *'RECs should not reach decisions based on scientific review'* and is quite specific that scientific review is outside the remit of research ethics committees, the Implementation Plan reiterates the point that *"RECs can be drawn into the science when apparently inadequate design affects the ethical judgement."* [322] As such the Implementation Plan continues the idea of Research Ethics Advisers although these are now referred to as National Research Ethics Advisers and will be able to form an executive sub-committee of at least two members (including a lay member).[323] As the introduction to the Implementation Plan notes there was some concern about individuals making decisions on applications and the solution appears to be the new executive sub-committee.[324] The National Research Ethics Advisers will screen applications which are submitted to a research ethics committee. The screening is designed to identify applications which:

1. *fall outside the remit of NHS RECs;*
2. *are patently of poor scientific quality or are poorly presented;*
3. *apparently present no ethical issues;*
4. *are studies that are complex, or involve potentially unfamiliar research methods (for complex studies committees may benefit from further advice to facilitate their review – the research ethics service will arrange for experts to provide such advice).*[325]

Where the studies do not involve physical interventions and the ethical dimensions are minimal, the executive sub-committee of National Research Ethics Advisers is able to issue a favourable opinion.[326] Where the study involves more ethical issues then the National Research Ethics Advisers *"...must refer applications to full committee review as only full ethics committees will be able to reject applications."*[327]

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[321] (2006) COREC http://www.corec.org.uk/consultation/ImplementationPlan.pdf (accessed January 2007) Hereafter referred to as the Implementation Plan
[322] *Ibid.* Recommendation 2, Page 4
[323] *Ibid.* at Para 2.1.5, page 10-11
[324] *Ibid.* at Page 1
[325] *Ibid.* at Para 2.1.5, page 10
[326] *Ibid.* at Para 2.1.5, page 11
[327] *Ibid.* at Para 2.1.5, page 11

Importantly for human embryonic stem cell research the research ethics committee is able to call upon expert advice when dealing with complex or unfamiliar research methods (see above). This is important as the research ethics committee may need to understand the scientific processes involved in greater detail before being able to consider the ethical issues. Whilst thorough scientific review is carried out by the HFEA the importance attached to sufficient peer review prior to application to the research ethics committee should not be underestimated.

The timescale for the implementation of these recommendations is not stated as it is noted that a pilot scheme will need to be undertaken first.[328] What can be stated is that even though the introduction of National Research Ethics Advisers will likely reduce the number of meetings involving the full membership of research ethics committees due to the National Research Ethics Advisers dealing with a large number of non-contentious applications, any application involving human embryonic stem cell research will undoubtedly require the full research ethics committee to consider the application due to the contentious ethical issues which arise from using human embryos and human embryonic stem cells (and/or tissue in light of the possibilities of chimera/hybrid embryos) in research.

The National Research Ethics Service

Following the publication of '*Building on Improvement*' COREC has since been incorporated into another body. The National Research Ethics Service (hereafter referred to as NRES) was launched on the 1st April 2007 and incorporated COREC and research ethics committees in England.[329] In respect of Wales, Northern Ireland and Scotland a transitional period is currently taking place involving the Regional Offices for Research Ethics Committees during which NRES has shadow structures in place. [330] The establishment of NRES forms part of the process of implementing the recommendations made in the Implementation Plan.[331]

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[328] *Ibid.* at Para 2.1.6, page 11
[329] *About us* NRES http://www.nres.npsa.nhs.uk/aboutus (accessed 10/01/08)
[330] *NRES staff – Regional Offices for Research Ethics Committees* NRES http://www.nres.npsa.nhs.uk/contacts/nres-staff-regional-offices/ (accessed 11/01/08)
[331] *Developing NRES* NRES http://www.nres.npsa.nhs.uk/aboutus/developing-nres/ (accessed 10/1/08)

Although COREC has been incorporated into NRES the UKECA still exists and *"...is responsible for the committees within NRES (and some independent committees) that are recognised to review Clinical Trials of Investigational Medicinal Products (CTIMPs)."*[332] Available information about the UKECA is still limited (September 2008) and the information gleaned comes from other reputable websites.

According to the NRES website the mission of NRES is to *"...protect the rights, safety, dignity and well-being of research participants, whilst facilitating and promoting ethical research."*[333] In order to do this NRES is:

- *Providing ethical guidance and management support to Research Ethics Committees in England*
- *Delivering a quality assurance framework for the Research Ethics Service*
- *Working with colleagues in the UK to maintain a UK-wide framework*
- *Working with colleagues in the wider regulatory environment to streamline the processes*[334]

The suggestion of introducing National Research Ethics Advisors does not yet appear to have been implemented (according to information available online) although NRES is currently undertaking pilot projects for *'Early Provision of Advice'* and *'Fast Track Review'* and once the results of these projects are assimilated, the introduction of National Research Ethics Advisors may happen. It is not clear exactly how these pilot projects have been designed and so the use of advisors may be one factor.[335]

In-House Ethical Review

As mentioned at the start of this chapter when a researcher seeks research ethics committee approval prior to commencement of a research project he will need to approach one of the three different research ethics committees. The NRES will send out the application to the appropriate research ethics committee.[336] Local and Multi-Centre

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[332] *Development of the research ethics service in the UK* NRES http://www.nres.npsa.nhs.uk/aboutus/history/ (accessed 10/1/08)
[333] *About us* NRES http://www.nres.npsa.nhs.uk/aboutus (accessed 10/01/08)
[334] *Ibid.*
[335] For a brief discussion of the pilot projects refer to *Developing NRES*, Pilot Screening NRES http://www.nres.npsa.nhs.uk/aboutus/developing-nres/ (accessed 10/1/08)
[336] *Guidance for applicants to the National Research Ethics Service* NRES (2007) http://www.nres.npsa.nhs.uk/EasySiteWeb/GatewayLink.aspx?alId=330 (accessed 23/11/08)

research ethics committees have already been discussed above. In-house ethical review occurs when the researcher is working outside of the NHS.

As the HFEA states in its Guidance notes on completing all research licence applications research centres outside of the NHS may refer research projects to the local research ethics committee or may set up their own committee. These in-house committees are expected to be independent and have five members as a minimum. Additionally the Chairman of the committee is expected to be independent of the research centre and no more than one third of the committee members are expected to be employed by or have a financial interest in the research centre.[337] Whilst membership of the in-house committee should be approved by the HFEA, information about the creation and operation of a research ethics committee can be obtained from the Department of Health.[338]

External funding and research ethics committee approval

NHS research ethics committees must be approached for ethics approval where the research proposes to use NHS patients, data or facilities and in-house ethics committees may be created where the research project is privately funded or alternatively approach an NHS research ethics committee where that is preferred. Additionally, NHS research ethics committee approval may be a prerequisite to obtaining outside sources of funding.

The Medical Research Council provides funding for stem cell research and has specific guidance for research involving human stem cells. In this guidance it is stated that:

> *All research aimed at deriving stem cell lines must be approved by a Local Research Ethics Committee.*[339]

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[337] *Regulation of Research on Human Embryos* HFEA at Section 14, page 13, http://www.hfea.gov.uk/docs/2006_Guidance_Notes_for_All_Research_Licence_Applications.pdf accessed 8/01/08,

[338] *Ibid.* at Section 14, page 13. Guidance has been discussed above concerning NHS research ethics committees

[339] Medical Research Council, *Research Involving Human Stem Cells: Supplementary Terms and Conditions to be applied to new and extant MRC Grants, MRC Unit Programmes and MRC Training Awards from 1/08/2003* http://www.mrc.ac.uk/pdf-terms_conditions_stem_cells.pdf (accessed 03/08/06)

This statement encompasses all types of stem cell research, not just embryonic. The Medical Research Council requirement to approach a local research ethics committee will ensure that a large proportion of 'privately funded, non-NHS resourced' human embryonic stem cell research will go through local research ethics committee approval. This is an additional level of scrutiny added by the funding body regardless of who is funding the work and the resources being used.

The Biotechnology and Biological Sciences Research Council (hereafter referred to as the BBSRC) in contrast does not have guidelines relating specifically to human embryonic stem cell research (or stem cell research more generally) but does have the requirement that:

> *If research involves human subjects, genetically modified organisms, or any other sensitive or dangerous materials, work must not commence until approval has been received from the appropriate Local Ethical Committee or appropriate authority.*[340]

The guidance from the BBSRC is slightly ambiguous here. Within the NHS the appropriate authority would be the local research ethics committee; as mentioned previously, NHS research ethics committees can also be approached by private bodies for ethical approval. However, the BBSRC has taken the step of stating that approval must be *"...received from the appropriate Local Ethical Committee **or** appropriate authority. (emphasis added)."* It is unclear what other body may be an appropriate authority for human embryonic stem cell research besides an ethical committee which the BBSRC have specifically mentioned in their guidance. It is likely that 'appropriate authority' has been included as the BBSRC covers more than just research with human subjects; it also covers research with 'non-human' subjects. 'Non-human' subjects have different appropriate authorities from which to seek ethical approval but may be too numerous to mention in the guidance.

As can be seen, two of the principal bodies which fund human embryonic stem cell research require local research ethics committee approval. This strengthens the position of local research ethics committees and also the need to reform and clarify the

[340] BBSRC Research Grants Guide, Version 6.20, May 2006 at Para 4.13 http://www.bbsrc.ac.uk/funding/research/grants_booklet.pdf (Accessed 4/7/06)

exact role which NHS research ethics committees play in considering and granting ethical approval for research projects involving human embryonic stem cell research.

Conclusion

The development of research ethics committees has undoubtedly been an important step in ensuring the safety and wellbeing of participants in medical research whilst helping the scientists to proceed with their important work. Research ethics committees have also played a role in helping to increase public confidence in the medical research work that is being undertaken.[341] This additional level of scrutiny has also largely been imposed by the HFEA and the funding bodies (particularly where non-NHS resources are involved) in a bid to increase public confidence in the research which is being performed.

In relation to human embryonic stem cell research the guidance which is provided about research ethics committees seems to be confusing and contradictory. The role of the research ethics committees in giving ethical approval to a research project for human embryonic stem cell research appears to be merely rubber stamping the detailed scientific review, and it could be said part of the ethical review too, is actually undertaken by the HFEA.[342]

One commentator has noted that *"Effectively, the HFEA partially "contracts out" the regulatory requirement of ethical scrutiny."*[343] I agree with this statement as the HFEA still performs some ethical review (as will be seen in the next chapter) but find that the current procedure does not in reality form a sound basis for ethically reviewing human embryonic stem cell research projects. The system is in desperate need of review and reform to clarify the exact role which research ethics committees play in giving ethical review to research projects involving human embryonic stem cell research and the use of progress reports once approval has been granted.

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[341] Although note the recent public concern over ethics committees following the adverse reactions of six men in March 2006 involved in a drugs trial involving the TGN1412 drug given to them by medical research company Parexel, working on behalf of German manufacturer TeGenero *Drug trials need 'better cover'* 18th April 2006, BBC http://news.bbc.co.uk/1/hi/england/london/4918080.stm (Accessed 4/7/06)

[342] This point is discussed further in Chapter 5

[343] Morgan, R., *The Regulation of Human Embryonic Stem Cell Research in the United Kingdom* (2005) PhD Thesis, Cardiff Law School at Page 259

Ideally, the establishment of a central research ethics committee which deals solely with research project applications to undertake human embryonic stem cell research would help to resolve the confusion and conflict which exists. One central research ethics committee for stem cell research is a possibility as there are such a small number of research projects being undertaken with stem cells. A central stem cell research ethics committee would have the expertise to deal with the ethical issues surrounding not only human embryonic stem cell research but also stem cell research more generally if it was felt that a completely centralised research ethics committee was needed. The central stem cell research ethics committee could be attached to the UK Stem Cell Bank. It could then be approached for ethical approval prior to application to the HFEA to undertake research on human embryos which involves the extraction of human embryonic stem cell lines; it could also be a requirement to approach the central stem cell research ethics committee to undertake research on stem cell lines held at the UK Stem Cell Bank.

With the introduction of a central stem cell research ethics committee a single set of criteria could then be used in assessing research projects involving human embryonic stem cell research ensuring that all applications are dealt with on an equal footing. As Morgan has noted, "*If the public is to have confidence that ES cell research is soundly regulated in terms of ethical review, it is right that there ought to be a single set of ethical criteria consistently applied.*"[344] The current system of using various research ethics committees to look at research projects wishing to undertake human embryonic stem cell research results in the application of different ethical criteria by each research ethics committee as well as different forms and procedures.

In composing this central stem cell research ethics committee it would be important to carry through many of the principles already applicable to NHS research ethics committees, such as independence and expertise of members, a diversity of ages and sex, and both lay and expert representation. Specialist interest groups, such as patient groups or pro-life groups, may also wish to be involved. The inclusion of specialist interest groups would not necessarily hinder human embryonic stem cell research, although, broadly speaking, pro-life groups would take an anti-embryo research stance,

[344] *Ibid.* at Page 302

they could still give a valuable contribution, particularly in considering if the work could and should be done using adult stem cells rather than embryonic.

The central stem cell research ethics committee could then work directly with the HFEA (and Human Tissue Authority where relevant) in establishing one coherent system for ethical and scientific review of research projects. In addition, the use of and submission of progress reports could be simplified. The progress report is an important element of the process of ongoing review once a proposal has been approved. If there was a central stem cell research ethics committee working in conjunction with the HFEA, progress reports could be submitted jointly to both bodies and be considered and discussed jointly, looking at both the ethical and the scientific aspects.

The establishment of a central stem cell research ethics committee working with the HFEA and the Human Tissue Authority would provide a cohesive system which it is proposed would have the remit to control research involving the derivation, culture, storage, research and clinical trials of human embryonic stem cells.

It is a pity that the Government has not taken the opportunity provided by the establishment of Ad Hoc Advisory Group on the Operation of NHS Research Ethics Committee to move towards establishing such a body. On reflection this is perhaps not surprising, in 2002 the House of Lords Select Committee suggested establishing just such a body, similar to the Gene Therapy Advisory Commission:

> *The Committee invites the Department of Health to consider either establishing a similar body [to the GTAC] with oversight of clinical studies involving stem cells, or extending the membership and remit of GTAC to achieve the same ends.*[345]

However, the Government Response to that Report was not fully supportive of this recommendation:

> *The Select Committee makes an interesting suggestion in respect to clinical studies. We are pleased that the report recognises and endorses the important role played by the Gene Therapy Advisory Committee in overseeing gene therapy research. However, the comparison to gene therapy reveals a number of key differences with stem cells.*
> ...

[345] *House of Lords Select Committee on Stem Cell Research: Report* Session 2001-02 HL Paper 83(i) at Para 8.23

Unlike adult stem cell transplantation, the clinical use of cells derived from ES cells would be a new development. The Government will consider whether any further oversight of such clinical trials involving embryonic stem cells is desirable and will discuss this further with interested parties including regulatory agencies such as the MCA and Medical Devices Agency, industry, the Human Genetics Commission and other interested groups.[346]

It does not appear from the literature that the Government has considered further the oversight of clinical trials involving human embryonic stem cells. This is something which must be done promptly. Whilst human embryonic stem cell research is just that, still at the research stage, it is surely only a matter of time until scientists develop the use of stem cells to the clinical trials stage. It would be better to consider the situation now rather than making a knee jerk reaction which may not help to resolve the issue for anyone involved.

[346] *Government Response to the House of Lords Select Committee on Stem Cell Research* CM 5561 at Paragraph 8.23, pg 16-17

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Chapter 5 - Human Fertilisation and Embryology Authority

The Human Fertilisation and Embryology Authority was established in 1991 following the enactment of the *Human Fertilisation and Embryology Act 1990.*[347] Before the introduction of the HFEA, treatments for human infertility were already in existence and being used daily and scientists were performing research upon human gametes and embryos. In this chapter I shall discuss the situation concerning regulation prior to 1990, the role of the HFEA and licensing of human embryonic stem cell research.

There is a need to examine the licensing and regulation of research upon human embryos as the body involved, the HFEA, is now involved in licensing the derivation of stem cells from embryos. The HFEA was not originally established to regulate such a process but due to the scientific advances which have been made as well as the interpretation and amendment of the legislation to include embryonic stem cell research the HFEA is now central to the process of human embryonic stem cell research.

Pre-1990

Following the birth of Louise Brown in 1978 and the subsequent media interest in the possibilities now open to infertile couples, the Government decided to undertake a review of human fertilisation and embryology. However, the *Committee of Inquiry into Human Fertilisation and Embryology* was not established until July 1982 and the Committee did not report until 1984. It was then a further six years before the Human Fertilisation and Embryology Authority was established under the *HFE Act.* Although it was 13 years between the birth of Louise Brown and the establishment of a statutory licensing body, the area of human fertilisation and embryology was not left completely unregulated. The Medical Research Council took an important interim step in helping to regulate this controversial area of research and treatment.

[347] Hereafter referred to as the HFEA and the HFE Act respectively

The Medical Research Council

The Medical Research Council originally had taken little interest in *in vitro* fertilisation but following the birth of the first IVF child in 1978 and the continuing work in both the UK and abroad, the Medical Research Council set up an Advisory Group in 1979 to review the ethical aspects of research related to *in vitro* fertilisation and embryo transfer in humans.[348] The Advisory Group considered a number of matters and made five recommendations to the Medical Research Council which were accepted:

i) *Scientifically sound research involving in vitro fertilization, both between human gametes and between human and non-human gametes where there is no intention to transfer the embryo to the uterus, should, on ethical grounds, be allowed to proceed if the aim of the research is clearly defined and acceptable – for example to obtain information about the process of reproduction relevant to clinical problems such as contraception or the differential diagnosis and treatment of infertility.*

ii) *Informed consent to the research should be obtained in every case from the donor of both ovum and sperm; sperm from sperm banks should therefore not be used unless collected and preserved specifically for this purpose.*

iii) *Human in vitro fertilization with subsequent embryo transfer should now be regarded as a therapeutic procedure covered by the normal ethics of the doctor/patient relationship. The role of the MRC should be to maximize opportunities presenting themselves to make the procedure safer and more successful, and coincidentally to increase knowledge of human reproductive processes.*

iv) *The Health Departments should be advised to set up a confidential register to record the number of embryo transfers undertaken and the number of subsequent pregnancies, and should consider the advisability and practicality of monitoring the resulting offspring.*

v) *The Advisory Group should meet again to examine the ethics of particular studies involving in vitro fertilization and embryo transfer if and when this proved desirable, and should possibly be reconvened to reconsider the general issues in about five years' time.*[349]

In 1982, two years earlier than expected, the Advisory Group was reconvened to provide the Council with information to form the basis of Council policy in this area. The terms of reference of the advisory group were:

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[348] Gunning, J and English, V., *Human In Vitro Fertilization* (2002) Ashgate at pg 15

[349] From *Minutes of the MRC Advisory Group to review policy on research in in vitro fertilization and embryo transfer in humans* March 1979 Reproduced in Gunning, J and English, V., *Human In Vitro Fertilization* (2002) Ashgate at pg 15

to consider recent and potential developments in research related to human fertilisation and embryology, and to advise the council on these and on the ethical grounds they should take into account in considering research proposals in these areas.[350]

The Advisory Group considered a wider range of treatment options and uses of research than had been considered three years earlier due to the rapid advances which were being made. Amongst the issues considered was the use of genetic manipulation in conjunction with *in vitro* fertilisation to overcome genetic disorders, the source of embryos for research, and at what stages of embryo development research was acceptable.[351]

Following the recommendations made by the Advisory Group the Medical Research Council issued guidelines that organisations which were supported by the Council should follow.

The guidelines are stated as:

i) *permitting scientific research into the processes and products of in vitro fertilisation where the research is related to clinical problems and that no embryo which has been researched upon must be transferred to the uterus*

ii) *Requiring informed consent from the donor's of gametes for research as well as requiring approval from the appropriate ethics committees*

iii) *Embryos which had been created for therapeutic purposes but which were no longer required could be used in research where informed consent had been obtained*

iv) *Embryos should not be stored after the implantation stage and only be stored for specific research uses*

v) *Animal studies must be carried out before assuming that freezing and storage of embryos does not cause harm to the conceptus*

vi) *Valuable interspecies fertilisation should be supported although fertilised ova should not be permitted to develop beyond the cleavage stage.*[352]

The Royal College of Obstetricians and Gynaecologists (RCOG) and the British Medical Association also produced similar reports and guidelines on human *in vitro*

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[350] *Research related to human fertilisation and embryology: Statement by the Medical Research Council* (1982) 285 BMJ 1480

[351] For further detail of the issues discussed by the Advisory Group refer to Gunning, J and English, V., *Human In Vitro Fertilization* (2002) Ashgate at pg 22-25

[352] *Research related to human fertilisation and embryology: Statement by the Medical Research Council* (1982) 285 BMJ 1480

fertilisation in 1983 and it seemed that the preferred approach in the United Kingdom was professional self-regulation rather than legislation.[353]

Whilst not establishing a licensing authority *per se* the Medical Research Council effectively established themselves as a voluntary oversight body. The Guidelines may not have had the force of law but as with most guidelines would have been persuasive authority, particularly as anyone wishing to seek funding from the Medical Research Council would have had to comply with them. At this time the Medical Research Council was the principal source of funding for research, guaranteeing high rates of compliance within the scientific community, additionally the sections of the scientific community which were not funded by the Medical Research Council wanted to be seen as responsible and so voluntarily followed the standards established.

What becomes clear though is that prior to the establishment of the HFEA there were no *statutory* licensing authorities regulating human fertilisation and embryology, neither treatment nor research. The Medical Research Council and the other organisations guidelines were important though as they showed the willingness of the relevant organisations to be guided by good practice and that they were seeking such regulation.

The fact that the Council had an Advisory Group and saw the need to formulate policy in relation to research relating to human fertilisation and embryology shows that the Council was receiving requests for funding for such research and that it was felt that regulation was needed in this area at least until further formal regulation was provided by the Government.

The Warnock Report Recommendations

The Report from the *Committee of Inquiry into Human Fertilisation and Embryology* recommended the creation of a statutory licensing authority to regulate research into human reproduction and embryology and to control the infertility services which the Committee had recommended for regulation.[354] The Warnock Report discussed

[353] *Report of the RCOG Ethics Committee on in vitro fertilization and embryo replacement or transfer* RCOG, London (1983), *Interim Report on human fertilization and embryo replacement and transfer* British Medical Association Working Group on in vitro fertilization (1983) 286 BMJ 1594-1595

[354] *Report of the Committee of Inquiry into Human Fertilisation and Embryology* (1984) DHSS Cmnd 9314 at Para 13.3. Hereafter referred to as the Warnock Report

the statutory licensing authority in general terms, seeing it as the role of the drafters of legislation to give substance and form to their recommendations.

Concerning the membership of the statutory licensing authority the Warnock Report noted the importance of lay membership of a body which would primarily be concerned with medical and scientific matters. This was considered important to help protect the public interest which would be affected by the potentially far reaching decisions the authority would have to take in the future.[355] The Committee went further than was possibly anticipated by not only recommending substantial lay membership but also a lay chairman.

The Warnock Committee concluded that the authority would have two distinct functions, one advisory and the other executive.[356] In performing its advisory function there would be two main interested parties; the Government and the scientists working within the field. The advice would of course vary between offering advice to Government on issues as they arose, to providing guidance on good clinical practice. As part of its responsibility in protecting the public interest, an annual report to Parliament was also recommended which would be publicly available.[357]

The executive function of the authority would involve granting licences to those wishing to offer infertility services and licences to researchers wishing to work with human embryos and gametes. Regular inspections to ensure compliance with licences and licensing conditions would be carried out by an inspectorate.[358]

The Warnock Report notes that it does not want to set out the criteria for granting a licence but prefers to discuss further some of the controls it would like to see put into force.[359] Of note for this work is the control desired in relation to research licences. The Warnock Report recognises the sensitivity of research upon human gametes and embryos and seeks tight control upon research licences by recommending that licences are granted to an individual or institution for a specific project, with a named licence holder who would have overall responsibility for the project. The objectives of the research must be clearly identified with reasons why the research cannot be carried out without human embryos. The source, number of embryos and duration of the project must also be clearly

[355] *Ibid.* at Para 13.4
[356] *Ibid.* at Para 13.5
[357] *Ibid.* at Para 13.5
[358] *Ibid.* at Para 13.6
[359] *Ibid.* at Para 13.6

stated along with approval from a local research ethics committee responsible for the institution in which the research will be carried out. Importantly, the Warnock Report states that the statutory licensing authority must not be responsible for the funding of such research projects; this could lead to a conflict of interests if this was permitted.[360]

The statutory licensing authority could be viewed as the most important element of the Warnock Report as without it, human fertilisation and embryology could not be regulated. This was recognised by the Warnock Committee:

> *...by far the most urgent is the recommendation that a statutory body should be established, within whose powers would fall the licensing and monitoring of provision for infertility treatment and of research on the human embryo. None of our other recommendations can have any practical impact until such a body is set up.*[361]

The Voluntary Licensing Authority

As seen above, the Warnock Report recommended the creation of a statutory licensing authority to regulate research into human reproduction and embryology and to control the infertility services which the Committee had recommended for regulation.[362] The Government sought comments on the Warnock Report and the Advisory Group of the Medical Research Council met again to discuss the recommendations. The establishment of a statutory licensing authority was well received by the Advisory Group and subsequently proposed "*...that some interim arrangement might be instituted until such time as the Warnock provisions could be implemented.*"[363]

The Councils of the Medical Research Council and the RCOG agreed to establish an interim licensing authority with members nominated by both groups. At the time of establishment in March 1985 it was thought that the statutory licensing authority would be enacted within a couple of years and as such "*...the main tasks of the Voluntary Licensing Authority would be to register and approve centres undertaking IVF and to consider and approve proposals for research in preparation for handing over to a statutory authority.*"[364]

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[360] *Ibid.* Refer to Paragraphs 13.10 to 13.12
[361] *Ibid.* at Para 13.14
[362] *Ibid.* at Para 13.3
[363] Gunning, J and English, V., *Human In Vitro Fertilization* (2002) Ashgate at pg 41
[364] *Ibid.* at pg 44-45

It was not until 1991 that the statutory licensing authority was established and during this six year period the Voluntary Licensing Authority worked with the centres providing infertility services and undertaking research to establish appropriate guidelines and licensing procedures. The lack of statutory footing for the Voluntary Licensing Authority worked to its favour as it was able to adapt and alter its guidelines as the science developed or if it became apparent that it had made an erroneous decision it could change its view.

The Interim Licensing Authority

Following the Consultation document in 1986 '*Legislation on Human Infertility Services and Embryo Research*'[365] and the White Paper in 1987 '*Human Fertilisation and Embryology: A Framework for Legislation*'[366] it was expected that the Human Fertilisation and Embryology Bill would soon be introduced to Parliament. However, this did not occur immediately and following a reduction in funding from the RCOG and the cramped conditions provided to the Voluntary Licensing Authority, which had intended to be in existence for only two years, the Voluntary Licensing Authority sought assistance from the Government. This was eventually granted in December 1988 to the tune of £45,000. In order to reflect the recognition now given to the Voluntary Licensing Authority it chose to change its name in May 1989 to the *Interim Licensing Authority for Human Fertilisation and Embryology.*[367]

The Interim Licensing Authority continued the work of licensing centres engaged in providing infertility services and/or undertaking research, it was also consulted on developments in science, law and policy both in the United Kingdom and abroad.

From a Voluntary to a Statutory Licensing Authority

Although the Recommendation from the Warnock Report that a Statutory Licensing Authority should be established to oversee human fertilisation and embryology was made in 1984, it was not actually established until the 1st August 1991. During this period the Interim Licensing Authority worked to establish and ensure adherence to its

[365] (1986) DHSS Cm46
[366] (1987) DHSS Cm 259
[367] Gunning, J and English, V., *Human In Vitro Fertilization* (2002) Ashgate at pg 87-88

guidelines. Upon the enactment of the *HFE Act* the Interim Licensing Authority did not automatically cease to exist, for a brief period it worked with the new Statutory Licensing Authority to hand over its activities.

The Statutory Licensing Authority, i.e. the HFEA, and the Interim Licensing Authority worked side by side for a total of nine months. A few of the Interim Licensing Authority members became members of the HFEA allowing the new Authority to draw upon their experience. Members of the HFEA also attended inspection visits by the Interim Licensing Authority to gain an understanding of how the inspection procedure had been set up. The HFEA did however return to discuss many of the issues already considered in depth by the Interim Licensing Authority in order to formulate its own policies in light of the new legislation.

The Interim Licensing Authority continued to consider applications for services and research up to the cut off date of 31st July 1991. The legislation had made provision for any services being offered or research being undertaken prior to the 31st July 1991 to continue until the HFEA had considered the licence application or up to the 31st July 1992, whichever was sooner. This meant that the Interim Licensing Authority received a relatively large number of applications by centres rushing to get the Interim Licensing Authority approval before the HFEA took over.[368]

Overall the work of the Interim Licensing Authority can be considered to be a success; it helped to establish guidelines for clinics to follow in an innovative and fast developing area of science whilst helping to increase public confidence in the work being undertaken at the clinics. It also established licensing procedures and good working practices which the HFEA continued in its new statutory setting.

[368] For a full discussion of the changeover period between the Interim Licensing Authority and the Human Fertilisation and Embryology Authority please refer to Gunning, J and English, V., *Human In Vitro Fertilization* (2002) Ashgate Chapter 7

Post-1990

The Human Fertilisation and Embryology Authority

The *HFE Act* which was enacted on the 1st November 1990 covers a wide and diverse area relating to human fertilisation and embryology, including surrogacy, embryo research and the statutory licensing authority. The *HFE Act* has been in force for 18 years with what can be considered a great deal of success. However, as with most legislation it has been subject to various legal challenges, along with the statutory licensing authority which it established, for example refer to *R (on the application of Quintavalle) v Secretary of State for Health*[369] and *R (on the application of Quintavalle) v Human Fertilisation and Embryology Authority.*[370]

The Human Fertilisation and Embryology Authority

The Human Fertilisation and Embryology Authority was formally established in August 1991, nearly a year after the enactment of the *HFE Act 1990.* The principal tasks of the HFEA are to:

- License and monitor clinics that carry out in vitro fertilisation (IVF) and donor insemination
- License and monitor research centres undertaking human embryo research
- Regulate the storage of gametes and embryos[371]
- Keep under review information about embryos and any subsequent development of embryos and about the provision of treatment services governed by this Act, and to advise the Secretary of State...about those matters,
- Publicise services provided to the public by the Authority or provided in pursuance of licences,

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[369] *R (on the application of Quintavalle) v Secretary of State for Health* [2001] 4 All ER 1013, [2002] 2 All ER 625, [2003] 2 All ER 113 – progression through the High Court, Court of Appeal and House of Lords

[370] *R (on the application of Quintavalle) v Human Fertilisation and Embryology Authority* [2002] EWHC 2785, [2003] EWCA Civ 667, [2005] UKHL 28

[371] *About the HFEA* HFEA http://www.hfea.gov.uk/AboutHFEA (accessed 2/5/06)

- Provide, to such extent as it considers appropriate, advice and information for persons to whom licences apply or who are receiving treatment services or providing gametes or embryos for use for the purposes of activities governed by the Act, or may wish to do so...[372]

As can be seen the HFEA was set up to deal with human embryos, subsequently the remit has been interpreted to include processes which involve human embryos (the derivation of embryonic stem cells) but do not strictly involve research upon human embryos or the provision of fertility services.

Composition

In accordance with the *HFE Act* the HFEA is composed of a chairman, deputy chairman and such other members as the Secretary of State appoints.[373] All members are appointed by the Secretary of State and can hold the position for up to three years at a time.[374] Currently there are 19 members of the HFEA including the Chair, Professor Lisa Jardine CBE who was appointed on the 1st April 2008.[375] The previous Chair, Miss Shirley Harrison was appointed on the 1st January 2007 and her predecessor Dame Suzi Leather was appointed in March 2002.[376] Like Shirley Harrison and Dame Leather, Professor Jardine is a lay person and all previous chairmen have been lay people, complying with the recommendations of Warnock which were carried through to the *HFE Act.*[377] The balance of medics, scientists and lay people as members of the HFEA is directly referred to in Schedule 1 of the *HFE Act.* The importance of lay representation within committees which principally deal with scientific matters should not be underestimated. Lay representation increases public confidence concerning the control of

[372] Section 8 (a)-(c) *HFE Act 1990*
[373] Section 5 *HFE Act 1990*
[374] Schedule 1, part 4(1) and 5(2) *HFE Act 1990*
[375] *New Chair appointed for HFEA* HFEA Press release, 23rd January 2008 http://www.hfea.gov.uk/en/1641.html (accessed 26/06/08)
[376] http://www.hfea.gov.uk/AboutHFEA/HFEAMembers (accessed 2/5/06)
[377] Schedule 1, part 4 (3) *HFE Act 1990*

scientists in an area that has been seen to be 'playing God' and occasionally making claims which abhor the majority of people.[378]

Committees

The *HFE Act* permits the HFEA to "*...maintain one or more committees to discharge the Authority's functions relating to the grant, variation, suspension and revocation of licences,...*" as well as permitting the HFEA to "*...provide for the discharge of any of its other functions by committees or by members or employees of the Authority.*"[379]

This has resulted in the establishment of the Licensing Committee, the Ethics and Law Committee (ELC) and the Scientific and Clinical Advances Group (SCAG).

The Licensing Committee

The Licensing Committee is responsible for the grant, variation, suspension and revocation of licences. In accordance with Section 11 of the *HFE Act* essentially a licence is required for treatment services, storage and research upon human gametes and embryos. Any activity which involves creating an embryo outside of the human body, whether for treatment or research, requires a licence.[380] There is currently one Research Licence Committee and three Treatment Licence Committees; in October 2009 when the *Human Fertilisation and Embryology Act 2008* comes into force there will be only one of each. Additionally there will be an Executive Licensing Panel.[381] The Executive Licensing Panel will consist of a Chair and two members drawn from a pool of six and is designed to turn around applications faster than is currently achieved by the HFEA.[382] The Executive Licensing Panel will consider all initial licence applications except research licence applications and must refer any applications which are considered to be 'novel, complex or potentially controversial' to the Licence Committee for

[378] For example refer to the cloning claims made the company Clonaid backed by the French-based Raelian Sect: *Cloned baby met with doubt* BBC 27th December 2002 http://news.bbc.co.uk/1/hi/health/2608655.stm (accessed 2/5/06)
[379] Section 9(1) and (2) *HFE Act 1990*
[380] Section 3(1) *HFE Act 1990*
[381] *Authority Paper on The Executive Licensing Panel* HFEA (18th March 2009) Annex A: *New Licensing Scheme Under the HFE Act 1990 as amended* at Para 5(ii) http://www.hfea.gov.uk/docs/AM_Item_5_March_09.pdf (accessed 6/7/09)
[382] *Ibid.* at Para 4

consideration.[383] Although the Executive Licensing Panel will not consider initial research licence applications it may consider applications to renew research licences although the Chair of the Research Licence Committee must be made aware of all renewal applications and can require the renewal to be considered by the Research Licence Committee, rather than the Executive Licensing Panel, where appropriate.[384]

It is a requirement of law to approach the Licensing Committee to obtain a licence prior to commencing activities controlled by the Act. The Licensing Committee will not automatically grant a licence, a thorough review of the proposed research is undertaken. Additionally, as noted in Section 3(3) of the *HFE Act,* certain activities cannot be authorised by the Licensing Committee, these include keeping or using an embryo after the appearance of the primitive streak, placing an embryo in an animal and the genetic manipulation of an embryo.

Additionally, as discussed in Chapter 4 and below, Local Research Ethics Committee approval must be sought and obtained prior to submitting an application to the Licensing Committee of the HFEA.[385] The HFEA generally requires this of all research licence applications even though it is only a legal requirement where the research involves the use of NHS patients or facilities (see previous chapter for further discussion of this requirement). One recent application from the University of Newcastle Upon Tyne received a research licence without research ethics committee approval as the applicants were able to show that they would be working with already existing stem cell lines and as such did not need further ethical approval.[386]

Permitted areas of research

In the UK, scientists are not allowed to do any type of research that they desire within the first 14 days of development of an embryo – the legislation strictly controls the permitted areas of research. As mentioned in earlier chapters, research upon embryos

[383] *Ibid.* at Para 6.1 and Annex B, Para 5
[384] *Ibid.* at Annex B, Para 5 and 6
[385] *Regulation of Research on Human Embryos* HFEA, Section 14, page 13 http://www.hfea.gov.uk/docs/2006_Guidance_Notes_for_All_Research_Licence_Applications.pdf (accessed 08/01/08)
[386] *Derivation of Embryonic Stem cell Lines from Interspecies Embryos produced by Somatic Cell Nuclear Transfer (R0179)* Newcastle-Upon-Tyne, Centre for Stem Cell Biology & Developmental Genetics, Institute of Human Genetics http://www.hfea.gov.uk/1580.html Confirmed in personal communication with Professor Emily Jackson, 3rd July 2009, member of the HFEA

was limited to respect the special status of the human embryo, permitting limited research which accorded with the social consensus and not allowing embryos to be used for frivolous reasons. The areas permitted to be licensed are expanded upon in Schedule 2 of the *HFE Act.* Of principal concern for this work is Schedule 2, paragraph 3 which deals with licences for research. Licences may authorise the creation of embryos *in vitro* and keeping or using those embryos for the purposes of a project of research specified in the licence.[387] Research may be authorised by licence where it is

> *...necessary or desirable for the purpose of:*
> *(a) promoting advances in the treatment of infertility,*
> *(b) increasing knowledge about the causes of congenital disease,*
> *(c) increasing knowledge about the causes of miscarriages,*
> *(d) developing more effective techniques of contraception, or*
> *(e) developing methods for detecting the presence of gene or chromosome abnormalities in embryos before implantation,*
> *or for such other purposes as may be specified in regulations.*[388]

The proviso of allowing other purposes to be devised in regulations was very important for human embryonic stem cell research. Under the original purposes contained in the legislation, the HFEA could not grant a licence for human embryonic stem cell research where the purpose of the research did not fall clearly into one of the five permitted research purposes. The use of regulations allowed the UK Government to introduce further research purposes, specifically to allow human embryonic stem cell research to go ahead. The list of permitted research purposes was extended in 2001 by the *Human Fertilisation and Embryology (Research Purposes) Regulations.*[389] A licence can now also be granted where the purpose of the research is to:

> *(a) increasing knowledge about the development of embryos;*
> *(b) increasing knowledge about serious disease, or*
> *(c) enabling any such knowledge to be applied in developing treatments for serious disease.*[390]

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[387] Schedule 2, paragraph 3(1) *HFE Act 1990* Note that by referring to embryos 'created *in vitro*' these refers to all embryos created outside of the human body, regardless of the method of creation.
[388] Schedule 2, paragraph 3(2) *HFE Act 1990*
[389] SI 2001/188, hereafter referred to as the 2001 Regulations
[390] Section 2(2) *Human Fertilisation and Embryology (Research Purposes) Regulations 2001*, SI 2001/188

These regulations are somewhat controversial as they allow for the first time research upon embryos which would not directly benefit the embryos themselves or the provision of fertility services. It has also been queried whether the 2001 Regulations permit basic research to be undertaken to help improve the techniques used.[391]

The flexibility of regulations allows the Government to keep legislation up to date without undergoing a thorough review and consultation period; however, there have been criticisms of the use of regulations to introduce such a fundamental aspect to the legislation. Human embryonic stem cell research is a controversial area of research and it is argued that the permission for such research to be undertaken should have been debated further in Parliament. However, one could disagree that the use of regulations was inappropriate for the introduction of these further research purposes. In the House of Commons alone the regulations were debated for nearly fourteen hours in total, a vast amount of time for a statutory instrument.

Note that Schedule 2, Paragraph 3 authorises *"...the creation of embryos in vitro."* This would appear to refer to the creation of embryos outside of the human body rather than the creation of embryos by *in vitro* fertilisation, thereby including embryos created by the cell nuclear replacement technique and any other technique. This is an important distinction to make as even though section 1(1)(a) of the *HFE Act* has been interpreted to include embryos created by cell nuclear replacement, Schedule 2, Paragraph 3 exclusively deals with embryos being created for research licences. If it specifically stated that a research licence could authorise the creation of embryos by *in vitro* fertilisation this would exclude embryos created by cell nuclear replacement or any other method from being used in research projects. This is particularly important for human embryonic stem cell research. Often, in research projects involving the derivation of embryonic stem cells, there is a need to derive those stem cells from embryos created in a particular manner. For example, there may be a need to derive patient specific stem cells which is only possible with the use of cell nuclear replacement embryos.

The research licence cannot be granted unless the HFEA is satisfied that any proposed use of embryos is necessary for the purposes of the research.[392] This may appease somewhat those who are uncomfortable with the thought that 'potential' human

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[391] *House of Lords Select Committee on Stem Cell Research: Report* Session 2001-02 HL Paper 83(i) at Para 8.14-8.15

[392] Schedule 2, paragraph 3(6) *HFE Act 1990*

beings are used in research unnecessarily. Additionally, there is the requirement that "*No embryo appropriated for the purposes of any project of research shall be kept or used otherwise than for the purposes of such a project.*"[393] Again, this helps to alleviate and negate the fears of the public of 'Frankenstein' babies being born after research has been performed at an early stage of embryonic development and which may affect subsequent growth. Also, by limiting the type of research upon human embryos, this helps to reinforce the Gradualist status which is implied by the *HFE Act* and the enforcement of the fourteen day rule. The limitation upon research conforms to the social consensus of not outlawing embryo research but also not allowing it to occur without any limits or protection.

Applicable to all types of licences is the requirement that the premises where the treatment, storage or research is being undertaken is specified in the licence along with the name of the person under whose supervision the activities will be performed.[394] This is in accordance with the recommendations made by the Warnock Committee.

The 'Person Responsible'

The person who must supervise the activities authorised by a licence is referred to in the *HFE Act* as the 'person responsible'. The 'person responsible' is under a duty to ensure that the other people who will participate in the activity permitted by the licence are suitably qualified by training and experience, that the proper equipment is used, proper arrangements are made for keeping and disposing of gametes and embryos, that suitable practices are used and that the conditions of the licence are complied with.[395] The Licensing Committee may revoke or vary the terms of a licence if it is satisfied that the 'person responsible' has failed to, or is unable to, discharge his duties as described under section 17, as described, no longer has the character required for the supervision of the activities in the licence or that the person responsible dies or is convicted of a criminal offence.[396]

It could be said that the 'person responsible' has an onerous duty in ensuring that the conditions of the licence are complied with, after all they are unlikely to be on site

[393] Section 15(4) *HFE Act 1990*
[394] Section 12(a) and Schedule 2, paragraph 4 *HFE Act 1990*
[395] Section 17(1)(a)-(e) *HFE Act 1990*
[396] Section 18(1)(c), 18(2)(a)-(b) *HFE Act 1990*

every minute of every day supervising in minute detail. However, when dealing with such sensitive material, both physically and morally, someone needs to be responsible to ensure compliance with the licence conditions. The fact that the Licensing Committee can revoke a licence if the 'person responsible' is not capable of fulfilling his duties as defined in Section 17 demonstrates the seriousness with which the Licensing Committee deals with the treatment, storage and research of human gametes and embryos.

To date, there has been only one criminal prosecution of a 'person responsible'. The case was first heard at Southampton Crown Court (unreported) where a 'person responsible' had been prosecuted for keeping an embryo except in pursuance of a licence, contrary to sections 3(1)(b) and 41(2)(a) of the *HFE Act.* The judge directed the jury to return a verdict of not guilty as he ruled that there was no case to answer. He held that as a matter of law the defendant was not a 'keeper' of the embryos.[397] The case was referred by the Attorney General to the Court of Appeal, Criminal Division for their opinion.

