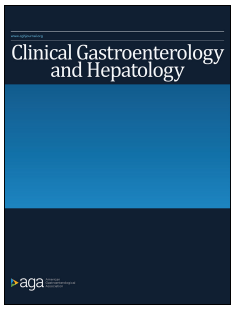
Journal Pre-proof



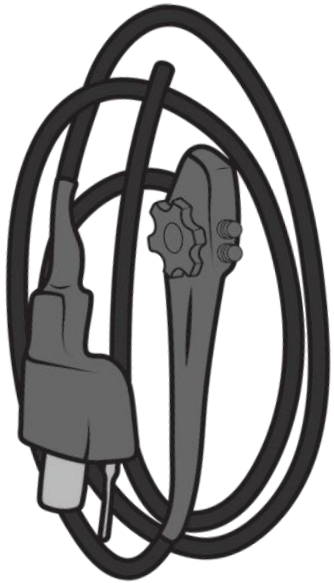
Comparative Efficacy and Safety of Endoscopic Modalities for Colorectal Cancer Screening in Inflammatory Bowel Disease: A Systematic Review and Network Meta-Analysis

Vasiliki Sinopoulou, Gaurav B. Nigam, Morris Gordon, Meghana Ganeshan, Mitchell Rudo Tokonyai, Sunil Dolwani, Marietta Iacucci, Matt Rutter, Venkat Subramanian, Ana Wilson, British Society of Gastroenterology Colorectal IBD Surveillance Guideline Development Group, James E. East

PII: S1542-3565(24)01073-5
DOI: https://doi.org/10.1016/j.cgh.2024.11.008
Reference: YJCGH 59718

To appear in: *Clinical Gastroenterology and Hepatology*
Accepted Date: 7 November 2024

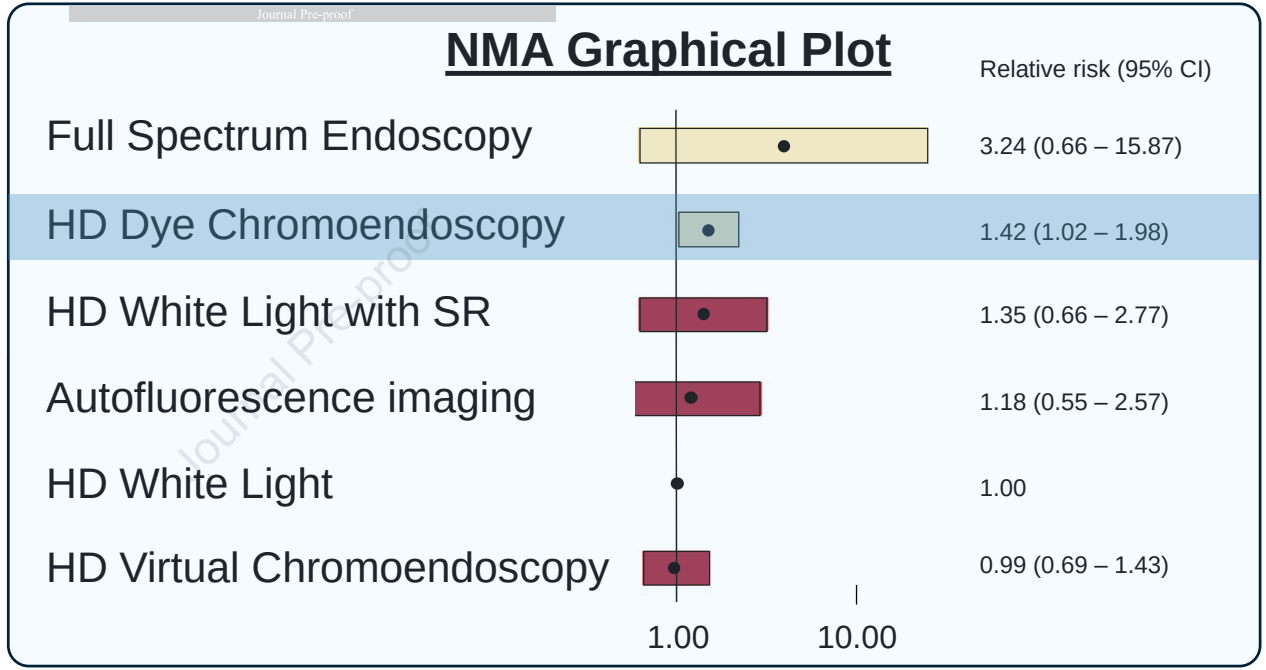
Please cite this article as: Sinopoulou V, Nigam GB, Gordon M, Ganeshan M, Tokonyai MR, Dolwani S, Iacucci M, Rutter M, Subramanian V, Wilson A, British Society of Gastroenterology Colorectal IBD Surveillance Guideline Development Group, East JE, Comparative Efficacy and Safety of Endoscopic Modalities for Colorectal Cancer Screening in Inflammatory Bowel Disease: A Systematic Review and Network Meta-Analysis, *Clinical Gastroenterology and Hepatology* (2025), doi: https://doi.org/10.1016/j.cgh.2024.11.008.



26 RCTs

4,159 participants

NMA Graphical Plot



Clinical Gastroenterology and Hepatology

Comparative Efficacy and Safety of Endoscopic Modalities for Colorectal Cancer Screening in Inflammatory Bowel Disease: A Systematic Review and Network Meta-Analysis

Authors:

Vasiliki Sinopoulou*, University of Central Lancashire, School of Medicine, Preston, Lancashire, UK

Gaurav B Nigam*, Translational Gastroenterology Unit, Nuffield Department of Medicine, John Radcliffe Hospital, University of Oxford, Oxford, UK

Morris Gordon, School of Medicine, University of Central Lancashire, Preston, Lancashire, UK

Meghana Ganeshan, School of Medicine, University of Central Lancashire, Preston, Lancashire, UK

Mitchell Rudo Tokonyai, School of Medicine, University of Central Lancashire, Preston, Lancashire, UK

Sunil Dolwani, School of Medicine and Cardiff and Vale University Health Board, Cardiff University, Cardiff, UK

Marietta Iacucci, College of Medicine and Health, University College of Cork and APC Microbiome, Cork, Ireland; Institute of Immunology and Immunotherapy, University of Birmingham, Birmingham, UK

Matt Rutter, Gastroenterology, University Hospital of North Tees, Stockton-on-Tees, United Kingdom of Great Britain and Northern Ireland

Venkat Subramanian, Leeds Gastroenterology Institute, Leeds Teaching Hospitals NHS trust, Leeds, UK

Ana Wilson, St Mark's Hospital and Academic Institute, Harrow, UK; Department of Metabolism, Digestion and Reproduction, Imperial College London, London, UK

British Society of Gastroenterology Colorectal IBD Surveillance Guideline Development Group

James E East, Translational Gastroenterology Unit, Nuffield Department of Medicine, John Radcliffe Hospital, University of Oxford, Oxford, UK

* **Author names in bold designate shared co-first authorship**

Authors under group authorship for - British Society of Gastroenterology Colorectal IBD Surveillance Guideline Development Group:

Ibrahim Al Bakir, Gastroenterology Department, Chelsea and Westminster Hospital, London, UK

Adrian Bateman, University Hospital Southampton NHS Foundation Trust, UK; University of Southampton, UK

Shahida Din, Institute of Genetics and Cancer, University of Edinburgh, Edinburgh, United Kingdom; Edinburgh Inflammatory Bowel Diseases Unit, Western General Hospital, Edinburgh, United Kingdom.

Anjan Dhar, Department of Gastroenterology, County Durham & Darlington NHS Foundation Trust, Bishop Auckland, UK

Omar Faiz, Department of Surgery and Cancer or Department of Metabolism, Digestion and Reproduction, Imperial College London, London, UK ; Department of Gastroenterology or Department of Colorectal Surgery, St Mark's Hospital, London, UK

Bu Hayee, King's Health Partners Institute for Therapeutic Endoscopy, King's College Hospital NHS Foundation Trust, London, UK

Chris Healey, Department of Gastroenterology, Airedale NHS Foundation Trust, Keighley, United Kingdom of Great Britain and Northern Ireland

Chris A Lamb, Translational & Clinical Research Institute, Newcastle University, Newcastle upon Tyne, UK ; Gastroenterology, Newcastle Upon Tyne Hospitals NHS Foundation Trust, Newcastle Upon Tyne, UK

Simon Leedham, Translational Gastroenterology Unit, Nuffield Department of Medicine, John Radcliffe Hospital, University of Oxford, Oxford, UK

Misha Kabir, Gastroenterology Department, University College Hospital, London UK

Ailsa Hart, St Mark's Hospital and Academic Institute, Harrow, UK; Department of Surgery and Cancer, Imperial College London, London, United Kingdom

John Morris, Department of Gastroenterology, Glasgow Royal Infirmary, Glasgow UK

Marco Novelli, Department of Histopathology, University College London Hospital, London, United Kingdom

Tim Raine, Department of Gastroenterology, Addenbrooke's Hospital, Cambridge University Hospitals NHS Trust, Cambridge, UK

Neil Shepherd, Gloucestershire Hospitals NHS Foundation Trust, UK

Nigel Trudgill, Department of Gastroenterology, Sandwell and West Birmingham Hospitals NHS Trust, Birmingham, UK

Maggie Vance, St Mark's Hospital and Academic Institute, Harrow, UK

Lydia White, Translational Gastroenterology Unit, Nuffield Department of Medicine, John Radcliffe Hospital, University of Oxford, Oxford, UK

Ruth Wakeman, Crohn's and Colitis UK

Acknowledgements: Ore-ofeoluwa Olubusayo Adaramola, Farhad Shokraneh.