The 'person responsible' in this particular situation was not the person who had been dealing directly with the embryos in question; an embryologist had in fact been the person who had dealt with the embryos incorrectly. However, the question remained for the opinion of the Court of Appeal:

> *Is the 'person responsible' as defined by the Human Fertilisation and Embryology Act 1990 a person who as a matter of law 'keeps' the embryos at the assisted conception unit at which he is named in the licence as being the 'person responsible'?*[398]

The Court of Appeal regards the *HFE Act* as providing two different mechanisms for dealing with non-compliance with the conditions of a licence. The first is a regulatory mechanism; section 18 of the *HFE Act* provides for the revocation or variation of a licence where the 'person responsible' fails to discharge his supervisory duties. The second is criminal sanctions relating to specific activities as specified in Section 41 of the *HFE Act.* Although the Court of Appeal recognises that these two methods of control are not 'mutually exclusive', it is equally recognised that the activity which triggers the regulatory mechanism will not necessarily also attract the attention of the criminal law.[399]

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[397] Facts as summarised by the Court of Appeal in *Attorney General's reference (No 2 of 2003)* [2004] EWCA Crim 785, Para's 5 & 6
[398] *Ibid.* at Para 9
[399] *Ibid.* at Para's 13 & 14

> *...regulatory mechanisms and criminal sanctions are not mutually exclusive. Criminal activity may bring the regulatory mechanisms into operation. Equally however, it does not follow that activity which infringes the licence conditions, and may trigger the regulatory mechanisms, necessarily attracts the sanctions of the criminal law.*[400]

The Court of Appeal answered the question put before them with a resounding 'No'.[401] This would seem fairest to the 'person responsible'; it would be inequitable if a 'person responsible' had fulfilled their duties under Section 17 of the *HFE Act*, in ensuring that the fellow researchers are suitably qualified and trained, and that suitable practices are used, for the 'person responsible' to then be found criminally liable for actions undertaken by those persons whom he had deemed appropriate to work on the licence project. Whilst there must be someone responsible for the work being undertaken, criminal sanctions are too extreme in this type of situation, whereby the 'person responsible' is not working directly with the material which is governed by the licence.

While it is sensible to have someone responsible for matters such as ensuring that the proper equipment is used, staff are suitably qualified and proper storage arrangements are in place, it does seem inequitable for this person to be held criminally liable for the actions of others when that person has done all that has been required of them. Rather, it would be more appropriate for the person who has performed the breach to be personally held liable.

Applying for a research licence

The cost of applying for a research licence is kept to a minimum due to Department of Health subsidisation of the HFEA. Licence fees are set at £500 and increase to £750 where the project involves the derivation of human embryonic stem cell lines; this is due to the complexity of regulating such projects.[402]

For individual research projects the HFEA has the power to grant research licences for up to three years and these can be renewed. Upon receipt of a completed application the HFEA aims to process licence applications within four months and

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[400] *Ibid.* at Para 14
[401] *Ibid.* at Para 23
[402] *HFEA Research Licence Fees* HFEA Research News http://www.hfea.gov.uk/Research/Researchnews (accessed 5/5/06)

requires local research ethics approval to have been sought prior to application.[403] The Chairman of the local research ethics committee is required to sign the completed application form to show that approval has been sought and obtained prior to application to the HFEA.[404] This is considered very important by the HFEA and has been imposed beyond what was required under the *HFE Act.* The role of the research ethics committee has been discussed in Chapter 4 of this thesis.

The requirement of seeking local research ethics committee approval prior to applying for a licence from the HFEA can be criticised as it effectively places the person applying for the licence under a double burden; the proposed research has to pass through the approval of two research committees. There are effectively two review procedures prior to the grant of a licence; the local research ethics committee and the Licensing Committee of the HFEA.

The two committees are designed to consider two different aspects of a research proposal involving human embryonic stem cell research. The local research ethics committee is designed to deal with the ethical issues, the Licensing Committee is designed to deal with the scientific and legal issues. Whilst the Licensing Committee of the HFEA does not reconsider the ethics of the research as such, it does consider if the research requires human embryos to fulfil its aims and objectives, this is an ethical consideration.

Local research ethics committees are permitted to seek the advice of specialist referees to cover any aspect of a research proposal which lies beyond the expertise of the members of the committee.[405] It can be questioned if a local research ethics committee which seeks expert advice from someone in the field of human embryonic stem cell research will receive anything more than scientific advice, the exception possibly being if the expert advises that the research can be undertaken with adult stem cells, similar to the considerations which must be fulfilled by peer reviewers of the HFEA.

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[403] *How to apply for a research licence* HFEA http://www.hfea.gov.uk/Research/Howtoapplyforaresearchlicence (accessed 5/5/06)

[404] *Regulation of Research on Human Embryos* HFEA Section 15, page 14 http://www.hfea.gov.uk/docs/2006_Guidance_Notes_for_All_Research_Licence_Applications.pdf (accessed 08/01/08)

[405] *Governance Arrangements for NHS Research Ethics Committee* (2001) Department of Health at Para 6.10

Peer Review

Upon the introduction of the *2001 Regulations* expanding the areas of research, the HFEA refined its licensing process. Applicants who wish to investigate human embryonic stem cell research have to justify the use of embryonic stem cells rather than adult stem cells, provide detailed information on the fate of the stem cells throughout the research project, and place a sample of all cell lines in the UK Stem Cell Bank.[406] Furthermore, additional peer reviewers with expertise in the field have been recruited and six monthly progress reports are required to be made after the licence has been granted (see below for further discussion of the progress reports).[407]

The recruitment of peer reviewers with expertise in the field of stem cell research is important as all research licence applications are sent out to at least two peer reviewers to report on the merits of the proposed project. The report from the peer reviewers is then submitted to the Licence Committee to assist in determining if a licence should be granted or renewed.[408]

The peer review is very detailed requiring consideration of:

- *Whether the research fulfils at least one of the categories for which embryo research is permitted*
- *The importance of the research in the field*
- *Whether research has been done before*
- *Whether the research requires human embryos to fulfil its aims and objectives*
- *Whether the research requires the numbers and types of embryos outlined in the application*
- *The suitability of the methods*
- *The length of the study*
- *The applicant's qualifications*
- *Meets the requirements of the HFEA Code of Practice including ethical approval and patient information*[409]

The consideration of the project and whether the work has been done previously is vital, as it prevents duplication of work, time and resources. This provision along with the

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[406] *Regulation of Research on Human Embryos* HFEA Section 11 http://www.hfea.gov.uk/cps/rde/xbcr/SID-3F57D79B-17AF5458/hfea/Licensing_the_use_of_Human_Embryos.pdf (accessed 5/5/06)
[407] *Ibid.* at Section 13
[408] *Ibid.* at Section 22 Personal communication from Dr Richard Martin, Head of Information, HFEA, 9th November 2006
[409] *Ibid.* at Section 12

provisions to consider the need to use human embryos and the quantities of embryos proposed to be used in the project helps to control the work being done and to avoid the unnecessary use of human embryos. While the public of the United Kingdom are generally supportive of the work being done in the field of human embryonic stem cell research, there are still many who are completely opposed to the use of human embryos in this way and others who are uncomfortable with using embryos unnecessarily.

Progress Reports

These progress reports again emphasise the importance which is attached to human embryos; the HFEA does not want to be perceived to be a body which does not consider the ethical implications of the research which it licences. In contrast the HFEA can be commended for taking a role which is both permissive of such research whilst also being protective of the research subject.

The progress reports are submitted to the HFEA once the research project is underway and allow the HFEA to oversee the research being undertaken, including the number of embryos used and if this is appropriate. For research projects which involve the derivation of human embryonic stem cell lines, there is the requirement to submit progress reports every six months from the date the licence was granted.[410]

The content of the progress report is quite detailed and, from a lay persons outlook, would take a considerable amount of time to complete properly. In actuality the level of detail required does not appear to be onerous; in fact it may help the 'person responsible', who is required to complete the progress report, to consider the research which has already been undertaken and the direction in which it is heading. This may prevent researchers from straying too far from the original licence as they will need to reconsider the licence boundaries whilst completing the progress report form.

An important section, particularly from a lay perspective, is Section 6 of the HFEA Research Progress Report.[411] Section 6 concerns the usage of material i.e. the gametes and/or embryos which are being used in the research project. The HFEA requires

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[410] *HFEA letter to all Persons Responsible* 26th July 2006 CE(06)04 HFEA http://www.hfea.gov.uk/cps/rde/xchg/SID-3F57D79B-3AD90B09/hfea/hs.xsl/1361.html (accessed 16/10/06)

[411] *HFEA Research Progress Report* can be downloaded from http://www.hfea.gov.uk/cps/rde/xbcr/SID-3F57D79B-BB56E384/hfea/2005_Research_Progress_Report__2_.pdf (accessed 12/01/07)

the researcher to reveal the number of embryos and/or eggs which they have used, to explain why the numbers are substantially different from those estimated in the original research proposal (if applicable) and to estimate the number of eggs and/or embryos which will be used in the following twelve months. The number of eggs and/or embryos being used in the research project is foreseen as the principal reason for the HFEA varying or revoking a research licence. The other main reason for varying or revoking a licence would be if a researcher has deviated so far from the original research proposal as to be considered unacceptable by the HFEA. The advantage with a central body overseeing embryo research is that it will quickly gain experience in such research projects and be able to gauge the acceptable number of eggs and/or embryos to be used in such research projects.

The numbers of eggs and/or embryos used in a research project is one of the areas which can be foreseen as causing conflict between the HFEA and the research ethics committee which gave ethical approval to the research project in the first instance. As discussed in the previous Chapter, research ethics committees also require progress reports once a project is underway and may withdraw their approval at any point during a research project. If a research ethics committee receives a progress report and concludes that the numbers of eggs and/or embryos used is unacceptable, it may withdraw its ethical approval. In contrast, the HFEA may be happy for the research project to continue due to its previous experiences with embryo research projects. Where there is conflict concerning approval for an ongoing research project the HFEA is clear that the licence holder is not able to work with only HFEA approval, research ethics committee approval is necessary.[412]

Donor Consent

When obtaining a licence to perform human embryonic stem cell research, there are additional requirements imposed when obtaining consent from patients to use their gametes or embryos in the proposed research. The HFEA requires that patients are to be informed that:

[412] Personal communication from Dr Richard Martin, Head of Information, HFEA, 9th November 2006

i. any stem cells lines created may continue indefinitely and be used in many different research projects;
ii. that once an embryo has been used in the project of research the donors have no control over any future use of the embryonic cells and any stem cell lines derived;
iii. that cell lines may be used for commercial purposes, but that the donor will not benefit financially from this; and
iv. that any cell lines derived, or discoveries made using them, could be patented, but that the donor will not benefit financially from this.[413]

The consent requirements to donate human gametes or embryos for embryonic stem cell research are far stricter than those which must be fulfilled when donating gametes or embryos for use in fertility treatment. The principle reason for this appears to be for copyright and patent reasons; any possible discoveries which may be made, potentially, have great financial rewards, besides the health benefits. The scientists, or rather the companies that they work for, will not want the donors of human material to have a claim over the financial rewards. The fact that this consideration forms part of the consent requirements protects all parties involved; the donors, by making them aware of the possible consequences arising from their donation, and the companies, by protecting their financial investment from future legal challenges.

The UK Stem Cell Bank

The HFEA imposes as a requirement of a research licence permitting human embryonic stem cell research that a sample of all embryonic stem cell lines is to be placed in the UK Stem Cell Bank.[414] This is an important step in allowing access for other researchers, ensuring that a minimum number of embryos are used in research, as well as providing information on the success of creating stem cell lines from human embryos. The role of the UK Stem Cell Bank is discussed further in Chapter 6 of this thesis.

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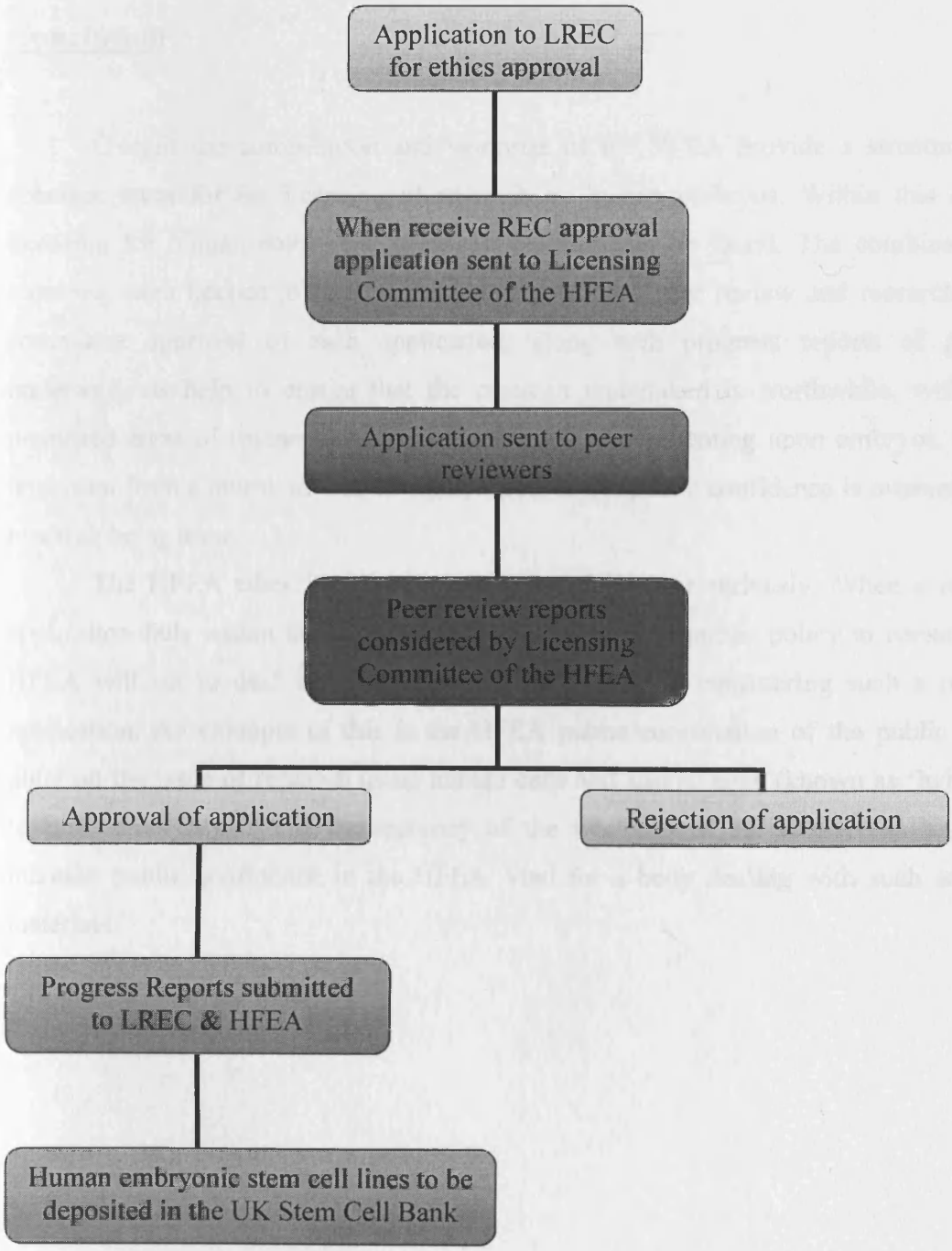
[413] *Regulation of Research on Human Embryos* HFEA Section 15
http://www.hfea.gov.uk/cps/rde/xbcr/SID-3F57D79B-17AF5458/hfea/Licensing_the_use_of_Human_Embryos.pdf (accessed 5/5/06)
[414] *Ibid.* at Section 11

Diagram: The Application Process for a Research Licence for Human Embryonic Stem Cell Research



This can be compared to the HFEA 'Decision Tree for Application for a Research Licence' found in the HFEA document 'Regulation of Research on Human Embryos' http://www.hfea.gov.uk/docs/2006_Guidance_Notes_for_All_Research_Licence_Applications.pdf Reproduced at Appendix A.

Conclusion

Overall the composition and workings of the HFEA provide a structured and coherent basis for the licensing of research on human embryos. Within this system, licensing for human embryonic stem cell research can be found. The combination of requiring each licence to have a 'person responsible', peer review and research ethics committee approval of each application, along with progress reports of projects underway, all help to ensure that the research undertaken is worthwhile, within the permitted areas of research and is not needlessly experimenting upon embryos. This is important from a moral, as well as legal, aspect as the public confidence is retained in the research being done.

The HFEA takes its role as regulator and licensor seriously. When a research application falls within their remit but there are issues of public policy to consider, the HFEA will act to deal with those policy issues prior to considering such a research application. An example of this is the HFEA public consultation of the public during 2007 on the issue of research using human cells and animal eggs (known as 'hybrid' or 'cybrid' embryos).[415] The transparency of the workings of the HFEA has helped to increase public confidence in the HFEA, vital for a body dealing with such sensitive materials.

[415] HFEA Update, Spring 2007 Pg 2 http://www.hfea.gov.uk/docs/Update3.pdf (accessed 14/03/07)

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Chapter 6 - The UK Stem Cell Bank

Introduction

As work on human embryonic stem cells gathered pace a need was identified for a central place to deposit stem cell lines which had been created. This resulted in the establishment of the UK Stem Cell Bank, the first such bank in the world.

This chapter seeks to look at the process by which the UK Stem Cell Bank came about, the composition of the Bank, the role that it plays in regulating stem cell research and its future role in bringing about and regulating clinical applications of stem cell therapies.

Pre-UK Stem Cell Bank

The Donaldson Report

The Donaldson Report, *Stem Cell Research: Medical Progress with Responsibility*, was published in June 2000.[416] The terms of reference were broad, considering many different aspects of human embryonic stem cell research. In the context of this Chapter of this thesis the relevant term of reference of the Donaldson Report was *"to advise on whether any additional regulation of the use of embryonic cell lines (such as stem cells) is required."*[417]

In light of this consideration the Donaldson Report noted that subsequent research involving cultures of stem cells fell outside of the remit of the HFEA, and although the Report did not think that further scrutiny of individual research proposals involving stem cell lines was necessary, it was desired that progress of research was to be monitored, assessed and to highlight any unforeseen concerns.[418]

As such, the Donaldson Report recommended that:

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[416] *Stem Cell Research: Medical Progress with Responsibility. A Report from the Chief Medical Officer's Expert Group Reviewing the Potential of Developments in Stem Cell Research and Cell Nuclear Replacement to Benefit Human Health* (2000) Department of Health http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_4065084 (last accessed 15/08/08) Hereafter referred to as the Donaldson Report

[417] *Ibid.* at Annex A, pg 49

[418] *Ibid.* at Para 4.34, pg 42

The Research Councils should be encouraged to establish a programme for stem cell research and to consider the feasibility of establishing collections of stem cells for research use.[419]

This recommendation of "*establishing collections of stem cells for research use*" was to lead to the establishment of the UK Stem Cell Bank.

Government Response to Donaldson

The Government response to the recommendation made by the Donaldson Report was unequivocal in its acceptance. Not only did the Government call upon the Research Councils to establish a programme for stem cell research involving all sources of stem cells, but it also called upon the Research Councils to consider the feasibility of establishing collections of stem cells for research "*...to avoid the need for researchers to continually create new cell lines or to import cell lines...*"[420] As will be seen the acceptance by the Government of the need for a central collection of stem cells would quickly hurry along the creation of the UK Stem Cell Bank.

The House of Lords Select Committee on Stem Cell Research

By the time that the House of Lords Select Committee on Stem Cell Research reported in February 2002, the Department of Health had already asked the Medical Research Council to take the lead in establishing an embryonic stem cell bank.[421] As the Select Committee reports

The Department of Health proposes that rules governing what can be deposited in and withdrawn from the bank should be established by a steering committee. Among the matters the rules would cover would be knowledge of the source of the stem cells, obtaining the consent of the donor, and establishing a full history of their storage and handling under good laboratory conditions.[422]

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[419] *Ibid.* Recommendation 9, pg 48

[420] *Government Response to the Recommendations Made in the Chief Medical Officer's Expert Group Report "Stem Cell Research: Medical Progress with Responsibility"* (2000) Department of Health Cm 4833 Recommendation 9, point 13, pg 6

[421] *House of Lords Select Committee on Stem Cell Research: Report* Session 2001-02 HL Paper 83(i) at Para 8.26

[422] *Ibid.* at Para 8.26

The Select Committee considered the issue of oversight of embryonic stem cell lines once they have been derived from embryos as a pressing matter.[423] This is understandable as although once the stem cells have been derived from an embryo and they no longer form part of an embryo, some parties would still attain a special status to the material. The regulation of human embryonic stem cells is an issue which needs to be resolved as they are not covered by the *Human Tissue Act 2004* or the *HFE Act* but the oversight of such sensitive material is important. This matter is discussed below.

The Select Committee recommended steps which would take the role of the Bank further than that proposed by the Department of Health. The Select Committee recommended that the Bank should include embryonic stem cell lines which have been generated abroad and are of the appropriate standard to be deposited with the Bank, and to facilitate the distribution of embryonic stem cell lines to researchers abroad operating under approved ethical guidelines.[424] Additionally the Select Committee recommended that the Bank should be open to the deposit of adult stem cell lines should it become possible to generate adult stem cell lines in the future.[425]

The Select Committee therefore endorsed the Department of Health proposal to create a Stem Cell Bank overseen by a steering committee. The Select Committee then goes further and for the first time we see the recommendation that the HFEA should make it a condition of granting a research licence that any embryonic stem cell lines which are created during human embryo research should be deposited with the Stem Cell Bank. The Select Committee goes on to also recommend that the HFEA checks with the Stem Cell Bank that there are no existing stem cell lines which could be used for the research.[426] This final part of the recommendation will take some time to come into force, as the creation of stem cell lines is a difficult process, it will be several years before there are sufficient numbers of stem cell lines deposited with the Stem Cell Bank which may be suitable for research. However, this is a wise recommendation to make, further enforcing the stated desire of the Select Committee and Department of Health to obviate the need to destroy excessive numbers of embryos for research.[427]

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[423] *Ibid.* at Para 8.24
[424] *Ibid.* at Para 8.27
[425] *Ibid.* at Para 8.28
[426] *Ibid.* at Para 8.29
[427] *Ibid.* at Para 8.24

The Government Response to the House of Lords Select Committee Report

The Government Response to the House of Lords Select Committee Report on Stem Cell Research was almost entirely agreeable of the recommendations made.[428] In light of the recommendations made by the Select Committee in relation to the UK Stem Cell Bank the Government was greatly supportive. The Government noted in its response that the Medical Research Council was already making progress in establishing a Stem Cell Bank. It also noted that the Research Councils had already indicated that the award of grants and funding for stem cell research would have the added requirement of banking cells with the Stem Cell Bank. All of this shows that the Stem Cell Bank had good support from its inception.

The EU Tissue and Cells Directive

The need for the UK Stem Cell Bank had also arisen due to the EU Tissue and Cells Directive. *Directive 2004/23/EC* covers tissues and cells intended for human application, not research using such material.[429] As Morgan notes, *"Whilst the current state of art does not extend to clinical applications of ES cell lines, the field is geared toward achieving such outcomes."*[430] Each Member State is obliged by the EU Tissue and Cells Directive to designate a 'competent authority' to implement the requirements of the Directive. Matters which must be complied with include, amongst others, the supervision of human tissue and cell procurement, accreditation of tissue establishments or cell preparation processes, the organisation of inspections of tissue establishments and the regulation of the import and export of human tissues and cells.[431]

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[428] *Government Response to the House of Lords Select Committee Report on Stem Cell Research* (2002) Department of Health Cmnd 5561

[429] *Directive 2004/23/EC of the European Parliament and of the Council of 31 March 2004 on setting standards of quality and safety for the donation, procurement, testing, processing, preservation, storage and distribution of human tissue and cells*, [2004] OJ L102/48 at Paragraphs 10 and 11. Hereafter referred to as the EU Tissue and Cell Directive

[430] Morgan. R., *A lack of foresight? Jurisdictional uncertainties in the regulatory interface between the HFEA, the UK Stem Cell Bank and beyond* 27(3) Legal Studies 511 at p526

[431] *Directive 2004/23/EC of the European Parliament and of the Council of 31 March 2004 on setting standards of quality and safety for the donation, procurement, testing, processing, preservation, storage and distribution of human tissue and cells*, [2004] OJ L102/48 Articles 5, 6, 7 and 9

The UK Stem Cell Bank, as discussed below, is considered to be the 'competent authority' in respect of the donation, procurement, storage, testing, processing, preservation and distribution of human embryonic stem cell lines which are to be used in clinical trials. If the UK Stem Cell Bank was not considered to be the 'competent authority' then the UK Government would need to set up yet another body to be involved in the regulation of human embryonic stem cell lines.

Not all countries have taken the step of designating a 'competent authority' to deal specifically with human embryonic stem cells. It should be noted that within the UK the Human Tissue Authority and the HFEA are both 'competent authorities' for the purposes of the Directive, but further steps were taken in respect of human embryonic stem cells by recognising the authority of the UK Stem Cell Bank.

Many of the other EU countries have designated their Ministry of Health as the 'competent authority', for example, the Czech Republic, Latvia and Slovakia. Other countries recognise the bodies which deal with transplantation as the 'competent authority', such as Bulgaria, Italy and Spain. It appears that apart from the United Kingdom only Poland has a Centre that deals with both tissues and cells, the National Centre of Tissues and Cell Banking.[432]

The UK Stem Cell Bank

Establishment

As mentioned above the Medical Research Council was asked by the Department of Health to take the lead in co-ordinating the establishment of a UK Stem Cell Bank.[433] The Medical Research Council set up a National Stem Cell Bank Advisory Committee to oversee a tendering process for the UK Stem Cell Bank. It was agreed that the Bank should be sited in an independent national laboratory to avoid conflicts of interest. The National Stem Cell Bank Advisory Committee had to consider all of the submitted tenders and generate a rank order list for the Medical Research Council to take a funding

[432] For the list of competent authorities refer to *Meeting of Competent Authorities on Tissues and Cells, 8th February 2007, Summary Report, Annex I*, European Commission http://ec.europa.eu/health/ph_threats/human_substance/documents/ev_20070208_mi_en.pdf (accessed 06/08/08)

[433] *Code of Practice of the UK Stem Cell Bank, Consultation Document* Aug 2003, Section 3.1, p11

decision in July 2002. The National Stem Cell Bank Advisory Committee was to form the Steering Committee for the Bank once it was established.[434]

On the 9th September 2002 the Medical Research Council announced that the National Institute for Biological Standards and Control had been appointed to set up the UK Stem Cell Bank.[435] The Medical Research Council and the Biotechnology and Biological Sciences Research Council were to share the costs of the UK Stem Cell Bank, 75% and 25% respectively.[436]

The first embryonic stem cell lines were deposited at the UK Stem Cell Bank on the 19th May 2004, the same day that the Bank was officially opened by the Health Minister Lord Warner. The two stem cell lines were created by researchers working separately at King's College London and the Centre for Life in Newcastle.[437]

At the time of announcing the launch of the UK Stem Cell Bank the Medical Research Council also laid out the management structure of the Bank; this consists of the Steering Committee to oversee the activities of the Bank and to establish the Codes of Practice for the Bank, a local Management Committee which will report directly to the Steering Committee, and the Joint Clinical and User Liaison Committees to discuss the use of the Bank and issues relating to the generation of stem cell lines for banking and clinical application.[438] Each of these committees is discussed in further detail below.

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[434] *House of Lords report on stem cell research* Medical Research Council http://www.mrc.ac.uk/index/strategy-strategy/strategy-science_strategy/strategy-strategy_implementation/strategy-government_spending_review_initiatives/strategy-stem_cells/strategy-house_of_lords_stem_cell_report.htm (accessed 3/8/06)

[435] *UK stem cell bank launched* Medical Research Council http://www.mrc.ac.uk/index/strategy-strategy/strategy-science_strategy/strategy-strategy_implementation/strategy-government_spending_review_initiatives/strategy-stem_cells/strategy-stem_cell_bank_launched.htm (accessed 3/8/06) Hereafter referred to as the NIBSC

[436] Hereafter referred to as the BBSRC

[437] *First stem cell lines to be deposited as UK Stem Cell Bank officially opens today* Medical Research Council http://www.mrc.ac.uk/public-interest/public-news_centre/public-press_office/public-press_releases_2004/public-19_may_2004.htm (accessed 3/8/06)

[438] *UK stem cell bank launched* Medical Research Council http://www.mrc.ac.uk/prn/index/strategy-strategy/strategy-science_strategy/strategy-strategy_implementation/strategy-government_spending_review_initiatives/strategy-stem_cells/strategy-stem_cell_bank_launched.htm (accessed 3/8/06)

Remit of the UK Stem Cell Bank

As the first Code of Practice of the UK Stem Cell Bank states:

> *The UK Stem Cell Bank has been charged with providing ethically sourced, quality controlled adult, fetal and embryonic stem cell lines for research and for the development of therapies by the national and international research community...In order to fulfil this remit the Bank must adhere to good practice standards in terms of validating, screening, processing, storing, providing and delivering stem cell lines to users.*[439]

Importantly it must be noted by the reader that the UK Stem Cell Bank does not deal solely with embryonic stem cell lines, it is designed to also bank adult and foetal stem cell lines. The Code of Practice governing the UK Stem Cell Bank covers the banking of all of these sources of stem cell lines, whether they are derived from living or dead human tissue.[440] It should also be noted that the UK Stem Cell Bank deals with stem cell lines, not individual stem cells. Stem cell lines consist of genetically identical cells.

The UK Stem Cell Bank does not yet (as of November 2008) deal with adult stem cell lines although it is authorised by its remit to do so.[441] It could be questioned if there is a need to have a Bank for adult stem cell lines. Adult stem cells have been known about, researched upon and used in medical therapies for far longer than embryonic stem cells, and without the need for a central bank. Although adult stem cell research has been around for a long time the ability of the UK Stem Cell Bank to bank adult stem cell lines should not be underestimated. Whilst adult stem cells have been used in treatments for some time, adult stem cell lines are still at an early stage of research and treatment. Should researchers wish to bank their cell lines with the UK Stem Cell Bank this should be permitted, the central storing and distribution of cell lines, regardless of their source, should help researchers to share their resources and to aid research.

The aim of the UK Stem Cell Bank to provide 'ethically sourced, quality controlled stem cell lines for research and the development of therapies' should be welcomed by the majority of commentators. By banking human stem cell lines this

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[439] *Code of Practice of the UK Stem Cell Bank, Consultation Document* Aug 2003, Section 1.1, p7
[440] *Ibid.* at Section 1.2, p7
[441] *Catalogue Overview* UK Stem Cell Bank http://www.ukstemcellbank.org.uk/catalogue.html (accessed 17/09/08)

should reduce the use of human tissue in research, embryonic and non-embryonic, facilitate access for researchers and scientists to high quality stem cell lines and enable different researchers to work on identical material.[442]

Due to the different sources of the stem cell lines which will be deposited with the UK Stem Cell Bank, the *Code of Practice for the use of Human Stem Cell Lines* recognises that there are two pieces of legislation which govern the establishment of human stem cell lines – *the Human Tissue Act 2004* and *the Human Fertilisation and Embryology Act 1990.*[443] The Code of Practice does however note that established cell lines as well as those created outside of the human body are outside of the remit of the *Human Tissue Act 2004*, this is discussed further below.[444]

Governance of the UK Stem Cell Bank

UK Stem Cell Bank Steering Committee[445]

The Steering Committee is the overarching body of the UK Stem Cell Bank, it oversees the activities of the Bank and the use of stem cell lines in the UK. Its terms of reference are:

- *To develop and monitor implementation of a code of practice for the Bank and for the use of stem cell lines*
- *To review on a case by case basis all applications to deposit and access embryonic stem cell lines*
- *To monitor all applications to deposit and access fetal and adult stem cell lines*
- *To ensure that strategies are in place to manage risk*
- *To address issues reported by the local Management Committee for the Bank*
- *To consider issues identified by the User and Clinical Liaison Committees*
- *To report at least annually to the Medical Research Council*
- *To brief Health and Science Ministers annually and advise them on request or as the need arises*[446]

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[442] Recognised in the *Code of Practice for the use of Human Stem Cell Lines* Version 3, August 2006, Section 5
http://www.ukstemcellbank.org.uk/documents/Code%20of%20Practice%20for%20the%20Use%20of%20Human%20Stem%20Cell%20Lines.pdf (accessed 30/04/08)

[443] *Ibid.* at Section 3

[444] *Ibid.* at Section 3.1

[445] Hereafter referred to as the Steering Committee

[446] *UK Stem Cell Bank Steering Committee* Medical Research Council
http://www.mrc.ac.uk/PolicyGuidance/EthicsAndGovernance/StemCells/SteeringCommittee/index.htm (last accessed 17/09/08)

The Steering Committee is chaired by Lord Patel and consists of 14 members all with different expertise and interests in stem cell research. The current (as of October 2008) committee consists of a bioethicist, two lay members (one of whom is also a solicitor), four stem cell experts, a theologian and ethicist, a lawyer, a tissue banking expert, a sociologist, a tissue engineer and a patient contact along with the Chairman who is a medical doctor.[447]

There are also a number of observers and Research Council representatives involved with the Steering Committee, this is due to the leading role which the Steering Committee plays "*...in liasing with the regional Health Departments, the Human Fertilisation and Embryology Authority, the Medicines and Healthcare products Regulatory Agency and the Research Council funders.*"[448]

The variety of people involved should help to ensure that decisions are reached equitably upon consideration of all the relevant issues. It can be assumed (although not known for certain) that the members of the Steering Committee will all be advocates of human embryonic stem cell research. Of course, with the UK Stem Cell Bank also dealing with adult and foetal stem cells, it is not as much of a necessity as could be said (and has been criticised) about the membership of the HFEA.

The Stem Cell Bank Management Committee[449]

The Management Committee of the UK Stem Cell Bank was established by the National Institute for Biological Standards and Control (NIBSC) to deal with the day to day issues relating to the Bank. The Management Committee reports to the Steering Committee.[450] As expected the Management Committee has a broad remit, the terms of reference are:

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[447] *Steering Committee Membership* http://www.mrc.ac.uk/PolicyGuidance/EthicsAndGovernance/StemCells/SteeringCommittee/index.htm (accessed 2/10/07)

[448] *Steering Committee for the UK Stem Cell Bank and for the use of Stem Cell Lines, First Annual Report, March 2004,* pg 2 Available at *Governance of the UK stem cell bank and the use of stem cell lines* Medical Research Council http://www.mrc.ac.uk/index/strategy-strategy/strategy-science_strategy/strategy-strategy_implementation/strategy-government_spending_review_initiatives/strategy-stem_cells/strategy-stem_cell_governance.htm (accessed 3/8/06)

[449] Hereafter referred to as the Management Committee

[450] *Governance of the UK stem cell bank and the use of stem cell lines* Medical Research Council

- *Oversee the establishment, management and development of the UK Stem Cell Bank.*
- *Approve and monitor implementation of financial strategies for the Bank and for Bank projects.*
- *Approve work plans for the Bank and for Bank projects and monitor progress.*
- *Approve regimes for testing, quality control etc; also certificates of analysis and supporting data.*
- *Oversee the Bank's R&D activities and ensure that Bank staff keep up to date with new stem cell developments and products.*
- *Ensure compliance with the Steering Committee's Code of Practice for the Bank and other relevant national regulatory and legal requirements and guidelines.*
- *Oversee implementation of Steering Committee decisions on applications for deposition/accession of stem cell lines.*
- *Develop marketing and customer liaison strategies.*
- *Develop a communications strategy for the Bank that interfaces with the overall stem cell communications strategies of the MRC and the BBSRC.*
- *Develop a long-term plan for the scientific and financial development of the Bank.*
- *Put in place and oversee a comprehensive risk management strategy.*
- *Approve the Bank's annual report and accounts for submission to the Steering Committee.*
- *Report to the Steering Committee.*[451]

The Management Committee is effectively the Committee which deals with the day to day and long term planning of the Stem Cell Bank, ensuring that procedures are in place and that the Code of Practice is complied with. This contrasts with the Steering Committee which assesses each application as well as addressing issues raised by the various committees of the Stem Cell Bank.

The UK Stem Cell Bank Joint Clinical and User Liaison Committee[452]

The terms of reference of the Joint Committee are to:

- *Discuss issues relating to the use of the UK Stem Cell Bank by the scientific community*
- *Bring relevant issues and concerns to the attention of the Steering Committee for the UK Stem Cell Bank and for the Use of Stem Cell Lines*[453]

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http://www.mrc.ac.uk/index/strategy-strategy/strategy-science_strategy/strategy-strategy_implementation/strategy-government_spending_review_initiatives/strategy-stem_cells/strategy-stem_cell_governance.htm (accessed 3/8/06)

[451] *UK Stem Cell Bank Management Committee* Medical Research Council http://www.mrc.ac.uk/PolicyGuidance/EthicsAndGovernance/StemCells/ManagementCommittee/index.htm (accessed 30/04/08)

[452] Hereafter referred to as the Joint Committee

[453] *UK Stem Cell Bank Joint Clinical and User Liaison Committee* Medical Research Council

The membership of the Joint Committee is currently (as of September 2008) made up of 78 people who are all working or involved in stem cell research to one degree or another.[454] This should not be surprising as the purpose of the group is to discuss issues relating to the use of the UK Stem Cell Bank by the scientific community. It is therefore logical that the Joint Committee is dominated by scientists and clinicians working in the field of stem cells and related areas. The range of experience of stem cells and of clinical application of therapies (whether adult/embryonic/foetal stem cells or other therapies) will ensure that there will be in depth and appropriate discussion of the issues which will arise in relation to the generation of stem cell therapies for clinical applications. Many of the members will be able to bring to the table their experience of past clinical applications of new therapies, which could help to ensure that some of the stumbling blocks that may have been faced in the past by those developing new therapies are avoided or at least negated as much as possible.

Originally this committee was set up as two separate committees – the Stem Cell User Liaison Committee and the Stem Cell Clinical Liaison Committee. The Clinical Liaison Committee had slightly different terms of reference to those now found for the Joint Committee.

The terms of reference for the Stem Cell Clinical Liaison Committee were:

- *To discuss clinical issues relating to the generation of stem cell lines for banking*
- *To discuss issues relating to the generation of stem cell therapies for clinical application*
- *To bring relevant issues and concerns to the attention of the Steering Committee for the UK Stem Cell Bank and for the Use of Stem Cell Lines*[455]

The two committees were merged to form the Joint Committee in 2003. The decision to merge the two committees was taken as the remits of each committee were similar.[456]

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http://www.mrc.ac.uk/PolicyGuidance/EthicsAndGovernance/StemCells/UserLiaisonCommittee/index.htm (accessed 30/04/08)

[454] *Ibid.*

[455] *Stem Cell User and Clinical Liaison Committees: Stem Cell User Liaison Committee* Medical Research Council http://www.mrc.ac.uk/index/strategy-strategy/strategy-science_strategy/strategy-strategy_implementation/strategy-government_spending_review_initiatives/strategy-stem_cells/strategy-stem_cell_governance/strategy-user_and_clinical_liaison_committees.htm (accessed 3/8/06)

[456] Personal communication with the MRC 6th May 2008

Human Fertilisation and Embryology Authority

The UK Stem Cell Bank works with the HFEA to govern and control access to human embryonic stem cells. The HFEA makes it a requirement of all licences which it grants that any human embryonic stem cell lines which are created are to be offered to the UK Stem Cell Bank for deposit.[457] Other scientists can then access the stem cell lines which are held at the UK Stem Cell Bank.

The HFEA plays an important role is ensuring that any human embryonic stem cell lines which are created are deposited in the UK Stem Cell Bank. Of course not all lines which are offered to the UK Stem Cell Bank are viable for deposit and storage but it is the role of the UK Stem Cell Bank to verify the viability of the cell lines, not the researchers who created them.

If a researcher does not offer his stem cell lines to the UK Stem Cell Bank for deposit he will be breaking a condition of his licence and therefore the HFEA is able to vary, suspend or revoke his licence.

Legislation governing the establishment of human stem cell lines

As discussed in detail elsewhere in this thesis the *HFE Act* as amended by the *2001 Regulations* sets out the permitted research purposes for which a research licence may be granted by the HFEA. Additionally for research which involves the derivation of human embryonic stem cell lines the HFEA makes it a requirement of all such research licences that the resulting stem cell lines are offered to the UK Stem Cell Bank for deposit.

What is vital to note here is that once embryonic stem cells have been extracted they are no longer subject to the controls contained in the *HFE Act*. This is recognised by the UK Stem Cell Bank in its Code of Practice.[458]

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[457] *Regulation of Research on Human Embryos* HFEA Section 11 http://www.hfea.gov.uk/cps/rde/xbcr/SID-3F57D79B-17AF5458/hfea/Licensing_the_use_of_Human_Embryos.pdf (accessed 5/5/06)

[458] *Code of Practice for the use of Human Stem Cell Lines* August 2006, Version 3 at Section 3.2, pg 8 Medical Research Council

Initially it could be thought that the extracted embryonic stem cell lines would be governed by the *Human Tissue Act 2004,* however, upon examination of the Act it quickly becomes apparent that human embryonic stem cell lines are actually outside of statutory regulation. Section 53 of the *Human Tissue Act* states that the 'relevant material' which is covered by the Act '*...means material, other than gametes, which consists of or includes human cells. [and that] references to relevant material from a human body do not include - embryos outside the human body...*' The Act continues in Section 54(7) to state that '*For the purposes of this Act, material shall not be regarded as from a human body if it is created outside the human body.*'

Therefore as embryos for research are created outside of the human body they do not fall into the remit of the Human Tissue Authority (this is as expected as they are governed by the HFEA). Equally as human embryonic stem cells are also created outside of the human body, as they are extracted from embryos which are created outside of the human body, they are also outside of the remit of the Human Tissue Authority. This is also recognised by the UK Stem Cell Bank Code of Practice which notes that "*Established cell lines as well as any other human material created outside the human body are excluded from the [Human Tissue] Act.*"[459]

Whilst the regulation of human embryonic stem cell lines is outside statutory regulation this does not lead to the conclusion that they are unregulated. The UK Stem Cell Bank notes that "*The conservation and use of human embryonic stem cells and cell lines is the responsibility of the Steering Committee.*"[460] Human embryonic stem cell lines effectively become the responsibility of the UK Stem Cell Bank before they are even created. Due to the requirement which the HFEA places upon all researchers applying for a licence to create embryos for the derivation of embryonic stem cell lines to place those resulting lines into the care of the UK Stem Cell Bank, the Bank effectively becomes aware of all embryonic stem cell lines which should be offered to it once a licence has been issued by the HFEA. Of course there is no guarantee that the scientists will be able to derive stem cell lines but once created they must be sent to the Bank for processing. The Bank then controls all access to those stem cell lines banked with it and as such controls the research which occurs upon those lines.

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http://www.ukstemcellbank.org.uk/documents/Code%20of%20Practice%20for%20the%20Use%20of%20Human%20Stem%20Cell%20Lines.pdf (accessed 2/10/07)

[459] *Ibid.* at Section 3.1, pg 7

[460] *Ibid.* at Section 3.2, pg 6

In this manner the Bank will also help to control the route to clinical applications of stem cell research. It will control it in the sense that it will direct the type of research which is permitted and as such in what areas developments and progress is made towards clinical applications. Note that the UK Stem Cell Bank does not require research ethics committee approval for research which involves established human embryonic stem cell lines but that once a researcher is to commence clinical trials of stem cell derived therapeutic products research ethics committee approval must be sought first.[461]

The UK Stem Cell Bank makes it clear in the *Code of Practice for the use of Human Stem Cell Lines* that the research projects in which human embryonic stem cell lines may be used must have *"...justified and valuable purposes that reflect the requirements of the HFEA Regulations."*[462] The Code of Practice clarifies the permitted research areas, these are:

> *(a) research which increases the knowledge about the development of embryos or has the long term goal of helping to increase knowledge about serious diseases and their treatment...*
> *(b) basic cell research which underpins these aims...*
> *(c) development of cell based therapies for clinical trials in respect of serious human diseases.*[463]

So as *"...to ensure compliance with the appropriate regulations and permissions..."* the UK Stem Cell Bank also has the right to seek periodic independent audit of the research which is being carried out, by both UK based and overseas researchers.[464]

The fact that the UK Stem Cell Bank is following the aims of Parliament in the research which it allows access to human embryonic stem cell lines for can only be seen as a good thing, even though *"It must be noted that this extra level of regulation is entirely an innovation of the UK Stem Cell Bank Steering Committee."*[465] Theoretically, without any statutory regulation relating directly to derived human embryonic stem cells the UK Stem Cell Bank is free to draw up its own areas of permitted research. This would probably be counter-productive to public confidence in an area which is already

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[461] *Ibid.* at Section 8.1.3, pg 13
[462] *Ibid.* at Section 8.1.1, pg 12
[463] *Ibid.* at Section 8.1.1, pg 12
[464] *Code of Practice of the UK Stem Cell Bank, Consultation Document*, Aug 2003 at Section 13.2, pg 29
[465] Morgan. R., *A lack of foresight? Jurisdictional uncertainties in the regulatory interface between the HFEA, the UK Stem Cell Bank and beyond* 27(3) Legal Studies 511 at p523

confusing to the average lay person. Whilst the majority of people would probably be of the opinion that the embryonic stem cell lines are merely cells, there could still be some who would like to see additional protection for embryonic stem cell lines as they may be viewed as an extension of the embryo. This is recognised by Morgan who notes that *"If ES cell lines derived under an HFEA licence were used for purposes outside those listed in para 3(2) of Sch 2 and the 2001 Regulations, then the original embryo would effectively have been used for purposes which do not outweigh its due respect."*[466] By adhering to the purposes laid out in the *2001 Regulations* and the discussions made in Parliament and in the Donaldson Committee the UK Stem Cell Bank is helping to increase public confidence in the type of work which is being carried out on human embryonic stem cells.

By following the aims of Parliament in respect of embryo research the UK Stem Cell Bank is adding extra levels of protection which will help to stop researchers from circumnavigating the permitted research purposes as laid out in the *HFE Act* and effectively prevent the frivolous use of embryos. For example it would not be desirable to allow human embryonic stem cell lines to be used for testing cosmetics as this would go beyond the purposes which Parliament debated and decided were acceptable reasons for which to override the special status which has been accorded to the human embryo. The UK Stem Cell Bank's acceptance and enforcement of the permitted research purposes as devised by Parliament implies that there is a morally sound basis for restricting research upon embryos and products derived from embryos. As discussed in earlier chapters there is a morally sound basis to this approach; the Warnock Committee recognised that the human embryo had a special status but that it was not absolute. The special moral status accorded to the human embryo could be overridden but that it must be subject to strict controls, this Gradualist status has formed the backbone to the legislation governing human embryo research and it is logical that products derived from embryos, in this case embryonic stem cells, should also be subject to some controls.

[466] *Ibid.* at p525

Foreign Stem Cell Lines

Import of Stem Cell Lines

Obviously human embryonic stem cell lines are not only generated within the UK and there may be occasions when a researcher wishes to access and use stem cell lines which have been derived abroad. The UK Stem Cell Bank recognises that this situation will arise and accordingly requires that *"all researchers wishing to work with human embryonic stem cell lines (whether accessed from the Bank, from other sources in the UK or overseas) should inform the Steering Committee..."*[467] The Steering Committee of the Stem Cell Bank oversees all research involving human embryonic stem cell lines, regardless of where the cell lines have been sourced from.[468]

The Steering Committee of the Bank *"needs to satisfy itself that the research fulfils the criteria in section 8.1.1...and that the human embryonic stem cell lines have been ethically sourced with fully informed and free donor consent."*[469] In satisfying itself that these criteria have been fulfilled the Steering Committee will refer to the information provided by the researcher on the application form to '*Import human embryonic stem cell line(s) into the UK.*'[470] The information required to be provided includes clarification that informed consent has been given in line with UK guidelines. This requirement could be considered to be onerous or difficult, particularly as each country has its own consent guidelines, not all of which may reach the UK standards, in which case the Steering Committee may refuse to give consent to import the stem cell line.

It is interesting to note that the UK Stem Cell Bank accepts that stem cell lines from certain countries will reach the required standards for consent. For example any stem cell lines which are to be imported from the United States NIH Human Embryonic Stem Cell Registry are generally accepted by the UK Stem Cell Bank. However even this source of stem cell lines has had questions raised about its consent procedures (and is discussed in further detail in Chapter 9). Although the UK Stem Cell Bank is satisfied

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[467] *Code of Practice for the use of Human Stem Cell Lines* August 2006, Version 3 at Section 8.3, page 14 Medical Research Council http://www.ukstemcellbank.org.uk/documents/Code%20of%20Practice%20for%20the%20Use%20of%20Human%20Stem%20Cell%20Lines.pdf (accessed 6/05/08)

[468] *Ibid.* at Section 8.3, page 14

[469] *Ibid.* at Section 8.3, page 14

[470] *Ibid.* Found in the Appendix

that the majority of stem cell lines from the NIH are ethically sourced, so far the UK Stem Cell Bank has accessioned some stem cell lines from the NIH Human Embryonic Stem Cell Registry but has not yet banked or distributed those stem cell lines to UK researchers.[471]

Whilst the Code of Practice of the Bank requires all researchers to apply to the Bank to import foreign stem cell lines, this is an informal control, or as Morgan states, *"...the UK Stem Cell Bank does not have the power to force compliance with its authorisation policy."*[472] Although the control of the UK Stem Cell Bank over the import of stem cell lines appears to be informal it cannot be said that it is not without force. Should a researcher import stem cell lines without the consent of the Steering Committee then the Committee will write to the researcher's superior informing them that the Bank's Code of Practice has not been complied with.[473] At this point it would be up to the researcher's superior to take appropriate action to either ensure compliance with the Code of Practice, or possibly choose to ignore the advice given by the Steering Committee. This would be unlikely when considered in light of the fact that many funding bodies in the UK support the work of the UK Stem Cell Bank. Additional control to ensure compliance with the Code of Practice can be found through this funding mechanism. Funding bodies *"...could make it a precondition of funding an ES cell project that import of ES cell lines is subject to bank approval...Nevertheless, purely private research would not be obligated to follow the Steering Committee's requirements. Such action, however, may sour the relationship between such researchers and the bank in future."*[474] Therefore, compliance with the Code of Practice to seek approval from the Steering Committee to import stem cell lines should be high.

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[471] *Announcement on stem cell lines in the NIH Registry* Medical Research Council http://www.ukstemcellbank.org.uk/index.html (accessed 19/6/09)
Stem Cell Catalogue Medical Research Council http://www.ukstemcellbank.org.uk/catalogue.html (accessed 19/6/09)

[472] Morgan. R., *A lack of foresight? Jurisdictional uncertainties in the regulatory interface between the HFEA, the UK Stem Cell Bank and beyond* 27(3) Legal Studies 511 at p525

[473] Thanks to Søren Holm for raising this point

[474] Morgan. R., *A lack of foresight? Jurisdictional uncertainties in the regulatory interface between the HFEA, the UK Stem Cell Bank and beyond* 27(3) Legal Studies 511 at p526

Export of Stem Cell Lines

When considering the exportation of stem cell lines to researchers working overseas the requirements which must be fulfilled could be seen to be overly onerous upon the researchers wishing to export. Researchers should apply to the Steering Committee for approval before exporting stem cell lines, similar to the procedure discussed above in respect of importing stem cell lines. However, there are the additional requirements that *"Research performed overseas should fulfil the criteria in Section 8.1.1 [the permitted research areas as discussed above] and must comply with legislation in the UK and in the country where the research is performed and is expected to comply with this Code of Practice."*[475]

Whilst it is perhaps admirable of the Stem Cell Bank to try to ensure that any human embryonic stem cell lines which are exported from the UK are not used for unethical research, and are in fact used for those purposes which the Bank considers to be suitable as defined in Section 8.1.1 of the Code of Practice, in reality this could be very difficult to ensure. The onus is upon the researcher who wishes to export the human embryonic stem cell lines to show that any research performed overseas complies with not only UK legislation but also the legislation of the country in which the research is going to be performed, as well as compliance with the Code of Practice. In reality once the stem cell lines pass from one country to another it could be very difficult for the UK Stem Cell Bank to enforce the requirements to comply with UK legislation.

The UK Stem Cell Bank or the researcher who exports the stem cell lines will have a contractual agreement with the receiving researcher which would include the requirements to comply with UK legislation. Should the receiving researcher breach that requirement then the Bank or exporting researcher may have a claim for damages for breach of contract. Additionally they may also be able to obtain an injunction to stop the 'illegal' research from continuing. The UK researcher or Stem Cell Bank would be able to take action either in the UK courts and then pursue the enforcement of the remedy in the receiving country's courts or, particularly if the receiving country is an EU country, sue directly in the receiving country court to enforce English law. It is likely that the

[475] *Code of Practice for the use of Human Stem Cell Lines* August 2006, Version 3 at Section 8.4, page 14 Medical Research Council http://www.ukstemcellbank.org.uk/documents/Code%20of%20Practice%20for%20the%20Use%20of%20Human%20Stem%20Cell%20Lines.pdf (accessed 6/05/08)

contracts between researchers will contain a condition that should any breach occur, English law is to be the presiding law.

Once human embryonic stem cell research progresses to the clinical therapies stage the role of the UK Stem Cell Bank in the import and export of cell lines will be reinforced by the EU Tissue and Cells Directive, as mentioned above. The EU Tissue and Cell Directive requires a 'competent authority' to *"...take all necessary measures to ensure that all imports [and exports] of tissues and cells from third countries are undertaken by tissue establishments accredited, designated, authorised or licensed for the purpose of those activities, and that imported tissues and cells can be traced from the donor to the recipient..."*[476] There is no requirement in the EU Tissue and Cells Directive that Member States receiving stem cell lines for clinical trials must comply with the permitted purposes of the Member State in which the cell lines were derived. So whilst the UK Stem Cell Bank is currently attempting to restrict research in other countries upon UK derived stem cell lines to those permitted research purposes of the UK, it does not seem that this will be possible in respect of clinical trials and applications.

Conclusion

Although there may be concern that embryonic stem cell lines are not regulated by an Act of Parliament the establishment of the UK Stem Cell Bank will have allayed many people's fears and concerns about the right of access to those stem cell lines as well as worries over the research which occurs.

The establishment of a UK Stem Cell Bank can only be a good thing; it helps make the research which is being undertaken more transparent to the public by making people aware of the stem cell lines which are available for research and the work which is being done upon them. The Bank controls the access to those stem cell lines and eventually the collection of stem cell lines may be large enough to warrant a decrease in the number of embryos used for the derivation of embryonic stem cell lines, something which may appease those who sit in the middle ground concerning the debate around the permissibility of embryo research.

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[476] *Directive 2004/23/EC of the European Parliament and of the Council of 31 March 2004 on setting standards of quality and safety for the donation, procurement, testing, processing, preservation, storage and distribution of human tissue and cells*, [2004] OJ L102/48 Article 9

The attempt by the Bank to regulate research abroad which is performed upon UK stem cell lines is open to criticism due to the difficulties in enforcing guidelines and contracts overseas. However, the attempt may well work, it is something that will have to be followed closely in the future.

The preceding chapters have discussed and analysed the regulation of human embryonic stem cell research – from the initial application to the local research ethics committee to the later application to the HFEA to create and derive the human embryonic stem cells, the regulation of the research, and the banking of the cell lines. Whilst the legislation has generally worked well in regulating human embryonic stem cell research it was in need of reform. The reform process is discussed in the following two chapters.

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Chapter 7 – Reform

Introduction

The *Human Fertilisation and Embryology Act 1990* has overall worked well for the duration of its lifetime.[477] However, that is not to say that it has been without its legal challenges. This factor, along with the rapidity with which science is developing, prompted the Government to undertake a review of the *HFE Act* with a view to replacing the existing legislation. New legislation, the *Human Fertilisation and Embryology Act 2008,* received Royal Assent on the 13th November 2008 although the majority of the Act including the provisions relating to embryo research will not come into force until October 2009.[478]

The road to reform has been a lengthy process and this chapter covers the period from 2003 to 2006. The subsequent Bills and the *HFE Act 2008* are discussed and analysed in the following chapter. It is necessary to examine the reform process to understand how and why the new legislation has been enacted in the manner which it has and how this will affect human embryonic stem cell research. It is important to recognise the interface between embryo research and human embryonic stem cell research, again legislation which governs human embryo research is being used to also regulate human embryonic stem cell research.

Historical progression of the Reports

The House of Commons Science and Technology Committee announced their intention to review the *HFE Act* in October 2003 and following the initial Report by the House of Commons Science and Technology Committee in 2005 there have been several reports and responses to those reports. For the purpose of this chapter the following documents are discussed:

[477] Hereafter referred to as the *HFE Act*
[478] Hereafter referred to as the *HFE Act 2008*

- *Human Reproductive Technologies and the Law* Fifth Report of Session 2004-05, House of Commons Science and Technology Committee HC 7-I
- *Human Reproductive Technologies and the Law:* Government Response to the Report from the House of Commons Science and Technology Committee (2005) CM 6641
- *Review of the Human Fertilisation and Embryology Act: A Public Consultation* (2005) Department of Health
- The Human Fertilisation and Embryology Authority Response to the Department of Health's consultation on the Review of the Human Fertilisation and Embryology Act, 24th November 2005, 05/33273
- *Report on the Consultation on the review of the Human Fertilisation and Embryology Act 1990: Prepared for the Department of Health* (2006) People Science and Policy Ltd
- *Review of the Human Fertilisation and Embryology Act: Proposals for revised legislation (including establishment of the Regulatory Authority for Tissue and Embryos)* (2006) Department of Health CM 6989

As the outcome of this reform is a new Act of Parliament this chapter will discuss each area individually, how it has been examined by each different body and the recommendations which have been made. The two areas which are relevant to this thesis are:

- Legislative definitions and regulation of human embryos and gametes
- Research

and as such the relevant parts of each report is discussed under these headings.

A vast amount of time and discussion was spent upon the Government's desire and proposal to merge the HFEA and the HTA to form RATE, the Regulatory Authority for Tissue and Embryos, and as such there are numerous references to this body within the documents discussed in this chapter, as well as the next. However, following the Report from the Joint Committee on the Human Tissue and Embryos (Draft) Bill, which

is discussed in greater depth in the next chapter, the Government backed down and did not push forward with the RATE proposal. Therefore the HFEA will continue to be the regulatory body responsible for human embryo research under the *HFE Act 2008.* Due to the Government's decision not to form RATE this body is not discussed in depth in this thesis, interested readers should refer to the relevant sections of the reform documents which are discussed here for further information upon this body if required.

Although the Government has now undertaken and completed a review of the *HFE Act* (which is discussed in detail below) it was initially slow to take this action. The House of Commons Science and Technology Committee decided to undertake its own review following evidence provided to it by the outgoing Chair of the Human Fertilisation and Embryology Authority, Dame Ruth Deech in April 2002.[479] The Committee felt that Dame Deech gave a "*...complacent response to developments in [a] fast-moving field...*" and equally that the Department of Health's response that the Government was keeping the *HFE Act* under review was a "*limp response.*"[480]

Therefore the Science and Technology Committee announced its own review on the 24th October 2003.[481] The Department of Health finally announced its own review of the *HFE Act* on the 21st January 2004 but waited for the publication of the Science and Technology Committee Report to inform its own review.[482]

The terms of reference of the *Inquiry into Human Reproduction and the Law* were:

> *a)* *To consider a) the balance between legislation, regulation and reproductive freedom; b) the role of Parliament in the area of human reproductive technologies; and c) the foundation, adequacy and appropriateness of the ethical framework for legislation on reproductive technologies.*
>
> *b)* *To consider the provisions of the Human Fertilisation and Embryology Act 1990 in the context of other national and international legislation and regulation of medical practice and research*

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[479] Hereafter referred to as the Science and Technology Committee

[480] *Human Reproductive Technologies and the Law* Fifth Report of Session 2004-05, House of Commons Science and Technology Committee HC 7-I at Para 2, Pg 3

[481] *New Inquiry: Human Reproductive Technologies and the Law* Press Release No. 45, Session 2002-2003, House of Commons Science and Technology Committee, 24th October 2003 http://www.parliament.uk/parliamentary_committees/science_and_technology_committee/scitech241003.cfm (last accessed 30/10/08)

[482] *Human Reproductive Technologies and the Law* Fifth Report of Session 2004-05, House of Commons Science and Technology Committee HC 7-I at Para 2, Pg 3

c) *To consider the challenges to the Human Fertilisation and Embryology Act 1990 from a) the development of new technologies for research and development, and their ethical and societal implications and b) recent changes in ethical and societal attitudes*

d) *To consider the composition, expertise and approach of the Human Fertilisation and Embryology Authority, its code of practice, licensing arrangements and the provision of information to patients, the profession and the public.*[483]

As can be seen the Science and Technology Committee undertook a thorough and comprehensive review of the *HFE Act* and related areas. It also carried out an on-line consultation to try to include as many people as possible from a cross-section of society.[484]

The Government presented its response to the House of Commons Science and Technology Committee Report on Human Reproductive Technologies and the Law in August 2005.[485]

As previously mentioned the Government had announced its own review of the *HFE Act* on the 21st January 2004 and as such had considered the Science and Technology Committee recommendations and conclusions in light of its own review. The Government responded to the recommendations made by the Science and Technology Committee by grouping together recommendations by topic rather than responding to each recommendation individually. The Government Response is discussed in this manner below.

Following the publication of the House of Commons Science and Technology Committee Report and the Government Response to that Report, the Department of Health released the *Review of the Human Fertilisation and Embryology Act: A Public Consultation* in August 2005.[486] Responses to the Public Consultation had to be received by Friday 25th November 2005. The responses were then collated and reported (see below).

For the purposes of this thesis there are two sections of the Public Consultation document which are relevant; Section Two: The model and scope of Regulation and

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[483] *Ibid.* at Table 1, Pg 4

[484] Hansard Society Online Consultation on Human Reproductive Technologies and the Law, Summary Report March 2004 http://tellparliament.net/scitech/documents/sci-tech-report.pdf (last accessed 07/08/08)

[485] *Human Reproductive Technologies and the Law:* Government Response to the Report from the House of Commons Science and Technology Committee (2005) CM 6641

[486] (2005) Department of Health http://www.dh.gov.uk/en/Consultations/Closedconsultations/DH_4123863 (last accessed 17/09/08)

Section 9: Research. Both are discussed in turn. The questions and proposals for consultation which the Government laid out in this Public Consultation can be found in full in Annex B of the Consultation.

People Science and Policy Ltd were asked to prepare a report which "*...summarises the landscape of arguments put forward in response to the DH consultation document.*"[487] A total of 535 responses were received and the arguments submitted are summarised within the Consultation Report.

The Consultation Report is laid out in the same structure as the Consultation Document upon which it is summarising. As such only the relevant parts of the Consultation Report will be discussed, those which correspond to the areas highlighted above in the discussion of the Consultation Document.

The White Paper was published just nine months after the *Report on the Consultation on the Review of the Human Fertilisation and Embryology Act 1990.* The White Paper is a comprehensive account of the proposed revised legislation, giving the reader the general scope and purpose of the proposed legislation. As with the *HFE Act* the proposed revised legislation covers a wide range of issues connected to human fertilisation and embryology, nonetheless, there are a large number of issues discussed within the White paper which relate to human embryonic stem cell research and these are examined below.

> *The Government recognised that the HFE Act had worked well and largely continued to do so, enabling science and medicine to flourish within agreed parameters and promoting public confidence...[and] has concluded that the foundations of the current law remain sound, and provide an effective and appropriate model of regulation for the development and use of human reproductive technologies.*[488]

Although the *HFE Act* had worked well the Government finally decided that a review of the Act was necessary due to a number of issues, including "*possible changes in public perceptions and attitude's on complex ethical issues.*"[489] These possible changes

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[487] *Report on the Consultation on the review of the Human Fertilisation and Embryology Act 1990: Prepared for the Department of Health* (2006) People Science and Policy Ltd http://www.peoplescienceandpolicy.com/downloads/FINAL_HFEA_reportDH.pdf (accessed 5/9/07) pg 1

[488] *Review of the Human Fertilisation and Embryology Act: Proposals for revised legislation (including establishment of the Regulatory Authority for Tissue and Embryos)* (2006) Department of Health CM 6989 at Para 1.2 and 1.8

[489] *Ibid.* at Para 1.3

are partly due to the rate at which science is progressing and the developments which are being made in respect of human embryo research and human embryonic stem cell research.

The need to keep legislation up to date was recognised within Paragraph 2.5 where it was stated that *"...regulatory controls need to be responsive to technological advances, and to keep pace with significant changes in public attitudes."* It is for this reason that the Government had finally undertaken the review of the *HFE Act* and published the White Paper with proposals to revise the legislation.

The relevant sections of all the Reports, Responses and Papers are discussed in the following sections.

Legislative definitions and regulation of human embryos and gametes

Human Reproductive Technologies and the Law

Chapter 4 – Problems with the HFE Act

The Science and Technology Committee identified a number of problems with the *HFE Act* including artificial gametes, fertility research and sperm sorting. For this part of the thesis the areas which will be considered are; the definition of an embryo, the 14 day rule and embryos created not by fertilisation.

Definition of an embryo and gamete - Recommendations 5 and 99

The first problem which the Science and Technology Committee discussed was the definition of an embryo contained in section 1(1) of the *HFE Act*. The definition based upon fertilisation did not cause a problem until researchers at the Roslin Institute in Scotland demonstrated the success of the cell nuclear replacement technique. It was noted that

> *While the HFE Act had foreseen cloning, it had assumed that this would require the replacement of an embryonic nucleus rather than an egg and had outlawed*

cloning only in specific terms, which did not include the method used to create Dolly.[490]

The Government however believed that the *HFE Act* covered such embryos and this was upheld by the House of Lords in the *Quintavalle* case (see discussion in Chapter 3).[491] Although the situation has since been resolved by the Courts, the HFEA in its evidence to the Science and Technology Committee suggested that the definition contained in the *HFE Act* was unsatisfactory.

The Science and Technology Committee formulated three different ways in which the problem of the definition of an embryo could be addressed:

a) *By redefining the embryo, at least defining those types of embryo that fall under legislation, according to the way in which they were created. This has the advantage of clarity but it fails to embrace any future technique that might be developed....*
b) *By defining an embryo by its capabilities. For example, it could embrace any diploid (two sets of chromosomes) with the potential to differentiate....danger that embryonic stem cells might be swept up by such a definition....*
c) *A final option would be to avoid any definition, as is the case in the 2001 Human Reproductive Cloning Act. Using this approach, the term "embryo" would cover the normal usage of the word....*[492]

Following this discussion of the possible ways to define an embryo within the legislation the Science and Technology Committee recommended that any future legislation should not contain a definition:

We are concerned that any legal definitions of the embryo based on the way it was created or its capabilities would either be open to legal challenge or fail to withstand technological advance. The attempt to define an embryo in the HFE Act has proved counter-productive, and we recommend that any future legislation should resist the temptation to redefine it. We consider that a better approach would be to define the forms of embryo that can be implanted and under what circumstances. Using this approach, only those forms of embryo specified in the legislation, such as those created by fertilisation, could be implanted in the womb and thereby used for reproductive purposes. Other forms of embryos would be regulated insofar as they are created and used for research purposes.[493]

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[490] *Human Reproductive Technologies and the Law* Fifth Report of Session 2004-05, House of Commons Science and Technology Committee HC 7-I at Para 51, Pg 25
[491] *R (on the application of Quintavalle) v Secretary of State for Health* [2003] 2 All ER 113
[492] *Human Reproductive Technologies and the Law* Fifth Report of Session 2004-05, House of Commons Science and Technology Committee HC 7-I at Para 52, Pg 26-27
[493] *Ibid.* at Para 53, Pg 27

This approach would be the simplest to take and would help to avoid any future legal challenges to the legislation. The *HFE Act* and the HFEA have been subjected to numerous legal challenges during their short history and as will be seen in the next Chapter of this thesis the Government has learned from these legal challenges and has tried to avoid definitional problems in the future. One possible problem with the suggestion made by the Science and Technology Committee is the development of artificial wombs. If the new legislation was to specify the types of embryos which could be implanted into wombs, as is suggested by the Science and Technology Committee, the wording of the legislation would have to be clear as to whether this includes artificial wombs or not. In this fast moving area of science the new legislation has to be very carefully worded, not just in respect of the definition of an embryo, but all associated expressions must be very clear. Whilst this would help to prevent legal challenges, the drafters of the legislation must be equally clear that the terms used do not in the future give the automatic green light for work which may be considered undesirable or unethical and that equally the terms do not block ethically acceptable research.

The 14 day Rule – Recommendation 7

The Warnock Report first recommended a short time limit during which research could be performed upon human embryos to protect the special status of human embryos. The Gradualist approach taken resulted in the recommendation that no embryo was to be allowed to develop beyond fourteen days, or the appearance of the primitive streak, whichever occurs first, from the moment that the gametes were mixed, not including time when it is stored. This was due to the knowledge that the primitive streak develops around this time and that "*This marks the beginning of individual development of the embryo.*"[494]

The fourteen day rule, as it is known, was carried through to the *HFE Act* and the Science and Technology Committee considered if the rule was still adequate. While it is generally accepted as a good cut off point (although there are some who feel that it is an

[494] *Report of the Committee of Inquiry into Human Fertilisation and Embryology* (The Warnock Report) (1984) DHSS Cmnd 9314 at Para 11.22, Pg 66

arbitrary cut off point) it was noted that the time limit may need to be re-evaluated in the future.

The Science and Technology Committee, in its considerations of the fourteen day rule, did not deem that the time limit currently needed to be adjusted. The Science and Technology Committee did however continue on to state that:

> *...if scientists or clinicians were able to provide convincing justification for any change, this should be determined by Parliament*[495]

This was a sensible recommendation. The fourteen day rule has so far stood the test of time with scientists currently extracting stem cells at around five to six days development and with no record of an embryo being successfully cultivated *in vitro* for up to fourteen days, there does not appear to be any urgency in readdressing this rule. However, as can be seen from the example of the development of the cell nuclear replacement technique and the successful extraction of human embryonic stem cells, there is the possibility that there could in the future be cause to review the time limit imposed by statute. The recommendation that this be done by Parliament was the most appropriate as the alteration of the time limit would no doubt be a controversial one, and should be thoroughly debated in Parliament before a free vote.

Embryos not formed through fertilisation

The Science and Technology Committee noted that embryos not formed through fertilisation were governed by two pieces of legislation – the *HFE Act* and the *Human Reproductive Cloning Act 2001.*

The Science and Technology Committee made a detailed discussion of the issues surrounding human reproductive cloning, the possible advantages and the disadvantages of allowing it, yet in respect of human therapeutic cloning in relation to the derivation of human embryonic stem cells the Science and Technology Committee took the view that;

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[495] *Human Reproductive Technologies and the Law* Fifth Report of Session 2004-05, House of Commons Science and Technology Committee HC 7-I, Para 58, Pg 30

The issues have been comprehensively addressed by the House of Lords Stem Cell Research Committee in 2001 and we are unaware of any new evidence that would require a reassessment of that Committee's conclusions, which we respect.[496]

Their interest in therapeutic cloning related to the adequacy of the *2001 Regulations* which extended the permitted areas of research, this is discussed later on in the Report.

***Human Reproductive Technologies and the Law:* Government Response**

Definition of an embryo – Recommendations 5, 99 and 7

The Government welcomed the Science and Technology Committee recommendations to avoid defining the embryo in future legislation but to define the embryo which may be implanted and in what circumstances. The Government agreed that there may be merit in taking this approach in future legislation and intended to consult further in its review of the *HFE Act.*[497]

The Government also considered the fourteen day rule under this heading. The Government agreed with the Science and Technology Committee that there was presently no need to alter the fourteen day rule but that if there came a time when scientists or clinicians could justify altering the time limit then this must be determined by Parliament.[498]

Review of the Human Fertilisation and Embryology Act: A Public Consultation

Definition of an embryo

The definition of an embryo as contained in the *HFE Act* plays a vital role as it underpins many of the basic prohibitions relating to embryos. This definition has been subjected to legal challenge and although the Courts have taken a purposive approach to interpret the law to follow the will of Parliament, it is not appropriate that such a

[496] *Ibid.* at Para 72, Pg 36
[497] *Human Reproductive Technologies and the Law:* Government Response to the Report from the House of Commons Science and Technology Committee (2005) CM 6641 at Para 13, Pg 9
[498] *Ibid.* at Para 14, Pg 9

fundamental aspect of the law should be subjected to legal challenge and it is be hoped that this could be avoided in the future.

The Government took an all inclusive approach to the definition of an embryo and stated within the Public Consultation document that it:

> *...believes that legislation should make clear that all human embryos outside the body are within the scope of regulation and subject to the control of the statutory licensing authority regardless of the manner of their creation.*[499]

The Government goes on to state that it:

> *...considers that the best approach is to define the forms of embryo which may be placed in a woman and in what circumstances, and to regulate other forms of embryo insofar as these are created and used for research.*[500]

This approach was the same as that taken by the Science and Technology Committee of the House of Commons. It would conform with the position found within the *Human Reproductive Cloning Act 2001* and would encompass all future forms of creating embryos, even if the method of creation was not foreseen, as was the situation with the cell nuclear replacement technique.

Also, by defining the embryos which may be implanted it clearly separates those embryos upon which only research may be performed and those embryos which may be researched upon or implanted.

Definition of gametes, eggs, sperm

The *HFE Act* does not currently define the terms gametes, eggs or sperm, but with the advent of artificial gametes and the possibility of these being used to overcome infertility problems, the Government foresaw the need to define those terms. The need to include a definition was raised by the Government in the respect that it was seen as undesirable to use artificial gametes in treatment due to safety and ethical concerns and a definition may be needed in order to effectively prohibit the use of artificial gametes.

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[499] *Review of the Human Fertilisation and Embryology Act: A Public Consultation* (2005) Department of Health at Para 2.20, Pg 14

[500] *Ibid.* at Para 2.22, Pg 15

Importantly though, the Government also proposed that legislation should contain a power for Parliament to make regulations. This would have given Parliament the flexibility to allow the use of artificial gametes if it wished to do so in the future. This could have been very useful and important as the situation may indeed arise whereby artificial gametes become a safe option to treat infertility.

Report on the Consultation on the review of the Human Fertilisation and Embryology Act 1990

Regulation of embryos

The majority of the responses agreed with the proposals by the Government that firstly new legislation should make it clear that all human embryos outside of the body were within the scope of regulation and control of the statutory licensing authority regardless of the manner of their creation, that secondly the forms of embryos and the circumstances in which they could be placed into a woman should be defined and thirdly to regulate other forms of embryos which are created and used for research. Some concerns were raised over the possible restrictiveness of definitions whilst others felt that the use of embryos for research purposes was wrong.[501]

Of course the use of embryos for research will always be a contentious issue to which there is no easy answer which will satisfy everyone. Overall it can be said that the Government proposals were well received as the majority of discussants centred their responses around how best to regulate embryos rather than outlawing such processes.

Regulation of eggs

There appears to have been an almost unanimous response to the Government's proposal that eggs undergoing processes intended to result in the creation of embryos should continue to be subject to regulation. There was even a suggestion to extend regulation to all embryos and gametes intended to partake in *in utero* development.[502] This suggestion appears to include gametes and embryos held within the human body and

[501] *Report on the Consultation on the review of the Human Fertilisation and Embryology Act 1990: Prepared for the Department of Health* (2006) People Science and Policy Ltd at Para 2.3.1, pg 6-7 http://www.peoplescienceandpolicy.com/downloads/FINAL_HFEA_reportDH.pdf (accessed 5/9/07)
[502] *Ibid.* at Para 2.3.2, pg 7

would be very difficult to put into practice. Currently embryos which are created outside of the body are regulated as are gametes. Previously clinics using fresh gametes for gamete intra-fallopian transfer (GIFT) or inter-uterine insemination (IUI) were excluded from the need for a licence. This is no longer the case due to the implementation of the EU Tissue and Cells Directive and all such clinics were required to have a licence by the 7th April 2007.[503]

Artificial gametes

The Government proposal that the use of artificial gametes for infertility treatments should be prohibited for the time being invoked a mixed response but it was the proposal by Government that the legislation should contain a regulation-making power to allow Parliament to permit the use of artificial gametes in the future if the need arose which was not as well met. It was felt that a full Parliamentary debate should be required before there was any amendment which would permit the use of artificial gametes for infertility treatment.[504]

Review of the Human Fertilisation and Embryology Act: Proposals for revised legislation

Embryos and gametes

Within the White Paper there was a continued acceptance that *"...activities involving the creation, keeping or use of embryos outside the body, or the use of donated gametes, should continue to be subject to licensing by an independent regulator."*[505] Of course it was vital that 'embryo' and 'gamete' were sufficiently defined within the new legislation so that all embryos and gametes which the Government wished to regulate were covered by the system of licensing. This was vital so as to avoid legal challenges

[503] *HFEA Consultation on Annual Fees for Centres Licensed under the European Tissue and Cells Directive from 7 April 2007* HFEA http://www.hfea.gov.uk/docs/2006-09-25_EUTD_Fees_Consultation_-_Final.pdf (accessed 07/08/08)

[504] *Report on the Consultation on the review of the Human Fertilisation and Embryology Act 1990: Prepared for the Department of Health* (2006) People Science and Policy Ltd at Para 2.4, pg 7-8 http://www.peoplescienceandpolicy.com/downloads/FINAL_HFEA_reportDH.pdf (accessed 5/9/07)

[505] *Review of the Human Fertilisation and Embryology Act: Proposals for revised legislation (including establishment of the Regulatory Authority for Tissue and Embryos)* (2006) Department of Health CM 6989 at Para 2.9

such as the *Quintavalle* case which challenged the legal definition of an embryo as contained within the *HFE Act*. For further discussion of this case refer to Chapter 3 of this thesis.

The Government proposed a broader definition of an embryo, as it was the intention of Government *"...that all human embryos outside the body, regardless of their manner of creation, will be within the scope of regulation."*[506] The proposed approach was to define the types of embryos which may be placed into a woman and to ensure that all embryos which were created for research purposes were subject to licensing.[507]

The need to regulate all embryos regardless of the manner of their creation was without doubt. To continue public confidence in the area of human embryo research it was vital that all work on human embryos and gametes was strictly regulated and controlled by the licensing authority. However, by defining the types of embryos which can be placed into a woman there was the risk that the legislation could again become quickly outdated if scientists discovered a new method for creating embryos which would be acceptable for reproductive means.

Equally, the Government intended to continue to regulate 'eggs in the process of fertilisation' in the same way as embryos, and to also regulate eggs undergoing other processes of embryo creation. This was a sensible idea as it would include eggs undergoing the cell nuclear replacement technique, parthenogenesis and any other method which scientists may devise in the future.

Whilst 'gametes' are not currently defined in the *HFE Act* it was recognised that the previously accepted understanding of human gametes, i.e. naturally produced eggs and sperm from the reproductive organs of humans, was no longer universal, particularly in light of the developments with artificial gametes. No definition was proposed for gametes within the White Paper although it was made clear that the law would apply to all cells pertaining to be human gametes (however created). Artificial gametes would also be subject to additional controls.

One other point in respect of human embryos is that the Government proposed to extend the statutory storage period from five years, to ten years, this being in line with the current statutory storage period for gametes.[508] This may appear to be of greater

[506] *Ibid.* at Para 2.11
[507] *Ibid.* at Para 2.11
[508] *Ibid.* at Para 2.37

relevance in respect of infertility treatment; nevertheless it could also be of use for embryo research. The vast majority of embryos upon which research is performed come from fertility treatments, embryos which are 'surplus' to the fertility requirements of the couple undergoing treatment. The current five year statutory storage period is relatively short in terms of a couple undergoing treatment, having a child (hopefully) and then deciding what to do with the remaining embryos which are in storage. It is the thought of the author of this thesis that it is possible that couples are faced with a looming deadline to do something with the stored embryos and may not feel ready to donate them to research and thereby preferring them to be disposed of. However, if the statutory storage period was extended, there is the possibility that the longer couples have to decide what to do with any remaining embryos following fertility treatment, there may be a trend towards donation to research if the couple have a longer period to reflect and decide. This could result in a greater number of embryos being donated for research and which are suitable for research, thereby helping the scientists who need more than are currently available for their research.

Research

Human Reproductive Technologies and the Law

Research

As noted previously, the *2001 Regulations* extended the permitted purposes of research. The *2001 Regulations* allow the use of embryos for therapeutic research, including research involving human embryonic stem cells.

Some concerns were raised over the *2001 Regulations*. As the Science and Technology Committee were told in the evidence submitted to them, the derivation of human embryonic stem cells and the creation of embryos by the cell nuclear replacement technique are not easy processes to achieve successfully. Basic research could improve the success rates but it was questioned if the *2001 Regulations* permitted this basic research to be carried out.

Valuable basic research could be undertaken in perfecting these techniques yet it would yield no information on serious disease, nor arguably increase knowledge about the development of embryos.[509]

The issue of permitting basic research upon human embryos was an area which needed to be addressed clearly within the legislation and the permitted research purposes. It was obviously an area of concern for the Science and Technology Committee.

Recommendation 104

The Science and Technology Committee noted that embryo research would have to be undertaken in an accredited facility, have been scrutinised by a research ethics committee, and been scientifically reviewed. The Science and Technology Committee suggested that the Medical Research Council (MRC) guidelines should be adopted to ensure that embryo research was of real clinical benefit and also suggested that the MRC took on the peer review process for applications involving human embryos even where the application did not involve MRC funds.[510] There was no specific reason given for the MRC to take over the peer review process, one possible reason could be to ensure independence from the HFEA so as to guarantee thoroughly independent review of proposed research projects.

***Human Reproductive Technologies and the Law:* Government Response**

Embryo Research – Recommendations 83 and 104

These two recommendations were made by the Science and Technology Committee in relation to Ethical Oversight and Research respectively and are discussed under those headings. The Government Response has grouped these two recommendations under the heading 'Embryo Research' along with recommendations 4, 59 and 100.

The recommendation to move towards local oversight of research on human embryos was not accepted by the Government as serious doubts were expressed over the

[509] *Human Reproductive Technologies and the Law* Fifth Report of Session 2004-05, House of Commons Science and Technology Committee HC 7-I at Para 175, Pg 79
[510] *Ibid.* at Para 400, Pg 173-4

consistency of decision-making, the expertise available, and the clarity of responsibilities in such a system. The Government believed that the purposes for which research using embryos may be undertaken should continue to be determined by Parliament and that such research projects should also continue to be approved by a national body to ensure compliance with the law, consistency and appropriate ethical oversight.[511]

Review of the Human Fertilisation and Embryology Act: A Public Consultation

Cell nuclear replacement

The *HFE Act* permits the creation of embryos with the cell nuclear replacement technique for the purposes of research only. The use of the cell nuclear replacement technique on embryos once they have been created is prohibited by law. There are two issues upon which the Government invited opinions; the first being that subject to licensing the cell nuclear replacement technique should be permitted to be used for the purpose of studying mitochondrial diseases, the second that the prohibition of preventing "*the replacing of a nucleus of a cell of an embryo with the nucleus taken from the cell of any person, another embryo or subsequent development of an embryo*" should be removed for research purposes.[512]

What is interesting to note is that the cell nuclear replacement technique was permitted in the first instance primarily for the research which was desired to be undertaken with human embryonic stem cells, and yet there is no further mention of the technique being used in conjunction with stem cell research here. To the Government at least it seemed to be an open and shut case that stem cell research in conjunction with the cell nuclear replacement technique should continue to be permitted under the new legislation, and did not need to be put out for public consultation. Whilst the *2001 Regulations* which extended the permitted research purposes received considerable parliamentary time for debate, the inclusion of the cell nuclear replacement technique in the legislation was not debated in this manner. The inclusion of the cell nuclear replacement technique for therapeutic or research purposes has not been fully debated by

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[511] *Human Reproductive Technologies and the Law:* Government Response to the Report from the House of Commons Science and Technology Committee (2005) CM 6641 at Para 11 and 12, Pg 8

[512] *Review of the Human Fertilisation and Embryology Act: A Public Consultation* (2005) Department of Health at Para's 9.22-9.23, Pg 63

Parliament although it is clear that the technique is included in the *HFE Act* due to the House of Lords decision in *Quintavalle*.[513] As discussed in an earlier Chapter the *Human Reproductive Cloning Act 2001* was enacted as a knee jerk reaction to the decision of the High Court in *Quintavalle*. The debate at the time of the *Human Reproductive Cloning Act 2001* was more concerned with the possible reproductive uses of the cell nuclear replacement technique, rather than the therapeutic uses. The Government felt that it was important to act quickly to outlaw human reproductive cloning and debate the issue of therapeutic cloning at a later date. The actual inclusion of the technique in the legislation for therapeutic purposes has not been fully debated subsequently.

The purposes for which research may be permitted

The Government very briefly dealt with the research purposes contained within the *HFE Act*. The concern which was raised, that the list of research purposes may not allow some basic research to be performed, was dismissed by the Government which stated that:

> *The Government has previously made clear that it is confident that basic research is permissible under the current list of legitimate research purposes.*[514]

The Government merely invited opinions on whether the current list of research purposes for research involving embryos was appropriate. It could be foreseen that some commentators would still take this opportunity to raise their concerns that basic research was not permitted under the legislation. It seemed somewhat naïve for the Government to think that just because it believed that basic research was permitted, that everyone would just accept this. The concern that basic research was not covered by the research purposes has been raised several times, most recently by the Science and Technology Committee in its Report.[515] It was an issue which needed clarification in the legislation as it is a fundamental part of the embryo research process.

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[513] *R (on the application of Quintavalle) v Secretary of State for Health* [2003] 2 All ER 113 Refer to Chapter 3 for a discussion of this case

[514] *Review of the Human Fertilisation and Embryology Act: A Public Consultation* (2005) Department of Health at Para 9.37, Pg 69

[515] *Human Reproductive Technologies and the Law* Fifth Report of Session 2004-05, House of Commons Science and Technology Committee HC 7-I at Para 175, Pg 79

Approval of research projects

The current system of requiring a research proposal to be approved by a local research ethics committee before passing to the HFEA for approval and licensing, was criticised as bureaucratic and time consuming. Although there was a suggestion for approval to lay with the local research ethics committee only, the Government rejected this and considered that not only should research purposes continue to be defined by law, but also that research projects should continue to be approved by a national body to ensure compliance with the law, consistency and ethical oversight.[516]

There is a definite advantage of a national body overseeing research projects; consistency in decisions is the primary one. However, the Government did need to seriously reconsider how research projects were approved as the present-day system of requiring research ethics committee approval prior to approval from the HFEA duplicates work, frustrates the participants, and involves additional costs, resources and time. This lack of consideration of the way in which research projects involving human embryos receive ethical approval is worrying. The Government wished to see consistency in decisions; with the limited number of research ethics committees that have experience of dealing with research projects involving human embryos, there should be greater concern that there is not consistency at the ethical approval stage of the process. As discussed elsewhere in this thesis, a single central research ethics committee, possibly even forming part of the HFEA or the UK Stem Cell Bank, could carry out ethical approval of all projects involving human embryos before the application passes to the Licensing Committee of the HFEA for scientific approval.

Creation of embryos for therapeutic purposes

One concern which has been raised about the research purposes contained within the legislation is that whilst they permit research upon embryos for research purposes, the legislation does not allow the creation of embryos for treatment purposes, other than as a means to assist a woman to carry children. Effectively this means that embryos can be

[516] *Review of the Human Fertilisation and Embryology Act: A Public Consultation* (2005) Department of Health at Para 9.41, Pg 70

researched upon but once a therapy has been designed, if the therapy requires the creation of embryos this would be prohibited under the Act.

> *The Government invites comments upon the desirability of allowing the creation of embryos for the treatment of serious diseases (as distinct from research into developing treatments for serious diseases which is already allowed.)*[517]

This was an important consideration and it was logical that the creation of embryos for therapeutic purposes should be permitted in the new legislation. It seemed somewhat bizarre if the legislation allowed the creation of embryos for research purposes, but that any subsequent research could not be therapeutically applied due to a prohibition on creating embryos for this purpose.

This would be a controversial step as it is going beyond using surplus embryos for research, the issue of creating embryos for personal gain, along with the number of embryos involved and the possibility of needing to use the cell nuclear replacement technique in conjunction, is for some people a step too far. Although it may at first sight seem strange that new legislation may allow the creation of embryos purely for research purposes and not for therapeutic purposes, it was actually politically sensible to take this route. It is thought by the author of this thesis that by not yet taking a decision on this step it allowed the new legislation to pass through Parliament relatively easily, after all, any possible therapies are a long way in the future and are still merely a possibility. Politically there was no need to make a decision on this matter before needed.

There are also questions as to how the therapies may occur in the sense that we do not know if it will be possible to create a number of 'general' stem cell lines for use by the majority of people or if any therapy needs to be individually tailored. Two different scenarios are foreseeable – the use of human embryonic stem cells in personalised medical treatments, through the derivation of embryonic stem cells from embryos cloned using a patients DNA or the 'general' application of stem cell lines. These stem cell lines would probably be derived from embryos which are surplus to reproductive uses, similar to the current situation of using surplus embryos for research. Commercially this would be very attractive but the creation of embryos specifically to derive 'general' stem cells for treatment is prohibited under the current legislation even if it could help thousands of

[517] *Ibid.* at Para 9.47, Pg 71

people. If the stem cells were initially derived for research purposes but then later found to have a therapeutic purpose this may be permissible under the current legislation.[518]

Report on the Consultation on the review of the Human Fertilisation and Embryology Act 1990

The Consultation Report separated the responses to the use of the cell nuclear replacement technique for mitochondrial diseases and the cell nuclear replacement technique on embryos. These two uses of the cell nuclear replacement technique were dealt with jointly in the discussion of the Consultation Document but will be dealt with separately here in accordance with the layout of the Consultation Report.