Funding statement:
The authors have not declared a specific grant for this research from any funding agency in the public, commercial or not-for- profit sectors.

GBN is funded by National Institute for Health and Care Research (Grant number 302607) for a doctoral research fellowship.

JEE is funded by the National Institute for Health Research (NIHR) Oxford Biomedical Research Centre. The views expressed are those of the authors and not necessarily those of the National Health Service, the NIHR or the Department of Health.

Conflicts of interest: All authors disclosed no financial relationships

Correspondence:

1. Professor James E East
Translational Gastroenterology Unit,
John Radcliffe Hospital,
Headley Way, Oxford, OX3 9DU
James.east@ndm.ox.ac.uk

2. Professor Morris Gordon
School of Medicine, University of Central Lancashire,
Preston, Lancashire, UK
mgordon@uclan.ac.uk

Abstract word count:	248
Text word count:	3776
Number of tables:	2
Number of figures:	3
References:	62

ABSTRACT

Background: Long-standing Inflammatory bowel disease (IBD) increases the risk of colonic neoplasia, necessitating effective screening strategies. This network meta-analysis (NMA) compared the efficacy and safety between different endoscopic modalities in the high-definition (HD) era.

Methods: We searched CENTRAL, ClinicalTrials.gov, Embase, MEDLINE, and WHO for randomised controlled trials (RCTs) comparing endoscopic modalities for screening colonoscopy in IBD patients up to February 2024. The primary outcome was detection of any dysplastic lesion per patient. The certainty of the evidence was GRADE assessed.

Results: A total of 26 RCTs involving 4,159 participants were included, comparing 6 endoscopic modalities: HD white light endoscopy (HD-WLE), HD virtual chromoendoscopy (HD-VCE), HD dye-based chromoendoscopy (HD-DCE), HD-WLE with segmental re-inspection (SR), auto-fluorescence imaging (AFI), and full-spectrum endoscopy (FUSE). HD-DCE may have a small benefit in detecting dysplasia over HD-WLE (low certainty, small magnitude, RR 1.42, 95% CI: 1.02-1.98). FUSE may be no different to HD-WLE (low certainty, RR 3.24, 95% CI: 0.66-15.87). The other modalities were assessed as very low certainty (HD-WLE with SR: RR 1.35, 95% CI: 0.66-2.77; AFI: RR 1.18, 95% CI: 0.55-2.57; HD-VCE: RR 0.99, 95% CI: 0.69-1.43). Sensitivity analyses supported these findings. Limited data on serious adverse events precluded meta-analysis; 2 serious events were reported among 2164 patients (very low certainty).

Conclusions: HD-DCE is the only modality for IBD surveillance with evidence (low-certainty) demonstrating potential to detect more dysplastic lesions compared to HD-WLE. There was no evidence to support any of the other modalities as an alternative due to very low-certainty evidence.

Keywords: Inflammatory bowel disease (IBD); Colorectal cancer screening; Endoscopic surveillance; Network meta-analysis; High-definition endoscopy; Chromoendoscopy; Dye-based chromoendoscopy (DCE); Virtual chromoendoscopy (VCE); White light endoscopy (WLE); Dysplasia

What You Need to Know

BACKGROUND

Inflammatory bowel disease (IBD) increases colorectal cancer risk, necessitating effective endoscopic surveillance. Various high-definition endoscopic modalities are used, but their comparative efficacy in dysplasia detection remains unclear.

FINDINGS

High-definition dye-based chromoendoscopy (HD-DCE) may improve dysplasia detection compared to other modalities like HD-WLE, though evidence certainty is low. No significant differences in safety outcomes were identified.

IMPLICATIONS FOR PATIENT CARE

HD-DCE may be preferred for IBD surveillance due to its potential for better dysplasia detection, but further high-quality studies are needed to confirm its clinical superiority and safety.

Introduction:

Individuals with longstanding inflammatory bowel disease (IBD), including colonic Crohn's disease (CD) and ulcerative colitis (UC), face a significantly higher risk of developing colorectal cancer (CRC) due to chronic inflammation and other risk factors such as age at diagnosis, extent of colonic involvement, family history, primary sclerosing cholangitis and a previous history of dysplasia.[1–4] Despite reductions in IBD-related CRC incidence due to advanced anti-inflammatory therapies and better endoscopic surveillance, these patients still have elevated CRC risk compared to the general population.

The annual incidence rates of CRC range from 19.5 to 344.9 per 100,000 for CD and from 54.5 to 543.5 per 100,000 for UC.[5] Recent large-scale Scandinavian population-based cohort studies show that individuals with UC and CD have a 1.66-fold (95% CI 1.57-1.76) and 1.40-fold (95% CI 1.27-1.53) increased risk of CRC, respectively, compared to the general population.[1,2] These estimates, which are lower than previously reported, have remained relatively stable in recent years, likely due to advancements in disease management and surveillance strategies. The risk of CRC escalates with the duration of IBD, contributing to 10 to 15% of all-cause mortality among these patients.[6] Effective surveillance is important as it may reduce the incidence of CRC, or the rate of CRC related mortality by detecting early-stage CRC, and enhancing survival rates among IBD patients.[7]

Given the critical need for early lesion detection in IBD patients to manage the "inflammation-dysplasia-carcinoma sequence", research has focused on identifying the best modality for endoscopic surveillance.[3,8] The evolution from standard-definition (SD) to high-definition (HD) endoscopy, along with advancements in dye-based and virtual chromoendoscopy, has enhanced our ability to visualize and target biopsies towards areas of concern. HD endoscopy and chromoendoscopy (CE) are currently considered superior to standard white light endoscopy (WLE) for detecting dysplasia.[9,10] A wide range of endoscopic modalities are available for CRC screening, including SD and HD WLE. Dye-based Chromoendoscopy (DCE) can be performed using either SD or HD scopes to enhance mucosal visualisation with dyes. Virtual Chromoendoscopy (VCE) technologies such as Narrow Band Imaging (NBI) from Olympus, i-SCAN from Pentax, and FICE from Fujinon enhance visualisation without topical dye application. Additionally, Autofluorescence Imaging (AFI) utilises tissue autofluorescence to highlight abnormalities, and Full-Spectrum Endoscopy (FUSE) offers an expanded field of view to improve lesion detection.[8] Recently segmental reinspection with HD white light has been proposed to enhance dysplasia detection in IBD.[11]

Efforts to clarify the optimal endoscopic technique for CRC surveillance in IBD patients have led to numerous observational studies and randomized controlled trials (RCTs), followed by systematic reviews with meta-analysis and, more recently, network meta-analyses (NMA).[12–15] The move towards the use of meta-analysis has been driven by low frequency of dysplasia outcomes, meaning many studies were underpowered, especially for inter-modality comparisons. Challenges in previous systematic reviews and NMAs include the inclusion of a broad range of endoscopic technologies with varying resolutions and capabilities, such as SD and HD WLE, DCE, and VCE and AFI, sometimes combining both imaging techniques and / or RCTs and observational studies to increase statistical

power.[12,14,15] This diversity complicates direct and indirect comparisons of their effectiveness. Specifically, including studies that utilized SD DCE could impact the overall assessment of CE's performance, especially when compared to VCE in the era of HD scopes.[15] Additionally, the use of crossover study data may introduce carry-over effects, potentially skewing the results.[14]

Previous guidelines have supported the use of both DCE and VCE as equivalent; however, their additional benefit in the era of high-definition (HD) white light remains unclear.[16–18] The current NMA, part of the British Society of Gastroenterology's (BSG) initiative to update IBD surveillance guidelines, aims to address these limitations through a comprehensive identification of relevant outcomes and a risk-thresholding exercise for each outcome to aid in grading the effect size. This systematic review and meta-analysis aims to estimate the comparative efficacy and safety of these modalities and assess the certainty of the evidence using GRADE methodology, aiming to provide clear guidance on the most effective endoscopic modalities for CRC surveillance in IBD, thereby enhancing patient care and outcomes.

Methods

This systematic review was conducted as part of an update to the BSG guidelines for CRC surveillance in IBD patients. The protocol was registered on University of Central Lancashire (UClan) online repository (https://clok.uclan.ac.uk/53182/). Critical and important outcomes and magnitude effect thresholds for the judgement of imprecision (eTable 8) were pre-determined at the beginning of the guidelines process, prior to the literature search, by the guideline development group (GDG).[19,20]

The detailed methodology follows the BSG's guideline development process and is available in the Standard Operating Procedure (SOP).[19,20]

The Preferred Reporting Items for Systematic Review and Meta-Analyses [PRISMA] guidelines were used to design and conduct this systematic review. [21]

Literature search and study selection

MEDLINE, Embase CENTRAL, ClinicalTrials.gov, and WHO ICTPR, were searched in February 2024 (eAppendix for search strategies and results developed by Cochrane information specialist).

The inclusion criteria were randomized controlled trials comparing any modality for the detection of CRC in IBD patients exclusively, from inception to current date reported as a full paper on in abstract form. Grey literature was eligible for inclusion, and no exclusions were made for IBD subtype or concurrent conditions, type of surveillance, language, participant age, or any other reasons. Cross-over trials were included but only data from the pre-crossover stages were eligible. The included studies reference list of a previous systematic review on the topic was searched manually for eligible studies.[15] The GDG was asked to provide any studies they thought should be included and were not captured in the database search.