Cell nuclear replacement and mitochondrial diseases

Understandably there were mixed views on the Government proposal to allow research on embryos created by cell nuclear replacement for the purpose of studying mitochondrial disease. This is still an area where a great deal of research needs to be carried out, certainly before possibly using it in treatment, but the need for regulation and review has been emphasised in some responses.[519]

While there is merit in trying to overcome mitochondrial diseases, the implications of effectively creating an embryo with three genetic parents needs to be carefully examined, particularly if the Government saw fit to include cell nuclear replacement embryos created for the purpose of overcoming mitochondrial disease in the group of embryos which are permitted to be placed into a woman. (Note that in the end the Government chose to include a regulation making power in the *HFE Act 2008* which would allow an embryo to be a permitted embryo when it had undergone 'a process designed to prevent the transmission of serious mitochondrial disease' and therefore could be implanted for treatment purposes).[520]

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[518] Thanks to Søren Holm for raising these points.
[519] *Report on the Consultation on the review of the Human Fertilisation and Embryology Act 1990: Prepared for the Department of Health* (2006) People Science and Policy Ltd at Para 29.2.1, pg 67 http://www.peoplescienceandpolicy.com/downloads/FINAL_HFEA_reportDH.pdf (accessed 5/9/07)
[520] Section 3(5) and 26 *Human Fertilisation and Embryology Act 2008*

Cell nuclear replacement on embryos

The proposal to remove the prohibition currently found in Section 3(3)(d) of the *HFE Act* again received a mixed response. Section 3(3)(d) prohibits "*replacing the nucleus of a cell of an embryo with a nucleus taken from the cell of any person, another embryo or a subsequent development of an embryo.*" Views ranged from the complete removal of the prohibition to allow for advances in research, to those who felt that the lifting of the ban could lead to the eventual cloning of humans. As pointed out by the British Medical Association the fears that the removal of this prohibition could result in human reproductive cloning were unjustifiable due to the *Human Reproductive Cloning Act 2001.*[521]

Whilst public opinion seemed to be divided upon this point it could be predicted that the Government would remove the prohibition contained in Section 3(3)(d) of the *HFE Act.* There did not appear to be a valid reason to retain the prohibition, precisely due to the reason raised by the British Medical Association.

The purposes for which research may be permitted

Unsurprisingly, there was again a varied response to the Government question whether any changes should occur to the current list of purposes for which research can be undertaken. As commented above, the question of the legislation allowing basic research was raised by some respondents. As the Government did not see the specific inclusion of basic research as an issue worthy of further consideration it was somewhat unlikely at that point in time (2006) that basic research would be mentioned in any future legislation. This could have been a problem for the Government if the issue had been raised in the Courts in the future and the issue had not been resolved in the new legislation.

From the varied responses, it can be seen the Government opinion that basic research was permissible under the current list of research purposes was not unanimously supported and if there was to be a legal challenge to this aspect of the legislation there

[521] *Report on the Consultation on the review of the Human Fertilisation and Embryology Act 1990: Prepared for the Department of Health* (2006) People Science and Policy Ltd at Para 9.2.2, pg 68http://www.peoplescienceandpolicy.com/downloads/FINAL_HFEA_reportDH.pdf (accessed 5/9/07)

could have been judges sympathetic to the argument that the list of research purposes was not inclusive of basic research. Of course, based upon previous legal challenges, notably *Quintavalle*,[522] it could have been predicted that the Courts would take the Government viewpoint and interpret the list of research purposes as permitting basic research. Ideally this was an issue which required clarification. As will be seen in the next Chapter this issue was resolved and basic research is specifically referred to in the new legislation.

Creation of embryos for therapeutic purposes

As expected, the invitation to comment upon the desirability of creating embryos for treatments of serious diseases invoked many different responses. Many of those who disagreed with creating embryos for treatment also disagreed with creating embryos for research purposes. This was unsurprising. As has been commented upon several times by the author of this work, the polarisation of views over the use of embryos for reasons other than for treating infertility means that embryo research will always be contentious.

Of those who felt that it was desirable to allow the creation of embryos for treatment purposes, the reasoning seemed to be that it was illogical that embryos could be used for research into treatments for diseases, and yet, once we reached the clinical trials and treatment stage of the process, the use of embryos for treatments may not have been permissible. There were of course calls for such use to be supported by evidence; after all there was still the feeling, even amongst the advocates of embryo research, that excessive numbers of embryos should not be used where this was not necessary. We would not want to see embryos being created for treatment purposes when there is inadequate evidence supporting the use of embryos in such treatments.

Review of the Human Fertilisation and Embryology Act: Proposals for revised legislation

Research involving embryos

Within the section of the White Paper concerning the reformation of the sections of the *HFE Act* which deal with research upon human embryos, it was made very clear

[522] *R (on the application of Quintavalle) v Secretary of State for Health* [2001] 4 All ER 1013, [2002] 2 All ER 625 (CA), [2003] 2 All ER 113 (HL) Discussed in Chapter 3

that the Government did not intend to reopen the debate on *"...the permissibility of the creation and use of embryos for research..."* as it is one of the fundamental principles of the legislation that such research is permitted to be performed *"...within limits and subject to regulatory oversight."*[523] Whilst the basic limits will not be altered, such as the fourteen day limit on developing embryos *in vitro*, the Government did propose to make some amendments to the Act *"...to ensure that legitimate research can continue to flourish, and that controls remain up to date."*[524]

There were no radical changes suggested to be made to the list of research purposes as contained within the *HFE Act*, although there was the suggestion that the new legislation should make it very clear that basic research as well as applied research was permissible, obviously still subject to the controls contained within the legislation.[525] So at this point we can see that the Government had listened to the respondents of the Public Consultation and would take steps to ensure that basic research was specifically referred to in the new legislation. This was a complete turnabout on the Government position which was insistent that basic research was covered by legislation and that there was no need to explicitly refer to it in the proposed new legislation.

There was the additional intention to broaden the permitted research purposes beyond *'increasing knowledge about serious disease'* to also include research into serious injuries.[526] The term 'serious disease' is not defined within the current legislation and there was no suggestion that a definition would appear in the revised legislation. It has been suggested that the Government could provide a list of diseases which warrant human embryonic stem cell research; this list would not be exhaustive and so would not exclude diseases from research but would help to provide guidance for the regulator as to the diseases which are 'serious' and therefore the regulator could permit human embryo research and/or human embryonic stem cell research which specifically looks at these diseases.[527]

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[523] *Review of the Human Fertilisation and Embryology Act: Proposals for revised legislation (including establishment of the Regulatory Authority for Tissue and Embryos)* (2006) Department of Health CM 6989 at Para 2.72

[524] *Ibid.* at Para 2.72

[525] *Ibid.* at Para 2.74

[526] *Ibid.* at Para 2.74

[527] Discussion between Professor Ruth Chadwick, Professor David Miers, Professor Søren Holm and the author on the 26th July 2007

An example of a disease which is considered to be 'serious' by the HFEA and warrant the use of embryos in research is research into mitochondrial DNA disease.[528] Other examples of 'serious' disease may include Alzheimer's and diabetes. In comparison diseases which may not be considered to be serious would be those which already have acceptable and cheap treatments such as an under-active thyroid and eczema. If such a list was introduced it would be vital that it was not exhaustive as the term 'serious' is very difficult to define. Equally a disease which may appear on the 'non-serious' list could require the HFEA to grant a research licence should a researcher later demonstrate the seriousness of it. Definitions and perceptions can change over time as do medical opinions and knowledge, therefore should a list of diseases be provided it must be flexible and open to interpretation and alterations. When considering what constitutes a 'serious' disease or condition that warrants the use of human embryos are we concerned with the effect that the disease or condition has upon a person or the number of people which are affected by it? Can we only justify the use of human embryos in research when the results of that research will potentially benefit thousands or millions of people or is it acceptable to use human embryos when only a handful of people will benefit from such research? Arguably it is both types of situations, provided that the effects of the disease or condition are sufficiently serious so as to warrant the use human embryos, the number of people to benefit from the research is irrelevant.

Creation of embryos for therapeutic use

The creation of embryos for research purposes is permitted under the *HFE Act* and that will continue under the new revised legislation. The situation could arise in the future that a therapy may require the creation of embryos which would be used for the direct benefit of a patient.[529] The use of embryos to directly benefit a patient would take this outside of the realm of research into the realm of treatment and the regulator would not be able to license such work.

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[528] *Current research projects* HFEA http://www.hfea.gov.uk/en/374.html (accessed 23/10/08)

[529] *Review of the Human Fertilisation and Embryology Act: Proposals for revised legislation (including establishment of the Regulatory Authority for Tissue and Embryos)* (2006) Department of Health CM 6989 at Para 2.79

There was no immediate resolution to this possible problem within the White Paper, the suggested solution was to keep the issue under review and to debate this particular question during the passage of the new legislation.[530]

The Government would need to be careful in wording any provision relating to embryos for therapeutic use in the new revised legislation. The Government would need to ensure that any such provision will allow the legislation to be adapted as the Government sees fit when this situation arises. It is not so much a question of 'if' this situation arises, but when. This is due to the ongoing human embryonic stem cell research work that is being undertaken. There is a high possibility that a situation may arise whereby a patient requires human embryonic stem cells for treatment which would require the use (and destruction) of embryos to obtain those stem cells for the direct benefit of a patient. This is the goal that scientists and researchers are working towards. Whilst some patients may need specific types of embryos to be used to create stem cells for their use, other patients may require stem cells more generally, but both types of situation will require the creation of embryos for therapeutic use.

As will be seen in the next Chapter the issue of creating embryos for therapeutic use was set aside for debate at a later date.

The Human Fertilisation and Embryology Authority Response to the Department of Health's consultation on the Review of the Human Fertilisation and Embryology Act

The Human Fertilisation and Embryology Authority responded to the Department of Health's consultation on the Review of the Human Fertilisation and Embryology Act 1990 on the 24th November 2005.

In respect of the discussion above of the suggestions contained in *Section Two: Model and Scope of Regulation*, concerning the definition and use of human embryos, gametes, eggs and sperm, the HFEA was in agreement with all of the Government suggestions on these points.

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[530] *Ibid.* at Para 2.80

The HFEA was also in agreement with the Government that research upon embryos created by the cell nuclear replacement technique should be permitted where that research is for the purpose of studying mitochondrial disease.[531]

The HFEA in its response to the desirability of creating embryos for the treatment of serious diseases, as opposed to the research into serious disease which is already permitted, opened this question up for further public debate. The HFEA recognised that it can be implied from the explicit permission to create embryos for research that the creation of embryos for treatment was also permitted but it equally recognised that this was an issue which needed wider public debate, as well as the appropriate regulatory framework for these treatments.[532]

This need for further public debate into the issue of creating embryos to derive stem cells for the treatment of patients is an important one. Besides the ethical issues which would undoubtedly re-arise in this debate, issues such as access to treatments, payment for these treatments and how to separate embryonic from non-embryonic treatments is an important debate which needs to happen. It was very interesting to note that the HFEA also raised the regulation of these treatments; it specifically recognised in the introduction that *"The HFEA regulates the generation of embryonic stem cell lines but does not regulate the use of embryonic stem cell lines once established."*[533] This is an issue which has been raised and discussed elsewhere in this thesis.

Conclusion

The House of Commons Science and Technology Committee conducted a thorough review of the *HFE Act* and the regulatory body, the HFEA. It can be commended for clearly identifying the areas of the law which require reform.

A review of the *HFE Act* was never going to be an easy task in light of the range of different topics that the legislation covers and the advances in science which have been made over the last 18 years. A public consultation was a correct first step in this review; the public want to be consulted on these matters which it views as fundamental to society.

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[531] *Response by the Human Fertilisation and Embryology Authority to the Department of Health's consultation on the Review of the Human Fertilisation and Embryology Act* 05/33273 HFEA 24th November 2005 at pg 38 Available at: http://www.hfea.gov.uk/AboutHFEA/HFEAPolicy/ReviewoftheHFEAct (accessed 11/4/06)

[532] *Ibid.* at pg 41

[533] *Ibid.* Introduction, Page 4

The Consultation Document can be criticised though for not taking into account the basic research aspect of the research purposes, regardless of the fact that the Government believed that basic research was covered by the legislation. It should have sought comments upon this aspect as it was foreseen to be a possible stumbling block in future legislation if it was not adequately addressed. Although the Government made an about turn in the White Paper concerning the specific inclusion of basic research in the new legislation, it would have been advisable to have sought the public opinion on this specific matter in the Public Consultation. It would have been useful so as to help guide the Government on how to explicitly approach this matter in the new legislation. The Government could also have taken the opportunity to overhaul the licensing system which has been criticised as bureaucratic, time consuming and has problems with overlap. Although there are some areas which do need further reform at least the Government recognised the need to overhaul the definition of a human embryo and had also taken steps to define human gametes. It is to be hoped that the final definition (as discussed in the following chapter) will stand the test of time, unlike the current statutory definition.

When dealing with the sensitive subject of embryos it was inevitable that such a range of responses would have been submitted to the Consultation. In discussing the responses at the time of publication of the Report it was difficult to come to any clear conclusions as to what direction the Government would take in forming the new legislation. There are no conclusions within the Report as it is designed as merely that, a Report outlaying the responses which were received by the Department of Health in its Consultation on the review of the *HFE Act*. At the time, how the Government would respond was not easy to foresee, the Draft Bill was eagerly awaited following the Consultation to see exactly how the Government listened, and responded, to the concerns raised.

The speed at which science is progressing particularly in the field of human fertilisation and embryology is astounding. Barely ten years after the enactment of legislation designed to regulate this new and developing area of science, the scientific leaps forward required the current legislation to be amended (in the form of the *2001 Regulations*) and new legislation to be introduced (the *Human Reproductive Cloning Act 2001*).

There was undoubtedly a need to revise the current legislation so as to continue the work started under the *Human Fertilisation and Embryology Act 1990,* to provide a legal framework within which scientific progress was encouraged but controlled. The path to complete reformation of the Act was a long one and is only just completed. The final stages in the reform process and the new legislation are discussed in the next Chapter.

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Chapter 8 - A New Act

Following the extensive reform process which has been undertaken by the UK Government, the *Human Fertilisation and Embryology Act 1990* has been overhauled by the enactment of the new *Human Fertilisation and Embryology Act 2008* which will come fully into force in October 2009. The legislation has only recently received Royal Assent after a lengthy reform process; a *Draft Bill* was published for pre-legislative scrutiny on the 22nd May 2007 and a subsequent report from the Joint Committee on the Human Tissue and Embryos (Draft) Bill was published on the 1st August 2007. The Government then issued a response to the Joint Committee Report and a new version of the Bill was debated in the Houses of Parliament. This Chapter is up to date as of the 13th November 2008 following the Royal Assent of the *Human Fertilisation and Embryology Act 2008.*[534] Controversially the Third Reading of the Bill in the House of Commons was suddenly delayed by four months. Scheduled for the 14th July 2008 the announcement was only made on the 11th July that the debate was delayed until October. One reason which it was speculated for the delay was an upcoming election in Glasgow. Harriet Harman MP however insisted that the Bill had been delayed to allow more time to debate it.[535] The reality was that when the debate was rescheduled for October the Government deliberately gave the debate limited time. This was to prevent the Bill from being delayed further due to many Members of Parliament wanting greater debate on the provisions relating to abortion.[536] Finally, following the debate in the House of Commons and the subsequent minor amendments, the Bill received Royal Assent one year after it was introduced. Whilst the outcome is now known it is important to examine the last few steps in the reform process to understand the content of the New Act when it comes into force and how it will regulate human embryonic stem cell research.

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[534] Hansard – House of Lords, 13th November 2008, Royal Assent – Human Fertilisation and Embryology Act 2008, Vol 705, Col 832 Hereafter referred to as the *HFE Act 2008*

[535] Watt, N and Stratton, A., *Health ministers stunned by embryo bill delay* 11th July 2008 The Guardian http://www.guardian.co.uk/politics/2008/jul/11/health.houseofcommons/print (accessed 11th July 2008)

[536] For example refer to the comments made by Norman Lamb, Hansard – House of Commons, Human Fertilisation and Embryology Bill, 22nd October 2008, Volume 480, Column 410

The Human Tissue and Embryos (Draft) Bill

It is necessary to examine the *Human Tissue and Embryos (Draft) Bill* in detail in order to understand the future regulation of, and consequences for, human embryonic stem cell research under the *HFE Act 2008*.[537]

As with the *HFE Act 1990* the *Draft Bill* dealt with a broad spectrum of issues relating to fertility and embryology. In fact the name of the *Draft Bill* was somewhat misleading as it did not deal specifically with the fine detail of regulating human tissue. Rather the regulation of human tissue was only referred to in respect of the proposed merger of the HFEA and the HTA which has been mentioned briefly in the preceding chapter and was subsequently abandoned. The legislation pertaining to human tissue, such as the retention of human organs, remained unaffected.

There are only parts of the *Draft Bill* which are of relevance to human embryonic stem cell research. These included amongst others; the definition of 'embryo' and 'gamete', legal prohibitions, activities which may be licensed and the permitted research purposes. The *Draft Bill* also referred to inter-species embryos, those created with a non-human element, the creation of which could have implications for human embryonic stem cell research. Each relevant part is examined and discussed in detail below.

Meaning of 'embryo' and 'gamete', prohibitions and permissions

The definition of an embryo has been altered to take into account the alternative ways of creating embryos, such as the cell nuclear replacement technique. As such the proposed definition of an embryo was as follows:

> *(a) embryo means a live human embryo and does not include an inter-species embryo...*
> *(b) references to an embryo include an egg in the process of fertilisation or is undergoing any other process capable of resulting in an embryo.*[538]

[537] *Human Tissue and Embryos (Draft) Bill* (2007) Department of Health CM7087 http://www.official-documents.gov.uk/document/cm70/7087/7087.pdf (last accessed 05/07/08) Hereafter referred to as the *Draft Bill*

[538] *Ibid.* at Part 2, Clause 14, sub clause 2

By not specifically naming the alternative processes by which it may be capable of forming an embryo, the Government had potentially avoided the definitional legal challenges which have caused problems within the current legislation. The broader definition to include *'any other process capable of forming an embryo'* should cover any new process which may arise in the future and which has not yet been discovered by scientists or tried with human embryos.[539]

Problems may however arise in respect of the proposed definition for human gametes. The proposed definitions were:

> *(a) references to eggs are to live human eggs, including cells of the female germ line at any stage of maturity, but...not including eggs that are in the process of fertilisation or are undergoing any other process capable of resulting in an embryo,*
> *(b) references to sperm are to live human sperm, including cells of the male germ line at any stage of maturity, ...*[540]

The problem which could potentially arise in respect of the definitions of human gametes is the issue of artificial gametes or *in vitro* derived gametes as they are also referred to. Artificial gametes are those which are created from stem cell lines. If the proposed definitions were strictly applied then artificial gametes would fall into the definitions and could be used to create human embryos. This may be of particular use for further stem cell research or even testing of drugs or techniques upon embryos. What needs to be questioned is the intention of Parliament. Is it the intention of Parliament that artificial gametes, and embryos created from artificial gametes, are used for research purposes only or could they also be used for reproductive purposes?

The intention of Parliament was not clear from the *Draft Bill* when examined in greater depth. To replace the *Human Reproductive Cloning Act 2001* the *Draft Bill* proposed to amend the section titled 'Prohibitions in connection with embryos' contained within the *HFE Act* to prevent placing in a woman *"an embryo other than a permitted*

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[539] For a discussion of the different ways of creating embryos refer to Hammond, N and Holm, S., *Resolving the "egg supply problem" in human embryonic stem cell derivation through technical means – a legal and ethical analysis* 27(1) Medicine and Law (2008) pg167

[540] *Human Tissue and Embryos (Draft) Bill* (2007) Department of Health CM7087 at Part 2, Clause 14, sub clause 4

embryo...or any gametes other than permitted eggs or sperm..."[541] This appears straightforward until one looks at the definitions of permitted egg, sperm and embryo.

A permitted egg is one –

(a) which has been produced by or extracted from the ovaries of a woman, and
(b) whose nuclear or mitochondrial DNA has not been altered.

Permitted sperm are sperm –

(a) which have been produced by or extracted from the testes of a man, and
(b) whose nuclear or mitochondrial DNA has not been altered.

An embryo is a permitted embryo if –

(a) it has been created by the fertilisation of a permitted egg by permitted sperm, and
(b) no nuclear or mitochondrial DNA of any cell of the embryo has been altered.[542]

This would also appear to be clear at first sight, eggs and sperm must come from the reproductive organs of men and women and embryos which are to be used for reproductive purposes can only be created from these permitted gametes. However, the argument could be made that as embryonic stem cells are extracted from embryos which have been created using 'permitted' eggs and sperm i.e. have been extracted from the ovaries and testes, and the embryonic stem cells are then differentiated into artificial gametes, it could then be argued that these artificial gametes are 'permitted' gametes as they technically originate from the ovaries and testes of humans.

This interpretation of the legal definition may be argued for if the use of artificial gametes becomes a realistic treatment for infertile couples. The argument will arise in the future that we should allow people to use artificial gametes for reproductive purposes where necessary. The use of artificial gametes to create embryos for research does not appear to be an issue here as the researchers would not be attempting to implant the embryos created by artificial gametes.

This interpretation is not one that the Government is keen upon. In fact in the Explanatory Notes to the *Draft Bill* it was stated that Clause 16 'Prohibitions in connection with embryos' "*...ensures that other forms of embryos or gametes including*

[541] *Ibid.* at Part 2, Clause 16, sub clause 2
[542] *Ibid.* at Part 2, Clause 16, sub clause 5

artificial gametes...cannot be placed into a woman."[543] Should the issue come to the Courts it is hard to predict the outcome. The Government made it clear in the Explanatory Notes that artificial gametes should only be used for research purposes. The problem is that there is no regulation making power contained within the Bill to allow for regulations in the future if or when the use of artificial gametes for treatment purposes becomes desirable and safe.[544]

The derivation of artificial gametes from non-embryonic stem cell lines for reproductive uses, such as those created from induced pluripotent stem cell lines, would be prohibited by the Bill in its current wording. Artificial gametes created from non-embryonic stem cells could not be used for reproductive uses as the stem cells from which they were derived are non-embryonic and so definitely did not use gametes from the ovaries or testes of humans at any point in the process.

Chimera and hybrid embryos

Although not previously discussed in great detail earlier in this thesis it is important to note that the *Draft Bill* included provisions for the creation of hybrid and chimera embryos when permitted by a licence. These provisions are briefly mentioned here due to the possible implications which these types of embryos may have for human embryonic stem cell research. One problem currently afflicting the progress of human embryonic stem cell research is the lack of suitable oocytes to enable researchers to create embryos, either by IVF or by the cell nuclear replacement technique (note that this is permitted under licence where 'spare' IVF embryos are not suitable for the purposes of the research). A possible solution to this problem is to create embryos using the enucleated oocytes of animals, effectively providing a shell for human DNA.

Although the debate about using the resulting stem cells from these human/animal embryos is still to fully occur, the creation of human/animal embryos could be very useful for human embryonic stem cell research. The reason for this is that researchers could perfect their techniques and skills in creating embryos, extracting stem cells and growing them in culture without using or wasting valuable human oocytes. There is no question that the debate about using stem cells extracted from human/animal embryos

[543] *Ibid.* at Explanatory Notes, Paragraph 53
[544] Thanks to Professor Emily Jackson for raising this point in her paper *Artificial Gametes and the Law: Legal and Ethical Implications* at the SLS conference 15th September 2008

will be one that will greatly divide people; nonetheless the Government took steps to allow the creation of these human/animal embryos in five different forms in a bid to allow stem cell research to progress for the foreseeable future. Referred to as inter-species embryos in the *Draft Bill* they could be created in the following ways:

> *(a) an embryo created by using human gametes and the gametes of an animal,*
> *(b) an embryo created by replacing the nucleus of an animal egg or a cell derived from an animal embryo with a human cell or the nucleus of a human cell,*
> *(c) a human embryo that has been altered by the introduction of any sequence of nuclear or mitochondrial DNA of an animal,*
> *(d) a human embryo that has been altered by the introduction of one or more animal cells, or*
> *(e) any other embryo that contains both –*
> *(i) any haploid set of human chromosomes, and*
> *(ii) any haploid set of animal chromosomes or any other sequence of nuclear or mitochondrial DNA of an animal.*[545]

According to the *Draft Bill* these inter-species embryos could only be created in pursuance of a licence and could not be implanted into a woman.[546] As can be seen the Government attempted to cover all of the possible methods for creating human/animal embryos. There was the risk that by taking this approach, as with the *HFE Act*, that it could lead to legal definitional challenges in the future if scientists were to discover another new method for creating embryos not covered within these definitions. The appearance of Part (e) was designed to be a catch all provision, to ensure that the legislation governed any type of embryo created with human and animal elements, even if the exact method did not correspond to the methods laid out in parts (a) – (d). Although Part (e) was designed to catch all human/animal hybrids there was always the possibility of this all encompassing definition not actually including an embryo which may, for example, have its chromosomes manipulated, possibly by removing a chromosome or fusing two, in such a way as to make it fall out of the definition. Manipulation of the mitochondria could also result in an embryo falling outside of the statutory definitions. The definition itself which was used in Part (e) was also hard to understand. As a non-scientist the author of this thesis was unable to explain or understand clearly the definition in Part (e) and, as will be seen in the Joint Committee Report on the Draft Bill,

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[545] *Human Tissue and Embryos (Draft) Bill* (2007) Department of Health CM7087 at Part 2, Clause 17, sub clause 2(5)
[546] *Ibid.* at Part 2, Clause 17, sub clause 2(1)(b) and 2(2)

scientists were also unable to explain the meaning of this provision. As noted by Professor Holm some of the definition contained in (e)(ii) can be found in part (c) but can you say that any of part (c) is found in part (e)(ii)?[547] The provision just made no sense.

There was also the risk that by specifically stating that an inter-species embryo may not be placed into a woman that a scientist may try to get around this prohibition and implant the inter-species embryo into an artificial womb. Although the *Draft Bill* also prohibited *"...the keeping or using of an inter-species embryo after...the appearance of the primitive streak, or...after 14 days"*[548] if a scientist was to attempt to implant an inter-species embryo into an artificial womb, he may try to do so before the fourteen days had expired (or the primitive streak had appeared) and may also have attempted to continue any resulting pregnancy in breach of the law. While it would be hoped that no scientist working within the UK would attempt this, and that his or her co-workers would report any suspected breach as serious as this, there is the possibility that this could happen. The Courts would be likely to take a liberal interpretation of the legislation so as to ensure that any scientist who did implant an inter-species embryo into an artificial womb would be subject to the Act. While a scientist may argue that they were not 'keeping or using an inter-species embryo after the appearance of the primitive streak or after 14 days' a judge could be persuaded to view an artificial womb as just another container, thereby the scientist would be 'keeping it.'[549]

The impetus for the inclusion of inter-species embryos into the *Human Tissue and Embryos (Draft) Bill* was two research licence applications to the HFEA by scientists working separately at King's College London and the Newcastle Centre for Life. Decisions on the applications were delayed by the HFEA which deferred judgement to the Government. Initially the Government did not want to permit the use of inter-species embryos in human embryo research but had a change of perspective following the House of Commons Science and Technology Select Committee Report.[550] Whilst there is the potential of inter-species embryos to aid the progress and development of human embryonic stem cell research it was felt that this was an area which needed further

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[547] Raised in a meeting with Søren Holm, 21st November 2007

[548] *Human Tissue and Embryos (Draft) Bill* (2007) Department of Health CM7087 at Part 2, Clause 17, sub clause 2(3)

[549] Thanks to Søren Holm for raising this point

[550] *Government Proposals for the regulation of hybrid and chimera embryos* Fifth Report of Session 2006-07, House of Commons Science and Technology Select Committee Report HC 272-I (April 2007) http://www.publications.parliament.uk/pa/cm200607/cmselect/cmsctech/272/272i.pdf (accessed 5/9/07)

discussion and consideration, not least due to the wording contained within the *Draft Bill* which could have led to legal challenges in the future. King's College London and the Newcastle Centre for Life have both recently received licences to carry out research on human/animal chimeric embryos and a third centre at the University of Warwick, which proposes to use pig eggs but to replace the animal mitochondria as well as the nucleus, has just had its licence application approved.[551]

Permitted research purposes

The requirement that research may only be licensed where it is 'necessary or desirable for a research purpose' was retained within the *Draft Bill* although the situations in which it may be 'necessary or desirable' were increased. The *Draft Bill* proposed three sections which all referred to research being 'necessary or desirable'. These were:

> *(1) A licence ...cannot authorise any activity unless the activity appears to the Authority -*
> *(a) to be necessary or desirable for any of the purposes specified in sub-paragraph (2) ("the principal purposes"),*
> *(b) to be necessary or desirable for the purpose of providing knowledge that, in the view of the Authority, may be capable of being applied for the purposes specified in sub-paragraphs (2)(a) or(b), or*
> *(c) to be necessary or desirable for such other purposes as may be specified in regulations*[552]

As will be seen in the following discussion the purpose of part (b) above was to ensure that any research into human embryonic stem cell research which may require basic research to be performed would be covered by the licensing system. The Government had previously stated that the research purposes contained in the *HFE Act* included basic research. This has been one criticism of the current research purposes in

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[551] HFEA Licence Committee Minutes for RO179 Newcastle - http://www.hfea.gov.uk/docs/HFEA_Licence_Committee_minutes_for_R0179_Newcastle_-_November_2007_and_January_2008.pdf
HFEA Licence Committee Minutes for RO180 Kings http://www.hfea.gov.uk/docs/HFEA_Licence_Committee_minutes_for_R0179_Newcastle_-_November_2007_and_January_2008.pdf
University of Warwick, Project title: *The generation of human embryonic stem cells by transferring a human cell into recipient pig eggs* http://www.hfea.gov.uk/en/1699.html (last accessed 05/07/08)

[552] *Human Tissue and Embryos (Draft) Bill* (2007) Department of Health CM7087 at Schedule 2, paragraph 6, subparagraph 3A(1)

that it was not explicitly stated that basic research upon embryos was permitted where this research was necessary for the progress of stem cell research.

Part (c) above is a continuation of the current regulation making power contained in Schedule 2, paragraph 3(2) of the *HFE Act.* As evidenced by the necessity of the Government to expand the permitted research purposes through the use of regulations so as to include human embryonic stem cell research it was important that this regulation making power was continued.[553] After all, the scientific progress in the field of human fertilisation and embryology is one that cannot be predicted, the use of regulations would have allowed the Government to keep the new legislation up to date, should the need have arisen to amend the research purposes.

The purposes for which a research licence may be granted were proposed to be:

> *(a) increasing knowledge about serious disease or other serious medical conditions,*
> *(b) developing treatments for serious disease or other serious medical conditions,*
> *(c) increasing knowledge about the causes of any congenital disease or any congenital medical condition that does not fall within paragraph (a),*
> *(d) promoting advances in the treatment of infertility,*
> *(e) increasing knowledge about the causes of miscarriage,*
> *(f) developing more effective techniques of contraception,*
> *(g) developing methods for detecting the presence of gene, chromosome or mitochondrion abnormalities in embryos before implantation, or*
> *(h) increasing knowledge about the development of embryos.*[554]

These were very similar to the current permitted research purposes contained in the *HFE Act* as amended by the *2001 Regulations.* The permitted research purposes have worked well over the past two decades, they have ensured that valuable research has been allowed to continue whilst also ensuring that embryos have not been used unnecessarily for research.

Parts (c) – (g) are basically the reiteration of the original research purposes as contained within Schedule 2, paragraph 3(2) of the *HFE Act.* There was the addition of 'mitochondrion' to part (g), unsurprising considering the increased knowledge about the role of mitochondrion in the developing embryo. Although the addition of mitochondrion

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[553] *Human Fertilisation and Embryology (Research Purposes) Regulations 2001* SI 2001/188
[554] *Human Tissue and Embryos (Draft) Bill* (2007) Department of Health CM7087 at Schedule 2, paragraph 6, subparagraph 3A(2)

to part (g) was at first sight unsurprising it is actually superfluous since what is looked for is mitochondrion gene abnormalities and would be covered by the 'gene abnormality' provision which was already contained within part (g).[555]

Parts (a), (b) and (h) were very similar provisions to those found in the *2001 Regulations*. The *2001 Regulations* read as:

(2) A licence may be issued for the purposes of -
(a) increasing knowledge about the development of embryos;
(b) increasing knowledge about serious disease, or
(c) enabling any such knowledge to be applied in developing treatments for serious disease.[556]

The provisions have been altered slightly, whereas the *2001 Regulations* merely refer to 'serious disease' the *Draft Bill* referred to not only 'serious disease' but also 'other serious medical conditions'. Potentially this greatly broadened the areas into which research could be performed using human embryos. There was also the issue as to what exactly constituted 'serious'. The *Draft Bill*, like the Act before it, did not define 'serious' thereby giving no guidance to the regulator as to how to judge whether a disease or medical condition was serious enough to warrant research using human embryos. It has been suggested that a list of appropriate medical diseases and conditions could be provided in the new legislation, with the explicit wording that such a list was not exhaustive, thereby not excluding research into diseases not on the list.[557] Although such a list could be possible it would also be very subjective, what one person considers serious, another person may not. Does a disease have to afflict a certain number of people before it is considered to be 'serious'? Is the affliction of two people sufficient? Is it the effect that a disease has which needs to be solely considered? Or is it both types of situation? This is the risk with not only a list, but also guidelines as to what constitutes 'serious'. Some guidance would be advisable, particularly as the permitted research purposes now allow research into not only serious disease, but also serious medical conditions. Although 'serious' was not defined the extension to include 'other serious medical conditions' was an important one as it permitted research into conditions which are not considered to be diseases but which warranted research, for example brain injury.

[555] Thanks to Søren Holm for clarifying this point
[556] *Human Fertilisation and Embryology (Research Purposes) Regulations 2001* SI 2001/188
[557] Suggestion from Professor David Miers, meeting 26th July 2007

It would appear that a licence for research could be given if only one person was suffering from a disease so long as they were affected seriously. The difficulty with using a term such as 'serious' is that it is open to interpretation; of course this could be deliberate so that the regulator has flexibility in deciding what is serious enough to warrant the use of human embryos for research. Whilst 'serious' is difficult to define in everyday language, within the context of the legislation it could eventually reach a particular meaning. An analogy is the term 'grievous'; this word is difficult to define as used in everyday language, but within the Criminal Law it has a legal meaning.[558]

Part (b) of the permitted research purposes contained in the *Draft Bill* repeated one of the provisions found in the *2001 Regulations* although it was subjected to a slight rewording. The current wording of subsection (c) of the *2001 Regulations*, if strictly interpreted, appears to allow knowledge to be used to develop treatments for serious disease, but not the application of those treatments. By omitting the wording '*enabling any such knowledge to be applied*' the new proposed section appeared to allow the development of treatments, which would include the testing and application of those treatments. While this is a minor change in terms of words, it could possibly be a major change in respect of the potential treatments which may arise from human embryonic stem cell research.

Part (h) of the proposed permitted research purposes was identical to that of Part (a) of the *2001 Regulations*. Increasing knowledge about the development of embryos is vital for human embryonic stem cell research, researchers may discover new ways of extracting the stem cells without destroying or damaging the human embryo, they may even find that stem cells are best to be extracted at a different time to which they are currently extracted (five to six days development). In fact it has been shown that it is possible to perform a single cell biopsy of embryos to extract stem cells without the destruction of that embryo.[559] Other developments may also be found in researching the development of human embryos, which may have implications for human embryonic stem cell research, infertility treatments or an area not currently in the minds of researchers and legislators alike.

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[558] Thanks to Søren Holm for raising this point

[559] Klimanskaya, I., *et al Human embryonic stem cell lines derived from single blastomeres* 444 Nature 481-485

As the current permitted research purposes were generally well received and accepted by the public and scientists alike, there was no great impetus to change dramatically the research purposes in any new legislation which was forthcoming. It was for this reason that the changes made were minor tweaks, explicitly allowing that which the Government had said was permitted under the current legislation but which is not clearly stated in the wording.

Conclusion

Whilst it was clear that the *HFE Act* was in need of updating to keep pace with the fast moving scientific developments being made, particularly in the field of embryo research, the *Draft Bill* which was put forward by the Government was not without its problem areas. Definitional questions and working procedures all required further detailed consideration and it was to be hoped that by placing the *Draft Bill* for legislative scrutiny prior to the publication of a Bill for debate, that the Government listened to the concerns which were raised, took them on board and adjusted the Bill as required. The need for legislative scrutiny was recognised and as such a Joint Committee on the Human Tissue and Embryos (Draft) Bill was established. Its findings are discussed below.

Report from the Joint Committee on the Human Tissue and Embryos (Draft) Bill

The Joint Committee on the Human Tissue and Embryos (Draft) Bill was appointed at the start of May 2007 *"to consider and report on any draft Human Tissue and Embryos Bill."*[560] The *Draft Bill* was presented to Parliament on the 17th May 2007 and the Joint Committee published their report on the 1st August 2007.[561] The Joint Committee had a limited amount of time to complete their inquiry and produce the Report and as such concentrated upon the issues which were most likely to cause problems if and when the Bill was published in full (note that the Bill under discussion here is the *Draft Bill* which was published for pre-legislative scrutiny in May 2007 to

[560] *Joint Committee on the Human Tissue and Embryos (Draft) Bill Volume I: Report* HL Paper 169-I, HC Paper 630-I at Para 1. Hereafter referred to as the Joint Committee http://www.publications.parliament.uk/pa/jt200607/jtselect/jtembryos/169/169.pdf (last accessed 05/07/08)
[561] *Ibid.*

enable these issues to be discussed and amendments to be made to the *Draft Bill* as necessary prior to publication of the Bill proper).

The Joint Committee Report was not wholly supportive of the *Draft Bill;* the Joint Committee was particularly scathing of the proposal to establish RATE. RATE has not been discussed in any great detail due to the Government decision not the merge the HFEA and the HTA. This decision was taken by the Government following this Report from the Joint Committee.[562] Readers interested in the criticisms raised against RATE should refer to the Joint Committee Report.

Definitions

Embryo and gamete

The Joint Committee was supportive of the broad definitions placed before Parliament by the Government as in the view of the Joint Committee, broad definitions would *"...allow the regulator appropriate flexibility in the exercise of its regulatory functions, yet [will be] certain enough that both the regulator and the scientific community can be reasonably confident about the legal boundaries of their actions."*[563]

The Joint Committee also noted the concerns which had been raised about the definition of 'embryo' and 'gametes' as contained within the *Draft Bill*, particularly that there was concern that the definitions did not make scientific sense and that the breadth of the definitions was unclear. As a solution to this the Joint Committee recommended following these definitions but that the detail as to how the definitions were to be applied should be left to the regulator.[564]

The issue of interpretation raised above by the author of this thesis in respect of artificial gametes was not addressed by the Joint Committee and so it appeared that this would be an issue for the regulator or the Courts to decide as and when the situation arises particularly if the matter was not fully resolved within the new legislation. As will be seen in the later discussion of the *HFE Act 2008,* Parliament believes that it has made

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[562] *Ibid.* at Para 92
Government Response to the Report from the Joint Committee on Human Tissue and Embryos (Draft) Bill (2007) Department of Health CM 7209 at Para 16
[563] *Joint Committee on the Human Tissue and Embryos (Draft) Bill Volume I: Report* HL Paper 169-I, HC Paper 630-I at Para 132
[564] *Ibid.* at Para 138

it clear that artificial gametes cannot be used for treatment purposes under the definitions contained within the Act.

Inter-species embryos

The issue of inter-species embryos was *"...one of the most contentious..."* for the Joint Committee.[565] The Joint Committee noted that in contrast to the wide definitional approach taken towards defining 'embryo' and 'gamete' the Government had listed the known methods of creating inter-species embryos and had also provided for the future with a catch all provision.[566]

The Joint Committee was highly critical of the approach taken by the Government in outlining the licensable methods of creating inter-species embryos as well as providing the catch all provision. Concerns were raised about the prospect of embryos being regulated by both the human embryo regulator and the Home Office through the *Animal (Scientific Procedures) Act 1986* as well as the lack of clarity as to what makes an embryo 'human', what is the required level of human genetics which must be apparent in the embryo before it is deemed human rather than animal? When considering that an embryo must be 50% human, for example, what specifically does the 50% refer to?[567]

The catch all provision was heavily criticised particularly in light of the fact that none of the witnesses could understand or explain what this provision meant![568] As the Joint Committee correctly stated *"...this is a fundamental flaw in the Government's approach to the definition of inter-species embryos."*[569]

While it is noted that the Joint Committee could not come to a consensus on the use of inter-species embryos for research, and as such the issue should be put to a free vote in both Houses of Parliament, the Joint Committee strongly recommended that *"...the Government should revisit its approach to the definition of inter-species embryos in the draft Bill with a view to providing a general definition...with authority given to the regulator to interpret and apply that definition to individual research applications, based on the principles set out in legislation..."*[570]

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[565] *Ibid.* at Para 142
[566] *Ibid.* at Para 144
[567] *Ibid.* Refer to Paragraphs 162-169
[568] *Ibid.* Refer to Paragraphs 162 and 173
[569] *Ibid.* at Para 162
[570] *Ibid.* at Para 178

A broader definition of an inter-species embryo would bring the definitions relating to all embryos and gametes into line with each other (in the sense that the approaches would be the same, not that the definitions would be identical). It would also avoid possible future legal challenges over the definitions provided for in the legislation, as has occurred in the past with the *HFE Act*, and would give the discretion to the regulator to licence research using inter-species embryos where it was considered appropriate and necessary. The regulator could look at each research application and consider the method of creating the inter-species embryo and then decide if the creation of inter-species embryos was desirable and necessary for that research project. This would have allowed the regulator to consider each method of creating inter-species embryos as and when the question of research arose before them.

Licensable activities – research licences

It was noted that the Joint Committee had insufficient time to consider in detail the licensable activities as proposed in the *Draft Bill*; however, they had been able to concentrate upon a few important issues, including research licences.[571]

It was noted that significant changes had been made to the current arrangements, the extension to allow research into 'serious medical conditions' being one.[572] The other significant change was that the new paragraph 3A(1)(b), which would allow the licensing of research *"...for the purpose of providing knowledge that...may be capable of being applied..."*[573] *"...is intended to allow fundamental research..."*[574] There was clear support for the alterations to the research purposes, including *"...the clarification that fundamental, as well as applied, research is licensable."*[575] In light of the support for these alterations, and the lack of evidence to the contrary that these alterations were not appropriate, the Joint Committee *"...consider[s] the extensions to the existing research purposes to be sensible and [they] therefore support these provisions."*[576]

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[571] *Ibid.* at Para 191
[572] *Ibid.* at Para 206
[573] *Human Tissue and Embryos (Draft) Bill* (2007) Department of Health CM7087 at Schedule 2, paragraph 6, subparagraph 3A(1)(b)
[574] *Joint Committee on the Human Tissue and Embryos (Draft) Bill Volume I: Report* HL Paper 169-I, HC Paper 630-I at Para 206
[575] *Ibid.* at Para 207
[576] *Ibid.* at Para 208

It was reasonable for the Joint Committee to support the extensions which had been made to the permitted research purposes, the alterations were relatively minor and the current research purposes were generally supported by those who favoured embryo research.

Government Response to the Report from the Joint Committee

The Government issued its response to the Joint Committee in October 2007.[577] The Government took on board the concerns raised by the Joint Committee, most notably in respect of RATE, as previously mentioned. An in depth discussion of the proposal to form RATE is not necessary here precisely due to the Government's acceptance that RATE was opposed by the vast majority of the interested parties.

> *...the Government accepts the recommendation to reconsider the proposal to establish RATE. The Government will therefore amend the Bill to drop the proposal for RATE.*[578]

The Government also accepted the Joint Committee recommendations that the HFEA and the HTA could work together more effectively;

> *In accepting the Committee's recommendation, the Government will be looking at the scope, without a full legal merger, for the two authorities to streamline regulation, for instance through sharing support functions.*[579]

The HFEA and the HTA could work together more effectively and efficiently. It is interesting to note though that the Government specifically referred to the sharing of support functions as one way to streamline the work of both of the authorities. This move would not only streamline the work of the authorities (or possibly mean the opposite, that the administrative staff are more overworked) but due to sharing support staff this would

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[577] *Government Response to the Report from the Joint Committee on Human Tissue and Embryos (Draft) Bill* (2007) Department of Health CM 7209 http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_079127 (last accessed 05/07/08)

[578] *Ibid.* at Para 16

[579] *Ibid.* at Para 17

reduce the running costs of the two authorities, thereby still achieving the objective of the Government to reduce the overall running costs of its arms length bodies.[580]

Of note is the fact that the Joint Chair of the HFEA and HTA, Shirley Harrison, announced on the 17th October 2007 that she would step down as Chair of the HFEA on the 1st November 2007 but would remain as Chair of the HTA. Walter Merricks CBE, a current HFEA member took over as Interim Chair of the HFEA.[581] Professor Lisa Jardine was appointed on the 1st April 2008 as the new Chair of the HFEA.[582] Whilst this does take into account the fact that the Government would no longer take the necessary steps to establish RATE the continuance of a Joint Chair may have been one way to ensure that the two bodies worked closer together in the future.

Definitions – Embryos, gametes and inter-species embryos

In respect of the definitions appertaining to 'embryo' and 'gamete' the Government recognised the support of the Joint Committee towards the definitions, with the regulator deciding how to apply the definitions in practice.[583]

It then discussed the recommendations made by the Joint Committee to bring the definitions of inter-species embryos in line with the definitions used for 'human embryo' and 'gametes', in the sense that a general definition should be provided along with authority given to the regulator to interpret and apply those definitions in line with the principles set out in the legislation. The Government also considered the recommendation to include hybrid embryos specifically within the Bill. As such the Government altered the definitions to include hybrid embryos and to remove the catch all provision which no-one appeared capable of understanding. A general definition for inter-species embryos was rejected. However, the new definitions along with the power of the regulator to interpret and apply those provisions are an improvement upon the original *Draft Bill*.[584]

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[580] *Reconfiguring the Department of Health's Arm's Length Bodies* 40378 (2004) Department of Health http://www.dh.gov.uk/prod_consum_dh/groups/dh_digitalassets/@dh/@en/documents/digitalasset/dh_4098136.pdf (accessed 1/12/08)

[581] *Statement on HFEA Chair* HFEA 17th October 2007 http://www.hfea.gov.uk/en/1601.html (accessed 30/01/08)

[582] *New Chair appointed for HFEA* HFEA 23rd January 2008 http://www.hfea.gov.uk/en/1641.html (accessed 26/06/08)

[583] *Government Response to the Report from the Joint Committee on Human Tissue and Embryos (Draft) Bill* (2007) Department of Health CM 7209 at Para 24

[584] *Ibid.* at Para 25-35

Licensable activities – research licences

As the Joint Committee was supportive of the amendments made to the licensable activities, or at least the relevant parts for this thesis, the Government made no further comment on this particular part of the Joint Committee Report.

The Human Fertilisation and Embryology Bill

The *Human Fertilisation and Embryology Bill* was published on the 8th November 2007.[585] The *New Bill* was debated in Parliament for some time due to all the amendments. Three amended versions of the *New Bill* appeared during the process, one following debate in the House of Lords (on the 29th January 2008) and two following debate in the House of Commons (on the 6th February and the 13th June 2008).[586] On the 23rd October 2008 the House of Commons published a list of amendments which were accepted by the House of Lords before the *New Bill* (as amended) was passed and received Royal Assent on the 13th November 2008. While this thesis is principally concerned with embryo research and the implications for human embryonic stem cell research the *New Bill*, as with the *HFE Act 1990*, deals with many contentious areas such as the need for a father in respect of infertility treatment, provisions relating to surrogacy and confidentiality provisions. All of these provisions took many hours of debate before the Bill was passed into legislation.

The provisions of the *New Bill* and amendments where appropriate will be discussed under the same headings as those in the *Draft Bill*: Meaning of 'embryo' and 'gamete', prohibitions and permissions, chimera and hybrid embryos and the permitted research purposes.

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[585] *Human Fertilisation and Embryology Bill [HL]* HL Bill 6, 54/3 http://www.publications.parliament.uk/pa/ld200708/ldbills/006/2008006.pdf (accessed 9/11/07) Hereafter referred to as the *New Bill*

[586] *Human Fertilisation and Embryology Bill [HL]* HL Bill 25, 54/3 http://www.publications.parliament.uk/pa/ld200708/ldbills/025/2008025.pdf (accessed 30/01/08) HL Bill 70, 54/3 http://www.publications.parliament.uk/pa/cm200708/cmbills/070/2008070.pdf (accessed 08/02/08) HL Bill 120, 54/3 http://www.publications.parliament.uk/pa/cm200708/cmbills/120/2008120.pdf (accessed 04/07/08) Hereafter referred to as the *January, February* and *June Bills* respectively or *Amended Bills* when referred to jointly

Meaning of 'embryo' and 'gamete', prohibitions and permissions

The definitions of 'embryo' and 'gamete' which appeared in the *Draft Bill* appear in the same wording in the *New Bill*. However, in the *January Bill* the term 'inter-species embryo' has been replaced with the term 'human admixed embryo'. Throughout the *Amended Bills* reference is made to the term 'human admixed embryo' which was previously referred to as an 'inter-species embryo'. It was felt that the term 'human admixed embryo' was preferable to that of 'inter-species embryo' for the following reason:

> *It was felt that the word "human" should be used to indicate that these entities are at the human end of the spectrum of this research....The term "admixed" is preferable as it...is used in the chemical sciences to refer to a substance where two or more components are mixed in to each other....This term...allows for more focused debate on the research issues addressed in the Bill.*[587]

Another amendment which was made was in respect of the definition of a 'permitted embryo'. The *New Bill* added a subsection so the definition included:

> *An embryo is a permitted embryo if –*
> ...
> (c) *no cell has been added to it other than by division of the embryo's own cells.*[588]

This amendment was made as the Members of Parliament did not want to allow embryos to be implanted whose cellular makeup had been added to.

The *New Bill* retained the prohibition that *'No person shall place in a woman an embryo other than a permitted embryo or gametes other than permitted eggs or permitted sperm'* (Proposed Section 3(2)(a) and (b)). There was no provision prohibiting the placing of an embryo (permitted or otherwise) from being implanted into an artificial womb. Whilst a scientist would in all likelihood be deemed to be 'keeping' an embryo beyond fourteen days if he was to do this, an express prohibition against the use of

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[587] Report Stage *Human Fertilisation and Embryology Bill [HL]* 15th January 2008, Volume 697, Column 1183, Lords Hansard http://www.publications.parliament.uk/pa/ld200708/ldhansrd/text/80115-0002.htm (accessed 29/01/08)

[588] *Human Fertilisation and Embryology Bill [HL]* HL Bill 6, 54/3 Proposed Section 3ZA (4) http://www.publications.parliament.uk/pa/ld200708/ldbills/006/2008006.pdf (accessed 9/11/07)

artificial wombs would have made this clear to all concerned that this is currently undesirable.

Interestingly the Government proposal within the Public Consultation to include a regulation making power in respect of the use of artificial gametes in treatment was not included in the *New Bill* probably due to the mixed response this suggestion received. If or when the use of artificial gametes becomes safe and desirable to use in treatment new primary legislation will need to be made.

Chimera and hybrid embryos

Additional amendments were made in the *New Bill* in respect of the definitions of inter-species embryos. The previous definitions were added to and expanded and Part (e) as contained in the *Draft Bill* was fortunately deleted altogether, showing that the Government had listened to the many criticisms made about Part (e) mainly that no-one understood what it meant. The section now reads as:

> *For the purpose of this Act an inter-species embryo is –*
> *(a) an embryo created by using –*
> *i. human gametes and animal gametes, or*
> *ii. one human pronucleus and one animal pronucleus,*
> *(b) an embryo created by replacing the nucleus of an animal egg or of an animal cell, or two animal pronuclei with –*
> *i. two human pronuclei,*
> *ii. one nucleus of a human cell, or*
> *iii. one human cell,*
> *(c) a human embryo that has been altered by the introduction of any sequence of nuclear or mitochondrial DNA of an animal into one or more cells of the embryo,*
> *(d) a human embryo that has been altered by the introduction of one or more animal cells, or*
> *(e) such other thing (sic) as may be specified in regulations.*[589]

The inclusion of a section allowing for regulations to be made was a sensible one to add due to the rapidity with which science is progressing in this field, the permissibility of using regulations would have allowed the Government to keep the legislation up to date should new methods of creating inter-species embryos have arisen in the future.

[589] *Ibid.* Proposed Section 4A (5)

The definitions were again altered within the *January Bill*. Part (a) has become Part (b) in the *January Bill*, although the wording remained the same, as it did for Parts (c)-(e). A change can be found in Part (a) of the *January Bill* definition of a human admixed embryo (previously Part (b) in the *New Bill*). The section reads as:

> *For the purpose of this Act a human admixed embryo is –*
> *(a) an embryo created by replacing the nucleus of an animal egg or of an animal cell, or two animal pronuclei, with -*
> *i. two human pronuclei,*
> *ii. one nucleus of a human gamete or of any other human cell, or*
> *iii. one human gamete or other human cell,*
> *...*[590]

Whilst the author of this thesis admits that these definitions are very technical and scientific it was important to see that the Government was taking seriously the proposals by scientists to undertake research with human and animal gametes, embryos and cells in a bid to push forward human embryonic stem cell research. The ethical debate surrounding the use of these embryos for research was being debated in Parliament with concerns raised about the use of any resulting embryos or cells being used in therapeutic applications.[591] While it may be useful for scientists to perfect extraction techniques and help them to understand embryo development, to name just a couple of reasons why this research is being pursued, it was obviously a contentious area which needed to be carefully regulated.

The definitions of a human admixed embryo are the same in the *February* and *June Bill*s but there was an amendment to Part (e) in the *June Bill*. Whereas the section had read as '*such other thing as may be specified in regulations*' Part (e) of the *June Bill* reads as:

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[590] *Human Fertilisation and Embryology Bill [HL]* HL Bill 25, 54/3 Proposed Section 4A (5), http://www.publications.parliament.uk/pa/ld200708/ldbills/025/2008025.pdf (accessed 30/01/08)

[591] For example refer to Lord Rea, Report Stage *Human Fertilisation and Embryology Bill [HL]* 15th January 2008, Volume 697, Column 1215, Lords Hansard http://www.publications.parliament.uk/cgi-bin/newhtml_hl?DB=semukparl&STEMMER=en&WORDS=human%20admix%20embryo%20therapeut%20applic&ALL=human%20admixed%20embryos%20therapeutic%20application&ANY=&PHRASE=&CATEGORIES=&SIMPLE=&SPEAKER=&COLOUR=red&STYLE=s&ANCHOR=80115-0007.htm_spnew2&URL=/pa/ld200708/ldhansrd/text/80115-0007.htm#80115-0007.htm_spnew2 (accessed 07/08/08)

(e) any embryo not falling within paragraphs (a) to (d) which contains both nuclear or mitochondrial DNA of a human and nuclear or mitochondrial DNA of an animal ("animal DNA") but in which the animal DNA is not predominant.[592]

Previously Part (e) would have allowed Parliament to issue regulations to cover any type of human admixed embryo which may have arisen in the future but which was not covered by the definitions in (a) to (d). By removing this provision and trying to write a catch all provision to encompass all future types and methods of creating human admixed embryos there is the very real risk that a new type of human admixed embryo may not fall within this definition. The use of the word 'predominant' is also very subjective. What percentage of the human admixed embryo must be human for it to be the dominant species? What one person would see as predominant others may not agree. Is 51% sufficient? Or is it somewhere closer to 100%? At least with the regulation making power Parliament could have amended the legislation once in force as it saw fit and as the need arose. Without this regulation making power there is a real risk that the new *HFE Act 2008* will need a complete rewrite very soon in the future, much as the *HFE Act 1990* has required. It is not clear from the Parliamentary debate as to why Part (e) was altered in this way. Part (e) was subsequently enacted in this wording.

Although there is no specific part of the definitions concerning human admixed embryos which gives a more general catch all definition or provides for regulations allowing Parliament to amend the definitions if the need arose, there is a power which allows the Secretary of State to amend the definitions:

If it appears to the Secretary of State necessary or desirable to do so in light of developments in science or medicine, regulations may –
(a) amend (but not repeal) paragraphs (a) to (e) of subsection (6);
(b) provide that in this section "embryo", "eggs", or "gametes" include things specified in the regulations which would not otherwise fall within the definitions.[593]

This section first appeared in the *January Bill* and as will be seen below was carried through to the new *HFE Act 2008*. The problem with this regulation making power is two fold; first of all it is the Secretary of State who has the power to amend the

[592] June Bill, *Human Fertilisation and Embryology Bill [HL]* Bill 120, 54/3 Proposed section 4A(6)(e) http://www.publications.parliament.uk/pa/cm200708/cmbills/120/2008120.pdf (accessed 04/07/08)
[593] *Ibid.* Proposed section 4A(11)

definitions without full Parliamentary debate, secondly there is only a power to 'amend' the definitions. It is surprising that the Secretary of State has the power to amend the definitions of human admixed embryos due to the particularly controversial nature of these embryos. It is recognised that the regulations which the Secretary of State may decide to make are subject to the affirmative resolution procedure within Parliament (Section 45 of the *HFE Act* as amended by section 30(5)(4A) of the *HFE Act 2008*) but this does not allow Parliament to alter any suggested regulations, merely to approve them. Additionally the fact that the definitions can only be amended means that there is a possibility that a new method of creating human admixed embryos may soon be discovered which does not fall into the current definitions and also find that an amendment to the definitions is not suitable; in such a situation an amendment would not bring that particular embryo within the scope of the new legislation and new primary legislation will be needed. The retention of Part (e) *'such other thing as may be provided for in regulations'* would have been preferable as it would have given Parliament as a whole greater scope to deal with any new methods of creation.

One regulation making power that was introduced in the *Commons Amendments* was the introduction of a new regulation making power which could be used *"to enable the circumstances in which a human admixed embryo can be kept or used to be restricted."*[594] The *Commons Amendments* introduced into Clause 4 of the *New Bill* the provision that:

> *A licence cannot authorise keeping or using a human admixed embryo in any circumstances in which regulations prohibit its keeping or use.*[595]

The House of Lords agreed with this amendment. It is interesting to note that this regulation making power could only be used to further restrict the use of human admixed embryos and not widen their use in research if it was shown to be necessary or desirable. The fact that regulations could only be used to further restrict the uses of human admixed embryos is possibly due to the fact that any regulations made under this provision are also subject to the affirmative resolution procedure in Parliament; due to their controversial

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[594] *Human Fertilisation and Embryology Bill [HL], Explanatory Notes on Commons Amendments* HL Bill 83-EN, 54/3 at Para 6 http://www.publications.parliament.uk/pa/ld200708/ldbills/083/en/2008083en.pdf (accessed 10/06/09)

[595] *Human Fertilisation and Embryology Bill [HL]* HL Bill 83, 54/3 at Amendment 2 http://www.publications.parliament.uk/pa/ld200708/ldbills/083/2008083.pdf (accessed 10/06/09)

nature it was not desirable to allow regulations to be used to extend the permitted uses of human admixed embryos through the use of affirmative resolution procedures and without full Parliamentary debate and free votes.

Permitted research purposes

Apart from the fact that the *Amended Bills* used the term 'human admixed embryo' instead of 'inter-species embryo' as is found in the *New Bill*, the different versions of the *New Bill* are identical. There was no alteration to the research purposes since they were first put forward in the *Draft Bill*. Importantly there was still the requirement that research should be necessary and desirable to fulfil any of the research purposes.[596]

Human Fertilisation and Embryology Act 2008

As previously mentioned the *HFE Act 2008* received Royal Assent on the 13th November 2008. The majority of the provisions are to come into force in October 2009. It is important to note that the entirety of the *HFE Act 1990* has not been repealed, the *HFE Act 2008* has amended Part 1 and Schedules 1 to 5 of the *HFE Act 1990* and so the two Acts need to be read together.[597] In summary the main points relating to human embryonic stem cell research which have been raised in the discussion of the reform process and of the Bill passing through Parliament to finally receive Royal Assent are: the definition of an embryo, gamete, human admixed embryos and the permitted research purposes.

Definition of an embryo, permitted embryo and gamete

The definition of an embryo in Section 1(2) if the *HFE Act 2008* is very broad; it defines an embryo as a 'live human embryo' but without reference to any specific method of creation. The provision which prohibits the placing into a woman of 'an embryo other

[596] For the latest version refer to *Human Fertilisation and Embryology Bill [HL]* Bill 120, 54/3 Proposed Schedule 2, paragraph 3A(1)(a) http://www.publications.parliament.uk/pa/cm200708/cmbills/120/2008120.pdf (accessed 04/07/08)
[597] *Human Fertilisation and Embryology Act 2008 Explanatory Notes* at Paragraph 12 http://www.opsi.gov.uk/acts/acts2008/en/ukpgaen_20080022_en.pdf (accessed 22/06/09)

than a permitted embryo' has been implemented without reference to placing or keeping embryos in any other way, such as placing an embryo into an artificial womb.[598] There is also no regulation making power which would allow the use of artificial gametes in treatment should that purpose become safe and desirable. Therefore it is possible that in the near future new primary legislation will be needed concerning the use of artificial gametes in treatment and the use of artificial wombs (for treatment or research) as and when the science progresses to this point.

Human admixed embryos

In contrast with the broad definition in Section 1(2) of the *HFE Act 2008* for human embryos, the definitions of human admixed embryos are very precise and scientific. As previously discussed within Section 4A(6) of the *HFE Act 2008* there is no regulation making power which could be used to expand the accepted list of human admixed embryos should the need arise in the future. As noted above the Secretary of State does have the power to amend (but not repeal) the definitions subject to the affirmative resolution procedure. It has been questioned how appropriate this is considering the particularly controversial nature of human admixed embryos and the possibility that amendments still may not bring all such embryos within the statutory definitions.

It is good to see that human admixed embryos are specifically referred to in the legislation as the creation of these types of embryos has implications for human embryonic stem cell research. The use of human admixed embryos in human embryonic stem cell research could speed up the research which is being carried out. Nonetheless the use of stem cells derived from human admixed embryos needs to be debated fully and legislated upon or referred to the UK Stem Cell Bank for regulation. Although the UK Stem Cell Bank would be highly likely to carefully regulate stem cells derived from human admixed embryos this is a matter which ideally needs further Parliamentary debate due to the contentious issue of using such stem cells in clinical trials and therapies.

[598] Section 3(2) *Human Fertilisation and Embryology Act 2008*

Permitted research purposes

The permitted research purposes passed through Parliament relatively easily compared to many of the other provisions contained within the *HFE Act 2008.* Any research activity involving embryos can only be authorised where the activity appears to the HFEA to be 'necessary or desirable' for one of the permitted purposes found in Schedule 2, paragraph 3A *HFE Act 2008.* This can be found originally in the *HFE Act 1990* and has worked well to ensure that embryos are not used frivolously for research. Basic research is now explicitly provided for in Schedule 2, Paragraph 3A(1)(b) and the requirement that no licence *"...is to be granted unless the Authority is satisfied that any proposed use of embryos or human admixed embryos is necessary for the purposes of the research"* has been retained and expanded to include human admixed embryos.[599] Also as previously discussed the permitted research purposes have been expanded to include research into 'serious medical conditions' potentially opening up the field of research.

The provisions of the *HFE Act 2008* are important for human embryo research generally and human embryonic stem cell research more specifically. The legislation now applies to all human embryos regardless of the method of creation and also applies to human admixed embryos. Therefore where it is desirable to use a particular method to create an embryo to extract stem cells this can be done provided of course that it falls within one of the permitted research purposes. The inclusion of basic as well as applied research is also very important for human embryonic stem cell research as there is still much basic research to be done before human embryonic stem cell research moves onto clinical trials and applications of therapies on a large scale.

The extension to the permitted research purposes to include 'other serious medical conditions' is likely to not only expand the areas in which embryos are being used for research but also the research uses of the extracted stem cells. This is due to the likelihood that the UK Stem Cell Bank will change its Code of Practice to follow the research purposes of the *HFE Act 2008* as it had done with the research purposes of the *HFE Act 1990.* The range of research and potential uses of stem cells has been greatly increased by the inclusion of 'serious medical condition' as well as disease in the permitted research purposes.

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[599] *Ibid.* at Schedule 2, Paragraph 3(5)

The debate surrounding the creation of embryos for treatment purposes, whereby it is desirable to create an embryo to extract stem cells for subsequent treatment, was set aside after the White Paper and will not be discussed by Parliament until it is necessary to do so. It was likely that had the Government included a provision in the *New Bill* which would have allowed the creation of embryos for treatment purposes then the *New Bill* would have been defeated. We do not yet know if we will need to create embryos specifically to derive stem cells for subsequent treatment or if we will be able to use 'general' stem cells which have been derived during research, while this matter is still being researched into it was important not to delay the new *HFE Act 2008* as there was a need for the legislation to be updated.

Conclusion

It was encouraging to see that the Government fully took on board the recommendations made by the Joint Committee before writing and publishing a Bill for debate. This was very important due to the very strong opposition to the establishment of RATE. The strong opposition towards the establishment of RATE was unsurprising and yet the Government wanted to push this provision despite the lack of support for this measure. The establishment of RATE could have dealt a major blow to the reputation which the UK has established in the field of human fertilisation and embryology. Although the Government backed down over the merger of the HFEA and the HTA to form RATE, there does still appear to be attempts to save money in respect of these two authorities. While the harmonisation of these two bodies is to be encouraged, where possible, it should not come for the sake of saving a few pounds.

The new 'embryo' definition should be better than the definition found in the *HFE Act 1990* which is scientifically out of date, however, the author has concerns about the definition of a 'permitted embryo' and why the Act does not contain a regulation making power so as to allow fertility treatment with embryos that have been created with artificial gametes if and when this is shown to be safe and desirable. It is foreseeable that without regulation making powers new primary legislation will be needed in the near future.

The inclusion of human admixed embryos could be beneficial to human embryonic stem cell research as there is a distinct lack of suitable oocytes to be used in

the process. The use of human admixed embryos in combination with human embryonic stem cell research could for example allow researchers to perfect their extraction techniques without wasting valuable 'pure' human embryos. Nevertheless the inclusion of such embryos was not without controversy and there is now the problem that the definitions contained within the *HFE Act 2008* are so scientifically precise that they may become out of date in the near future. The inability of Parliament to debate and introduce Regulations as it sees fit could mean that primary legislation is again needed in the near future. The usefulness of the Secretary of State being able to amend the definitions through the affirmative resolution procedure remains to be seen.

Finally, the alterations to the permitted research purposes are sensible, unproblematic and of benefit to human embryonic stem cell research as they greatly increase the potential areas of research and future clinical trials and therapies.

Previous chapters of this thesis have been a detailed critical look at the United Kingdom's current regulation of human embryonic stem cell research as well as a critical analysis of the reform process and the new *HFE Act 2008*. The UK was the first country to regulate permissively on human embryo research and human embryonic stem cell research but it is no longer the only country to do so. By way of comparison the following chapter examines the regulation of human embryonic stem cell research in the State of California in the United States of America.

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Chapter 9 - California and Proposition 71

Introduction

In November 2004 the Californian public voted to allow State funds to be used for stem cell research. This was to be done by raising a bond, not through paying more taxes. Whilst this may not at first sight appear to be groundbreaking, when compared to the stance taken for many years in the United Kingdom, in actuality this was a major step in the United States. At the time of completing this thesis in November 2008 and as will be discussed, the United States prohibits the use of Federal (national) funds to create new embryonic stem cell lines and greatly limits the funding of embryo research more generally. It needs to be noted that on the 4th November 2008 Barack Obama was elected as the next President of the United States. One of the policies which he said he would overturn was the prohibition on the Federal funding of human embryonic stem cell research. As the ban was contained within a Presidential Executive Order this would be easy to do.[600] President Obama subsequently overturned the Bush Executive Order on the 9th March 2009 and the National Institutes of Health is now devising new guidelines.[601] Although President Obama has now reversed the Federal position regarding the funding of human embryonic stem cell research, it is still important to understand how and why the Federal funding of embryo research and human embryonic stem cell research has generally been prohibited over the years and why this led to California adopting a contrary position. Additionally the new Federal rules and NIH guidelines will take some time to come into force and to start to have an effect upon human embryonic stem cell research within the United States. California will want to maintain the head start which it has over the Federal Government.

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[600] Zeleny, J., *Obama Weighs Quick Undoing of Bush Policy* NY Times 9th November 2008 http://www.nytimes.com/2008/11/10/us/politics/10obama.html?_r=1&scp=2&sq=barack%20obama%20embryonic%20stem%20cells&st=cse (accessed 23/11/08) Editorial, *Stem-cell futures* 456 Nature 282 (20th November 2008) http://www.nature.com/nature/journal/v456/n7220/pdf/456282a.pdf (accessed 23/11/08)

[601] *Executive Order no.13505 of March 9, 2009: Removing Barriers to Responsible Scientific Research Involving Human Stem Cells* http://edocket.access.gpo.gov/2009/pdf/E9-5441.pdf (accessed 13/03/09) Hereafter referred to as the NIH

It will be seen that the issue of human embryonic stem cell research in the United States is not primarily a question of legislation and regulation, but one of funding at the Federal and State level.

This Chapter seeks to discuss the historical context of stem cell research in the United States, discuss the legislation and policies of the State of California and where appropriate draw comparisons between the legal position adopted in California and that which has been adopted in the United Kingdom.

History of the regulation of embryo research in the United States

Historically the United States has taken a very limited approach towards the regulation of human embryo research. Looking over the last few decades we can see that human embryo research and the Federal funding of such research were not condoned.

In the late 1970's Congress issued a moratorium on the Federal funding of human IVF research until regulations were adopted by the Department of Health and Human Services. The Federal regulations, which were adopted in 1978, recommended that no human embryo research should receive Federal funding until the application had been approved by an Ethical Advisory Board (EAB).[602] The first such EAB was appointed in 1978 and a year later the EAB recommended the Federal funding of IVF research provided that alternative methods were not available and that the embryos were not kept beyond fourteen days development. Although the EAB had recommended the Federal funding of human IVF research the Department of Health and Human Services did not move forward and allowed the EAB to expire in 1980. This effectively prohibited all embryo research from occurring (where Federal funds were required) as no such research could proceed without EAB approval.[603]

The lack of Federal funding for embryo research continued with Presidents Reagan and Bush Snr as the pro-life lobby were successful in persuading the Presidents not to appoint a new EAB, effectively resulting in a moratorium of embryo research.

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[602] 45 CFR 46 (Title 45, *Public Welfare, Department of Health and Human Services*, Part 46, Protection of Human Subjects) The most recent version (2005) is available online: http://www.hhs.gov/ohrp/humansubjects/guidance/45cfr46.htm (Accessed 7/6/07)

[603] Refer to Belew, K., *Comment: Stem Cell Division: Abortion Law and its Influence on the Adoption of Radically Different Embryonic Stem Cell Legislation in the United States, the United Kingdom and Germany* (2004) 39 Tex. Int'l L.J. 479 for a detailed and clear discussion of the historical regulation of embryo research in the United States

However, the election of President Clinton was to see a reversal in the Federal funding fortunes of embryo research.

President Clinton introduced the *National Institute of Health Revitalization Act of 1993* which was passed by Congress. This Act eliminated the need for EAB approval prior to conducting research upon human embryos.[604] As the NIH started to receive applications for funding of embryo research, the NIH responded by assembling the Human Embryo Research Panel, an ethics board which was required to consider the ethics of human embryo research and provide advice accordingly.[605]

In September 1994 the Human Embryo Research Panel published its report, *Report of the Human Embryo Research Panel,* which recommended that the Federal funding of embryo research was ethical provided that certain conditions were met.[606] This included not permitting research on embryos past fourteen days development.[607] Surprisingly, in light of the fact that absolutely no embryo research, irrelevant of the sources of the embryos, up to this point had been federally funded, the Report also recommended allowing embryos to be created specifically for research purposes. The Report notes that this was one area which was the most difficult to consider amongst its panel members but felt that the fertilisation of oocytes specifically for research should be permitted and federally funded but only when two conditions were met.[608] These were:

- *When the research by its very nature cannot otherwise be validly conducted. ...*
- *When the fertilization of oocytes is necessary for the validity of a study that is potentially of outstanding scientific and therapeutic value. ...*[609]

It is also worth noting that the Report recommended a further three guidelines in respect of the procurement of oocytes for the specific purpose of research. This included only obtaining oocytes from women who were already undergoing gynaecological surgery such as IVF treatment.[610] Therefore women could not altruistically donate

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[604] *National Institutes of Health Revitalization Act of 1993* Public Law 103-43, section 121(c)
[605] The National Institutes of Health (NIH), a part of the U.S. Department of Health and Human Services, is the primary federal funding agency for conducting and supporting medical research *About NIH* NIH http://www.nih.gov/about (Accessed 11/6/07)
[606] *Report of the Human Embryo Research Panel, Volume I* National Institutes of Health, Sept 1994 http://www.bioethics.gov/reports/past_commissions/human_embryo_vol_1.pdf (accessed 4/6/07)
[607] *Ibid.* at pg51
[608] *Ibid.* at pg 41
[609] *Ibid.* at pg 44-45
[610] *Ibid.* at pg 57

oocytes unless they were already undergoing related medical treatment. This is different to the situation in the United Kingdom where women can donate oocytes altruistically if they desire. This also differs to the US position of allowing payment for oocytes for infertility treatments. Allowing payment for donation of oocytes for treatment but not for research can perhaps be explained by the fact that in the US the donation of oocytes for infertility treatment is considered to be a worthy cause by helping the childless to achieve the goal of having a child, whereas donation of oocytes to research is still seen as ethically contentious and to many people is not a worthy reason for which to donate oocytes. The donation (and payment) of oocytes for infertility treatment may be encouraged in the US due to the fact that any resulting embryos have the possibility of their potential to become persons to be fulfilled (even if this is theoretical depending upon the number of embryos produced and needed) whereas the donation of oocytes for research will result in embryos that cannot and will not fulfil their potential due to restrictions upon their implantation. Allowing payments to be made to egg donors for treatment is perhaps meant to encourage donors to participate whereas prohibiting payments for donations to research is another method of signalling (even subconsciously) disapproval for embryo research.

Considering the restrictions which the Human Embryo Research Panel placed upon the fertilisation of oocytes for research purposes it is somewhat surprising, to the British observer at least, that President Clinton was not willing to accept the recommendation of the Human Embryo Research Panel to allow embryos to be created specifically for research purposes. Whilst not corresponding to the British legislative position it is consistent with the stance taken by many other countries. As such President Clinton issued "*...a directive barring the use of federal funds to create human embryos for experimentation.*"[611] The directive did not however prohibit the Federal funding of research using 'spare' IVF embryos, those which had been created for reproductive purposes but which were no longer required for that purpose and had been donated to research by the gamete donors.

Before the NIH could make any funding decisions on applications for research involving these spare embryos, an amendment was introduced in 1995 to the *Department*

[611] Belew, K., *Comment: Stem Cell Division: Abortion Law and its Influence on the Adoption of Radically Different Embryonic Stem Cell Legislation in the United States, the United Kingdom and Germany* (2004) 39 Tex. Int'l L.J. 479 at page 501

of Health and Human Services Appropriations Bill. Called the 'Dickey Amendment' after the Republican who introduced it, the Amendment prevents the Federal funding of any research which involves:

> *(1) the creation of a human embryo or embryos for research purposes; or*
> *(2) research in which a human embryo or embryos are destroyed, discarded, or knowingly subjected to risk of injury or death greater than that allowed for research on fetuses in utero under 45 CFR 46.208(a)(2) and ... [42 U.S.C. 289g (b)].*
> ...
>
> *For purposes of this section, the phrase "human embryo or embryos" shall include any organism, not protected as a human subject under 45 CFR 46 as of the date of enactment of this Act, that is derived by fertilization, parthenogenesis, cloning, or any other means from one or more human gametes.*[612]

This Amendment has been passed in all successive years and as such controls the access to Federal funds for all human embryo research.

When Professor Thomson at the University of Wisconsin announced his work with human embryonic stem cells in 1998 the question arose if work on the derived stem cell lines could be federally funded without breaching the Dickey Amendment. The actual research undertaken by Professor Thomson and his team had been privately funded by the Geron Corporation of Menlo Park, California.[613] Within the same month John Gearhart also announced work involving the derivation of human embryonic germ cells, derived from aborted foetuses of between 5 and 9 weeks gestation.[614] This work had also been privately funded by the Geron Corporation.

On the 14th November 1998 President Clinton wrote to the National Bioethics Advisory Commission to request that it conduct a review of the ethical issues associated with human embryonic stem cell research.[615] The Director of the NIH, Harold Varmus,

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[612] 'Dickey Amendment' *Balanced Budget Downpayment Act of 1996* Pub. L. No. 104-99, §128, 110 Stat. 26, 34 (1996)
[613] Korobkin, R., *Stem Cell Century, Law and Policy for a Breakthrough Technology* (2007) Yale University Press at pg 51 (Ch 2 *Embryo Wars*) and pg 96-98 (Ch 4 *Stem Cell Patents*)
[614] M.J. Shamblott et al., *Derivation of Pluripotent Stem Cells from Cultured Human Primordial Germ Cells* 95 Proceeding Nat'l Acad. Sci. 13726 – 13731 (1998)
[615] *Ethical Issues in Human Stem Cell Research, Vol I, Report and Recommendations of the National Bioethics Advisory Commission* September 1999 Letter to the President http://www.bioethics.gov/reports/past_commissions/nbac_stemcell1.pdf (accessed 4/6/07)
The National Bioethics Advisory Commission was set up for the purpose of "Advising the President on ethical issues related to advances in biomedical science and technology." http://www.bioethics.gov (accessed 11/6/07)

also sought the legal opinion of the General Counsel of the Department of Health and Human Services, Harriet Raab. In Harriet Raab's memorandum to Harold Varmus it was established that in her legal opinion the NIH could provide Federal funding for research involving human embryonic stem cell lines as the cells did not constitute an embryo within the statutory definition.[616]

In September of 1999 the National Bioethics Advisory Commission also concluded in its Report, *Ethical Issues in Human Stem Cell Research,* that it was ethical for research upon the derived stem cell lines to proceed with Federal funding and that a statutory exception to the Dickey Amendment should be permitted to allow the Federal funding of such research. However, the National Bioethics Advisory Commission did not agree with the recommendation made by the Human Embryo Research Panel five years earlier that the creation of embryos specifically for research purposes should be permitted.[617]

> *Recommendation 2:*
> *Research involving the derivation and use of human ES cells from embryos remaining after infertility treatments should be eligible for federal funding. An exception should be made to the present statutory ban on federal funding of embryo research to permit federal agencies to fund research involving the derivation of human ES cells from this source under appropriate regulation that includes public oversight and review.*
>
> *Recommendation 3:*
> *Federal agencies should not fund research involving the derivation or use of human ES cells from embryos made solely for research purposes using IVF.*[618]

The call for national oversight and public review of stem cell research, including the recommendation to create a National Stem Cell Oversight and Review Panel, has been subsequently ignored by the Federal Government, as evidenced by the lack of a national oversight panel nearly a decade after its recommendation by the National Bioethics Advisory Commission.[619]

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[616] *Federal Funding for Research Involving Human Pluripotent Stem Cells* Memorandum from Harriet S. Raab, General Counsel of the DHHS, to Harold Varmus, Director of the NIH (Jan. 15, 1999)
[617] *Ethical Issues in Human Stem Cell Research, Vol I, Report and Recommendations of the National Bioethics Advisory Commission* September 1999 at pg 61-62, Summary http://www.bioethics.gov/reports/past_commissions/nbac_stemcell1.pdf (accessed 4/6/07)
[618] *Ibid.* at pg 70-71
[619] *Ibid.* Refer to Recommendation 8, Page 76 for a discussion of the National Stem Cell Oversight and Review Panel

Considering that the National Bioethics Advisory Commission viewed national oversight as crucial *"...to ensure strict adherence to guidelines and standards across the country"* it is strange that an issue as sensitive and divisive as human embryonic stem cell research has not resulted in the panel which was called for in 1999.[620] When a subject is as divisive as human embryonic stem cell research, particularly in a country as politically sensitive as the United States, it would be thought that a system of national oversight would be one way in which the Federal Government could show that it is taking an active interest in this area of research.

In light of the favourable Report from the National Bioethics Advisory Commission, the NIH went ahead with adopting guidelines for research on human pluripotent stem cells. On a side note, the term 'human pluripotent stem cell' is used in the American literature when referring to human embryonic stem cells and human embryonic germ cells and the discussions centre around these two sources of stem cells, along with those created by somatic cell nuclear transfer.[621] This is compared to the UK literature which generally separates human embryonic stem cells from 'adult' stem cells, of which germ cells are part of, and also refers to somatic cell nuclear transfer as therapeutic cloning. As such, the NIH guidelines refer to all human pluripotent stem cells, not specifically to human embryonic stem cells.

Although the National Bioethics Advisory Commission had called for a statutory exception to the Dickey Amendment to allow research involving the derivation of human embryonic stem cells, this was not forthcoming and so the NIH guidelines which were being adopted only referred to work on stem cell lines which had already been derived. The Federal funding of the actual derivation process was still outlawed and so could not be funded by the NIH but the subsequent research upon the stem cells themselves could be federally funded.

The NIH adopted guidelines on human pluripotent stem cells in August 2000 and started to receive grant applications for this type of research. One condition of the guidelines was that for all research involving human pluripotent stem cell lines the research application had to be reviewed by the NIH Human Pluripotent Stem Cell Review

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[620] *Ibid.* at pg 76

[621] For a US discussion of the three sources of human pluripotent stem cells refer to Capron, A.M., *Stem Cells: Ethics, Law and Politics* (2001) 20(5) Biotechnology Law Report 678 at page 682

Group (HPSCRG) for compliance with the guidelines.[622] However, before any funding could be allocated and distributed President Clinton's term in office came to an end and President George W. Bush was elected. In spring 2001, *"In order to prevent the NIH from funding stem cell research under the Clinton administration's policies,...the Bush administration froze federal funding of stem cell research and postponed the first scheduled meeting of the HPSCRG in anticipation of the announcement of his administration's own funding guidelines."*[623]

On the 9th August 2001 President George W. Bush announced the Federal policy in relation to human pluripotent stem cells.[624] In essence it can be summarised as permitting the Federal funding of research using human pluripotent stem cell lines which had been derived prior to the 9th August 2001. The reason for this was that those embryos which had been destroyed prior to that date were effectively beyond help and that valuable work could be done upon the cell lines for which they were sacrificed. However, President Bush did not want to be seen to be encouraging the future destruction of embryos, hence the ban on Federal funding of any stem cell lines created after the date of his announcement.

The adoption of this policy was criticised from all sides, from those who felt that the President should have completely outlawed all embryo research where it involves the destruction of embryos, to those who felt that the policy did not go far enough and that the limited research which was being permitted was inadequate.[625]

In reality this approach adopted by President Bush is absurd as embryos will continue to be destroyed in the United States for embryo research and for the derivation of stem cell lines but that such research will be privately funded, as was the situation with Professor Thomson's original groundbreaking work. By not moving to completely outlaw embryo research where embryos are destroyed, but preferring to see it as an issue of funding, the President has put the United States in the strange position of not condoning

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[622] *National Institutes of Health Guidelines for Research Using Human Pluripotent Stem Cells*, Effective as of 25th August 2000, Section IV (A) NIH http://stemcells.nih.gov/news/newsArchives/stemcellguidelines.asp (accessed 4/6/07)

[623] Belew, K., *Comment: Stem Cell Division: Abortion Law and its Influence on the Adoption of Radically Different Embryonic Stem Cell Legislation in the United States, the United Kingdom and Germany* (2004) 39 Tex. Int'l L.J. 479 at page 503

[624] *Remarks by the President on Stem Cell Research* President Bush 9th August 2001 The full transcript of President Bush's speech can be found on the Whitehouse website at: http://www.whitehouse.gov/news/releases/2001/08/20010809-2.html (accessed 11/6/07)

[625] For a summary of some of the criticisms aimed at the Bush policy refer to Sax, J.K., *The States "Race" with the Federal Government for Stem Cell Research* (2006) 15 Annals Health L. 1 at pg 18

embryo research and yet not prohibiting it. It appears that the private investors will be left to pursue human embryonic stem cell research without any national oversight or regulation. An analogous situation in the UK is in respect of lap dancing. The UK Government does not like lap dancing and yet has not outlawed it. If moves were made to outlaw this practice it is unlikely that such a law would pass through Parliament. Interestingly the industry itself is calling for stricter regulation (though still permitting the practice).[626]

Although the situation that the Bush policy has created is bizarre to the outside observer, upon reflection it is perhaps not that surprising that human embryonic stem cell research has been regulated, not through legislation but by funding bodies and through a Presidential Executive Order. It is typical of the United States to regulate sensitive issues through funding rather than legislation as it is an easier route by which to regulate and is less open to legal challenges. With the Federal body, the NIH as the principal funder of medical research this effectively means that research is adequately controlled. Additionally, not only is the Bush Executive Order the easiest way to regulate human embryonic stem cell research it is also the only immediately effective option. Had President Bush tried to regulate human embryonic stem cell research through the introduction of prohibitive legislation the debate may still be ongoing in Congress.[627]

Due to the complete change in direction which the Bush administration had taken towards human embryonic stem cell research compared to the approach taken by the Clinton administration, the NIH was forced to redraft the guidelines concerning the Federal funding of human pluripotent research. As Daar notes, "*The specific funding parameters of the Bush Administration policy are set out by the National Institutes of Health...*"[628] The guidelines state that:

> *On August 9, 2001, at 9:00 p.m. EDT, the President announced his decision to allow Federal funds to be used for research on existing human embryonic stem cell lines as long as prior to his announcement (1) the derivation process (which commences with the removal of the inner cell mass from the blastocyst) had already been initiated and (2) the embryo from which the stem cell line was derived no longer had the possibility of development as a human being.*

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[626] Lewis, P., *Lap dance firms call for tighter regulation* 28th April 2008 The Guardian http://www.guardian.co.uk/uk/2008/apr/28/3 (accessed 6/11/08)
[627] Thanks to Søren Holm for his comments on this point
[628] Daar, J.F., *Reproductive Technologies and The Law* (2006) LexisNexis at Page 783

In addition, the President established the following criteria that must be met:

- *The stem cells must have been derived from an embryo that was created for reproductive purposes;*
- *The embryo was no longer needed for these purposes;*
- *Informed consent must have been obtained for the donation of the embryo;*
- *No financial inducements were provided for donation of the embryo.*

In order to facilitate research using human embryonic stem cells, the NIH is creating a Human Embryonic Stem Cell Registry that will list the human embryonic stem cells that meet the eligibility criteria...[629]

The establishment of an NIH Human Embryonic Stem Cell Registry was necessary to enable the NIH to list the eligible and available stem cell lines for Federal research. At the time of President Bush's announcement this was anticipated to number "*...more than 60 genetically diverse stem cell lines...*" and that research upon these stem cell lines would allow the United States "*...to explore the promise and potential of stem cell research without crossing a fundamental moral line...*"[630] The reality is that of these 60 stem cell lines only 21 (as of November 2008) have so far been registered as suitable for research with the NIH Human Embryonic Stem Cell Registry.[631] Of the remaining stem cell lines referred to by President Bush, many are not suitable for research due to problems in retaining them in their undifferentiated state or have developed mutations.[632]

Recently (June 2008) it has come to light that the 21 cell lines which are available for funding and distribution by the NIH may not fulfil the informed consent requirements which President Bush specifically referred to in his 9th August speech. Streiffer requested from the NIH copies of the consent forms used for the cell lines available for distribution and has analysed eleven forms from the six providers of the cell lines.[633] Two of the consent forms, from Cellartis and BresaGen, are considered to be the most problematic whilst the others are adequate to cover many research uses although the research will be

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[629] *Notice of Criteria for the Federal Funding of Research on Existing Human Embryonic Stem Cells and Establishment of NIH Human Embryonic Stem Cell Registry* NIH 7th November 2001 http://grants.nih.gov/grants/guide/notice-files/not-od-02-005.html (accessed 4/6/07)

[630] *Remarks by the President on Stem Cell Research* President Bush 9th August 2001 http://www.whitehouse.gov/news/releases/2001/08/20010809-2.html (accessed 4/6/07)

[631] *Information on Eligibility Criteria for Federal Funding of Research on Human Embryonic Stem Cells* National Institutes of Health http://stemcells.nih.gov/research/registry/eligibilityCriteria.asp (last accessed 2/11/08)

[632] For example refer to *Time to expand US funding for stem-cell research* (2007) 6 The Lancet Neurology 469

[633] Streiffer, R., *Informed Consent and Federal Funding for Stem Cell Research* (2008) 38 Hastings Cent. Rep. 40-47 at pg 42

restricted. Streiffer argues that federal funding should be used to derive new cell lines which comply with informed consent guidelines and then subsequent research would not be restricted.[634]

Stanford University is considering taking steps to prevent its researchers working upon the two most problematic lines and other research institutions may also follow suit.[635] This also has implications for the UK Stem Cell Bank which will normally allow researchers to access stem cell lines from the NIH Stem Cell Registry without the need to prove that the cell lines were ethically sourced:

> *"Information in relation to the ethical sourcing of human embryonic stem cell lines does not need to be provided for human embryonic stem cell lines that ...b) are listed on the National Institute of Health (NIH) registry (as ethical sourcing has been confirmed by NIH)..."*[636]

The Steering Committee of the UK Stem Cell Bank has also approved four stem cell lines from Cellartis although these are not yet accessioned by the Bank.[637] This was to be reviewed by the Steering Committee in September 2008.[638]

The original number of 60 was criticised by some for not being representative or suitable for research. As the number has since been shown to be much smaller there were calls for President Bush to review his policy.[639] There is also the issue of the suitability of these stem cell lines to be used in therapeutic applications. Although it will occur sometime into the future there is the possibility that these stem cell lines could lead to therapies or cures. However, it is unlikely that these particular stem cell lines could be used for human therapies due to the fact that they have all been grown on cultures which include mouse feeder cells. The possibility of animal to human infection and

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[634] *Ibid.* at pg 47

[635] Baker, M., *Consent issues restrict stem-cell use* 28th July 2008 Nature news http://www.nature.com/news/2008/080728/full/454556a.html (accessed 30/07/08)
Baker, M., *The Niche Stem Cell Blog: Some NIH Registry Lines Fall Outside Informed Consent Guidelines* http://blogs.nature.com/reports/theniche/2008/07/some_nih_registry_lines_fall_o.html (accessed 05/09/08)

[636] *Code of Practice for the use of Human Stem Cell Lines* Version 3, August 2006 at Section 8.3 http://www.ukstemcellbank.org.uk/documents/Code%20of%20Practice%20for%20the%20Use%20of%20Human%20Stem%20Cell%20Lines.pdf (accessed 30/04/08)

[637] *Accepted by the Steering Committee* UK Stem Cell Bank http://www.ukstemcellbank.org.uk/accepted.html (accessed 12/08/08)

[638] Electronic communication from Søren Holm 8th July 2008, member of the UK Stem Cell Bank Steering Committee. Confirmed 17th July 2009 in meeting with Søren Holm that one Cellartis line was okay as new consent had been sought

[639] For example refer to *Time to expand US funding for stem-cell research* (2007) 6 The Lancet Neurology 469 and Rao, M.S., *Embryonic Stem Cell Research and U.S. Policy* (2006) 24 Stem Cells 1412

contamination is one which everyone wishes to avoid. If scientists were able to find a way to purify these cell lines of the mouse feeder cells then there is the possibility of these cell lines being used in future therapies. Until such work is undertaken and proven, these cell lines will remain unsuitable for use in humans.