Online literature search and study selection were performed independently in duplicate at both title/abstract, and full-text screening, and disagreements were resolved by a senior reviewer, on the Covidence systematic review management software.[22]

Data extraction and risk of bias assessment

Data extraction was performed using piloted extraction forms for demographic and baseline characteristics, intervention details, and outcome data at study end. Risk of bias (RoB) assessment was assessed using the Cochrane risk of bias 1.[23] Data extraction and RoB assessment was performed independently in duplicate and disagreements resolved by a senior reviewer. Authors were contacted for missing or unclear outcome data and risk of bias clarifications (Table 1).

Outcomes

The GDG pre-determined the primary and secondary outcomes as follows:

Primary Outcome:

- **Patients with at least one dysplastic lesion detected**: Defined as Vienna Classification 2 to 5 (indefinite for dysplasia, low-grade dysplasia, high-grade dysplasia, or invasive neoplasia).[24]

Secondary Outcomes:

- **Patients with at least one dysplastic lesion detected from targeted biopsies**: Yield of dysplastic lesions (Vienna 2-5) from targeted biopsies during colonoscopy.
- **Patients with at least one dysplastic lesion detected from random biopsies**: Yield of dysplastic lesions (Vienna 2-5) from random biopsies, if taken.
- **Patients with at least one lesion of any type detected**: Includes both neoplastic (dysplastic + serrated) and non-neoplastic lesions (Vienna Classification 1 to 5).[24]
- **Patients with serious adverse events**: Defined as events requiring hospitalization, causing permanent disability, or being life-threatening.
- **Patients with any adverse events**: Includes all adverse events, serious or non-serious.
- **Patient withdrawals due to adverse events**: Refers to those who withdrew from the procedure due to adverse events.
- **Withdrawal times**: Time taken for withdrawal during colonoscopy. This was an additional outcome examined which was not part of the risk-thresholding exercise by the GDG.

For all primary and secondary outcomes, only lesions from biopsies taken from colitic regions were considered, excluding non-colitic areas.

Subgroup and sensitivity analyses

A subgroup analysis for modality sub-types (high or low concentration HD DCE, and HD VCE subtypes) and sensitivity analyses for studies including participants with inactive disease only, studies where serrated lesions were not considered, and studies with more than one endoscopists who performed the trial endoscopies, were pre-determined. They were only performed for the primary outcome.

Statistical analysis

Dichotomous outcomes were expressed in risk ratios (RR) with corresponding 95% confidence intervals (CI). Continuous outcomes were expressed as mean difference (MD) with 95% CIs. The unit of analysis was the participant for all outcomes. The modified intention-to-treat method was used for analysis. The random effect model was used to pool data.

NMA methodology was used as described by Higgins et al within a frequentist framework using multivariate meta-analysis.[25] We assessed the assumption of transitivity by comparing the distribution of potential effect modifiers across the pairwise comparisons.

Heterogeneity was assessed statistically using the the I^2 statistic for each pairwise comparison, and with the loop-specific approach for the direct and indirect estimates. Surface under the cumulative ranking curve (SUCRA) was used to rank treatments.

Funnel plots were used to assess publication bias for pairwise analyses where there were at least ten studies. Indirectness was assessed for outcomes.

Statistical analyses were performed using the netmeta package on R statistical software version 4.3.1. HD-WLE was used as the reference modality to which other modalities were compared for the presentation of these results. This choice aligns with current international guidelines, which emphasize that HD-WLE should be used as the baseline technique for detecting dysplasia in IBD patients undergoing surveillance colonoscopies.[10,16]

GRADE assessment for the certainty of the evidence

The GRADE framework was used to assess the certainty of the evidence. The direct and indirect evidence certainty was assessed based on risk of bias, inconsistency, indirectness and publication bias. Following that the network evidence certainty was assessed based on imprecision and incoherence, and the contribution of the direct and indirect evidence. Two review authors (MG, VS) independently rated the certainty ratings and disagreements were resolved by discussion and consensus. The evidence was rated as ‘high’, ‘moderate’, ‘low’ or ‘very low’ according to the GRADE framework. These findings were presented in ‘Graphics on Recommendations Diagram of NMA’ plots.[26]

Results

Twenty-six RCTs were included (Figure 1).[11,27–51] The following modalities were identified: WLE with HD or SD scope, HD-WLE with segmental re-inspection (SR), DCE with HD or SD scope, VCE with sub-types of NBI, FICE, and i-SCAN, as well as FUSE and AFI. The examinations with reported modalities were performed for the entire colon.

Included study characteristics, intervention details, study sponsor details, excluded studies and reasons for exclusion, ongoing and studies awaiting classification can be found in Table 1 and the Supplementary material (eTables 1-5).

The summary of the RoB assessment for the included studies and the detailed judgements are presented in Figure 2 and the Supplementary material (eTable 6).

Summary of findings tables for all GRADEd outcomes with direct, indirect and network GRADE decisions and reasons can also be found in Figures 3 – 4, Tables 2 and the Supplementary material (eTable 7).

Details on extracted outcome data and additional characteristics of the included studies are also reported in the Supplementary material (eTables 9-10)

Patients with at least one dysplastic lesion detected

Twenty-three of the included studies reported this outcome.[11,27–40,42–46,48–50] Nineteen of them could be connected for the main NMA, comparing a total of 6 modalities.(Figure 2)[11,27–31,33–40,43–46,50] Three studies (Freire 2014, Kiesslich 2003 and Kiesslich 2007) could not be connected to the network because they were comparing SD DCE and WLE, which were not compared in any of the other studies.[42,48,49] Lord 2018 could not be included in the main analysis because it compared high and low concentration HD DCE modalities, however it could be connected in subgroup analysis for modality subtypes.[32]

The overall detection rate for HD WLE was 113 per 1,000 people screened.
No modality had high or moderate GRADE certainty ratings for this outcome.

HD DCE may be better at detecting at least one dysplastic lesion per patient compared to HD WLE (RR 1.42, 95% CI 1.02 to 1.98, small magnitude more (ranging from trivial to moderate) low GRADE certainty). FUSE may be no different to HD WLE (RR 3.24, 95% CI 0.66 to 15.87, low GRADE certainty) (Table 2 and Figure 3).

The results for HD WLE with segmental re-inspection (SR) (RR 1.35, 95% CI 0.66-2.77), AFI (RR 1.18, 95% CI 0.55-2.57), and HD VCE (RR 0.99, 95% CI 0.69-1.43) were all very low-GRADE certainty, and no conclusions can be drawn.

<u>Subgroup and sensitivity analyses</u>

Visual inspection of the subgroup analysis for seven modality subtypes compared to HD WLE did not reveal major deviations from the main analysis, however the imprecision for all

comparisons was high (AFI: RR 1.17, 95% CI 0.51-2.66; FICE: RR 0.19, 95% CI 0.02-1.56; FUSE: RR 3.24, 95%CI 0.65-16.11; HD CE High Concentration: RR 1.38, 95%CI 0.9-2.11; HD CE Low Concentration RR 1.21, 95%CI 0.75-1.94); I-scan: RR 0.94, 95%CI 0.59-1.52; NBI: RR 1.05, 95%CI 0.57-1.93; Supplementary eFigures1).

We were led to similar conclusions by the sensitivity analyses for studies including participants with inactive disease only (based on specific criteria reported in each study- AFI: RR 1.03, 95%CI 0.49-2.15; FUSE: RR 3.24 95%CI 0.7-15.07; HD DCE: RR 1.25, 95%CI 0.82-1.92; HD VCE RR 0.88, 95%CI 0.56-1.4; HD WLE with SR: RR 1.21, 95%CI 0.63-2.33), studies where serrated lesions were not considered (AFI: RR 1.42, 95%CI 0.74-2.75; HD DCE: RR 1.91, 95%CI 1.36-2.69; HD VCE RR 1.21, 95%CI 0.75-1.95; HD WLE with SR: RR 1.67, 95%CI 0.95-2.94), and studies where more than one endoscopist performed trial endoscopies (AFI: RR 1.27, 95%CI 0.6-2.7; FUSE: RR 3.24, 95%CI 0.68-15.55; HD DCE: RR 1.57, 95%CI 1.1-2.26; HD VCE RR 1.18, 95%CI 0.78-1.77; HD WLE with SR: RR 1.45, 95%CI 0.73-2.89) (Supplementary eFigures1).

Patients with at least one dysplastic lesion detected from targeted biopsies

Sixteen studies,[11,27–31,33,34,36–40,43,46,50] comparing a total of 6 modalities, reported this outcome and could be connected in an NMA.

The overall detection rate for HD WLE was 100 per 1,000 people screened.

No modality results had high or moderate GRADE certainty.
FUSE may be no different to HD-WLE (RR 3.24, 95% CI 0.67 to 15.62, low GRADE certainty) (Figure 4A).

The results for HD-DCE (RR 1.41, 95% CI 1-1.98), HD WLE with SR (RR 1.34, 95% CI 0.67-2.67), AFI (RR 1.16, 95% CI 0.55-2.48), and HD-VCE (RR 1.06, 95% CI 0.72-1.55) were all of very low-GRADE certainty and no conclusions can be drawn (Figure 4A)

Patients with at least one dysplastic lesion detected from random biopsies
An NMA for this outcome was not possible, as only nine studies[11,29–32,40,43,46,48] with very low event numbers reported outcome data, which could not be connected in a network with at least 10 studies. In total 27 participants were detected with at least one lesion from random biopsies among 3653 participants in the studies that provided outcome data.