President Bush's speech on the 9th August pronouncing the Federal Government policy in respect of human embryonic stem cell research was not the end of the matter at Federal level. There are many supporters of human embryonic stem cell research within the Government, some of whom have taken steps to introduce legislation which would override the current Federal position. The latest of these is the *Stem Cell Research Enhancement Act of 2007*. This Act would have amended Part H of Title IV of the Public Health Act by inserting wording after section 498C. The amendment would have permitted the Federal Government to *"...conduct and support research that utilizes human embryonic stem cells...(regardless of the date on which the stem cells were derived from the human embryo)."*[640] First introduced on the 4th January 2007 it was passed by the Senate on the 11th April, and was finally passed by the House of Representatives on the 7th June. However, less than two weeks later President Bush vetoed the Bill. The Presidential veto can be overridden if two thirds of each chamber, starting with the Senate, were to vote in favour of the Act. No attempt was made to do this.[641] The Presidential veto was not a surprise as President Bush had vetoed an identical Bill the previous year and the attempt to override the Presidential veto failed.[642] How successful the Act would have been has been debated elsewhere, all that is left to say is that the divisive voting and subsequent Presidential veto shows the continued problems which human embryonic stem cell research raises and the difficulty of finding a middle ground upon which everyone can agree, at least to some extent.[643] Due to the Bush policy in force at the time California took steps to actively fund human embryonic stem cell research.

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[640] §2 *Stem Cell Research Enhancement Act of 2005* H.R. 810, 109th Cong.

[641] The passage of the *Stem Cell Research Enhancement Act of 2007* can be located at: http://www.govtrack.us/congress/bill.xpd?bill=s110-5 (accessed 12/7/07)

[642] The passage of the *Stem Cell Research Enhancement Act of 2005* can be located at: http://www.govtrack.us/congress/bill.xpd?bill=h109-810 (accessed 29/5/07)

[643] For a useful discussion of the shortcomings of the *Stem Cell Research Enhancement Act of 2005* refer to Korobkin, R., *Stem Cell Century, Law and Policy for a Breakthrough Technology* (2007) Yale University Press at pg 41-48 (Ch 2 *Embryo Wars* subheading 'The Stem Cell Research Enhancement Act and Limitations of the SCREA')

California and Proposition 71

It is necessary to consider California's stance on stem cell research in light of the above discussion concerning Federal funding and lack of regulation of human embryonic stem cell research. It was the dissatisfaction with the Federal Government policy on stem cell research which lead to the introduction of *Proposition 71* by the California legislature.

Proposition 71 was sold to the general public as an opportunity to keep California at the forefront of global biotechnology whilst also providing revenue to the State of California in the future. The public was asked to vote for the State to provide $3 billion over 10 years to Californian scientists to continue work with human pluripotent stem cells. The debate over this proposed legislation was fierce, as can be imagined over such a divisive issue, however, when the 'yes' campaign group had campaign funds of $35 million whereas the 'no' campaign group had a mere $200,000 it is in some respect hardly surprising that 59% of the general public voted 'yes' to *Proposition 71* and 41% voted no.[644]

The initiative was voted on in November 2004, with the idea that the regulatory body established by *Proposition 71*, the California Institute for Regenerative Medicine, would start to distribute funds as soon as suitable policies had been formulated. However, the distribution of funds was delayed by various legal challenges from groups which challenged the constitutionality of *Proposition 71*.

The legal challenges

Various groups challenged the legality of *Proposition 71*, including the California Family Bioethics Council and the People's Advocate. One legal challenge by the People's Advocate fell at the first hurdle,[645] whilst the decision of Judge Bonnie Lewman-Sabraw in the Superior Court of Alameda County,[646] in favour of the California

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[644] Fox, C., *Cell of Cells: The Global Race to Capture and Control the Stem Cell* (2007) W.W.Norton at pg 413

[645] *People's Advocate et al. v. Independent Citizen's Oversight Committee et al.* S131655 (Supreme Court of California) 23rd March 2005

[646] *People's Advocate and National Tax Limitation Foundation v. Independent Citizen's Oversight Committee et al.* Superior Court of Alameda County No's HG05206766 and HG05235177 – Judge Bonnie Lewman-Sabraw

Institute for Regenerative Medicine and the Independent Citizen's Oversight Committee, lead to an appeal first to the Court of Appeal of California and then finally to the Supreme Court of California.

Court of Appeal of California

The Court of Appeal of California consolidated two cases, one involving the California Family Bioethics Council against the California Institute for Regenerative Medicine, the other involving the People's Advocate against the Independent Citizen's Oversight Committee.[647] Both groups were challenging the legality of *Proposition 71* on a number of bases. This included an alleged violation of the Californian Constitution concerning the appropriation of funds for the benefit of private entities, an alleged violation of the single-subject rule contained in the Californian Constitution and possible conflicts of interest.[648]

After detailed and lengthy analysis of all the issues the Court of Appeal of California followed the trial court decision and unanimously held that *Proposition 71* was valid.

The legal challenges in California differs greatly to those seen in the United Kingdom concerning the *Human Fertilisation and Embryology Act 1990* as the Californian cases concerned the actual validity of the legislation and as such the challenges were initiated within a very short time of the public vote on *Proposition 71*. In comparison, the cases challenging the *HFE Act* have occurred sometime after the enactment of the Act and mainly concern definitions contained in the Act and whether the Act stood up to modern day techniques.[649]

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[647] *California Family Bioethics Council v. California Institute for Regenerative Medicine, People's Advocate v. Independent Citizen's Oversight Committee* 26th February 2007, 147 Cal. App. 4th 1319

[648] Refer to the case headnote for a full discussion of all the issues which were challenged

[649] For example refer to the discussion of *R (on the application of Quintavalle) v. the Human Fertilisation and Embryology Authority* in Chapter 3 of this thesis

The Supreme Court of California

In a final bid to overturn the legality of *Proposition 71* the groups appealed to the Supreme Court of California, the final arbiter. The request for an appeal hearing was met with a resounding 'no' on the 16th May 2007.[650]

With this decision the California Institute for Regenerative Medicine and its governing body, the Independent Citizen's Oversight Committee, could move forward obtaining and distributing funds to the scientists of California to continue work on human pluripotent stem cells.

The Fundamentals of Proposition 71

When *Proposition 71* was enacted following the positive 59% vote by the Californian public, it created the *California Stem Cell Research and Cures Bond Act* which was inserted into the *Californian Health and Safety Code* (Division 106, Part 5, Chapter 3, sections 125290-125292). Additionally it took the unusual step of introducing a new article into the Californian Constitution.

The California Constitution

Article XXXV of the Californian Constitution establishes the California Institute for Regenerative Medicine,[651] outlaws the funding by the CIRM of human reproductive cloning and most interestingly of all, establishes

> *...a right to conduct stem cell research, which includes research involving adult stem cells, cord blood cells, pluripotent stem cells, and/or progenitor cells...Pluripotent stem cells may de derived from somatic cell nuclear transfer or from surplus products of in vitro fertilization treatments...*[652]

It should be noted that while Article XXXV of the Californian Constitution specifically prohibits the funding of human reproductive cloning by the CIRM, it does

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[650] *California Family Bioethics Council v. California Institute for Regenerative Medicine et al and companion case* 16th May 2007 S151574, Supreme Court of California

[651] Hereafter referred to as the CIRM

[652] *California Constitution, Section 5, Article XXXV, Medical Research* http://www.leginfo.ca.gov/.const/.article_35 (accessed 4/6/07)

not mean that private investors can freely pursue human reproductive cloning in California. Sections 24185-24187 of the *California Health and Safety Code* specifically outlaw human reproductive cloning irrespective of the funding source:

> *(a) No person shall clone a human being or engage in human reproductive cloning.*
> *(b) No person shall purchase or sell an ovum, zygote, embryo, or fetus for the purpose of cloning a human being.*[653]
> ...

These sections also apply administrative penalties in terms of pecuniary fines, the amount is dependant upon who has breached this section i.e. an individual or a corporation.[654]

This particular section of the California Constitution is perhaps the most interesting due to establishing a *'right to conduct stem cell research'*. Whereas the United Kingdom establishes a system of licensing for those people who are correctly qualified and who desire to perform stem cell research within the limited and restrictive range of permissible purposes, the Californian approach appears, at first sight, to be one of uncontrolled permissiveness. By establishing a *'right to conduct stem cell research'* it appears that anyone can claim a right to do this research, without the need to approach a regulatory body for permission or oversight. The *'right to conduct stem cell research'* is not dependant upon funding for the research being allocated by the CIRM, thereby implying a right to perform stem cell research irrelevant of the funding source. This is a problem with the system of controls with which the United States has chosen to regulate stem cell research. Rather than implement a nationwide regulatory system it has chosen to regulate stem cell research on the basis of who is funding the research and when the stem cell lines were established. However, this is where the new article of the California Constitution fails. It does not establish a right to conduct research only when the researcher is funded by the State agency, the CIRM, rather it establishes a right to conduct research full stop. This could have serious implications for privately funded stem cell research occurring in California. As with the rest of the United States privately funded stem cell research is left unregulated thereby allowing any type of research to be

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[653] §24185 (Division 20, Chapter 1.4) *California Health and Safety Code* http://www.leginfo.ca.gov/cgi-bin/displaycode?section=hsc&group=24001-25000&file=24185-24187 (accessed 7/6/07)
[654] *Ibid.* at §24187

performed and potentially extending the acceptable moral limits (i.e. the twelve day development rule as established by *Proposition 71*). The only way in which privately funded research will be regulated by individual States is where the research is prohibited, regardless of the funding source, and this has not yet happened anywhere in the United States. This issue of regulation through funding controls will be revisited throughout this Chapter.

It should also be noted that although there is a *'right to conduct stem cell research'* there is no corresponding right for the Californian public to receive the benefits of the research. There is the potential that the therapies resulting from stem cell research funded by the CIRM may for a long time be very costly, thereby excluding access to those therapies for many citizens of California.[655]

One final point to note in consideration of the *'right to conduct stem cell research'* in California is in respect of the types of embryos upon which this research can be conducted. *Section 5 of Article XXXV of the California Constitution* continues on to state that:

> *Pluripotent stem cells may be derived from somatic cell nuclear transfer or from surplus products of in vitro fertilization treatments...*

This section therefore means that researchers in California are only able to conduct stem cell research upon embryos which are left over from IVF treatments and are no longer required for reproductive purposes, or can create embryos specifically for research, but only through using the therapeutic cloning method, somatic cell nuclear transfer. Researchers are not able to create embryos specifically for stem cell research either through normal *in vitro* fertilisation, or through any other method of creation. Considering that the *Medical and Ethical Standards Regulations,* which are discussed below, specifically prohibits keeping human embryos or "*any product of SCNT, parthenogenesis or androgenesis*" in culture beyond twelve days, it is difficult to resolve these two sections as the California Constitution does not appear to allow the creation of

[655] For further discussion of the failure to grant a right to receive the benefits of CIRM funded stem cell research refer Greenfield, D., *Impatient Proponents: What's Wrong with the California Stem Cell and Cures Act?* (2004) 34(5) The Hasting Center Report 32 at pg 34

human embryos in any manner apart from SCNT and IVF for stem cell research anyway.[656]

The California Institute for Regenerative Medicine

As mentioned above, the CIRM is established by Section 1 of Article XXXV of the California Constitution. Section 2 goes further and outlines the purposes of the CIRM:

> *(a) To make grants and loans for stem cell research, for research facilities, and for other vital research opportunities to realize therapies, protocols, and/or medical procedures that will result in, as speedily as possible, the cure for, and/or substantial mitigation of major diseases, injuries, and orphan diseases.*
> *(b) To support all stages of the process of developing cures, from laboratory research through successful clinical trials.*
> *(c) To establish the appropriate regulatory standards and oversight bodies for research and facilities development.*

The *California Stem Cell Research Cures and Bonds Act,* which is added to Division 106, Part 5 of the Health and Safety Code, expands upon the powers, role and mission of the CIRM and gives the substance to the otherwise brief but ground breaking Article XXXV of the California Constitution.

However, the CIRM is merely the name of the body which controls access to State funds for human pluripotent stem cell research. In actuality it is the governing board of the CIRM which makes the decisions and guidelines governing this type of research.

The Independent Citizen's Oversight Committee

The CIRM is governed by the Independent Citizen's Oversight Committee which has *"...full power, authority, and jurisdiction over the institute"* and must oversee the operations of the institute.[657]

The ICOC is composed of 29 members drawn from Californian Universities (9), non-profit academic and research institutes (4), commercial life science institutes (which

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[656] For the full list of activities which are ineligible for CIRM funding refer to §100030 *The CIRM Medical and Ethical Standards Regulations* CIRM (2006) http://CIRM.ca.gov/laws/pdf/Compiled_Regulations_2.pdf (accessed 11/4/07)

[657] Hereafter referred to as the ICOC. §125290.15 and §125290.40 (a) *California Health and Safety Code, California Stem Cell Research and Cures Bond Act* http://www.cirm.ca.gov/prop71/pdf/prop71.pdf (accessed 4/6/07)

are not actively involved in stem cell research) (4), various advocacy groups (10) and finally the chairperson and vice chairperson (2).[658]

The advocacy groups which have members on the ICOC represent the following diseases:

- Spinal cord injury
- Alzheimer's disease
- Type II diabetes
- Multiple sclerosis or amyotrophic lateral sclerosis
- Type I diabetes
- Heart disease
- Cancer
- Parkinson's disease
- Mental health disease
- HIV/Aids[659]

Whilst it is admirable to include representatives of advocacy groups it can be questioned if these representatives will be able to remain neutral when considering research applications which do not directly benefit the disease which they represent. As will be seen representatives of the disease advocacy groups are required to sit on the various working groups of the ICOC, including the Research Funding Working Group. Whilst the ICOC is required to hold some public meetings every year, the Research Funding Working Group meetings could be held in closed sessions, although the award of grants will be made in public meetings.[660]

Californian Universities are also highly represented on the ICOC, with a representative from the University of California at San Francisco, Davis, San Diego, Los Angeles and Irvine.[661] The remaining Californian University representatives can come from any other Californian University "*...that has demonstrated success and leadership*

[658] *Ibid.* at §125290.20
[659] *Ibid.* at §125290.20 (a)(3)-(5)
[660] *Ibid.* at §125290.30 (d)(1)-(3)
[661] *Ibid.* at §125290.20 (a)(1)

in stem cell research."[662] There are also additional qualifying requirements for these Universities to have representatives on the ICOC (refer to §125290.20 (a)(2)(A)(i)-(iii) *California Health and Safety Code, California Stem Cell Research and Cures Bond Act).*

Looking at the membership of the ICOC it is obvious that no-one can be a member without either representing a body with an established record in stem cell research or representing a group who has a vested interest in the success of stem cell research. This includes the Chairperson and Vice Chairperson who must have a *"Documented history in successful stem cell research advocacy."* [663] In retrospect this weighting towards supporters of stem cell research is hardly surprising, after all this is the body designed to award grants to support such work. However, it is a criticism which has also been levelled at the UK's regulatory body, the HFEA that bodies which oversee stem cell research should have members who are opposed to such work to provide a contrary viewpoint and to ensure that the research which is being undertaken is strictly necessary. By including members who are opposed to human embryonic stem cell research upon such regulatory bodies both sides of the argument would be heard before decisions were reached upon the funding of such controversial research. In all likelihood though this would result in deadlock and the repetition of arguments slowing or preventing decisions from being made and progress occurring in this area of science. Once an area of research has been governed upon as acceptable, as has been the case in both California and the UK, it is important that progress is made and not hindered at every turn.

The functions of the ICOC

The ICOC has a number of specific functions which are laid out in §125290.40 of the *California Health and Safety Code*. These include:

> ...
> *(d) Ensure the completion of an annual financial audit of the institute's operations.*
> *(e) Issue public reports on activities of the institute.*
> *(f) Establish policies regarding intellectual property rights arising from research funded by the institute.*
> ...

[662] *Ibid.* at §125290.20 (a)(2)(A)
[663] *Ibid.* at §125290.20 (a)(6)(A)(i)

(m) May annually modify its funding and finance programs to optimize the institute's ability to achieve the objective that its activities be revenue-positive for the State of California during its first five years of operation without jeopardizing the progress of its core medical and scientific research program.

(n) ...accept additional revenue and real and personal property...that may be used to supplement annual research grant funding and the operations of the institute.

The requirement to complete an annual financial audit and to issue public reports on the activities of the CIRM is hardly surprising in light of the fact that it is taxpayers' money which is funding this research. What is interesting to note is that the ICOC is under an obligation to ensure that the CIRM is returning a profit within five years of starting its operations. It is without doubt that the CIRM must make a profit so as to be able to repay the $3 billion which the taxpayers are providing through the sale of general obligation bonds, however, the fact that the CIRM must start to be revenue-positive within five years is interesting. The promise of stem cell research, particularly human embryonic stem cell research, is that it will provide therapies and cures for a large number of diseases. However, at present it is just that, a promise. Scientists are predicting that it will be many years before any therapies come to market. However, the pressure is on California and the CIRM to show that not only are these therapies and cures within reach but to also make a profit upon the discoveries.

It should be noted that due to the intellectual property policy which the ICOC has created, the CIRM will see a return in a number of different situations. The policy of the CIRM for non-profit organisations states that the policy

> *...is intended to meet the dual goals of academic openness and the need to bring scientific advances to the public via commercialization....[the policy] aims to provide a financial benefit to the State of California through revenue sharing in the event that CIRM-funded discoveries lead to valuable diagnostics and/or medical therapies.*[664]

The intellectual property policy requires that any revenue on CIRM-funded patented inventions exceeding $500,000 the grantee organisation must pay 25% of its profits to the CIRM (25% on the portion exceeding $500,000).[665] An invention is defined according to the *Bayh-Dole Act* (which along with the US Patent Code governs intellectual property in the United States) as *"...a discovery that is or may be patentable (novel, useful and*

[664] *Intellectual Property Policy for Non-Profit Organizations* CIRM approved by the ICOC 2/10/06 at Pg 4-5 http://www.cirm.ca.gov/policies/pdf/IPPNPO.pdf (Accessed 11/4/07)
[665] *Ibid.* at Section H(f)(2), Page 19

obvious) or otherwise protectable under Title 35 of the United States Code."[666] Therefore the 'invention' upon which the funded bodies need to repay the CIRM are not defined in terms of therapies and cures; rather it is a 'discovery'. This could include scientific processes, culture mediums or new stem cell lines (as was the case in the Thomson patents).[667] Therefore the potential for the CIRM to start to make a profit within five years of starting its operations may not be as unrealistic as it first appears.[668]

ICOC Working Groups

The ICOC also has functions in respect of its working groups.

> *(g) Establish rules and guidelines for the operation of the ICOC and its working groups.*
> ...
> *(i) Select members of the working groups.*[669]

The CIRM is required to have three different scientific and medical working groups, these are:

1. The Scientific and Medical Research Funding Working Group
2. The Scientific and Medical Accountability Standards Working Group
3. The Scientific and Medical Research Facilities Working Group[670]

These Working Groups are purely advisory and have no final decision making authority, therefore the recommendations which the Working Groups make can be considered by the ICOC and potentially ignored in reaching the final decision.[671] The possibility of this occurring is slim though due to the presence of ICOC members on each

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[666] *Ibid.* at *Glossary,* Section D, Page 7
[667] For a full discussion of the scope, range and problems with stem cell patents refer to Korobkin, R., *Stem Cell Century, Law and Policy for a Breakthrough Technology* (2007) Yale University Press at Ch 4 *Stem Cell Patents*
[668] For a detailed critique of the financial benefits which may accrue to California and how these will be assessed refer to Longaker, M.T., Baker, L.C. and Greely, H.T., *Proposition 71 and CIRM – assessing the return on investment* (2007) 25(5) Nature Biotechnology 513
[669] §125290.40 ICOC Functions, *California Health and Safety Code, California Stem Cell Research and Cures Bond Act* http://www.cirm.ca.gov/prop71/pdf/prop71.pdf (accessed 4/6/07)
[670] *Ibid.* at §125290.50
[671] *Ibid.* at §125290.50 (e)(3)

of the Working Groups, thereby helping to ensure that the recommendations of each Working Group are fairly considered, even if they are not followed to the letter.

The Accountability Standards Group is composed of 19 members, five of the ICOC disease advocacy members, nine scientists nationally recognised in the field of stem cell research, four medical ethicists and the Chairperson of the ICOC.[672] The role of this Working Group is to recommend to the ICOC scientific, medical and ethical standards, standards for all medical, socioeconomic and financial aspects of clinical trials and therapy delivery to patients, the modification of those standards, recommend appropriate oversight by the ICOC of funded research to ensure compliance with the standards and to advise on an ongoing basis about relevant ethical and regulatory issues.[673]

The use of 'nationally recognised' scientists in this Working Group provides an opportunity for any standards which are recommended to the ICOC to reflect, consider and possibly incorporate the standards which are being used elsewhere in the United States (where this type of work is permitted and being performed). The incorporation of medical ethicists is also vital as this ensures that the standards which are recommended have passed ethical review and consideration and should reach the highest ethical standards.

In contrast the role of the Research Funding Working Group is to recommend to the ICOC standards and requirements for the consideration of funding applications and for awarding research grants and to recommend standards for the medical and scientific oversight of funding awards. It is also required to review those grant applications and make recommendations to the ICOC whether to award funding, conduct progress oversight reviews of grantees and to recommend to the ICOC standards for evaluating grantees to ensure that they comply with all requirements.[674] The membership quota of this group is also higher than that of the Accountability Standards Working Group. The Research Funding Working Group is composed of 23 members, seven ICOC members from the disease advocacy groups, fifteen scientists nationally recognised in stem cell research and the Chairperson of the ICOC.[675]

As mentioned previously the high number of ICOC disease advocacy members is of slight concern here. As noted, the Research Funding Working Group has the role of

[672] *Ibid.* at §125290.55(a)
[673] *Ibid.* at §125290.55 (b)(1)-(5)
[674] *Ibid.* at §125290.60 (b)(1)-(6)
[675] *Ibid.* at §125290.60 (a)

reviewing grant applications and making recommendations to the ICOC for the award of funding. Whilst the ICOC has the final decision making power in all situations it is to be thought that the ICOC will generally follow the recommendations of its Working Groups, otherwise what is the point of these groups? Even if the ICOC disease advocacy members try to take a position of neutrality concerning the review of funding applications it is almost inevitable that should there be disagreement over recommending the award of funding to an application, if the application is considering the disease of which that member is representing, he will almost undoubtedly be in favour of this research, with the possibility of overlooking some fundamental aspect.

Of course, an alternative view to look at this situation with the ICOC disease advocacy members is to bear in mind that although there are seven such members sitting on the Research Funding Working Group, each member is representing a different disease. Additionally, there is the presence of fifteen scientists who are the only members of this group permitted to evaluate the scientific merit of the research application.[676] Therefore, even if one ICOC disease advocacy member strongly supports a research application, possibly because it is specific to the disease which they are representing, there are 22 other members of the groups whose opinions have to be taken into consideration before a final recommendation can be made to the ICOC.

At this point, it is important to note that

> *Recommendations of each of the working groups may be forwarded to the ICOC only by a vote of a majority of a quorum of the members of each working group. If 35 per cent of the members of any working group join together in a minority position, a minority report may be submitted to the ICOC...*[677]

A quorum consists of at least 65% of the members who are eligible to vote.[678] Therefore there should be a very small risk of one persuasive ICOC disease advocacy member controlling the research funding to the favour of his particular disease. The possible conflict of interest though should always be borne in mind.

The final Working Group for consideration is the Facilities Working Group. The role of the Facilities Working Group is self-explanatory; it makes recommendations to the ICOC standards for applications for, and awarding of, grants for buildings and

[676] *Ibid.* at §125290.60 (c)(1)
[677] *Ibid.* at §125290.50 (d)
[678] *Ibid.* at §125292.10 (s)

equipment.[679] This is necessary due to the fact that Federal money has been used in many research laboratories in the past for various different research projects. However, the Federal funding rules governing human embryonic stem cell research prohibits Federal funds being used in any manner in relation to human embryonic stem cell research which is not permitted under President Bush's policy. Therefore the situation has arisen whereby equipment such as microscopes, Petri dishes and laboratories which have been previously paid for with Federal funds cannot be used for human embryonic stem cell research in California (or elsewhere in the United States) where those stem cell lines have been created after the 9th August 2001. The reason for this is that *"The complicated bookkeeping required by federal policy, along with fear of political repercussions should errors be made, has caused some universities to take even more extreme precautions to prevent intermingling of funds than the government actually requires."*[680] It has resulted in the ridiculous situation where laboratories have been physically separated with barriers or new laboratories have been or are being built alongside already perfectly useable facilities.[681]

Therefore it can be seen that the ICOC, along with the three Working Groups, controls the access to the CIRM funds as well as setting the appropriate standards for applications to be considered.

The funding story so far...

The California Institute for Regenerative Medicine is charged with distributing $295 million dollars a year over a ten year period to fund stem cell research and dedicated facilities in a bid to *"Improve the California health care system and reduce the long-term health care cost burden on California through the development of therapies that treat diseases and injuries with the ultimate goal to cure them."*[682]

This level of funding has not been seen anywhere else in the world. In comparison, the Stem Cell Initiative in the United Kingdom has secured a total of up to £100 million of public sector funding for stem cell research from 2006 until 2008 and the

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[679] *Ibid.* at §125290.65 (b)
[680] Korobkin, R., *Stem Cell Century, Law and Policy for a Breakthrough Technology* (2007) Yale University Press at pg 55 (Ch 2 *Embryo Wars*)
[681] *Ibid.* Refer to the situations at Harvard and Stanford at pg 55 (Ch2 *Embryo Wars*)
[682] Section 3, Purpose and Intent *California Stem Cell Research and Cures Initiative* http://www.cirm.ca.gov/prop71/pdf/prop71.pdf (accessed 4/6/07)

National Institutes of Health allocates around $40 million a year to human embryonic stem cell research.[683]

Although the legality of *Proposition 71* was being challenged in the courts, with the effect that the bond issuance necessary to support the research programme was halted before it even started, the CIRM was still able to start work on formulating its policies for the regulation of stem cell research and was even able to distribute some grants.

"*On April 10, 2006, CIRM officially became a State funding agency when it announced that the first stem cell grants were awarded.*"[684] The CIRM was able to announce the first stem cell grants due to "*...the sale of $14 million of bond anticipation notes (BANs) from six leading California philanthropic individuals and foundations.*"[685] These initial grants to 16 Californian non-profit institutions were to train new stem cell researchers and a total of 169 training fellowship grants were awarded to the tune of $12.1 million. In August 2006 the Californian Governor, Arnold Schwarzenegger decided to loan the CIRM $150 million from the State's general fund and in November 2006 an additional $31 million in BANs was announced.[686]

Following these initial training grants the CIRM called for applications for a further three different types of grant. This new grant programme *Innovation in Human Embryonic Stem Cell Research* is designed to focus upon human embryonic stem cell research.[687] These grants are:

- The Leon J. Thal SEED Grants
- Comprehensive Research Grants
- Shared Research Laboratories Grants

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[683] For the UK Government funding refer to the *Government Response to the UK Stem Cell Initiative Report and Recommendations* http://www.dh.gov.uk/en/Policyandguidance/Healthandsocialcaretopics/Stemcell/Stemcellgeneralinformation/DH_4124082 (accessed 28/6/07, last updated 8th February 2007) and for the US NIH funding refer to *NIH – Estimates of Funding for Various Diseases, Conditions, Research Areas* http://www.nih.gov/news/fundingresearchareas.htm (accessed 12/08/08) The table provides actual figures for 2004-2007, estimates for 2008-2009, last updated 5th Feb 2008

[684] *Scientific Strategic Plan* December 2006 CIRM at pg 17 http://www.cirm.ca.gov/meetings/pdf/2006/12/120706_item_7.pdf (accessed 4/6/07)

[685] *Ibid.* at pg 17

[686] *Ibid.* at pg 17

[687] *Ibid.* Refer to Page 17 and 61 to 63

On the 16th February 2007 the CIRM distributed $45 million across 72 grants to 20 Californian institutions for human embryonic stem cell research.[688] SEED grants (Scientific Excellence through Exploration and Development) "*...are intended to bring new ideas and new investigators into the field of hESC research and offer an opportunity for investigators to carry out studies that may yield preliminary data or proof-of-principle results that could then be extended to full scale investigations.*"[689]

On the 16th March 2007 the CIRM approved 29 Comprehensive Research Grants which resulted in the award of $75 million over 4 years to 12 academic and non-profit research centres.[690] *"Comprehensive Research Grants will support mature, ongoing studies on hESCs by scientists with a record of accomplishment in the field."*[691] The work which is being funded covers a broad range of projects including studies *"to develop neural cellular models of Parkinson's Disease", "development of new ways to derive human embryonic stem cells"* and *"building better tools to isolate heart and blood cells from differentiated populations of human embryonic stem cells."*[692]

The final stage of this grant programme was the award of the Shared Research Laboratories Grants. These were announced on the 5th June 2007. These grants are to fund dedicated laboratory space for the culture of human embryonic stem cells, particularly those which are outside of the Federal funding guidelines. They are to be used to develop core laboratories for use by multiple investigators and are to be shared by multiple institutions, providing an environment for the unrestricted conduct of scientific research on human embryonic stem cells.[693] The terminology used within the *Scientific Strategic Plan* to describe the objectives of the Shared Research Laboratory Grant Programs is very worrying as it specifically says that these Grants are *"...to provide an environment...for the unrestricted conduct of scientific research on hESCs."*[694] Considering that *Proposition 71* and the *Medical and Ethical Standards Regulations* do

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[688] CIRM press release 16th February 2007 '$45 MILLION FOR STEM CELL RESEARCH IN CALIFORNIA' http://www.cirm.ca.gov/press/pdf/2007/02-16-07.pdf (last accessed 11/08/08)
[689] Page 17, *Scientific Strategic Plan* December 2006 CIRM http://www.cirm.ca.gov/meetings/pdf/2006/12/120706_item_7.pdf (accessed 4/6/07)
[690] CIRM press release 16th March 2007 '$75 MILLION BOOST FOR CALIFORNIA STEM CELL SCIENTISTS' http://www.cirm.ca.gov/pressreleases/pdf/2007/03-16-07icoc.pdf (accessed 20/3/07)
[691] *Scientific Strategic Plan* December 2006 CIRM at pg 17 http://www.cirm.ca.gov/meetings/pdf/2006/12/120706_item_7.pdf (accessed 4/6/07)
[692] Page 2, CIRM press release 16th March 2007 '$75 MILLION BOOST FOR CALIFORNIA STEM CELL SCIENTISTS' http://www.cirm.ca.gov/pressreleases/pdf/2007/03-16-07icoc.pdf (accessed 20/3/07)
[693] *Scientific Strategic Plan,* December 2006 CIRM at pg 62 http://www.cirm.ca.gov/meetings/pdf/2006/12/120706_item_7.pdf (accessed 4/6/07)
[694] *Ibid.* at pg 62

impose some research limits upon stem cell research (although limited) this wording stands out almost as an attempt to override those rules. In reality it is to be hoped that this wording was a careless slip in the drafting of the *Scientific Strategic Plan* and that at most it is a reference to the very restricted research which is permitted under Federal guidelines and funding. In total $50 million has been distributed to 17 academic and non-profit institutions under the Shared Research Laboratories Grants.[695]

In the interim, between the award of the Comprehensive Research Grants and the Shared Research Laboratories Grants, the legal challenges to *Proposition 71* were finally ended with the Supreme Court of California refusing leave to appeal (as discussed above). With this announcement the CIRM now needs to repay the State of California the $150 million loan which it was given in August 2006 and to also repay the philanthropists who made loans to enable the CIRM to get up and running whilst the cases were ongoing.[696]

In the last year (June 2007-2008) the CIRM has distributed a further $349 million. $54 million was awarded for 22 New Faculty Awards *"...to encourage and support the next generation of clinical and scientific leaders in stem cell research."*[697] $271 million was awarded to 12 different institutions under the Major Facilities Grant Program. These grants are awarded so as to enable institutions to fund and build new facilities *"...that are free of any federal funding so as to allow research and development of therapies based on human embryonic stem cell (hESC) and other stem cell approaches to proceed in California without restrictions imposed by the federal government...bring stem cell-related researchers together in a collaborative setting."*[698]

Additionally, $23 million has been awarded to 25 institutions under the New Cell Lines Awards *"...to support the derivation and propagation of new lines of pluripotent human stem cells with important research and clinical application for understanding,*

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[695] CIRM press release 5th June 2007 'FIRST STEM CELL RESEARCH FACILITIES GRANTS APPROVED' http://www.cirm.ca.gov/pressreleases/pdf/2007/06-05-07.pdf (accessed 7/6/07)
[696] CIRM press release 16th May 2007 'LITIGATION AGAINST CALIFORNIA STEM CELL PROJECT ENDS' http://www.cirm.ca.gov/pressreleases/pdf/2007/05-16-07.pdf (accessed 4/6/07)
[697] *Approved CIRM Grants as of June 2008* CIRM http://www.crim.ca.gov/info/grants.asp (accessed 10/08/08)
[698] CIRM press release 7th May 2008 Page 4 'CALIFORNIA STEM CELL AGENCY, DONORS AND 12 CALIFORNIAN INSTITUTIONS COMMIT $1.1 BILLION TO INCREASE THE CAPACITY FOR STEM CELL RESEARCH IN CALIFORNIA' http://www.cirm.ca.gov/press/pdf/2008/05-07-08.pdf (accessed 12/08/08)

diagnosing and treating serious injury and disease."[699] What is particularly interesting about this award is that not only are the awards for the derivation of new human embryonic stem cell lines from excess or rejected human embryos created by IVF, but they have also been awarded for the derivation of pluripotent human stem cell lines from other sources such as SCNT and induced pluripotent stem cells.[700] So the CIRM is actively engaged in pluripotent stem cell research generally, although the focus still remains upon human embryonic stem cells.

Finally, $1 million was awarded across 22 Disease Team Planning grants which are designed *"...to support multi-disciplinary teams of scientists in pursuits of therapies for specific disease."*[701] These are preliminary awards to teams who will prepare proposals to an upcoming request from the CIRM for proposals for major grants to support translational research that could lead to clinical trials. These proposals are to be considered by the ICOC in June 2009 and the award of these grants should be a major step towards the CIRM realising its goal of proving therapies and cures for disease and injury.[702]

With these grants being awarded between April 2006 and June 2008 and totalling nearly $555 million the CIRM is already on its way to fulfilling its obligation to distribute $295 million a year for the next ten years. This level of funding is immense and yet it remains to be seen if the Californian public will be repaid, not only financially but also health wise in the much hoped for therapies and cures which stem cell research potentially offers.

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[699] CIRM press release 27th June 2008 Pg 1 '$24 MILLION IN NEW STEM CELL RESEARCH FUNDING AWARDED TO 25 CALIFORNIA INSTITUTIONS' http://www.cirm.ca.gov/press/pdf/2008/06-27-08.pdf (accessed 12/08/08)
[700] *Ibid.* at Pg 1
[701] *Ibid.* at Pg 2
[702] *Ibid.* at Pg 2

Oversight and Regulation of Stem Cell Research by the California Institute for Regenerative Medicine

> *...the institute will develop its own scientific and medical standards to carry out the specific controls and intent of the act...The ICOC, its working committees, and its grantees shall be governed solely by the provisions of this act in the establishment of standards, the award of grants, and the conduct of grants awarded pursuant to this act.*[703]

The CIRM took time to formulate, finalise and approve many of its policies.[704] However, the CIRM did manage to formulate and approve the *Medical and Ethical Standards Regulations* and the *Scientific Strategic Plan* promptly which were vital for the running of the CIRM's operations.

The CIRM Medical and Ethical Standards Regulations

The CIRM *Medical and Ethical Standards Regulations* became effective as of the 22nd November 2006.[705] The Regulations were brought into force prior to the first grants for human embryonic stem cell research on the 16th February 2007.

The CIRM *Medical and Ethical Standards Regulations* are effectively the equivalent of the sections of the UK's *HFE Act* which deal with the prohibited activities in respect of embryo research, the oversight of that research and donor consent.

The first point to note is that the CIRM *Medical and Ethical Standards Regulations* apply only to CIRM-funded research.[706] Again the issue of regulating stem cell research falls to the funding bodies; rather than produce comprehensive ethical guidelines which apply to all forms and stages of human embryonic stem cell research regardless of the source of funding, the issue is left to each body to regulate. Whilst the CIRM may well become the main source of funding for stem cell research in California there will still be some privately funded work occurring in California. It can be

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[703] §125290.35 (a) Medical Standards, *California Health and Safety Code, California Stem Cell Research and Cures Bond Act* http://www.cirm.ca.gov/prop71/pdf/prop71.pdf (accessed 4/6/07)
[704] Refer to CIRM Regulations web page for policies under discussion: http://www.cirm.ca.gov/laws/default.asp (accessed 7/6/07)
[705] Introduction, *The CIRM Medical and Ethical Standards Regulations* CIRM (2006) http://CIRM.ca.gov/laws/pdf/Compiled_Regulations_2.pdf (accessed 11/4/07)
[706] *Ibid.* Refer to Introduction and §100010

questioned why the State Government did not also take the opportunity to introduce State wide regulation of stem cell research at the time of introducing *Proposition 71*.

Prohibited activities

The CIRM *Medical and Ethical Standards Regulations* lay out the activities which are not eligible for CIRM funding. These are:

> *(a) Human reproductive cloning*
> *(b) The culture in vitro of*
> *(i) any intact human embryo or*
> *(ii) any product of SCNT, parthenogenesis or androgenesis, after the appearance of the primitive streak or after 12 days whichever is earlier. The 12 day prohibition does not count any time during which the embryos and/or cells have been frozen*
> *(c) The introduction of stem cells from a stem cell line into non-human primates*
> *(d) The introduction of any stem cells, human or non-human, into human embryos*
> *(e) Breeding any animal into which stem cells from a stem cell line have been introduced*
> *(f) The transfer to a uterus of a genetically modified human embryo*[707]

The first point to note is that the language used to refer to the time limit for the culture *in vitro* of a human embryo, regardless of the manner of the embryos creation, contained in the *Medical and Ethical Standards Regulations* differs to the *California Stem Cell Research Cures and Bonds Act*. Within the Act the time limit refers to obtaining cells, not the culture of embryos *in vitro*. The Act states that:

> *Standards setting a limit on the time during which cells may be extracted from blastocysts, which shall initially be 8 to 12 days after cell division begins, not counting any time during which the blastocysts and/or cells have been stored frozen.*[708]

The *Medical and Ethical Standards Regulations* places a time limit on keeping human embryos in culture but does this without reference to a starting point. Whilst the section refers to '*human embryos and any product of SCNT, parthenogenesis or androgensis*', these are the final products after the creation process has started. Whilst

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[707] *Ibid.* at §100030
[708] §125290.35 (b)(6) *California Health and Safety Code, California Stem Cell Research and Cures Bonds Act* http://www.cirm.ca.gov/prop71/pdf/prop71.pdf (accessed 4/6/07)

both the Act and the Regulations have the same moral and legal cut off point of 12 days (cell extraction within 12 days of cell division compared to12 days culture *in vitro*) it does need to be asked why the Regulations were phrased differently to the wording found within the Act, particularly as the Act is the legal basis upon which the CIRM can fund stem cell research.

Another issue is that by specifically stating the alternative processes to create embryos, other than by *in vitro* fertilisation, the Regulations are already running the risk that they will become outdated and inapplicable if and when scientists find other ways to create human embryos. One possible advantage of not referring to human embryos created by fertilisation is that it may incorporate all future methods of creation. This is dubious as the specific reference to other methods of creation implies that the Regulations are designed to deal with these processes specifically and not apply to other creation processes. The final decision would probably lie with the Court, if the CIRM did not alter its Regulations immediately that a new creation method was discovered. However the CIRM can and would in all likelihood change the Regulations very quickly should such a situation arise.

An additional problem with the prohibition of the CIRM funding the retention of human embryos *'or any other product of SCNT, parthenogenesis or androgenesis'* in culture beyond twelve days has already been noted above (see the Section on the California Constitution). That is to say that the California Constitution only permits human embryonic stem cell research upon spare IVF embryos and those created specifically for research through SCNT. It can be questioned again why the *Medical and Ethical Standards Regulations* specifically refers to creation methods other than IVF or SCNT when it seems that any other method of creating embryos for stem cell research could not be funded by the CIRM anyway.

The other activities which are prohibited for CIRM funding are not as problematic. The main issue is that the Regulations have not incorporated what could be termed a 'dustbin clause'. This could be a sentence such as 'Any other activities which the CIRM deems ineligible for funding.' Such a clause would allow the CIRM to incorporate all future creation methods, the problem identified above, as well as any other activities which may be felt to be unethical and not desirable to pursue (at least with State funding).

Compliance

The next point to note is the issue of compliance with the *Medical and Ethical Standards Regulations*. It is the responsibility of the institutions which receive CIRM funding to provide "*...written assurance satisfactory to CIRM that CIRM-funded research complies with the requirements set forth in [these regulations].*"[709] This method of providing written assurance of compliance is common in the US. It is also the responsibility of the grantees to report to CIRM "*...any failure to comply with the terms and conditions of an award.*"[710] As it is the CIRM which reviews the research applications and provides funding accordingly, it would have been thought that the CIRM would be the only body responsible for ensuring compliance with its Regulations. However, the addition of institutional compliance provides an extra level of security, helping to ensure compliance with the requirements set by the CIRM.

Oversight

The *Medical and Ethical Standards Regulations* also require all research institutions to designate one or more Institutional Review Boards (IRB) as well as one or more Stem Cell Research Oversight Committees (SCRO committee).[711] The function of the SCRO Committee is to "*...provide scientific and ethical review of CIRM-funded research*" and "*...may provide oversight for two or more funded research institutions.*"[712]

It can be questioned why the CIRM does not have one central SCRO Committee which could conduct the scientific and ethical review of CIRM-funded research, particularly as one SCRO Committee may be used by more than one institution. One advantage of this would be that all applications for CIRM funding would receive the same review treatment and the central SCRO Committee would rapidly build up experience of dealing with stem cell research funding applications.