Patients with at least one lesion of any type detected
Ten studies, comparing a total of 4 modalities, reported this outcome and could be connected for an NMA.[28,30,31,34,35,37,38,43,46,50] The overall detection rate for HD WLE was 187 per 1,000 people screened.

No modality results had high, moderate, or low-GRADE certainty.

The results for HD DCE (RR 1.34, 95% CI 0.89-2.01), AFI all of very low-GRADE certainty and no conclusions could be drawn (Figure 4B).

Patients with serious adverse events

No NMA was possible for this outcome. Ten studies [11,29,31,34–36,38,43,46,50] reported it of which 8 reported 0 serious adverse for their participants. [29,31,35,36,38,43,46,50] In total two serious adverse events were reported among 2164 participants in the studies that reported this outcome: one perforation in the HD-SCE arm and one post-polypectomy bleed requiring a second therapeutic colonoscopy in the HD-DCE arm.[11,34]

Patients with total adverse events

Seven studies reported all types of adverse events that occurred.[31,34–36,38,42,45] In Five of them reported none occurred (Yang 2019, Iacucci 16/18, Gulatti 2018, Freire 2014, van den Broek 2011).[31,35,38,42,45] In Leong 2017 A 14 patients had temporary urine discoloration and 23 patients had transient abdominal bloating.[52] Vleugels 2018 reported 5 patients had adverse events but did not provide details of what these adverse events were.[34]

Withdrawals due to adverse events

Six studies reported this outcome, with all of them reporting there were no withdrawals (Yang 2019, Iacucci 16/18, Gulatti 2018, Leong 2017 A, Freire 2014, van de Broek 2011).[31,35,36,38,42,45]

Withdrawal times

No NMA was possible for this outcome. In total 20 studies [11,27–39,41–43,45,46,48–50] reported this outcome, in a variety of heterogeneous methods, with only two studies providing measures of time variance (Alexandersson 2020 and Leifield 2015);[30,41] however numerically differences in times for HD-DCE versus HD-WLE or HD-VCE ranged from -1.1 minutes to +10.1 minutes. Details can be found in eTable 1 in the Supplementary material. Extracted outcome data can be found in eTable 10.

We had planned to use funnel plots to assess publication bias for pairwise analyses with at least ten studies, but this did not occur for any outcome. Indirectness was assessed to not have occurred in any of the outcomes.

Discussion

Main Findings

Our analysis of 26 RCTs involving 4,159 participants and comparing six endoscopic modalities, found HD-DCE to be modality with the highest-GRADE certainty level for detecting dysplasia, with a risk ratio of 1.42 (95% CI 1.02 to 1.98) compared to HD-WLE. Based on our predefined thresholds, this represents a small increase in the detection of patients with at least one dysplastic lesion using HD-DCE compared to HD-WLE.
Our analysis considered key effect modifiers, such as type of IBD, colonoscopy purpose, number of endoscopists, surveillance pathway, and concurrent therapies (supplementary eTable 1 and 10). While factors like bowel preparation, sedation, and endoscopist experience were inconsistently reported, no major differences in the distribution of the effect modifiers were observed. Despite some reporting heterogeneity, we believe the assumption of transitivity holds based on the available data. Subgroup analyses were performed to explore the performance of different VCE techniques (iSCAN, NBI, FICE) and dye dosages in DCE to understand each method's effectiveness in detecting dysplastic lesions[53,54]; however, these did not reveal any significant differences that would alter the overall conclusions of the NMA.

Comparison with other Studies

Methodologically, GRADE analysis within NMAs varies significantly, affecting outcomes and interpretations.[53] Applying GRADE in NMA relies on clinical thresholds for precise judgements, but no review has consistently used these methods.[54] This inconsistency may have led to overestimations in the certainty of previous results which was addressed in this review by pre-specifying risk thresholds set by an expert GDG. Previous NMAs and systematic reviews have highlighted the potential superiority of DCE over traditional WLE in detecting dysplasia in IBD.[13,14] Our findings align with these studies, reinforcing the argument for adopting HD-DCE in clinical practice. [15]A significant difference noted in previous reviews is in the consideration of sub-types of VCE and comparisons between VCE and DCE. El-Dallal et al. conducted a meta-analysis comparing VCE with DCE (HD and SD clubbed together), SD-WLE, HD-WLE or sub-types of VCE.[12] For the VCE category they grouped AFI with FICE, iSCAN, and NBI. We believe that AFI should be considered separately due to its distinct mechanism of detecting natural tissue fluorescence, whereas iSCAN, FICE, and NBI enhance mucosal visualization through optical filtering or digital post-processing and can be appropriately grouped together.[8]

Recently, HD-WLE with segmental re-inspection (SR) has shown promising results in IBD surveillance. The HELIOS trial, a large RCT of 563 participants, demonstrated that HD-WLE with SR is non-inferior to HD-DCE for detecting colorectal neoplasia (CRN) in IBD, although HD-DCE remained numerically superior.[11] This suggests that HD-WLE with SR might achieve similar neoplasia detection rates as HD-DCE, simplifying the surveillance process by eliminating the need for dye application while maintaining high detection efficacy. However, further large RCTs are needed to establish its equivalence to DCE and to confirm these findings in broader clinical practice.

Strengths and Limitations

One of the key strengths of our study is the comprehensive nature of our literature search and the rigorous application of the GRADE methodology, which enhances the reliability of our findings. Additional unpublished data were obtained through direct communication with the corresponding authors of respective studies, providing information not otherwise available. As an innovation we employed a method of pre-selecting outcomes and magnitude effect thresholds for judging imprecision and could have utility for future studies (Supplementary eTable 8). These were pre-determined at the beginning of the guidelines process and before the literature search by the GDG. This ensured judgements around precision by our review team were not affected by clinical bias based on awareness of the results of the analyses. The methodological rigor of our NMA was maintained by adhering to established guidelines for conducting and reporting meta-analyses.[55,56] The inclusion of only RCTs and the application of the GRADE methodology ensured a structured and transparent approach to evaluating the quality of evidence. However, the heterogeneity in study designs and the variability in reporting across the included trials posed challenges in synthesizing the data and in turn limits some of the scope of our analysis and conclusions. Additionally, the limited availability of safety data precluded a comprehensive analysis of the safety profiles of the endoscopic modalities. As described, certain methodological decisions were made that, while consensus-driven and believed to be objectively appropriate, do have a significant impact on the findings. For example, the exclusion of the study by Wan et al. or the removal of crossover data.[57] To account for some of the impacts of these decisions, sensitivity analyses excluded studies reporting on serrated lesions, single endoscopist studies, and those based on disease activity information. These analyses were conducted to test the robustness of the primary findings considering these methodological choices.

Future Directions

Future research should focus on conducting well-designed RCTs with larger sample sizes and standardized protocols to confirm the efficacy and safety of endoscopic modalities for CRC screening in IBD patients. Additionally, studies exploring the cost-effectiveness and environmental impact of these modalities would provide valuable insights for healthcare decision-making. The exploration of patient-centred outcomes and preferences in the context of CRC screening is also warranted. As the field of endoscopy evolves with new technologies and techniques, ongoing evaluation and comparison of these innovations will be essential. Emerging technologies, such as computer-aided detection (CADe) systems, require further validation in IBD populations to confirm their efficacy.[58,59] Recent studies have demonstrated that CADe systems specifically retrained with IBD images significantly improve sensitivity and specificity for detecting IBD-related neoplastic lesions.[60,61] While initial attempts to develop AI systems for polyp characterization and detection in IBD patients have shown mixed results, ongoing research aims to refine these technologies for more accurate diagnosis and surveillance in this patient population.[60–62]

Conclusions

This NMA highlights the potential advantage of HD-DCE over HD-WLE in detecting dysplastic lesions in IBD patients undergoing CRC screening. While HD-DCE offers enhanced detection

capabilities, the low certainty of evidence and considerations of cost and environmental impact suggest prudence in its widespread adoption. Although differences for other modalities was not demonstrated, very low certainty limited conclusions and therefore lack of evidence should not be interpreted as evidence of no effect, indicating a need for more studies in these areas. The choice of modality should consider technology availability, endoscopist experience and training, and broader cost-effectiveness and practicality consideration.