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[709] §100040 (a) *The CIRM Medical and Ethical Standards Regulations* CIRM (2006) http://CIRM.ca.gov/laws/pdf/Compiled_Regulations_2.pdf (accessed 11/4/07)
[710] *Ibid.* at §100050
[711] *Ibid.* at §100040 (b)(2) and (3)
[712] *Ibid.* at §100060 (c) and (e)

The Research Funding Working Group already recommends to the ICOC standards and requirements for considering funding applications and for awarding research grants. It also reviews all research funding applications, including the scientific merit of those applications. It is therefore apparent that all research funding applications are not only reviewed for scientific and ethical merit by the institutional SCRO Committee but are also subject to the same review by the Research Funding Working Group before making recommendations of awarding grants to the ICOC for the final decision. With the Accountability Standards Working Group also recommending to the ICOC the scientific, medical and ethical standards it is unclear why the CIRM has established the SCRO Committees within the institutions requesting funding. It seems that all research funding applications are in fact subject to a double review, first by the institutional SCRO Committee then by the Research Funding Working Group, before the final decision by the ICOC. The usefulness of this double review can be questioned. Research institutions already have departments and personnel who can advise research applicants if their proposed research complies with all the necessary rules and guidelines, why require the institutions to also undertake scientific and ethical review when that will be completed by the Research Funding Working Group? This central Working Group will rapidly build up the experience which it needs to review research applications, whereas the local institutional SCRO Committees will see far fewer applications in comparison and so will take far longer to build up comparative experience.

A similar comment has been made in Chapter 4 of this thesis in respect of the role played in the United Kingdom by Research Ethics Committees in their ethical review role of licence applications and following up progress of research. Research Ethics Committee scrutiny is only legally required for research which involves NHS patients or facilities and yet the HFEA normally requires research ethics committee approval for all research licence applications. This is very similar to the CIRM requirement that a SCRO Committee reviews CIRM funded research as well as the involvement of an IRB. It is the CIRM which has chosen to impose this additional level of scrutiny.

At first sight there appears to also be the risk that these SCRO Committees will be biased towards approval of all applications. After all the SCRO Committee is set up within the very institution from which it is receiving applications for scientific and ethical review. As Winickoff notes

SCRO members are likely to be...from the research institution itself. Such members would be likely to appreciate the value of these investments to the institution, and may be influenced by the desire to protect the overall fiscal health of the entity.[713]

However, upon closer examination of the *Medical and Ethical Standards Regulations* an attempt has been made to negate the possible conflict of interest. The membership of an SCRO Committee must include, at a minimum, people with expertise in developmental biology, stem cell research, molecular biology, assisted reproduction and ethical issues in stem cell research as well as at least one patient advocate. Whilst these members may be employees of the institution which has established the SCRO Committee there is the additional requirement that a SCRO Committee shall include at least one non-scientist member of the public who is not paid by the institution.[714]

The inclusion of a member with expertise in ethical issues of stem cell research is important as without this member there could be a serious risk of the members merely considering the scientific issues, and neglecting to give full consideration of the ethical issues connected with this type of research such as appropriate donor consent, protection of women who donate their eggs to research as well as considering the actual use of embryos in research. It is to be hoped that the balance of expertise, along with at least one member who is not reimbursed by the institution where the SCRO Committee is based, will result in fair and balanced consideration of applications for and ongoing review of, CIRM funded research. However, *"There is a danger that the SCRO system of oversight could create the perception that crucial ethical decisions are being made in the dark back rooms of the very institutions that stand to gain from large CIRM grants."*[715] Until these SCRO Committees are convened and their actions scrutinised there is no way of knowing which of the two possible routes discussed above the committees may go down.

The SCRO Committees not only have a role to play in reviewing research prior to an application being submitted to the CIRM, they also play a role in research which has been awarded CIRM funding and is ongoing. The SCRO Committee approvals are to be reviewed at least once per year and *"The renewal review shall confirm compliance with*

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[713] Winickoff, D.E., *Bioethics and Stem Cell Banking in California* (2006) 21 Berkeley Tech. L.J 1067 at pg 1089

[714] §100060 (a) *The CIRM Medical and Ethical Standards Regulations* CIRM (2006) http://CIRM.ca.gov/laws/pdf/Compiled_Regulations_2.pdf (Accessed 11/4/07)

[715] Winickoff, D.E., *Bioethics and Stem Cell Banking in California* (2006) 21 Berkeley Tech. L.J 1067 at pg 1090

all applicable rules and regulations. The SCRO Committee may establish guidelines and procedures for expedited review of renewals so that review by the entire SCRO Committee is not required."[716] Whilst it is to be congratulated that the approval is to be reviewed at least once per year, the possibility of the review being completed by an incomplete SCRO Committee is somewhat worrying. There is a possibility that new ethical or scientific issues may have arisen since the research was approved for funding. If the full complement of the SCRO Committee membership is not involved in the review process, how can these issues be reviewed and resolved? Upon closer inspection of the wording used in relation to SCRO Committee ongoing review, it becomes obvious why it may be possible to review approvals without the full membership. This is due to the fact that the review is merely required to ensure compliance with all applicable rules and regulations. The SCRO Committee is not required to look again at the scientific and ethical issues of the funded research, even where issues may have arisen subsequent to the research receiving funding. Therefore the role of the SCRO Committee in reviewing ongoing research is merely to ensure compliance, not to thoroughly review the research.

The SCRO Committee is required to review and approve in writing specified research projects, as defined by the *Medical and Ethical Standards Regulations* and funded by the CIRM. These research projects are:

1) Research involving the procurement or use of human oocytes – the researcher must justify the use of oocytes, the numbers needed and justify SCNT if the process is to be used
2) Research involving the use of human embryos – the researcher must justify the use of embryos and the numbers required
3) Research with the aim to derive or create a covered stem cell line[717] – the researcher must justify why there is a need to derive the stem cell line, the use of SCNT if proposed, and show how the stem cell lines will be stored, distributed, validated and characterised to ensure the confidentiality of donors
4) Research introducing covered stem cell lines into non-human animals – the researcher must provide justification for undertaking this process and show that the stem cell lines have been acceptably derived. The reader should be reminded of the prohibitions in §100030 (c) and (e) which prohibit the introduction of stem cells into primate embryos and the prohibition to breed any animal into which stem cells have been introduced

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[716] §100070 (h) *The CIRM Medical and Ethical Standards Regulations* CIRM (2006) http://CIRM.ca.gov/laws/pdf/Compiled_Regulations_2.pdf (accessed 11/4/07)

[717] *Ibid.* at §100020 (c) Defined in the Regulations as: *"...a culture derived, human pluripotent stem cell population that is capable of: (1) sustained propagation in culture; and (2) self-renewal to produce daughter cells with equivalent developmental potential."*

5) Research introducing stem cells from covered stem cell lines into a live born human – the researcher must provide justification for introducing stem cells into humans and show that the stem cell lines have been acceptably derived[718]

Furthermore, the SCRO Committee must be notified in writing where there is *"...purely in vitro research utilizing covered stem cell lines."*[719] Researchers must show that the stem cell lines have been acceptably derived along with proof of compliance with and required review of the proposed research by an IRB.

This mere notification requirement for work upon stem cell lines could lead to problems in the future. For a start, as there is no SCRO Committee making scientific or ethical review of the type of work which is being undertaken upon these stem cell lines, there is the risk that the work being undertaken suffers from ethical issues which should be addressed prior to starting the research. There is also a risk of work being repeated, possibly within the same institution but certainly within all of the Californian institutions eligible for CIRM funding for this type of research. This is another problem with the SCRO Committees being localised rather than centralised. Whilst the CIRM reviews all research applications and it would be hoped is able to distinguish between research applications, this really is the work of the SCRO Committees, to review the scientific merit of the research proposed.

Additionally, as one commentator has noted, *"Furthermore, if researchers in California send cells out to non-CIRM funded researchers, then any subsequent SCRO oversight would be purely voluntary. No formal legal requirement would exist that research funded outside of CIRM, but on CIRM-derived lines, be subject to any institutional oversight."*[720] When the CIRM has worked hard to ensure that there is oversight of stem cell research (whether this is adequate or appropriate is open to debate as above) it is somewhat strange that there is no additional requirement for SCRO Committee oversight when CIRM-derived cell lines are being used for research and worked upon by non-CIRM funded researchers. This is a major flaw with stem cell research in the United States, not just at State level in California, and is yet another reason why there should be national oversight of stem cell research. This would be possible, even though the 52 States of America have all taken different approaches

[718] *Ibid.* at §100070 (a)-(c) and (e)-(f)
[719] *Ibid.* at §100070 (d)
[720] Winickoff, D.E., *Bioethics and Stem Cell Banking in California* (2006) 21 Berkeley Tech. L.J 1067 at pg 1092

towards human embryonic stem cell research. There could be national regulation of stem cell research in those States which permit such research which requires not only SCRO Committee oversight of the research, but also lays out clearly the permitted and prohibited areas of research and would ensure consistency between the States. I believe that this would not contravene the popular view that the human embryo should be protected from the moment of its conception (which ever method that may be), which is a widely held belief within the United States, hence the current Federal position on stem cell research. I believe that this widely held belief would not be contravened by introducing national regulation as each State still has the option whether or not to allow such research to occur within its borders, just as the Californian public chose in November 2004 with the approval of *Proposition 71*. Those who strongly and fervently believe that human embryos should be protected at all times will not be involved in the research, either as researchers, donors of gametes or as patients of the therapies which may be developed from human embryonic stem cell research.

A final point to note in relation to the different research areas that require SCRO Committee written approval prior to starting the research application process with the CIRM, is that within the section governing SCRO Committee review, there is nothing which would allow the CIRM to easily add in or alter the research areas which would require SCRO Committee approval. Overall, this is another major flaw with the *Medical and Ethical Standards Regulations*. The Regulations do not contain any provisions which would allow the CIRM to easily alter the Regulations should it be required. That is not to say that the Regulations should not be fully debated prior to alteration, but with science rapidly advancing the ability to alter the Regulations at relatively short notice could be invaluable. One only needs to look to the United Kingdom's *2001 Regulations* which introduced three new research purposes into the *HFE Act* to specifically allow stem cell research, to see the value of alteration provisions such as these.

Amendments to Proposition 71

Although the CIRM has been established under the *California Stem Cell Research and Cures Bond Act* to distribute funds over 10 years for stem cell research, there is a possibility that the *California Stem Cell Research and Cures Bond Act* may need to be amended or altered before these ten years expire.

The process for amending the statutory provisions of the Act is contained in the final paragraph:

> *The statutory provisions of this measure, except the bond provisions, may be amended to enhance the ability of the institute to further the purposes of the grant and loan programs created by the measure, by a bill introduced and passed no earlier than the third full calendar year following adoption, by 70 percent of the membership of both houses of the Legislature and signed by the Governor, provided that at least 14 days prior to passage in each house, copies of the bill in final form shall be made available by the clerk of each house to the public and news media.*[721]

The first point to note is that action to amend the Act cannot be taken until three years after the measure has been adopted, in this situation not until January 2008.[722] This three year period of allowing the legislation to sit on the books without alteration allows the CIRM to formulate and implement the many policies which it needs to devise. It also allows a period of reflection, permitting the CIRM the time to identify problems which may need to be rectified by amendment at a later date. Importantly, for the supporters of the Act, this three year period prevents unnecessary legal challenges to the Act through introducing amendments which would or could dramatically alter how the Act works. Any amendments introduced in this manner would be time consuming and costly and in light of the fact that there was a public referendum which passed the Act, a waste of taxpayers money.

Interestingly the amendment provision of the Act requires 70% of both Houses of the Legislature to approve any proposed amendments. This is a very high percentage to require and it can be questioned if this will result in no amendments ever passing the Houses for approval. Considering that only 59% of the public voted in favour of *Proposition 71* it is unlikely that there will be 70% support for stem cell research and amendments to the very Act supporting that type of research in both Houses. It is possible of course that the approval percentage was deliberately set that high in an attempt to prevent all future amendments, if this was the reasoning behind it this would be very strange as legislation needs to adapt and be adapted as needs arise. In an area of science developing as fast as stem cell research it is vital that legislation governing this area of

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[721] Article 3, Section 8 *California Stem Cell Research and Cures Initiative* http://www.cirm.ca.gov/prop71/pdf/prop71.pdf (accessed 4/6/07)

[722] Confirmed in personal communication with CIRM on 11th July 2007

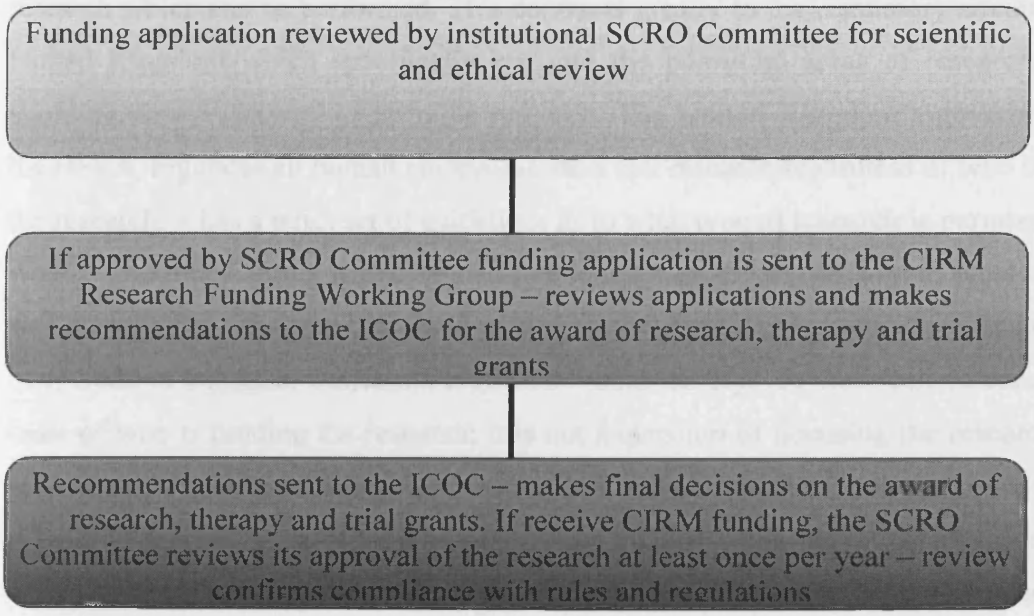
work is able to keep up to date with current developments. There is the risk that the *California Stem Cell Research and Cures Bond Act* will fail to do this if amendments are not able to be passed.

A final point to note in respect of the ability to amend the *California Stem Cell Research and Cures Bond Act* is the requirement that any amendment which is approved by 70% of both Houses of the Legislature must be approved by the State Governor. This is similar to the role which the President has concerning Federal legislation. The current Californian Governor, Arnold Schwarzenegger, is supportive of stem cell research and so would be likely to approve any amendments which continued the supportive work being undertaken under the Act. However, there is always the possibility that a new Californian Governor would not be so supportive of stem cell research and may take steps to hinder or prevent such research from occurring in California by refusing to sign any amendments to the Act. This would be the same action as President Bush has taken recently by vetoing a new *Stem Cell Research Enhancement Act of 2007.*[723] President Bush had never before vetoed legislation but has done so now in respect of legislation which would have allowed the Federal funding of human embryonic stem cell research.

So whilst it is important to have the methods to amend legislation it remains to be seen how easily or successfully amendments are introduced and passed by the Californian Legislature and Governor.

[723] Details of the progress of the *Stem Cell Research Enhancement Act 2007* can be found at: http://www.govtrack.us/congress/bill.xpd?bill=s110-5 (accessed 12th July 2007)

Research funding application process



Conclusion

It is the CIRM, as controlled by the ICOC and receiving recommendations from its three Working Groups, which is charged with the job of funding, facilitating and overseeing human stem cell research in California. The issue of conflicts of interest is one which the CIRM is keen to avoid, as evidenced by its many 'Conflict of Interest' policies.[724] It will be interesting to see how successful the 'separation of powers' will be within this State body. With ICOC members from many of the Universities which will be requesting funding, there is a high risk of a conflict of interest, along with the fact that the CIRM is not only regulating but also funding such research, which implies that there is a possibility that the CIRM will be seen as a bank, to be approached for grants and loans to do as one wishes with. Without greater regulatory controls there is a risk that the CIRM will go in the opposite direction of the Federal Government and permit grants for a wide range of research purposes, some of which may not be entirely ethically acceptable.

[724] CIRM policies http://www.cirm.ca.gov/policies/ (accessed 7/06/07)

Beyond the restrictions specifically included in *Proposition 71*, including human reproductive cloning and not keeping an embryo in culture beyond twelve days or the appearance of the primitive streak, there are very few restrictions upon the type of research which can be performed. This contrasts greatly to the regulatory situation in the United Kingdom which specifically lays out the permitted areas of research, thereby avoiding unnecessary or undesirable research. The United Kingdom's governing body, the HFEA, regulates all human embryonic stem cell research regardless of who is funding the research, it has a strict set of guidelines as to what type of research is permissible, and what is prohibited, along with criminal sanctions for those who attempt to break the rules. Additionally the UK Stem Cell Bank reinforces the permitted research purposes within its own Code of Practice. California regulates human embryonic stem cell research on the basis of who is funding the research; it is not a question of licensing the research. There also appears to be no criminal sanctions for those who conduct research other than that for which the CIRM funds were awarded. The exception is human reproductive cloning which is specifically outlawed irrelevant of the sources of funding and also carries pecuniary penalties within the *California Health and Safety Code.*

The CIRM appears to be prepared for its role of funding stem cell research, however, the regulation contained within *Proposition 71* and the CIRM policy documents do not appear to be sufficient to regulate this highly sensitive area of research. Whilst the principal role of the CIRM is to fund such research, it cannot shirk its responsibility of also overseeing and regulating the very research which it is funding. It is to be hoped that the CIRM will rapidly develop and refine its policies to ensure that the research which it is funding is safely overseen and regulated.

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Thesis Conclusion

The science of human embryonic stem cell research is fast moving, with rapid developments made on an almost daily basis. In order to regulate this field of research, and hopefully clinical applications, the legislation needs to be flexible so as to keep up to date with the progress which is being made. The legislation needs to be flexible to allow Parliament to adapt and regulate as it sees fit but also so as to allow scientific freedom and progress.

The ability to keep up to speed with the scientific progress in human embryonic stem cell research is necessary to keep the United Kingdom at the forefront of stem cell science. It is also necessary so as to retain public confidence in this controversial field of work. The regulatory framework in the United Kingdom works both ways, legislation cannot develop without the input of the science which it seeks to regulate, and equally this contentious area of science cannot progress successfully without the support of the regulatory regime.

Ethically, the Gradualist status afforded to the human embryo by the United Kingdom's legislature is accepted by the majority of the public and commentators alike. The law enshrines a form of Step Gradualism – *in vitro* embryos are protected by the law, research is only permitted up until the fourteenth day of development or the appearance of the primitive streak, whichever occurs first. The type of research is also limited, human embryos cannot be used unnecessarily or frivolously. After fourteen days development post-creation the human embryo takes a step up the 'respect ladder' as it were. After fourteen days the human embryo can no longer be experimented upon as the moral status of the embryo increases at this point.

When this is combined with the approach taken in the *Abortion Act 1967* it can be seen that the human embryo/foetus takes another step up the 'respect ladder' at 24 weeks gestation when it becomes morally and legally unacceptable to abort due to 'social' reasons. The human embryo/foetus does not attain full legal status until birth, even after 24 weeks gestation abortion is permitted in limited circumstances. Further steps up the 'respect ladder' are taken after birth, with the development of self-consciousness, rationality, speech skills and so on. The point at which a human foetus/child attains full moral status and reaches the top of the 'respect ladder' will depend upon ones own moral

compass. Most lay Gradualists would be likely to afford full respect to the human embryo/foetus/child upon birth, as does the law. Academic commentators tend to debate the merits of rationality, self-awareness and so on as necessary for full moral status.

As was seen in the discussion upon the morality of human embryo research, it is unlikely that a time will ever be reached when everyone is in agreement as to when the human embryo reaches a point at which it is to be afforded full moral status. However, the *Human Fertilisation and Embryology Act 1990* as well as its successor the *Human Fertilisation and Embryology Act 2008* have made it clear that the law approaches the human embryo in a Gradualist manner. This approach was first advocated by the Warnock Committee in 1984 and once enacted has generally been well received.

Whilst the ethical issue of allowing human embryo research and human embryonic stem cell research appears to be resolved, in the sense that the law has taken a permissive but controlled stance, the regulation of such research is not without its faults. The use of legislation that governs human embryo research to also regulate human embryonic stem cell research was bound to lead to some problems, although it was a novel and innovative approach which has allowed human embryonic stem cell research to progress, with the confidence of the public.

The involvement of research ethics committees can be both criticised and praised. The need for ethical review of human embryonic stem cell research licence applications is necessary and instils confidence in the work being performed. At first sight, it would appear that the use of research ethics committees to undertake this ethical review is ideal. Upon closer inspection of the process involved it is shown that the situation is burdensome and time consuming.

The process is far from satisfactory due to the two stage process that research licence applications must go through, first applying to a research ethics committee for ethical approval and then to the HFEA for the legal approval. If the ethical and legal approval were clearly separate there may be no issue, but as the situation currently stands, research ethics committees undertake ethical and scientific review of an application prior to the application going to the HFEA for scientific, ethical and legal review before a licence is granted. There is also the problem that few research ethics committees will have the necessary knowledge or expertise to deal with applications for human embryonic stem cell research in a timely or suitable manner. This is time consuming for all involved.

I would not advocate losing the ethical review although I have suggested the creation of a single central research ethics committee, to deal solely with human embryonic stem cell research applications, or possibly all research applications concerned with stem cell research more generally. This single central research ethics committee could be attached to either the HFEA or the UK Stem Cell Bank and therefore deal with applications prior to submission to either body. If this system was put in place, the HFEA should be content that appropriate ethical review had occurred prior to applying to it for the legal approval and would then only be concerned with the scientific and legal issues. As the central research ethics committee would be working closely with the HFEA and the UK Stem Cell Bank, action could be taken so as to ensure that one set of forms would be appropriate for both stages of the process. This would help to speed up the time taken for applications.

Another area where a central research ethics committee would help is in the reporting of research after a licence has been granted. Research ethics committees and the HFEA require regular progress reports once work is underway. This double reporting requirement is again burdensome for the researcher who is often duplicating information on two different sets of forms. There is also the problem that following submission of the progress report either body could revoke its approval. Whilst the HFEA has the experience and knowledge as to when it is appropriate to revoke, suspend or vary its approval, local research ethics committees have far less experience with the field of human embryonic stem cell research and so may take action when it is unnecessary. The HFEA has made it clear that if research ethics committee approval is withdrawn all research will have to stop until a resolution is found. This seems an unnecessary strain upon the researcher when there may actually be no ethical problem as far as the HFEA is concerned. A central research ethics committee would be able to work closely with the HFEA so as to discuss progress reports jointly and ensure that the situation does not arise whereby one body approves and the other disapproves of a research project. Additionally, one set of progress report forms could be devised, again saving time and work for those involved.

Overall, the HFEA has worked well to implement the will of Parliament. It has approved research licence applications in many different research areas, not just human embryonic stem cell research. All research licence applications must comply with the permitted research purposes as contained in the *Human Fertilisation and Embryology Act*

1990 (and from October 2009 those contained in the *Human Fertilisation and Embryology Act 2008*) as well as demonstrating that the use of embryos is 'necessary'; the HFEA has been a good final arbiter in deciding if an application fulfils the legal requirements. The double approval requirement as mentioned above is an area of concern and although this has been highlighted it does not appear that it will be resolved soon. Within the *Human Fertilisation and Embryology Act 2008* there is no section which provides for the establishment of a central research ethics committee for human embryo research and human embryonic stem cell research, it is a shame that the Government has not taken the opportunity to do this.

The formation of the UK Stem Cell Bank solves a regulatory problem within the UK. The EU required a 'competent authority' to oversee human tissue and cells and the UK decided that the UK Stem Cell Bank was appropriate for this task in respect of stem cells. Not many other European countries have a Stem Cell Bank; others have used existing bodies to be the 'competent authority'.[725] The *Human Fertilisation and Embryology Act 1990* and the *Human Fertilisation and Embryology Act 2008* (from October 2009) only govern human embryonic stem cell research where human embryos are needed to derive the stem cells. Post-extraction the stem cells fall outside of statutory regulation. The formation of the UK Stem Cell Bank, along with the legal requirement made by the HFEA to bank human embryonic stem cell lines with the UK Stem Cell Bank, ensures that research upon human embryonic stem cell lines is overseen and regulated. The implementation of the EU Tissue and Cells Directive also requires there to be a 'competent authority' which is responsible for overseeing clinical trials where human tissue and cells are used. Although human embryonic stem cell research is still at the research stage, clinical trials are not far off. The use of the UK Stem Cell Bank to oversee research and future clinical trials helps to ensure continuity in the regulation of work involving human embryonic stem cells.

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[725] Whilst Spain has created a National Stem Cell Bank (established by Ley 45/2003, de 21 de noviembre, por la que se modifica la Ley 35/1988, de 22 de noviembre, sobre Técnicas de Reproducción Asistida) it has designated its Organización Nacional de Transplantes (National Transplant Organisation) as its competent authority. Other countries have also utilised pre-existing bodies such as the Federal Agency for Medicines and Health Products in Belgium and the Irish Medicines Board in Ireland. *Summary Table of Responses from Competent Authorities: Questionnaire on the transposition and implementation of the European Tissue and Cells regulatory framework* European Commission, Health and Consumer Protection Directorate-General, 2008 (Oct) http://ec.europa.eu/health/ph_threats/human_substance/summary_table_questionnaire-responses_from_ca-october2008.pdf (last accessed 23/11/08)

The need for the UK Stem Cell Bank to continue the permitted research purposes found in the *HFE Act* in its Code of Practice can be questioned, although understandable. Once extracted, human embryonic stem cells no longer form part of the human embryo and are not capable of developing into an embryo (at least not in their undifferentiated state and then only if differentiated into gametes and fertilisation occurs). Why then the need to only permit research on human embryonic stem cells when it is for one of the permitted research purposes as found in the legislation? One possible explanation that springs to mind is that this is the easiest and the least controversial approach. Some people are unable to differentiate between human embryos and embryonic stem cells; therefore, there is a need for the UK Stem Cell Bank to reinforce the permitted research purposes within its own Code of Practice. Of course, further debate and disagreement about the UK Stem Cell Bank reinforcing the permitted research purposes may soon occur. Another explanation is that by reinforcing the permitted research purposes found within the *HFE Act* it prevents researchers and scientists from circumventing the statutory provisions. For example, a researcher may decide that human embryonic stem cells are a good source upon which to test cosmetics. If this was permitted then human embryonic stem cell research could become very difficult within the UK, the public would quickly lose confidence in the fact that scientists only use human embryos for research where it is necessary and desirable. It is for this reason that the use of human embryonic stem cell lines needs to be controlled and overseen.

Finally, in respect of the UK Stem Cell Bank and the permitted research purposes criticism was made of the Bank's attempt to enforce the permitted research purposes upon researchers working overseas with UK stem cell lines. Whilst admirable to attempt continuity in this manner, it is foreseen that someone soon will import UK stem cell lines and go beyond the permitted research purposes. A long protracted legal battle could then occur.

The UK Stem Cell Bank is still in its infancy; there is undoubtedly a need for such a bank and the UK Stem Cell Bank is taking steps in the right direction in overseeing research upon human embryonic stem cells and hopefully soon clinical trials with these cells.

It was recognised that, due to the pace of scientific developments, the *Human Fertilisation and Embryology Act 1990* was in need of reform. The reform process has been long, drawn out, and only recently reached its conclusion.

The reform process has been ongoing since 2004 when the House of Commons Science and Technology Committee undertook a review of the Act. Following several reports, a consultation, White Paper and Draft Bill the Government finally debated the *Human Fertilisation and Embryology Bill.* Throughout the parliamentary process three amended versions of the Bill were published along with a document laying out amendments from the House of Commons which were accepted by the House of Lords before the Bill received Royal Assent on the 13th November 2008. This thesis is up to date as of the 13th November 2008.

The debate surrounding the legal definitions of 'embryo', 'gamete' and 'human admixed embryo' have all been interesting and resulted in both broad and precise technical definitions. The need for flexibility has been turned down by Parliament in some respects. The precise scientific definitions for human admixed embryos, as well as the lack of regulation making powers in respect of both human admixed embryos and the permitted research purposes, has resulted in inflexible and rigid legislation. This could lead to scientific developments being made in the near future with the result that the Government is unable to amend the legislation appropriately. A need for new primary legislation could soon arise. In respect of the legal definition of an embryo the Government has in contrast taken a broad sweeping approach which should encompass all forms of creating embryos, including any methods not yet discovered or applied to human embryos. As the *HFE Act 2008* does not deal solely with human embryo research but also includes issues such as who are legal mothers/fathers and surrogacy matters, there was much that needed to be discussed, hence the lengthy and protracted debates that occurred during its passage through Parliament. The Bill spent one year passing through Parliament before Royal Assent was given.

Finally, comment needs to be made upon the regulation of human embryonic stem cell research in the State of California, USA. Comparisons with California show that regulation is made through the funding of research rather than restricting the type of research which can be undertaken or imposing criminal sanctions. The State of California has taken this approach as this is how the Federal Government has also chosen to regulate human embryo research more generally.

It is recognised that regulation through funding has occurred in California due to the Federal stance on this issue, although it is equally recognised that the Federal position has now changed but it will take some time for the effects of that change to be seen. It is

of concern that California has not sought to regulate in finer detail human embryonic stem cell research (besides the time limits of keeping embryos *in vitro*). For example, the Californian legislation is apparently more concerned with making clear what is prohibited (very little) and how money can be made from the research. Unlike the UK legislation, there is no restriction upon the type of research which can be undertaken, possibly leading to funding of relatively frivolous research involving human embryos and embryonic stem cells. Whilst I have queried the need to limit the research done upon extracted embryonic stem cells, the complete lack of guidance in the Californian legislation is of concern.

Equally, the use of multiple Institutional Review Boards and Stem Cell Research Oversight Committees along with the CIRM leads to comparisons with research ethics committees and the HFEA. The ethical review and subsequent oversight of research funded by the CIRM is complicated and inadequate. The CIRM should take responsibility for the research which it is funding and take action for greater oversight and control. A central SCRO Committee could be established to oversee the necessary scrutiny of all funding applications before going to the CIRM for discussion and possibly subsequent approval. This has parallels with the suggestion of a central research ethics committee to provide ethical review of stem cell research applications prior to passing to the HFEA for scientific and legal approval.

The State of California has taken steps to ensure that it is at the forefront of stem cell research by pumping $3 billion into such research over 10 years. While I cannot criticise California for taking positive action, I am concerned that it is pushing research forward without seriously overseeing the work which is occurring. There is also the issue that the Californian tax payers are funding this venture and yet there is no guarantee of the money being returned or that Californians will benefit either financially or physically from any scientific developments which occur. The forward thinking of California is admirable; however, greater thought into regulating this field of research is needed.

This thesis has been an in depth look at the interface between embryo research and human embryonic stem cell research primarily through examining the regulation of human embryonic stem cell research in the United Kingdom, from the early steps towards regulation, the current legislation and the licensing process, through to the reform which has occurred and the new legislation which will soon come into force. Comparison has

been made with California, the system of regulating through funding throws into highlight the careful system of regulating through licensing that occurs in the United Kingdom. Whilst human embryonic stem cell research is still at an early stage, it is important to know why and how we regulate this area of science, as well as looking at faults in the system and looking for improvements in the future. When all of the provisions of the *Human Fertilisation and Embryology Act 2008* come into force the Act will continue to allow human embryonic stem cell research as well as maintaining the system of licensing which we have currently; it is the legal definitions and permitted research purposes that will change. Human embryonic stem cell research is here to stay.

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American

Baker, M. *Consent issues restrict stem-cell use* 28th July 2008 Nature News http://www.nature.com/news/2008/080728/full/454556a.html

Baker, M., *The Niche Stem Cell Blog: Some NIH Registry Lines Fall Outside Informed Consent Guidelines* http://blogs.nature.com/reports/theniche/2008/07/some_nih_registry_lines_fall_o.html

Belew, K., *Comment: Stem Cell Division: Abortion Law and its Influence on the Adoption of Radically Different Embryonic Stem Cell Legislation in the United States, the United Kingdom and Germany* (2004) 39 Tex. Int'l L.J. 479

Capron, A.M. *Stem Cells: Ethics, Law and Politics* (2001) 20(5) Biotechnology Law Report 678

Greenfield, D. *Impatient Proponents: What's Wrong with the California Stem Cell and Cures Act?* (2004) 34(5) The Hasting Center Report 32

Jiang Y, Jahagirdar BN, Reinhard RL, Schwartz RE, Keene CD, Ortiz XR, Reyes M, Lenvik T, Lund T, Blackstad M, Du J, Aldrich S, Lisberg A, Low, WC, Largaespada DA, Verfaillie CM., *Pluripotency of mesenchymal stem cells derived from adult marrow* (2002) 418 Nature 41-9

Leading Edge: *Time to expand US funding for stem-cell research* (2007) 6 The Lancet Neurology 469

Longaker, M.T., Baker, L.C. & Greely, H.T. *Proposition 71 and CIRM – assessing the return on investment* (2007) 25(5) Nature Biotechnology 513

Rao, M.S. *Embryonic Stem Cell Research and U.S. Policy* (2006) 24 Stem Cells 1412

Sax, J.K. *The States "Race" with the Federal Government for Stem Cell Research* (2006) 15 Annals Health L. 1

Shamblott, M.J. et al. *Derivation of Pluripotent Stem Cells from Cultured Human Primordial Germ Cells* 95 Proceeding Nat'l Acad. Sci. 13726 – 13731 (1998)

Streiffer, R. *Informed Consent and Federal Funding for Stem Cell Research* (2008) 38 Hastings Cent. Rep. 40-47

Winickoff, D. E., *Bioethics and Stem Cell Banking in California* (2006) 21 Berkeley Tech. L.J 1067

Zeleny, J., *Obama Weighs Quick Undoing of Bush Policy* NY Times, 9th November 2008 http://www.nytimes.com/2008/11/10/us/politics/10obama.html?_r=1&scp=2&sq=barack%20obama%20embryonic%20stem%20cells&st=cse

British

Agar, N., *Embryonic Potential and Stem Cells* (2007) 21(4) Bioethics 198

BBC News website *Controversy over human embryo clone* 26th November 2001 http://news.bbc.co.uk/1/hi/sci/tech/1676234.stm

BBC News website *Cloned baby met with doubt* 27th December 2002 http://news.bbc.co.uk/1/hi/health/2608655.stm

BBC News website *Drug trials need 'better cover'* 18th April 2006 http://news.bbc.co.uk/1/hi/england/london/4918080.stm

Bagaric, M & McConvill, J., *Embryonic Stem Cell Research: The Principal Ethical Issue - When Does Life Begin?* (2003) 12(1) Nott. L.J. 1

Benedict, Pope XVI., *Address of His Holiness Pope Benedict XVI to Participants of the Symposium on the Theme: 'Stem Cells: What Future for Therapy? Scientific Aspects and Bioethical Problems'* (2008) 41 (Suppl. 1) Cell Prolif. 4-6

Brazier, M., *Regulating the Reproduction Business?* (1999) 7 Med L. Rev. 166

Cameron, C and Williamson, R., *In the world of Dolly, when does a human embryo acquire respect?* (2005) 31 J.Med. Ethics 215-220

Chung.Y., *et al.*, *Human Embryonic Stem Cell Lines Generated without Embryo Destruction* (2008) 2(2) Cell Stem Cell 113-117

Cibelli, J.B., Lanza, R.P. and West, M.D. with Ezzell, C. *The First Human Cloned Embryo* 24th Nov 2001, Scientific American 286(1):44-51, 2002 http://www.sciam.com/article.cfm?articleID=0008B8F9-AC62-1C75-9B81809EC588EF21&catID=4

Clark, P., *An Outline of Kant's Moral Theory* Cardiff University Philosophy Handout

Cyranoski, D., *Stem-cell therapies closer to clinic* Nature News 28th May 2009 http://www.nature.com/news/2009/090528/full/news.2009.525.html

Denker, H-W., *Potentiality of embryonic stem cells: an ethical problem with alternative stem cell sources* (2006) 32 J Med Ethics 665

Editorial, *Stem-cell futures*, 456 Nature 282 (20th November 2008)

Evans, M.J. and Kauffman, M.H., *Establishment in culture of pluripotent cells from mouse embryos* (1981) 292 Nature 154

Grubb, A., *Commentary: Reproductive Cloning in the UK: The Human Reproductive Cloning Act 2001* [2002] 10 Med. L. Rev. 327

Hammond, N., and Holm, S., *Resolving the "egg supply problem" in human embryonic stem cell derivation through technical means – a legal and ethical analysis* 27(1) Medicine and Law (2008) pg167

Hammond-Browning, N., *Legal and Ethical Considerations of Induced Pluripotent Stem Cells* (forthcoming) Medical Law Review

Hare, R.M., *When does Potentiality Count? A comment on Lockwood* (1988) 2(3) Bioethics 214-226

Harvey, E., *Scientists argue for freedom to develop sperm and eggs from stem cells* 21st April 2008, Bionews
http://www.bionews.org.uk/new.lasso?storyid=3807

Hearn, J., *Stem Cell Frontiers: Science, Ethics and Regulation* (2007) 15 JLM 32

Herring, J and Chau, Dr P-L., *Are Cloned Embryos Embryos? - The Queen on the Application of Quintavalle v The Secretary of State for Health* (2002) 14 CFLQ 315

Herring, J and Chau, Dr P-L., *Cloning in the House of Lords* (2003) 33 Fam LJ 663

Holbrook, D., *All Embryos are Equal?: Issues in Pre-implantation Genetic Diagnosis, IVF Implantation, Embryonic Stem Cell Research, and Therapeutic Cloning* (2007) 21(1) International Journal of Applied Philosophy (Earlier version was emailed direct from the author)

Holm, S., *Going to the Roots of the Stem Cell Controversy* (2002) 16(6) Bioethics 493-507

Holm, S., *The Ethical case against Stem Cell Research* (2003) 12 Cambridge Quarterly of Healthcare Ethics 372

Holm, S., *Embryonic stem cell research and the moral status of human embryos* (2005) 10 Reproductive Medicine Online 63

Holm, S., *Who should control the use of human embryonic stem cell lines - A defence of the donors' right to control* (2006) Vol 3 (1-2) Journal of Bioethical Inquiry pg 55-68

Hwang, W-S *et al, Evidence of a Pluripotent Human Embryonic Stem Cell Line Derived from a Cloned Blastocyst,* (2004) 303 (5664) Science 1669-1674 (Retracted)

Klassen, H and Reubinoff, B., *Stem cells in a new light* (2008) 26(2) Nature Biotechnology 187

Klimanskaya, I., *et al. Human embryonic stem cell lines derived from single blastomeres* 444 Nature 481-485

Lewis, P., *Lap dance firms call for tighter regulation* 28th April 2008, The Guardian http://www.guardian.co.uk/uk/2008/apr/28/3

Lockwood, M., *Warnock Versus Powell (and Harradine): When does Potentiality Count?* (1988) 2(3) Bioethics 187-213

McKie, R., *Men redundant? Now we don't need women either* 10th February 2002, The Observer http://observer.guardian.co.uk/international/story/0,6903,648024,00.html

Middle, C, Johnson, A, Petty, T, Sims, L and Macfarlane, A., *Ethics approval for a national postal survey: recent experience* (1995) 311 BMJ 659

Morgan, R., *A lack of foresight? Jurisdictional uncertainties in the regulatory interface between the HFEA, the UK Stem Cell Bank and beyond* 27(3) Legal Studies 511

Nayernia K, Nolte J, Michelmann HW, Lee JH, Rathsack K, Drusenheimer N, *et al.,* (2006) *In vitro-differentiated embryonic stem cells give rise to male gametes that can generate offspring mice* Dev Cell 11:125-132 http://www.cell.com/developmental-cell/fulltext/S1534-5807(06)00248-6

Nicholl, H., *Stem Cell Sperm Success* 17th July 2006, Bionews http://bionews.org.uk/new.lasso?storyid=3107

Plomer, A., *Beyond the HFE Act 1990: The Regulation of Stem Cell Research in the UK* [2002] 10 Med. L. Rev. 132

Pope John Paul II., *The Unspeakable Crime of Abortion* Reproduced in Mappes, T.A. & DeGrazia, D., *Biomedical Ethics,* 6th Ed. (2006) McGraw-Hill

Roslin Institute. *Cloning - A life of Dolly* http://www.roslin.ac.uk/publicInterest/cloning.php

Roslin Institute. *Cloning - A life of Dolly: Dolly's Final Illness* http://www.ri.bbsrc.ac.uk/publicInterest/DollyFinalIilness.php

Schuklenk, U., *How not to win an ethical argument: Embryo stem cell research revisited* (2008) 22(2) Bioethics ii-iii

Shaw, D.M., *Moral Qualms, Future Persons, and Embryo Research* (2008) 22(4) Bioethics 218-223

Sikora, R.I., *Is It Wrong to Prevent the Existence of Future Generations?* Article in Sikora. R. I. and Barry. B, Editors, *Obligations to Future Generations* Temple University Press (1978)

Stojkovic, M, Stojkovic, P, Leary, C, Hall, V, Armstrong, L, Herbert, M. Nesbitt, M. Lako, M, Murdoch, A., *Derivation of a human blastocyst after heterologous nuclear transfer to donated oocytes.* (2005) 11(2) Reproductive Biomedicine Online 226-231 http://www.rbmonline.com/4DCGI/Article/Detail?38%091%09=%201872%09

Takahashi, K., *et al., Induction of Pluripotent Stem Cells from Adult Human Fibroblasts by Defined Factors* (2007) 131(5) Cell 861-872

Thomson, J., *et al., Embryonic stem cell lines derived from human blastocysts* (1998) 282 Science 1145-47

Vlastos, G., *Human Worth, Merit and Equality* Article in Feinberg, J., (Ed) *Moral Concepts* (1969) Oxford University Press

Warnock, M. Baroness., *The Enforcement of Morals in the Light of New Developments in Embryology* (1986) 39 C.L.P. 17

Warren, M., *Do Potential People Have Moral Rights?* Article in Sikora. R. I. and Barry. B, Editors, *Obligations to Future Generations* Temple University Press (1978)

Warren, M., *On the Moral and Legal Status of Abortion* Reproduced in Mappes, T.A. & DeGrazia, D., *Biomedical Ethics* 6th Ed. (2006) McGraw-Hill

Watt, N & Stratton, A., *Health ministers stunned by embryo bill delay* 11th July 2008 The Guardian

Wood, Dr P and Good, Dr J., *Human Reproductive Cloning - Nipped in the Bud?* (2001) 151 NLJ 1760

Zhou, H., *et al., Generation of Induced Pluripotent Stem Cells Using Recombinant Proteins* (2009) 4(5) Cell Stem Cell 381-384

Books

Attfield, R., *Value, Obligation and Meta-Ethics* (1995) Value of Inquiry Book Series

Daar, J.F., *Reproductive Technologies and the Law* (2006) LexisNexis

Downie, R.S. & Telfer, E., *Respect for Persons* (1969) George Allen and Unwin Ltd

Feinberg, J., (Ed) *Moral Concepts* (1969) Oxford University Press

Fox, C., *Cell of Cells: The Global Race to Capture and Control the Stem Cell* (2007) W.W. Norton

Gunning, J. & English, V., *Human In Vitro Fertilization* (2002) Ashgate

Harris, J., *The Value of Life, An Introduction to Medical Ethics* (1985) Routledge

Harris, J., *Clones, Genes, and Immortality: Ethics and the Genetic Revolution* (1998) OUP

Harris, J., *Ch X 'The Irredeemable Paradox of the Embryo'* in *Enhancing Evolution* (2007) Princeton University Press

Jackson, E., *Medical Law: Text, Cases and Materials* (2006) Oxford University Press

Korobkin, R with Munzer. S. R., *Stem Cell Century: Law and Policy for a Breakthrough Technology* (2007) Yale University Press

Mappes, T.A. and DeGrazia, D., *Biomedical Ethics* (2006) McGraw-Hill 6th Ed.