References:

1. Olén O, Erichsen R, Sachs MC, et al. Colorectal cancer in ulcerative colitis: a Scandinavian population-based cohort study. The Lancet 2020;395:123-131.
2. Olén O, Erichsen R, Sachs MC, et al. Colorectal cancer in Crohn's disease: a Scandinavian population-based cohort study. Lancet Gastroenterol Hepatol 2020;5:475-484.
3. Porter RJ, Arends MJ, Churchhouse AMD, et al. Inflammatory Bowel Disease-Associated Colorectal Cancer: Translational Risks from Mechanisms to Medicines. J Crohns Colitis 2021;15:2131.
4. Abu-Freha N, Cohen B, Gordon M, et al. Colorectal cancer among inflammatory bowel disease patients: risk factors and prevalence compared to the general population. Front Med (Lausanne) 2023;10:1225616.
5. Wheat CL, Clark-Snustad K, Devine B, et al. Worldwide Incidence of Colorectal Cancer, Leukemia, and Lymphoma in Inflammatory Bowel Disease: An Updated Systematic Review and Meta-Analysis. Gastroenterol Res Pract 2016;2016.
6. Stidham RW, Higgins PDR. Translational Research in Colorectal Cancer: Colorectal Cancer in Inflammatory Bowel Disease. Clin Colon Rectal Surg 2018;31:168.
7. Bye WA, Ma C, Nguyen TM, et al. Strategies for Detecting Colorectal Cancer in Patients with Inflammatory Bowel Disease: A Cochrane Systematic Review and Meta-Analysis. Am J Gastroenterol 2018;113:1801-1809.
8. Dal Buono A, Gabbiadini R, Furfaro F, et al. Endoscopic Surveillance in Inflammatory Bowel Diseases: Selecting a Suitable Technology. Front Med (Lausanne) 2022;9:855652.
9. Lamb CA, Kennedy NA, Raine T, et al. British Society of Gastroenterology consensus guidelines on the management of inflammatory bowel disease in adults. Gut 2019;68:s1-s106.
10. Laine L, Kaltenbach T, Barkun A, et al. SCENIC international consensus statement on surveillance and management of dysplasia in inflammatory bowel disease. Gastrointest Endosc 2015;81:489-501.e26.
11. Te Groen M, Wijnands A, Den Broeder N, et al. OP15 High-definition white light endoscopy with segmental re-inspection is non-inferior compared to dye-based chromoendoscopy in Inflammatory Bowel Disease: the randomized controlled HELIOS trial. J Crohns Colitis 2024;18:i29-i30.
12. El Dallal M, Chen Y, Lin Q, et al. Meta-analysis of Virtual-based Chromoendoscopy Compared With Dye-spraying Chromoendoscopy Standard and High-definition White Light Endoscopy in Patients With Inflammatory Bowel Disease at Increased Risk of Colon Cancer. Inflamm Bowel Dis 2020;26:1319-1329.
13. Mohamed MFH, Marino D, Elfert K, et al. Dye Chromoendoscopy Outperforms High-Definition White Light Endoscopy in Dysplasia Detection for Patients With Inflammatory Bowel Disease: An Updated Meta-Analysis of Randomized Controlled Trials. Am J Gastroenterol 2024;119.
14. Imperatore N, Castiglione F, Testa A, et al. Augmented Endoscopy for Surveillance of Colonic Inflammatory Bowel Disease: Systematic Review With Network Meta-analysis. J Crohns Colitis 2019;13:714-724.

15. Iannone A, Ruospo M, Palmer SC, et al. Systematic review with network meta-analysis: endoscopic techniques for dysplasia surveillance in inflammatory bowel disease. Aliment Pharmacol Ther 2019;50:858-871.
16. Murthy SK, Feuerstein JD, Nguyen GC, et al. AGA Clinical Practice Update on Endoscopic Surveillance and Management of Colorectal Dysplasia in Inflammatory Bowel Diseases: Expert Review. Gastroenterology 2021;161:1043-1051.e4.
17. Rabinowitz LG, Kumta NA, Marion JF. Beyond the SCENIC route: updates in chromoendoscopy and dysplasia screening in patients with inflammatory bowel disease. Gastrointest Endosc 2022;95:30-37.
18. Bisschops R, East JE, Hassan C, et al. Advanced imaging for detection and differentiation of colorectal neoplasia: European Society of Gastrointestinal Endoscopy (ESGE) Guideline - Update 2019. Endoscopy 2019;51:1155-1179.
19. Schünemann HJ, Neumann I, Hultcrantz M, et al. GRADE guidance 35: update on rating imprecision for assessing contextualized certainty of evidence and making decisions. J Clin Epidemiol 2022;150:225-242.
20. Gordon M, NIgam G, Sinopoulou V, et al. Protocol for the 2024 British Society of Gastroenterology guidelines on colorectal surveillance 2 in inflammatory bowel disease: an update from 2010 (standard operating procedure). BMJ Open Gastroenterol 2024;In press.
21. Page MJ, McKenzie JE, Bossuyt PM, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. BMJ 2021;372:n71.
22. Covidence - Better systematic review management. https://www.covidence.org/. Accessed May 31, 2024.
23. Chapter 8: Assessing risk of bias in a randomized trial | Cochrane Training. https://training.cochrane.org/handbook/current/chapter-08. Accessed May 31, 2024.
24. Schlemper RJ, Riddell RH, Kato Y, et al. The Vienna classification of gastrointestinal epithelial neoplasia. Gut 2000;47:251-255.
25. Higgins JPT, Jackson D, Barrett JK, et al. Consistency and inconsistency in network meta-analysis: concepts and models for multi-arm studies. Res Synth Methods 2012;3:98-110.
26. Gordon M. Maintaining remission in Crohn's disease post surgery: what can we learn from Cochrane? Frontline Gastroenterol 2024;15:241-246.
27. Sinonquel P, Jans A, Pierik MJ, et al. DYE ANOTHER DAY: DYE-BASED CHROMOENDOSCOPY VERSUS I-SCAN VIRTUAL CHROMOENDOSCOPY IN LONG-STANDING UC: A MULTICENTER PROSPECTIVE RANDOMIZED CONTROLLED TRIAL. Gastrointest Endosc 2022;95:AB83.
28. González-Bernardo O, Riestra S, Vivas S, et al. Chromoendoscopy With Indigo Carmine vs Virtual Chromoendoscopy (iSCAN 1) for Neoplasia Screening in Patients With Inflammatory Bowel Disease: A Prospective Randomized Study. Inflamm Bowel Dis 2021;27:1256-1262.
29. Kandiah K, Subramaniam S, Thayalasekaran S, et al. Multicentre randomised controlled trial on virtual chromoendoscopy in the detection of neoplasia during colitis surveillance high-definition colonoscopy (the VIRTUOSO trial). Gut 2021;70:1684-1690.
30. Alexandersson B, Hamad Y, Andreasson A, et al. High-Definition Chromoendoscopy Superior to High-Definition White-Light Endoscopy in Surveillance of Inflammatory

Bowel Diseases in a Randomized Trial. Clin Gastroenterol Hepatol 2020;18:2101-2107.
31. Yang DH, Park SJ, Kim HS, et al. High-Definition Chromoendoscopy Versus High-Definition White Light Colonoscopy for Neoplasia Surveillance in Ulcerative Colitis: A Randomized Controlled Trial. Am J Gastroenterol 2019;114:1642-1648.
32. Lord R, Burr N, Mohammed N, et al. PWE-035 HDCE using 0.03% versus 0.2% indigocarmine for detecting dysplasia in IBD colitis surveillance. RCT interim-analysis. Gut 2018;67:A84-A84.
33. Bisschops R, Bessissow T, Joseph JA, et al. Chromoendoscopy versus narrow band imaging in UC: a prospective randomised controlled trial. Gut 2018;67:1087-1094.
34. Vleugels JLA, Rutter MD, Ragunath K, et al. Chromoendoscopy versus autofluorescence imaging for neoplasia detection in patients with longstanding ulcerative colitis (FIND-UC): an international, multicentre, randomised controlled trial. Lancet Gastroenterol Hepatol 2018;3:305-316.
35. Gulati S, Dubois P, Carter B, et al. A Randomized Crossover Trial of Conventional vs Virtual Chromoendoscopy for Colitis Surveillance: Dysplasia Detection, Feasibility, and Patient Acceptability (CONVINCE). Inflamm Bowel Dis 2019;25:1096-1106.
36. Leong RW, Ooi M, Corte C, et al. Full-Spectrum Endoscopy Improves Surveillance for Dysplasia in Patients With Inflammatory Bowel Diseases. Gastroenterology 2017;152:1337-1344.e3.
37. Pellisé M, López-Cerón M, Rodríguez De Miguel C, et al. Narrow-band imaging as an alternative to chromoendoscopy for the detection of dysplasia in long-standing inflammatory bowel disease: a prospective, randomized, crossover study. Gastrointest Endosc 2011;74:840-848.
38. Iacucci M, Kaplan GG, Panaccione R, et al. A Randomized Trial Comparing High Definition Colonoscopy Alone With High Definition Dye Spraying and Electronic Virtual Chromoendoscopy for Detection of Colonic Neoplastic Lesions During IBD Surveillance Colonoscopy. Am J Gastroenterol 2018;113:225-234.
39. Watanabe K, Nishishita M, Shimamoto F, et al. 722 Comparison Between Newly-Developed Narrow Band Imaging and Panchromoendoscopy for Surveillance Colonoscopy in Patients With Longstanding Ulcerative Colitis: A Prospective Multicenter Randomized Controlled Trial, Navigator Study. Gastrointest Endosc 2016;83:AB172.
40. Mohammed N, Kant P, Abid F, et al. 446 High Definition White Light Endoscopy (Hdwle) Versus High Definition With Chromoendoscopy (Hdce) in the Detection of Dysplasia in Long Standing Ulcerative Colitis: a Randomized Controlled Trial. Gastrointest Endosc 2015;81:AB148.
41. Leifeld L, Rogler G, Stallmach A, et al. White-Light or Narrow-Band Imaging Colonoscopy in Surveillance of Ulcerative Colitis: A Prospective Multicenter Study. Clin Gastroenterol Hepatol 2015;13:1776-1781.e1.
42. Freire P, Figueiredo P, Cardoso R, et al. Surveillance in ulcerative colitis: is chromoendoscopy-guided endomicroscopy always better than conventional colonoscopy? A randomized trial. Inflamm Bowel Dis 2014;20:2038-2045.
43. Ignjatovic A, East JE, Subramanian V, et al. Narrow band imaging for detection of dysplasia in colitis: a randomized controlled trial. Am J Gastroenterol 2012;107:885-890.

44. Feitosa F, Carlos A, Nogueira JG, et al. Narrow-band imaging and chromoendoscopy for the detecion of colonic dysplasia in inflammatory bowel disease: a prospective and randomized study: P-8. Inflamm Bowel Dis 2011;17:S14-S15.
45. Van Den Broek FJC, Fockens P, Van Eeden S, et al. Narrow-band imaging versus high-definition endoscopy for the diagnosis of neoplasia in ulcerative colitis. Endoscopy 2011;43:108-115.
46. Van Den Broek FJC, Fockens P, Van Eeden S, et al. Endoscopic tri-modal imaging for surveillance in ulcerative colitis: randomised comparison of high-resolution endoscopy and autofluorescence imaging for neoplasia detection; and evaluation of narrow-band imaging for classification of lesions. Gut 2008;57:1083-1089.
47. Dekker E, van den Broek FJC, Reitsma JB, et al. Narrow-band imaging compared with conventional colonoscopy for the detection of dysplasia in patients with longstanding ulcerative colitis. Endoscopy 2007;39:216-221.
48. Kiesslich R, Goetz M, Lammersdorf K, et al. Chromoscopy-guided endomicroscopy increases the diagnostic yield of intraepithelial neoplasia in ulcerative colitis. Gastroenterology 2007;132:874-882.
49. Kiesslich R, Fritsch J, Holtmann M, et al. Methylene blue-aided chromoendoscopy for the detection of intraepithelial neoplasia and colon cancer in ulcerative colitis. Gastroenterology 2003;124:880-888.
50. Feuerstein JD, El-Dallal M, Rosenwald N, et al. Mo1808 CHROMOENDOSCOPY AND HIGH DEFINITION WHITE LIGHT COLONOSCOPY ARE EQUALLY EFFECTIVE TO SCREEN FOR COLON CANCER IN INFLAMMATORY BOWEL DISEASES: A RANDOMIZED CONTROL TRIAL PRELIMINARY ANALYSIS. Gastroenterology 2020;158:S-930-S-931.
51. Drastich P, Kamenar D, Wohl P, et al. Mo1271 Autofluorescence Imaging Colonoscopy for the Detection of Dysplastic Lesions in Patients With Primary Sclerosing Cholangitis and Ulcerative Colitis: A Pilot Study. Gastroenterology 2013;144:S-623.
52. Leong RW, Ooi M, Corte C, et al. Full-Spectrum Endoscopy Improves Surveillance for Dysplasia in Patients With Inflammatory Bowel Diseases. Gastroenterology 2017;152:1337-1344.e3.
53. Salanti G, Giovane C Del, Chaimani A, et al. Evaluating the quality of evidence from a network meta-analysis. PLoS One 2014;9.
54. Puhan MA, Schünemann HJ, Murad MH, et al. A GRADE Working Group approach for rating the quality of treatment effect estimates from network meta-analysis. BMJ 2014;349.
55. Chapter 10: Analysing data and undertaking meta-analyses | Cochrane Training. https://training.cochrane.org/handbook/current/chapter-10. Accessed April 16, 2024.
56. Chapter 11: Undertaking network meta-analyses | Cochrane Training. https://training.cochrane.org/handbook/current/chapter-11. Accessed April 16, 2024.
57. Wan J, Zhang Q, Liang SH, et al. Chromoendoscopy with targeted biopsies is superior to white-light endoscopy for the long-term follow-up detection of dysplasia in ulcerative colitis patients: a multicenter randomized-controlled trial. Gastroenterol Rep (Oxf) 2020;9:14-21.
58. Huguet JM, Ferrer-Barceló L, Suárez P, et al. Colorectal cancer screening and surveillance in patients with inflammatory bowel disease in 2021. World J Gastroenterol 2022;28:502-516.

59. Guerrero Vinsard D, Fetzer JR, Agrawal U, et al. Development of an artificial intelligence tool for detecting colorectal lesions in inflammatory bowel disease. iGIE 2023;2:91-101.e6.
60. Abdelrahim M, Siggens K, Iwadate Y, et al. New AI model for neoplasia detection and characterisation in inflammatory bowel disease. Gut 2024;73:725-728.
61. Guerrero Vinsard D, Fetzer JR, Agrawal U, et al. Development of an artificial intelligence tool for detecting colorectal lesions in inflammatory bowel disease. iGIE 2023;2:91-101.e6.
62. Yamamoto S, Kinugasa H, Hamada K, et al. The diagnostic ability to classify neoplasias occurring in inflammatory bowel disease by artificial intelligence and endoscopists: A pilot study. J Gastroenterol Hepatol 2022;37:1610-1616.

Table 1. Patient and Included Study Demographics

S. No	Study ID	Modality 1	Modality 2	Modality 3 (if applicable)	Abstract/ Full Paper	Cross over	Population	Country	Single/ Multicenter	Disease Severity (inactive/mixed /Not Reported)	Tr Re n
1	Kiesslich 2003[49]	Dye Chromoendoscopy	White Light Endoscopy	N/A	Full paper	No	UC+PSC	Germany	Single	Not Reported	No
2	Kiesslich 2007[48]	Dye Chromoendoscopy	White Light	N/A	Full paper	No	UC+PSC	Germany	Single	Not Reported	No
3	Dekker 2007[47]	White Light endoscopy	Virtual chromoendoscopy (first gen)	N/A	Full Paper	Yes	UC	Netherlands	Single	Inactive	No
4	Van de Broek 2008[46]	HD White Light	Auto Fluorescence imaging	N/A	Full paper	Yes	UC+PSC	Netherlands	Single	Inactive	ISR 74
5	Van de Broek 2011[45]	HD White Light	HD Virtual Chromoendoscopy	N/A	Full Paper	Yes	UC+PSC	Netherlands	Single	Inactive	ISR 83
6	Feitosa 2011[44]	HD Dye Chromoendoscopy	HD Virtual Chromoendoscopy	N/A	Abstract/ Thesis	No	UC+CD	Portugal	Single	Not Reported	No
7	Ignjatovic 2012[43]	HD White Light	HD Virtual Chromoendoscopy	N/A	Full paper	No	UC+PSC	United Kingdom	Multicentre	Mixed	NC
8	Drastich 2013[51]	White Light Endoscopy	Auto Fluorescence imaging	N/A	Abstract	Yes	UC+PSC	Czech Republic	Single	Not Reported	No
9	Freire 2014[42]	Dye Chromoendoscopy	White Light Endoscopy	N/A	Full paper	No	UC	Portugal	Multicentre	Inactive	No
10	Leifield 2015[41]	White Light Endoscopy	Narrow Band Imaging	N/A	Full paper	Yes	UC+PSC	Europe	Multicentre	Inactive	No
11	Mohammed 2015[40]	HD Dye Chromoendoscopy	HD White Light	N/A	Abstract/ Thesis	No	UC+PSC	United Kingdom	Single	Mixed	NC
12	Watanabe 2016 B[39]	HD Dye Chromoendoscopy	HD Virtual Chromoendoscopy	N/A	Abstract	No	UC	Japan	Multicentre	Inactive	UM 27

14	Pelise 2017[37]	HD Dye Chromoendoscopy	HD Virtual Chromoendoscopy	N/A	Full paper	Yes	UC+CD+PSC	Spain	Single	Inactive	No
15	Leong 2017 A[36]	HD White Light	Full spectrum endoscopy	N/A	Full Paper	Yes	UC+CD	Australia	Single	Inactive	AC 00
13	Iacucci 2018[38]	HD White Light	HD Dye Chromoendoscopy	HD Virtual Chromoendoscopy	Full Paper	No	UC+CD+PSC	Canada	Single	Inactive	NC
16	Gulatti 2018[35]	HD Dye Chromoendoscopy	HD Virtual Chromoendoscopy	N/A	Full Paper	Yes	UC+CD+PSC	United Kingdom	Single	Inactive	NC
17	Vleugels 2018[34]	HD Dye Chromoendoscopy	Auto fluorescence imaging	N/A	Full Paper	No	UC+PSC	Netherlands + United Kingdom	Multicentre	Inactive	No
18	Bisschops 2018[33]	HD Dye Chromoendoscopy	HD Virtual Chromoendoscopy	N/A	Full Paper	No	UC+PSC	Belgium + Canada	Multicentre	Inactive	NC
19	Lord 2018[32]	HD Dye Chromoendoscopy (high concentration)	HD Dye Chromoendoscopy (low concentration)	N/A	Abstract with Thesis	No	UC+CD+IC+PSC	United Kingdom	Single	Not Reported	NC
20	Yang 2019[31]	HD White Light	HD Dye Chromoendoscopy	N/A	Full Paper	No	UC+PSC	South Korea	Multicentre	Mixed	KC 4-2
21	Alexandersson 2020[30]	HD White Light	HD Dye Chromoendoscopy	N/A	Full Paper	No	UC+CD+IC+PSC	Sweden	Single	Not Reported	NC
22	Feuerstein 2020[50]	HD White Light	HD Dye Chromoendoscopy	N/A	Abstract	No	UC+CD+IC+PSC	United States of America	Single	Not Reported	No
23	Kandiah 2021[29]	HD White Light	HD Virtual Chromoendoscopy	N/A	Full Paper	No	UC+CD+PSC	United Kingdom	Multicentre	Inactive	No
24	Gonzalez-Bernardo 2021[28]	HD Dye Chromoendoscopy	HD Virtual Chromoendoscopy	N/A	Full Paper	No	UC+CD + PSC	Spain	Single	Inactive	No
25	Sinonquel 2022[27]	HD Dye Chromoendoscopy	HD Virtual Chromoendoscopy	N/A	Abstract	No	Not Reported	Europe	Multicentre	Not Reported	No
26	Te Groen 2024[11]	HD White Light	HD Dye Chromoendoscopy	HD White Light with SR	Abstract	No	UC+CD+IC+PSC	Netherlands	Multicentre	Inactive	No