McMahan, J., *The Ethics of Killing: Problems at the Margins of Life* (2002) OUP

Morgan, R., *The Regulation of Human Embryonic Stem Cell Research in the United Kingdom* PhD Thesis, Cardiff Law School (2005)

Paton, H.J., *The Moral Law* (1964) Hutchinson & Co. (Publishers) Ltd

Pattinson, S., *Medical Law and Ethics* (2006) Sweet and Maxwell

Sikora. R. I. and Barry. B., (Eds) *Obligations to Future Generations* (1978) Temple University Press

Warren, M.A., *Moral Status: Obligations to Persons and Other Living Things* (1997) OUP

Cases

American

People's Advocate et al. v. Independent Citizen's Oversight Committee et al. S131655 (Supreme Court of California) 23rd March 2005

People's Advocate and National Tax Limitation Foundation v. Independent Citizen's Oversight Committee et al. Superior Court of Alameda County, No's HG05206766 and HG05235177 – Judge Bonnie Lewman-Sabraw

California Family Bioethics Council v. California Institute for Regenerative Medicine, People's Advocate v. Independent Citizen's Oversight Committee 26th February 2007, 147 Cal. App. 4th 1319

California Family Bioethics Council v. California Institute for Regenerative Medicine et al and companion case 16th May 2007, S151574, Supreme Court of California

British

Royal College of Nursing of the UK v Dept of Health and Social Security [1981] 1 All ER 545

R (on application of Quintavalle) v Secretary of State for Health [2001] 4 All ER 1013

R (on application of Quintavalle) v Secretary of State for Health [2002] 2 All ER 625

R (on application of Quintavalle) v Secretary of State for Health [2003] 2 All ER 113

Attorney General's Reference (No 2 of 2003) [2004] EWCA Crim 785

R (on the application of Quintavalle) v. Human Fertilisation and Embryology Authority [2002] EWHC 2785

R (on the application of Quintavalle) v. Human Fertilisation and Embryology Authority [2003] EWCA Civ 667

R (on the application of Quintavalle) v. Human Fertilisation and Embryology Authority [2005] UKHL 28

Codes of Practice and Guidelines

American

California Institute for Regenerative Medicine

Reformatted Compiled CIRM Medical and Ethical Standards Regulations
http://www.cirm.ca.gov/laws/pdf/Compiled_Regulations_2.pdf

Intellectual Property Policy for Non-Profit Organizations
http://www.cirm.ca.gov/policies/pdf/IPPNPO.pdf

Scientific Strategic Plan
http://www.cirm.ca.gov/meetings/pdf/2006/12/120706_item_7.pdf

National Institutes of Health

National Institutes of Health Guidelines for Research Using Human Pluripotent Stem Cells (Effective 25th August 2000)
http://stemcells.nih.gov/news/newsArchives/stemcellguidelines.asp

Notice of Criteria for the Federal Funding of Research on Existing Human Embryonic Stem Cells and Establishment of NIH Human Embryonic Stem Cell Registry (7th November 2001)
http://grants.nih.gov/grants/guide/notice-files/not-od-02-005.html

Information on Eligibility Criteria for Federal Funding of Research on Human Embryonic Stem Cells
http://stemcells.nih.gov/research/registry/eligibilityCriteria.asp

British

BBSRC

BBSRC Research Grants Guide, Version 6.20
http://www.bbsrc.ac.uk/funding/research/grants_booklet.pdf

HFEA

Code of Practice, 6th Edition Human Fertilisation and Embryology Authority 2004
http://www.hfea.gov.uk/HFEAPublications/CodeofPractice

Code of Practice, 7th Edition Human Fertilisation and Embryology Authority Last updated 10th June 2008
http://cop.hfea.gov.uk/cop/pdf/CodeOfPracticeVR_3.pdf

MRC

Research Involving Human Stem Cells: Supplementary Terms and Conditions to be applied to new and extant MRC Grants, MRC Unit Programmes and MRC Training Awards from 1/08/2003 Medical Research Council 2003 (Aug)
http://www.mrc.ac.uk/pdf-terms_conditions_stem_cells.pdf

NRES

Guidance for applicants to the National Research Ethics Service NRES (2007)
http://www.nres.npsa.nhs.uk/EasySiteWeb/GatewayLink.aspx?alId=330

UK Stem Cell Bank

Code of Practice for the UK Stem Cell Bank: Consultation Document UK Stem Cell Bank 2003 (Aug)
http://www.mrc.ac.uk/pdf-stem_cell_bank_code_draft.pdf

Code of Practice for the use of Human Stem Cell Lines Version 3 UK Stem Cell Bank 2006 (Aug)
http://www.ukstemcellbank.org.uk/documents/Code%20of%20Practice%20for%20the%20Use%20of%20Human%20Stem%20Cell%20Lines.pdf

Government Reports and Policy Documents

American

Report of the Human Embryo Research Panel, Volume I National Institutes for Health Sept 1994
http://www.bioethics.gov/reports/past_commissions/human_embryo_vol_1.pdf

Ethical Issues in Human Stem Cell Research, Vol I, Report and Recommendations of the National Bioethics Advisory Commission National Bioethics Advisory Commission Sept 1999
http://www.bioethics.gov/reports/past_commissions/nbac_stemcell1.pdf

Alternative Sources of Human Pluripotent Stem Cells: A White Paper of the President's Council of Bioethics The President's Council on Bioethics May 2005
http://www.bioethics.gov/reports/white_paper/alternative_sources_white_paper.pdf

British

Minutes of the MRC Advisory Group to review policy on research in in vitro fertilization and embryo transfer in humans March 1979

Research related to human fertilisation and embryology: Statement by the Medical Research Council (1982) 285 BMJ 1480

Report of the RCOG Ethics Committee on in vitro fertilization and embryo replacement or transfer Royal College of Obstetricians and Gynaecologists London (1983)

Interim Report on human fertilization and embryo replacement and transfer
British Medical Association Working Group on In Vitro Fertilization (1983) 286 BMJ 1594-1595

Report of the Committee of Inquiry into Human Fertilisation and Embryology (1984) DHSS Cmnd 9314

Written evidence to the Inquiry and Responses to the Report of Human Fertilisation and Embryology (1985) DHSS House of Commons Library Dep 1497

Legislation on Human Fertility Services and Embryo Research: A Consultation Paper (1986) DHSS Cm 46

Human Fertilisation and Embryology: A Framework for Legislation (1987) DHSS Cm 259

Local Research Ethics Committees HSG (91) 5 Department of Health and Social Security 1991

Ethics Committee Review of Multi-Centre Research HSG (97) 23 Department of Health 1997

Cloning issues in Reproduction, Science and Medicine HGAC Paper (1998) Department of Health
http://www.advisorybodies.doh.gov.uk/hgac/papers/papers_c.htm

Government Response to the Report by the Human Genetics Advisory Commission and the Human Fertilisation and Embryology Authority on Cloning Issues in Reproduction, Science and Medicine 1999/0383 Department of Health
http://www.dh.gov.uk/PublicationsAndStatistics/PressReleases/PressReleasesNotices/fs/en?CONTENT_ID=4025446&chk=0zNabK

Stem Cell Research: Medical Progress with Responsibility. A Report from the Chief Medical Officer's Expert Group Reviewing the Potential of Developments in Stem Cell Research and Cell Nuclear Replacement to Benefit Human Health (2000) Department of Health
http://www.dh.gov.uk/assetRoot/04/06/50/85/04065085.pdf

Government Response to the Recommendations Made in the Chief Medical Officer's Expert Group Report "Stem Cell Research: Medical Progress with Responsibility" (2000) Department of Health CM 4833

Governance Arrangements for NHS Research Ethics Committees (2001) Department of Health (July)
http://www.dh.gov.uk/PublicationsAndStatistics/Publications/PublicationsPolicyAndGuidance/PublicationsPolicyAndGuidanceArticle/fs/en?CONTENT_ID=4005727&chk=CNcpyR

House of Lords Select Committee Report on Stem Cell Research: Report Session 2001-02 HL Paper 83(i) (13th Feb 2002)

Stem Cell Research: Report from the Select Committee: Evidence Session 2001-02 HL Paper 83(ii) (13th Feb 2002)

Government Response to the House of Lords Select Committee Report on Stem Cell Research (2002) Department of Health CM 5561

Hansard Society Online Consultation on Human Reproductive Technologies and the Law, Summary Report Hansard Society 2004 (Mar)
http://tellparliament.net/scitech/documents/sci-tech-report.pdf

Central Office for Research Ethics Committees (COREC) Annual Report, June 2004 Department of Health
http://www.corec.org.uk/public/about/docs/COREC_Annual_Report_2004.doc

Reconfiguring the Department of Health's Arm's Length Bodies
40378 (2004) Department of Health (July)
http://www.dh.gov.uk/prod_consum_dh/groups/dh_digitalassets/@dh/@en/documents/digitalasset/dh_4098136.pdf

Human Reproductive Technologies and the Law Fifth Report of Session 2004-05 House of Commons Science and Technology Committee HC 7-I (14th March 2005) http://www.publications.parliament.uk/pa/cm200405/cmselect/cmsctech/7/702.htm

Human Reproductive Technologies and the Law Fifth Report of Session 2004-05 House of Commons Science and Technology Committee HC 7-II http://www.publications.parliament.uk/pa/cm200405/cmselect/cmsctech/7/702.htm

Government Response to the Report from the House of Commons Science and Technology Committee: Human Reproductive Technologies and the Law (2005) CM 6641 http://www.dh.gov.uk/PublicationsAndStatistics/Publications/PublicationsPolicyAndGuidance/PublicationsPolicyAndGuidanceArticle/fs/en?CONTENT_ID=4117875&chk=Mc/3LI

Review of the Human Fertilisation and Embryology Act: A Public Consultation (2005) Department of Health http://www.dh.gov.uk/Consultations/LiveConsultations/LiveConsultationsArticle/fs/en?CONTENT_ID=4117820&chk=vchu%2B9

Research Governance Framework for Health and Social Care 2nd Edition (2005) Department of Health (April) http://www.dh.gov.uk/PublicationsAndStatistics/Publications/PublicationsPolicyAndGuidance/PublicationsPolicyAndGuidanceArticle/fs/en?CONTENT_ID=4008777&chk=dMRd/5

Report of the Ad hoc Advisory Group on the Operation of NHS Research Ethics Committees 268110 (2005) Department of Health (June) http://www.dh.gov.uk/PublicationsAndStatistics/Publications/PublicationsPolicyAndGuidance/PublicationsPolicyAndGuidanceArticle/fs/en?CONTENT_ID=4112416&chk=kw5gAf

Response by the Human Fertilisation and Embryology Authority to the Department of Health's consultation on the Review of the Human Fertilisation and Embryology Act 05/33273 Human Fertilisation and Embryology Authority 24th Nov 2005 http://www.hfea.gov.uk/AboutHFEA/HFEAPolicy/ReviewoftheHFEAct

Government response to the UK Stem Cell Initiative Report and Recommendations (2005) Department of Health (2nd Dec) http://www.dh.gov.uk/PolicyAndGuidance/HealthAndSocialCareTopics/StemCell/StemCellGeneralInformation/StemCellGeneralArticle/fs/en?CONTENT_ID=4124082&chk=5mbZjS

Implementing the recommendations of the *Ad Hoc Advisory Group: consultation* (2006) Central Office for Research Ethics Committees (Jan) http://www.corec.org.uk/public/consultation.htm

Report on the Consultation on the review of the Human Fertilisation and Embryology Act 1990 (2006) People Science and Policy Ltd. Prepared for the Department of Health http://www.peoplescienceandpolicy.com/downloads/DH_consultation.pdf

Building on Improvement: Implementing the recommendations of the *Report of the Ad Hoc Advisory Group on the Operation of NHS Research Ethics Committees* (2006) Central Office for Research Ethics Committees (Aug) http://www.corec.org.uk/consultation/ImplementationPlan.pdf

HFEA Consultation on Annual Fees for Centres Licensed under the European Tissue and Cells Directive from 7 April 2007 Human Fertilisation and Embryology Authority 2006 (Nov) http://www.hfea.gov.uk/docs/2006-09-25_EUTD_Fees_Consultation_-_Final.pdf

Review of the Human Fertilisation and Embryology Act: Proposals for revised legislation (including establishment of the Regulatory Authority for Tissue and Embryos) (2006) Department of Health CM 6989 http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_073098

Government Proposals for the regulation of hybrid and chimera embryos Fifth Report of Session 2006-07 House Commons Science and Technology Committee HC 272-I (Apr 2007) http://www.publications.parliament.uk/pa/cm200607/cmselect/cmsctech/272/272i.pdf

Joint Committee on the Human Tissue and Embryos (Draft) Bill Volume I: Report HL Paper 169-I, HC Paper 630-I (Aug 2007) http://www.publications.parliament.uk/pa/jt200607/jtselect/jtembryos/169/169.pdf

Joint Committee on the Human Tissue and Embryos (Draft) Bill Volume II: Evidence HL Paper 169-II, HC Paper 630-II (Aug 2007) http://www.publications.parliament.uk/pa/jt200607/jtselect/jtembryos/169/169ii.pdf

Government Response to the Report from the Joint Committee on Human Tissue and Embryos (Draft) Bill (2007) Department of Health CM7209 http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_079127

European

Meeting of Competent Authorities on Tissues and Cells, 8th February 2007, Summary Report, Annex I European Commission, 2007 (Feb) http://ec.europa.eu/health/ph_threats/human_substance/documents/ev_20070208_mi_en.pdf

Summary Table of Responses from Competent Authorities: Questionnaire on the transposition and implementation of the European Tissue and Cells regulatory framework European Commission, Health and Consumer Protection Directorate-General, 2008 (Oct)

http://ec.europa.eu/health/ph_threats/human_substance/summary_table_questionnaire-responses_from_ca-october2008.pdf

Hansard

Hansard - House of Commons, 2nd April 1990
House of Commons Debate of the Human Fertilisation and Embryology Bill
Volume 170, Column 986

Hansard - House of Commons, 19th Dec 2000
2001 Regulations Debate and Vote House of Commons
Volume 360, Column 212

Hansard – House of Commons, 3rd December 2007
Written Answers, Human Embryo Experiments
Volume 486, Column 1005W

Hansard - House of Lords, 15th Jan 2008
Report Stage, Human Fertilisation and Embryology Bill [HL]
Volume 697, Column 1183

Hansard - House of Lords, 15th Jan 2008
Report Stage, Human Fertilisation and Embryology Bill [HL]
Volume 697, Column 1215

Hansard – House of Commons, 22nd October
Third Reading, Human Fertilisation and Embryology Bill [HL]
Volume 480, Column 410

Hansard - House of Lords, 13th Nov 2008
Royal Assent, Human Fertilisation and Embryology Act 2008
Volume 705, Column 832

Legislation

American

California Constitution, Article XXXV, Medical Research
http://www.leginfo.ca.gov/.const/.article_35

California Health and Safety Code, Sections 24185-24187
http://www.leginfo.ca.gov/cgi-bin/displaycode?section=hsc&group=24001-25000&file=24185-24187

National Institutes of Health Revitalization Act of 1993 Public Law 103-43

'Dickey Amendment' Balanced Budget Downpayment Act of 1996 Pub. L. No. 104-99, §128, 110 Stat. 26, 34 (1996)

California Stem Cell Research and Cures Initiative, Proposition 71 - proposed laws http://www.cirm.ca.gov/prop71/pdf/prop71.pdf

California Stem Cell Research and Cures Bond Act (Proposition 71) Division 106, Part 5, Chapter 3, California Health and Safety Code http://www.cirm.ca.gov/pdf/prop71.pdf

Title 45, Public Welfare, Department of Health and Human Services, Part 46, Protection of Human Subjects 45 CFR 46 http://www.hhs.gov/ohrp/humansubjects/guidance/45cfr46.htm

Stem Cell Research Enhancement Act of 2005 (not in force) H.R. 810, 109th Cong.

Stem Cell Research Enhancement Act of 2007 (not in force - vetoed by President) S. 5, 110th Cong.

European

Declaration of Helsinki (1964) http://www.wma.net/e/policy/b3.htm

Declaration of Helsinki (1975) available at: (1999) 150 Bulletin of Medical Ethics 14

Declaration of Helsinki (2000) http://www.wma.net/e/policy/b3.htm

Directive 2001/20/EC of the European Parliament and of the Council of 4 April 2001 on the approximation of the laws, regulations and administrative provisions of the Member States relating to the implementation of good clinical practice in the conduct of clinical trials on medicinal products for human use L121/34 OJEC

Directive 2004/23/EC of the European Parliament and of the Council of 31 March 2004 on setting standards of quality and safety for the donation, procurement, testing, processing, preservation, storage and distribution of human tissue and cells (31st March 2004) [2004] OJ L102/48

Spain

Ley 45/2003, de 21 de noviembre, por la que se modifica la Ley 35/1988, de 22 de noviembre, sobre Técnicas de Reproducción Asistida

United Kingdom

Offences Against the Person Act 1861

Infant Life Preservation Act 1929

Abortion Act 1967

Congenital Disabilities (Civil Liability) Act 1976

Animal (Scientific Procedures) Act 1986

Human Fertilisation and Embryology Bill [HL] (1989) ISBN 0104001909

Human Fertilisation and Embryology Act 1990

Human Fertilisation and Embryology (Research Purposes) Regulations 2001 SI 2001/188

Human Reproductive Cloning Bill [H.L.] Research Paper 01/104
http://www.parliament.uk/commons/lib/research/rp2001/rp01-104.pdf

Human Reproductive Cloning Act 2001

Medicines for Human Use (Clinical Trials) Regulations 2004 SI 1031

Human Tissue Act 2004

Human Tissue and Embryos (Draft) Bill (2007) Department of Health CM 7087
http://www.official-documents.gov.uk/document/cm70/7087/7087.pdf

Human Fertilisation and Embryology Bill [HL] HL Bill 6, 54/3 (New Bill)
http://www.publications.parliament.uk/pa/ld200708/ldbills/006/2008006.pdf

Human Fertilisation and Embryology Bill [HL] HL Bill 25, 54/3 (January Bill)
http://www.publications.parliament.uk/pa/ld200708/ldbills/025/2008025.pdf

Human Fertilisation and Embryology Bill [HL] HL Bill 70, 54/3 (February Bill)
http://www.publications.parliament.uk/pa/cm200708/cmbills/070/2008070.pdf

Human Fertilisation and Embryology Bill [HL] HL Bill 120, 54/3 (June Bill)
http://www.publications.parliament.uk/pa/cm200708/cmbills/120/2008120.pdf

Human Fertilisation and Embryology Bill [HL] HL Bill 83, 54/3 (Commons Amendments)
http://www.publications.parliament.uk/pa/ld200708/ldbills/083/2008083.pdf

Human Fertilisation and Embryology Bill [HL] Explanatory Notes on Commons Amendments HL Bill 83-EN, 54/3
http://www.publications.parliament.uk/pa/ld200708/ldbills/083/en/2008083en.pdf

Human Fertilisation and Embryology Act 2008
http://www.opsi.gov.uk/acts/acts2008/pdf/ukpga_20080022_en.pdf

Human Fertilisation and Embryology Act 2008 Explanatory Notes
http://www.opsi.gov.uk/acts/acts2008/en/ukpgaen_20080022_en.pdf

Other

Federal Funding for Research Involving Human Pluripotent Stem Cells Memorandum from Harriet S. Raab, General Counsel of the DHHS, to Harold Varmus, Director of the NIH (Jan. 15, 1999)

Remarks by the President on Stem Cell Research Speech of President Bush 9th Aug 2001
http://www.whitehouse.gov/news/releases/2001/08/20010809-2.html

Seven In Ten Members Of The Public Support The Use Of Embryos For Medical Reasons MORI Poll 8th April 2003 http://www.ipsos-mori.com/content/seven-in-ten-members-of-the-public-support-the-use.ashx

Artificial Gametes and the Law: Legal and Ethical Implications Conference paper presented by Professor E Jackson, SLS Conference, 15th September 2008

Stem Cell Policy: World Stem Cell Map
http://www.mbbnet.umn.edu/scmap.html

Executive Order no.13505 of March 9, 2009: Removing Barriers to Responsible Scientific Research Involving Human Stem Cells President Obama
http://edocket.access.gpo.gov/2009/pdf/E9-5441.pdf

Press Releases

American

CIRM

$45 Million Headed for Stem Cell Research in California, 16th February 2007
http://www.cirm.ca.gov/pressreleases/2007/02/pricoc021607final.pdf

$75 Million Boost for California Stem Cell Scientists, 16th March 2007
http://www.cirm.ca.gov/pressreleases/pdf/2007/03-16-07icoc.pdf

Litigation against California stem cell project ends, 16th May 2007
http://www.cirm.ca.gov/pressreleases/pdf/2007/05-16-07.pdf

First stem cell research facilities grants approved, 5th June 2007
http://www.cirm.ca.gov/pressreleases/pdf/2007/06-05-07.pdf

California Stem cell agency, donors and 12 Californian institutions commit $1.1 Billion to increase capacity for stem cell research in California, 7th May 2008
http://www.cirm.ca.gov/press/pdf/2008/05-07-08.pdf

$24 million in new stem cell research funding awarded to 25 Californian institutions, 27th June 2008
http://www.cirm.ca.gov/press/pdf/2008/06-27-08.pdf

British

HFEA

Statement on HFEA Chair HFEA 17th October 2007
http://www.hfea.gov.uk/en/1601.html

New Chair appointed for HFEA HFEA 23rd January 2008
http://www.hfea.gov.uk/en/1641.html

HFEA Chair welcomes Royal Assent for HFE Act HFEA 13th November 2008
http://www.hfea.gov.uk/en/1746.html

House of Commons Science and Technology Committee

New Inquiry: Human Reproductive Technologies and the Law Press Release No. 45, Session 2002-2003, House of Commons Science and Technology Committee, 24th October 2003
http://www.parliament.uk/parliamentary_committees/science_and_technology_committee/scitech241003.cfm

Newcastle University

Hybrid Embryos Statement 1st April 2008
http://www.ncl.ac.uk/press.office/press.release/content.phtml?ref=1207065299

Hybrid Embryos: FAQs 1st April 2008
http://www.ncl.ac.uk/press.office/press.release/content.phtml?ref=1207063854

Web based documents

American

CIRM

Approved CIRM Grants as of June 2008
http://www.crim.ca.gov/info/grants.asp

Regulations
http://www.cirm.ca.gov/laws/default.asp

Policies
http://www.cirm.ca.gov/policies/

National Institutes of Health

NIH - Estimates of Funding for Various Diseases, Conditions, Research Areas
http://www.nih.gov/news/fundingresearchareas.htm

About NIH
http://www.nih.gov/about/

British

COREC

About Us
http://www.corec.org.uk/public/about/about.htm

HFEA

About the HFEA
http://www.hfea.gov.uk/AboutHFEA

Alternatives to embryonic stem cells SCAG (02/08) 04 HFEA - Scientific and Clinical Advances Group
http://hfea.gov.uk/docs/2008-02-21_SCAG_paper_-_alternatives_ES_cells.pdf

Authority Paper on The Executive Licensing Panel (18th March 2009)
http://www.hfea.gov.uk/docs/AM_Item_5_March_09.pdf

Current Research Projects
http://www.hfea.gov.uk/en/374.html

Derivation of Embryonic Stem cell Lines from Interspecies Embryos produced by Somatic Cell Nuclear Transfer (R0179) Newcastle-Upon-Tyne, Centre for Stem Cell Biology & Developmental Genetics, Institute of Human Genetics http://www.hfea.gov.uk/1580.html

HFEA Chair welcomes Royal Assent of HFE Act
http://www.hfea.gov.uk/en/1746.html

HFEA Consultation on Annual Fees for Centres Licensed under the European Tissue and Cells Directive from 7 April 2007
http://www.hfea.gov.uk/docs/2006-09-25_EUTD_Fees_Consultation_-_Final.pdf

Human Embryo Research in the UK 2006/2007
http://www.hfea.gov.uk/docs/HFEA_Human-Embryo-Research-06-07.pdf

HFEA letter to all Persons Responsible 26th July 2006, CE(06)04
http://www.hfea.gov.uk/cps/rde/xchg/SID-3F57D79B-3AD90B09/hfea/hs.xsl/1361.html

HFEA Licence Committee Minutes for RO179 Newcastle
http://www.hfea.gov.uk/docs/HFEA_Licence_Committee_minutes_for_R0179_Newcastle_-_November_2007_and_January_2008.pdf

HFEA Licence Committee Minutes for RO180 Kings
http://www.hfea.gov.uk/docs/HFEA_Licence_Committee_minutes_for_R0179_Newcastle_-_November_2007_and_January_2008.pdf

HFEA Research Licence Fees
http://www.hfea.gov.uk/Research/Researchnews

HFEA Research Progress Report
http://www.hfea.gov.uk/cps/rde/xbcr/SID-3F57D79B-BB56E384/hfea/2005_Research_Progress_Report__2_.pdf

HFEA Update, Spring 2007
http://www.hfea.gov.uk/docs/Update3.pdf

How to apply for a research licence
http://www.hfea.gov.uk/Research/Howtoapplyforaresearchlicence

Regulation of research on Human Embryos
http://www.hfea.gov.uk/docs/2006_Guidance_Notes_for_All_Research_Licence_Applications.pdf

The generation of human embryonic stem cells by transferring a human cell into recipient pig eggs Clinical Sciences Research Institute, University of Warwick
http://www.hfea.gov.uk/en/1699.html

Medical Research Council

Announcement on stem cell lines in the NIH Registry
http://www.ukstemcellbank.org.uk/index.html

First stem cell lines to be deposited as UK Stem Cell Bank officially opens today 19th May 2004
http://www.mrc.ac.uk/public-interest/public-news_centre/public-press_office/public-press_releases_2004/public-19_may_2004.htm

Governance of the UK stem cell bank and the use of stem cell lines
http://www.mrc.ac.uk/index/strategy-strategy/strategy-science_strategy/strategy-strategy_implementation/strategy-government_spending_review_initiatives/strategy-stem_cells/strategy-stem_cell_governance/public-stemcell_governance_steering.htm

House of Lords Report on Stem Cell Research
http://www.mrc.ac.uk/index/strategy-strategy/strategy-science_strategy/strategy-strategy_implementation/strategy-government_spending_review_initiatives/strategy-stem_cells/strategy-house_of_lords_stem_cell_report.htm

Steering Committee Membership
http://www.mrc.ac.uk/PolicyGuidance/EthicsAndGovernance/StemCells/SteeringCommittee/index.htm

Steering Committee for the UK Stem Cell Bank and for the use of Stem Cell Lines, First Annual Report, March 2004, Available at *Governance of the UK stem cell bank and the use of stem cell lines*
http://www.mrc.ac.uk/index/strategy-strategy/strategy-science_strategy/strategy-strategy_implementation/strategy-government_spending_review_initiatives/strategy-stem_cells/strategy-stem_cell_governance/public-stemcell_governance_steering.htm

Stem Cell Catalogue
http://www.ukstemcellbank.org.uk/catalogue.html

UK Stem Cell Bank Joint Clinical and User Liaison Committee
http://www.mrc.ac.uk/PolicyGuidance/EthicsAndGovernance/StemCells/UserLiaisonCommittee/index.htm

Stem Cell User and Clinical Liaison Committees: Stem Cell User Liaison Committee
http://www.mrc.ac.uk/index/strategy-strategy/strategy-science_strategy/strategy-strategy_implementation/strategy-government_spending_review_initiatives/strategy-stem_cells/strategy-stem_cell_governance/public-stemcell_governance_steering.htm

UK Stem Cell Bank Launched
http://www.mrc.ac.uk/index/strategy-strategy/strategy-science_strategy/strategy-strategy_implementation/strategy-government_spending_review_initiatives/strategy-stem_cells/strategy-house_of_lords_stem_cell_report.htm

UK Stem Cell Bank Management Committee
http://www.mrc.ac.uk/PolicyGuidance/EthicsAndGovernance/StemCells/ManagementCommittee/index.htm

UK Stem Cell Bank Steering Committee
http://www.mrc.ac.uk/PolicyGuidance/EthicsAndGovernance/StemCells/SteeringCommittee/index.htm

National Research Ethics Service

About us
http://www.nres.npsa.nhs.uk/aboutus

Developing NRES
http://www.nres.npsa.nhs.uk/aboutus/developing-nres/

Development of the research ethics service in the UK
http://www.nres.npsa.nhs.uk/aboutus/history/

NRES staff – Regional Offices for Research Ethics Committees
http://www.nres.npsa.nhs.uk/contacts/nres-staff-regional-offices/

UK National Stem Cell Network

About Us
http://www.uknscn.org/aboutuknscn.html

About UKNSCN: Mission
http://www.uknscn.org/aboutuknscn.html

Newsletter, Issue 1, Autumn 2007
http://www.uknscn.org/downloads/pdfs/UKNSCNNewsletterIssue1.pdf

UK Stem Cell Bank

Accepted by the Steering Committee
http://www.ukstemcellbank.org.uk/accepted.html

Catalogue Overview
http://www.ukstemcellbank.org.uk/catalogue.html

World Medical Association

Updates on the Helsinki Declaration
http://www.wma.net/e/policy/b3.htm

Websites

BBSRC
http://www.bbsrc.ac.uk

Central Office for Research Ethics
http://www.corec.org.uk

California Institute for Regenerative Medicine
http://www.cirm.ca.gov/

Comment on Reproductive Ethics
http://www.corethics.org/index.php

Department of Health
http://www.dh.gov.uk/en/index.htm

Human Fertilisation and Embryology Authority
http://www.hfea.gov.uk

Medical Research Council
http://www.mrc.ac.uk/index.htm

National Bioethics Advisory Committee
http://www.bioethics.gov

National Institutes of Health
http://www.nih.gov/about

National Research Ethics Service
http://www.nres.npsa.nhs.uk/home/

Roslin Institute
http://www.ri.bbsrc.ac.uk

UK National Stem Cell Network
http://www.uknscn.org/index.html

UK Parliament
http://www.parliament.uk/index.cfm

UK Stem Cell Bank
http://www.ukstemcellbank.org.uk/

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Annex of non-cited materials

Articles

Alavi, A.M *The Stem Cell Compromise: A Wolf in Sheep's Clothing, Constitutional Implications of the Bush Plan* (2003) 13 Health Matrix 181

Baylis, Francoise .E *The Ethics of Ex Utero research on Spare 'Non-Viable' IVF Human Embryos* (1990) 4 (4) Bioethics 311-329

Baylis, F & Robert, J.S *Human Embryonic Stem Cell research: An Argument for National Research Review* (2006) 13 Accountability in Research 207

Birk, D *The Reform of the Human Fertilisation and Embryology Act 1990* (2005) 35 Fam LJ 563

Bogatko, J *Stem Cell Research: A Comparative Legal Analysis* (2001-2002) 6 J. Med & L. 123

Brock, D.W *Is a consensus possible on stem cell research? Moral and political obstacles* (2006) 32 J. Med. Ethics 36-42

Brownsword, R *Dolly, Dignity and the Genetics Debate* (1998) 143 NLJ 413

Brownsword, R *Stem Cells, Superman, and the Report of the Select Committee* (2002) 65(4) M.L.R. 568

Brownsword, R *Regulating Human Genetics: New Dilemmas for a New Millennium* (2004) 12 Med L. Rev.14

Byrne, J.A., *et al Producing primate embryonic stem cells by somatic cell nuclear transfer* (2007) Nature doi:10.1038/nature06357

Casey, S., B & Adams, N.,A *Specially Respecting the Living Human Embryo by Adhering to Standard Human Subject Experimentation Rules* (2001-2002) 2 Yale J. Health Pol'y L. & Ethics 111

Cave, E and Holm, S *New governance arrangements for research ethics committees: is facilitating research achieved at the cost of participants' interest* (2002) 28 J Med Ethics 318

Charo, R.,A *The Ethics of Control* (2001-2002) 2 Yale J. Health Pol'y L. & Ethics 143

Check Hayden, E *The 3-Billion-Dollar Question* (2008) 453 Nature 18-21

Cheng, L *More new lines of human parthenogenetic embryonic stem cells* Cell Research (2008) 18:215-217

Childress, J.,F *An Ethical Defense of Federal Funding for Human Embryonic Stem Cell Research* (2001-2002) 2 Yale J. Health Pol'y L. & Ethics 157

Commentary *Cloning (Cell Nuclear Replacement): The Scope of the Human Fertilisation and Embryology Act 1990* [2003] 11 Med. L. Rev. 135

Devolder, K *What's in a name? Embryos, entities, and ANTities in the stem cell debate* (2006) 32 J. Med. Ethics 43

Dillon, K.J *Significant Developments in Stem Cell research* (2006) 12 (1) Human Reproduction and Genetics Ethics 24

Editorial *Long Gestation for Warnock Report* (1987) 137(6334) N.L.J. 1125

English, V & Denton, J., *Where is the Debate about Rate?* 17th December 2006, Bionews 389

Fenton, R. A and Dabell, F *The Human Fertilisation and Embryology Act 1990: Still Fit for Purpose in the 21st Century?* (2005/2006) Vol 8(6) BSLR 223

Freeman, M.D.A *After Warnock - Whither the Law?* (1986) 39 C.L.P. 33

Frist, B *The Promise and Peril of Embryonic Stem Cell Research: A Call for Vigilant Oversight* (2001-2002) 2 Yale J. Health Pol'y L. & Ethics 167

Gaze, B and Dawson, K *Distinguishing Medical Practice and Research: The Special Case of IVT* (1989) 3 (4) Bioethics 301

Geenens, R *The Deliberative Model of Democracy: Two Critical Remarks* (2007) 20(3) Ratio Juris 355-77

Gibson, S *Uses of Respect and Uses of the Human Embryo* (2007) 21(7) Bioethics 370

Hagger, Lynn *The Role of the Human Fertilisation and Embryology Authority* [1997] 3 Med Law Int 1

Hare, R.M. *Abortion and the Golden Rule* (1975) 4(3) Philosophy and Public Affairs 201-222

Holm, S. *Regulating stem cell research in Europe by the back door* (2003) 29 J. Med. Ethics 203

Holm, S. *Therapeutical cloning and the protection of embryonic life: Different approaches, different levels of protection - A view from the United Kingdom* CCELS June 2007

Holm, S. *'New Embryos' – New Challenges for the Ethics of Stem Cell Research* (2008) 187 Cells Tissues Organs 257-262

Hwang *et al Evidence of Pluripotent Human Embryonic Stem Cell Line Derived form a Cloned Blastocyst (Retracted)* (2004) 303 Science 1669 (Retracted 12th Jan 2006)

Kaufman, D., S *A Scientific Rationale for Human Embryonic Stem Cell Research* (2001-2002) 2 Yale J. Health Pol'y L. & Ethics 177

Kerrison, S and Pollock, A M *The reform of the UK research ethics committees: throwing the baby out with the bath water?* (2005) 31 J Med Ethics 487

Knowles, L. P. *A regulatory patchwork - human ES cell research oversight* (2004) 22(2) Nature Biotechnology 157

Knowles, L. P. *Stem Cell Policy: Where do we draw the line?* (2004-2005) 39 New Eng. L. Rev 623

Little, M., Hall, W., & Orlandi, A *Delivering on the promise of human stem-cell research* (2006) 7(12) EMBO Reports 1188

Lizza, J.P. *Potentiality and Human Embryos* (2007) 21(7) Bioethics 379

Mclachlan, H.V *Harris on Quintavalle and the Ethics of Stem Cell Research* (2006) 12(2) Human Reproduction and Genetic Ethics 66

Moreno, J *Taking Stem Cells Seriously* (2006) 6(5) The American Journal of Bioethics 6-7

Mori, M *Genetic Selection and the Status of the Embryo* (1993) 7 (2/3) Bioethics 141-148

Nettleton, E & Hopson, H *Still nuturing stem cell research in the UK?* (2007) Pharmaceutical Law Insight (June) 17

Okie, S *Stem-Cell Politics* (2006) 355 (16) N Engl J Med 1633

Okie, S *Single-Cell Storm* (2006) 355 (16) N Engl J Med 1634

Orr, R.,D & Hook, C., C *Stem Cell Research: Magical Promise v. Moral Peril* (2001-2002) 2 Yale J. Health Pol'y L. & Ethics 189

Pattinson, S. D. *Some Problems Challenging the UK's Human Fertilisation and Embryology Authority* (2005) 24 Medicine and the Law 391

Prentice, D., A *The Case Against Federal Funding of Human Embryonic Stem Cell Research* (2001-2002) 2 Yale J. Health Pol'y L. & Ethics 201

Samuels, A *Warnock Committee: Human Fertilisation and Embryology* (1983) 51 Medico-Legal Journal 174

Savulescu, J *Two deaths and two lessons: Is it time to review the structure and function of research ethics committees?* (2002) 28 J Med Ethics 1

Seller, M. J. *The Human Embryo: A Scientist's Point of View* (1993) 7 (2/3) Bioethics 135-140

Snead, O.C *Preparing the Groundwork for a Responsible Debate on Stem Cell Research and Human Cloning* (2004-2005) 39 New Eng. L. Rev. 479

Snead, O.C *The Pedagogical Significance of the Bush Stem Cell Policy: A window into Bioethical Regulation in the United States* (2005) 5 Yale J. Health Pol'y L. & Ethics 491

Stanton, C. and Harris, J. *The moral status of the embryo post-Dolly* (2005) 31 J.Med. Ethics 221-225

Baroness Warnock, M *Morality and The Law: Some Problems* (1987) 18 Cambrian L.R. 14

Winickoff, D.,E *Governing stem cell research in California and the USA: towards a social infrastructure* 24 (9) TRENDS in Biotechnology 390

Books

Dyson, A and Harris, J *Experiments on Embryos* Routledge (1990)

Gunning, J and Szoke, H (Editors) *The Regulation of Assisted Reproductive Technology* Ashgate (2003)

Harris, J *On Cloning* Routledge (2004)

Lee, R. G. & Morgan, D *Human Fertilisation and Embryology: Regulating the Reproductive Revolution* Blackstone Press Ltd (2001)

Lockwood, M (Editor) *Moral Dilemmas in Modern Medicine* Oxford University Press (1985)

Mulgan, T *Future People: A Moderate Consequentalist Account of our Obligations to Future Generations* Clarendon Press (2006)

Government Reports

House of Commons Science and Technology Committee: Human Reproductive Technologies and the Law. Fifth Report of Session 2004-05 Volume II HC 7-II House of Commons
http://www.publications.parliament.uk/pa/cm200405/cmselect/cmsctech/7/702.htm

UK Stem Cell Initiative 271735/UK Stem Cell Initiative Report & Recommendations (2005) Department of Health (Nov)
http://www.advisorybodies.doh.gov.uk/uksci/index.htm

Guidelines

Compiled CIRM Medical and Ethical Standards Regulations Sections 100010-1000110
http://www.cirm.ca.gov/laws/pdf/AdoptedRegs_100010.pdf

Hansard

Hansard - House of Commons
2001 Regulations Debate House of Commons 17th Nov 2000 Volume 356

Hansard - House of Commons 2001 Regulations Debate House of Commons 15th Dec 2000 Volume 359

Hansard - House of Lords
2001 Regulations Debate House of Lords 22nd Jan 2001
Volume 621

Hansard - House of Lords
Human Fertilisation and Embryology Bill - 2nd Reading, 1st sitting, 19th Nov 2007
Volume 696, Part 8

Hansard - House of Lords
Human Fertilisation and Embryology Bill - 2nd Reading, 2nd sitting, 21st Nov 2007
Volume 696, Part 10

Hansard - House of Lords
Human Fertilisation and Embryology Bill - Committee Stage, 3rd Dec 2007
Volume 696, Part 17

Hansard - House of Lords
Human Fertilisation and Embryology Bill - Committee Stage, 4th Dec 2007
Volume 696, Part 18

Hansard - House of Lords
Human Fertilisation and Embryology Bill, Committee Stage, 10th Dec 2007
Volume 697, Part 21

Hansard - House of Lords
Human Fertilisation and Embryology Bill - Committee Stage, 12th Dec 2007
Volume 697, Part 23

Hansard - House of Lords
Human Fertilisation and Embryology Bill - Report Stage, 1st Sitting, 15th Jan 2008
Volume 697, Part 33

Hansard - House of Lords
Human Fertilisation and Embryology Bill - Report Stage, 2nd Sitting, 21st Jan 2008
Volume 698, Part 33

Hansard - House of Lords
Human Fertilisation and Embryology Bill - Report Stage, 3rd Sitting, 28th Jan 2008
Volume 698, Part 41

Hansard - House of Lords
Human Fertilisation and Embryology Bill - 3rd Reading
Volume 698, Part 45

Hansard - House of Commons
Human Fertilisation and Embryology Bill - 2nd Reading
Volume 475, Part 92

Hansard - House of Commons
Human Fertilisation and Embryology Bill - Committee Stages (8 Sittings)
http://services.parliament.uk/bills/2007-08/humanfertilisationandembryology.html#2007-08

Legislation

Convention for the protection of Human Rights and Dignity of the Human Being with regard to the application of Biology and Medicine, on the prohibition of Cloning Human Beings (1998) CETS 168

Additional Protocol to the Convention for the Protection of Human Rights and Dignity of the Human Being with regard to the Application of Biology and Medicine, on the Prohibition of Cloning Human Beings (1998) Paris ETS 168

Reports And Papers

Stem Cell Research and Regulations under the *Human Fertilisation and Embryology Act 1990* (Revised edition) 2000 (Dec) House of Commons Research Paper 00/93
http://www.parliament.uk/commons/lib/research/rp2000/rp00-093.pdf

House of Commons Science and Technology Committee: Inquiry into Human Reproductive Technologies and the Law. Eighth Special Report of Session 2004-05
House of Commons, 24th March 2005 HC 491
http://www.publications.parliament.uk/pa/cm200405/cmselect/cmsctech/491/49102.htm

Review of the Act - Preliminary recommendations HFEA, 18th May 2005 Annex A
http://www.hfea.gov.uk/AboutHFEA/HFEAPolicy/ReviewoftheHFEAct

UK Stem Cell Initiative, 271735/UK Stem Cell Initiative Report and Recommendations Department of Health, Nov 2005 http://www.advisorybodies.doh.gov.uk/uksci/index.htm

Steering Committee on Bioethics (Chart of signatures and ratifications of Protocol on the Prohibition of Cloning Human Beings) CBD/INF (2006) 3, Council of Europe 2006 (Jan) www.coe.int

Statutory Authority Papers

ICOC Meeting, Presentation of the Draft Scientific Strategic Plan
Zach W. Hall, CIRM President
http://www.cirm.ca.gov/meetings/pdf/2006/10/Strat_Plan_Slide.pdf

Draft Scientific Strategic Plan, October 2006, CIRM
http://www.cirm.ca.gov/meetings/pdf/2006/10/Strat_Plan_100406.pdf

Internal Governance Policy, CIRM
http://www.cirm.ca.gov/policies/pdf/Intnl_Gov_Policy.pdf

Resolution no. 2006-01, CIRM
http://www.cirm.ca.gov/icoc/pdf/Resolution2006-01fin.pdf

Resolution no. 2006-02, CIRM
http://www.cirm.ca.gov/icoc/pdf/Resolution2006-02baltimorefin.pdf

Resolution no. 2005-01, CIRM
http://www.cirm.ca.gov/icoc/pdf/Resolution2005-01.pdf

Resolution no. 2005-02, CIRM
http://www.cirm.ca.gov/icoc/pdf/Resolution2005-02.pdf

ICOC Letter to Senators Feinstein and Boxer, CIRM
http://www.cirm.ca.gov/meetings/pdf/2005/08/05/080505_item_7b.pdf

Proposed CIRM MES Regulations, CIRM

ICOC Members List, CIRM
http://www.cirm.ca.gov/icoc/pdf/Members.pdf

ICOC Subcommittee Members, CIRM
http://www.cirm.ca.gov/icoc/pdf/SearchCommitteeLists.pdf

ICOC Biographies, CIRM
http://www.cirm.ca.gov/icoc/pdf/Bio.pdf

Press Releases

California Stem Cell Project Prevails
27th February 2007, CIRM
http://www.cirm.ca.gov/pressreleases/2007/02/02-27-07b.asp

New Chair of Human Tissue Authority and Human Fertilisation and Embryology Authority appointed 20/12/2006
http://www.hfea.gov.uk/en/1471.html

Web based documents

HFEA

Biography - Ms Anne Carragher
http://www.hfea.gov.uk/en/624.html

Biography - Mrs Shirley Harrison
http://www.hfea.gov.uk/cps/rde/xchg/SID-3F57D79B-8D7DB5A0/hfea/hs.xsl/1421.html

Current research projects licensed by the HFEA
http://www.hfea.gov.uk/cps/rde/xchg/SID-3F57D79B-C281D2A2/hfea/hs.xsl/374.html

HFEA Members
http://www.hfea.gov.uk/AboutHFEA/HFEAMembers

Report of how the HFEA made its decision to licence the creation of embryos by cell nuclear replacement
http://www.hfea.gov.uk/docs/HFEA_CNR_Decision_Report.pdf

Research Licence Committee Meeting 17th May 2006
http://www.hfea.gov.uk/docs/Variation_of_licence_to_include_additional_sources_of_eggs_for_research.pdf

Appendix A

Decision Tree for Application for Research Licence

Regulation of research on Human Embryos
http://www.hfea.gov.uk/docs/2006_Guidance_Notes_for_All_Research_Licence_Applications.pdf

Annex A

DECISION TREE FOR APPLICATION FOR A RESEARCH LICENCE