CD: Crohn's Disease; **HD:** High Definition; **IC:** Indeterminate Colitis; **PSC:** Primary Sclerosing Cholangitis; **UC:** Ulcerative Colitis

Table 2. Summary of Findings table and Grade decisions for the primary outcome of patients with at least one dysplastic lesion detected (red colouring means the results cross the line of no effect, N=number, RoB=risk of bias)

Patients with at least one dysplastic lesion detected						
Patient or population: people with IBD undergoing CRC surveillance						
Settings: hospital setting						
Intervention: all modalities at RCT level						
Comparison: HD White Light						
Treatment	**Network evidence**		**Anticipated absolute effects for network estimate**			**Magnitude size (95% CI range of magnitude size)***
	RR (95% CI)	**Certainty**	**Detections with HD White Light[a]**	**Detections with modality (95% CI)**	**% Detection Difference (95% CI)**	
Full spectrum endoscopy	3.24 (0.66 to 15.87)	Low ⊕⊕⊖⊖	113 per 1,000	366 per 1,000 (75 to 1000)	25.3% more (3.8% less to 100%)	It may be no different to HD White Light (small detection numbers less to large more)
HD chromoendoscopy (all)	1.42 (1.02 to 1.98)	Low ⊕⊕⊖⊖	113 per 1,000	160 per 1,000 (115 to 224)	4.7% more (0.2% more to 11.1% more)	It may detect a small amount more patients with at least one dysplastic lesion (trivial to moderate)
HD White Light with SR	1.35 (0.66 to 2.77)	Very Low ⊕⊖⊖⊖	113 per 1,000	153 per 1,000 (75 to 313)	4% more (3.8% less to 20% more)	The evidence is very inconclusive
Auto-fluorescence imaging	1.18 (0.55 to 2.57)	Very Low ⊕⊖⊖⊖	113 per 1,000	133 per 1,000 (62 to 290)	2% more (5.1% less to 17.7% more)	The evidence is very inconclusive
HD virtual chromoendoscopy (all)	0.99 (0.69 to 1.43)	Very low ⊕⊖⊖⊖	113 per 1,000	112 per 1,000 (78 to 162)	0.1% less (3.5% less to 4.9% more)	The evidence is very inconclusive
GRADE Working Group grades of evidence						
High certainty: we are very confident that the true effect lies close to that of the estimate of the effect.						
Moderate certainty: we are moderately confident in the effect estimate; the true effect is likely to be close to the estimate of the effect						
Low certainty: our confidence in the effect estimate is limited; the true effect may be substantially different from the estimate of the effect.						
Very low certainty: we have very little confidence in the effect estimate; the true effect is likely to be substantially different from the estimate of effect.						

CI: confidence interval; RR: risk ratio

[a]The risk with HDWL has been calculated based on the cumulative HDWL rates of all studies with a HDWL arm

*The range of magnitude were calculated based on the 95% CI possibility within which the actual magnitude lies, and do not imply a definitive range of benefit

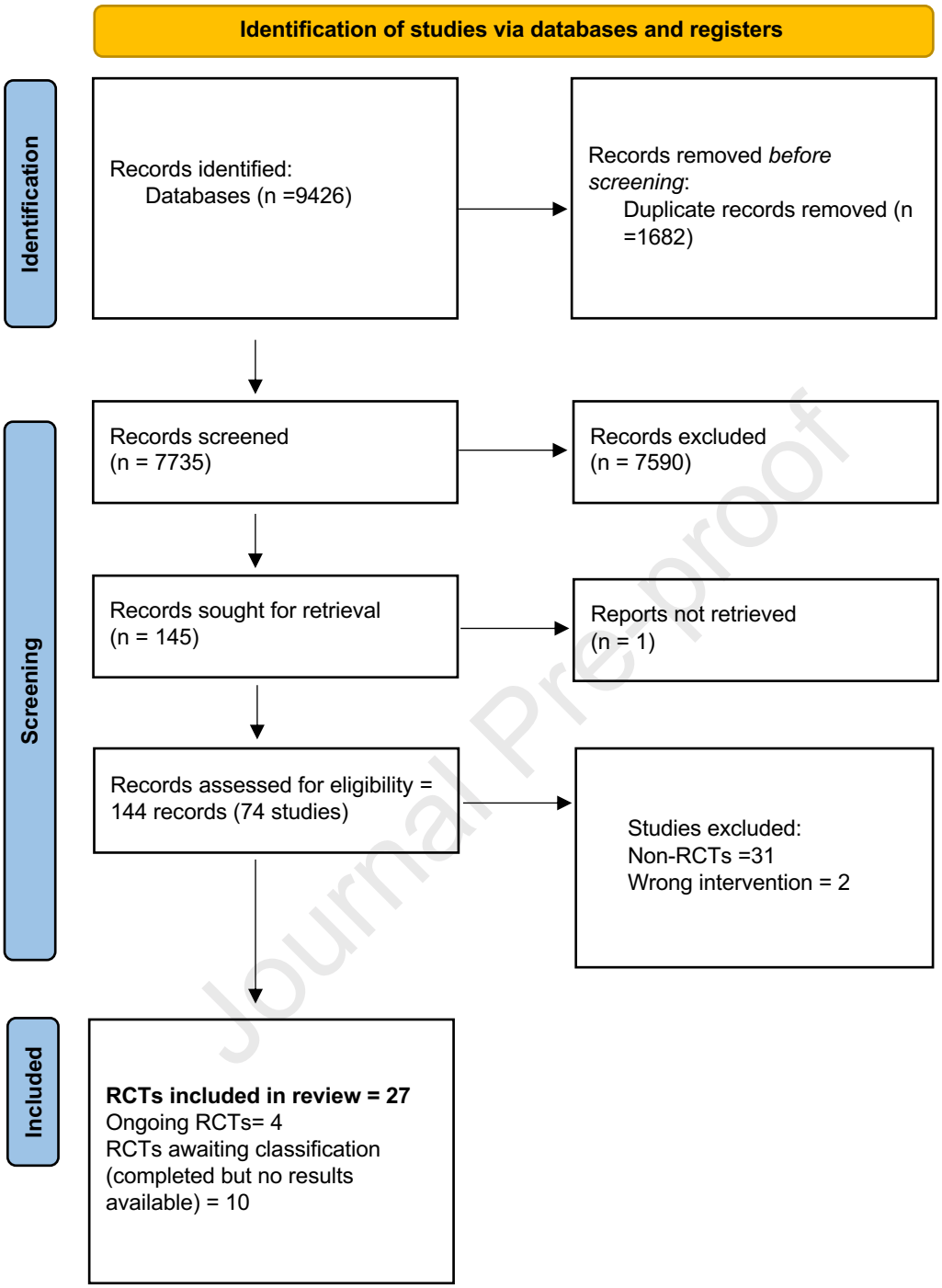
SUCRA	Intervention (n=6)	network estimate RR	lower 95%CI	higher 95% CI	N of direct studies to HD-WLE	Direct GRADE	Reasons for direct downgrade	Indirect GRADE
1	**Full spectrum endoscopy**	3.24	0.66	15.87	1	high	no reason	x
2	**HD chromoendoscopy (all)**	1.42	1.02	1.98	6	moderate	once RoB	moderate
3	**HD White Light with SR**	1.35	0.66	2.77	1	low	twice RoB	low
4	**Auto-fluorescence imaging**	1.18	0.55	2.57	1	moderate	once RoB	moderate
6	**HD White Light**	1						
5	**HD virtual chromoendoscopy (all)**	0.99	0.69	1.43	4	moderate	once RoB	moderate

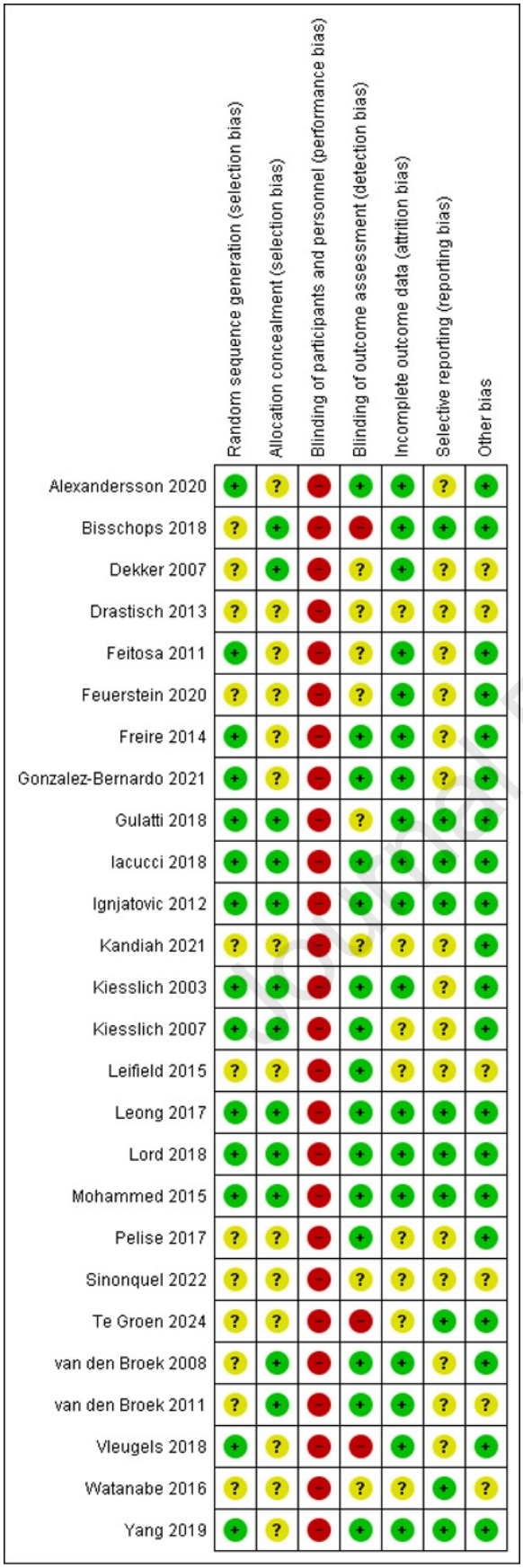
Figure 1. PRISMA diagram

Figure 2. Risk of bias of included studies.

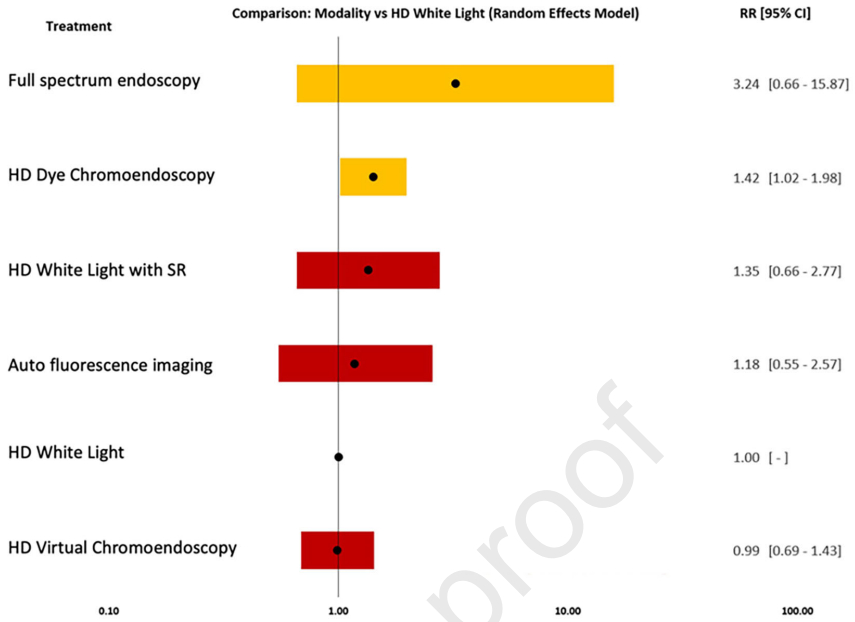
Figure 3. Forest plot and GRADE certainty for the outcome 'Patients with at least one dysplastic lesion detected' for network connected studies (n=19). RR= risk ratio, CI = confidence interval, HD = high definition, sr=segmental re-inspection

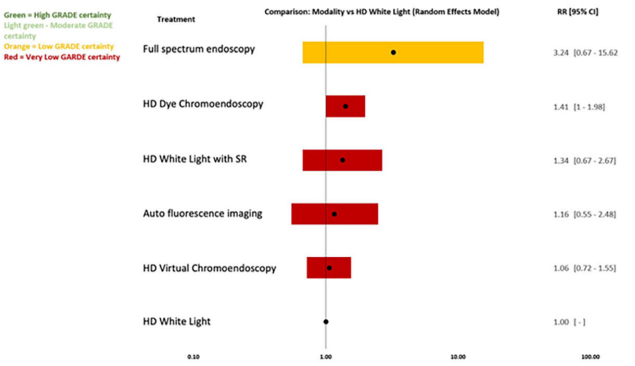
Figure 4. Forest plot and GRADE certainty for the outcome A. 'Patients with at least one dysplastic lesion detected from targeted biopsies' for network connected studies (n=16).B. 'Patients with at least one lesion of any type detected' for network connected studies (n=10). RR= risk ratio, CI = confidence interval, HD = high definition, SR=segmental re-inspection



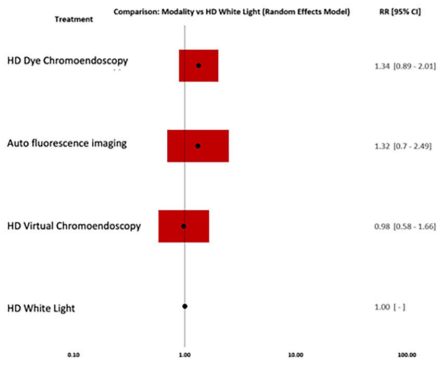


Green = High GRADE certainty
Light green - Moderate GRADE certainty
Orange = Low GRADE certainty
Red = Very Low GARDE certainty





A) Patients with at least one dysplastic lesion detected from targeted biopsies



B) Patients with at least one lesion of any type detected

What You Need to Know

BACKGROUND

Inflammatory bowel disease (IBD) increases colorectal cancer risk, necessitating effective endoscopic surveillance. Various high-definition endoscopic modalities are used, but their comparative efficacy in dysplasia detection remains unclear.

FINDINGS

High-definition dye-based chromoendoscopy (HD-DCE) may improve dysplasia detection compared to other modalities like HD-WLE, though evidence certainty is low. No significant differences in safety outcomes were identified.

IMPLICATIONS FOR PATIENT CARE

HD-DCE may be preferred for IBD surveillance due to its potential for better dysplasia detection, but further high-quality studies are needed to confirm its clinical superiority and safety.

Supplementary Content

eTable 1. Interventional and Procedural Details of the Included Studies

Serial No.	Study ID	Purpose of colonoscopy	Targeted/both/ Not Reported	Type of Virtual Chromoendoscopy (if applicable)	Type of Chromoendoscopy dye concentration (if applicable)	Dye concentration dichotomous categorization	Serrated polyps included (yes or no)	Indefinite for dysplasia included (yes or no)	Endoscopists details
1	Kiesslich 2003	Colonoscopic surveillance for cancer in patients with ulcerative colitis	Targeted	N/A	0.1% methylene blue	High-concentration	Not Reported	No	Not mentioned
2	Kiesslich 2007	Surveillance of patients with long standing ulcerative colitis	Targeted only for Chromoendoscopy. Both for White Light	N/A	0.1% methylene blue	High-concentration	Not Reported	No	Not mentioned
3	Dekker 2007	Surveillance - patients with longstanding UC	Targeted	NBI (Olympus) - first gen	N/A	N/A	Not Reported	No	All colonoscopies were performed by one of three experienced endoscopists (E.D., S.v.D., D.H.), each blinded to the findings of the previous procedure.
4	Van de Broek 2008	Surveillance - patients with longstanding UC	Both	N/A	N/A	N/A	No	No	Three experienced endoscopists performed all colonoscopies. Each had completed more than 2500 colonoscopies prior to the study.
5	Van de Broek 2011	Surveillance - patients with longstanding UC	Both	NBI (Olympus)	N/A	N/A	No	Not Reported	Four experienced endoscopists performed the procedures, each with at least 3 years of clinical experience with NBI.
6	Feitosa 2011	Detection of colonic dysplasia in long-standing inflammatory bowel disease:	Not Reported	NBI (Olympus)	Indigo carmine - concentration Not Reported	Not Reported	Not Reported	Not Reported	Not reported
7	Ignjatovic 2012	Dysplasia surveillance in longstanding IBD	Both	NBI (Olympus)	N/A	N/A	Not Reported	Yes	Six experienced colonoscopists performed the procedures, with two

									endoscopists performing the majority (88 colonoscopies).
8	Drastich 2013	Surveillance - Patients With Primary Sclerosing Cholangitis and Ulcerative Colitis	Targeted	N/A	N/A	N/A	Not Reported	Not Reported	Not mentioned
9	Freire 2014	Intraepithelial neoplasia (IN) detection in patients with longstanding UC without primary sclerosing cholangitis and/or history of IN.	Both	N/A	0.1% methylene blue	High-concentration	Not Reported	No	Single experienced endoscopist with extensive practice in UC surveillance, including use of chromoendoscopy, and has appropriate training in endomicroscopy
10	Leifield 2015	Surveillance colonoscopies for long-standing UC	Both	NBI (Olympus)	N/A	N/A	Not Reported	Not Reported	Not mentioned
11	Mohammed 2015	surveillance for extensive ulcerative colitis.	Both	N/A	0.2% indigo carmine	High-concentration	Not Reported	No	Not mentioned
12	Watanabe 2016 B	Surveillance in Longstanding left-sided or pancolitis	Targeted	NBI (Olympus)	Indigo carmine - concentration not eported	Not Reported	No	No	The procedures were performed by experienced endoscopists. Further training or specific endoscopist experience details are not provided
14	Pelise 2017	Detection of colitis-associated intraepithelial neoplasia (IN) in patients with long-standing inflammatory bowel disease (IBD).	Targeted	NBI (Olympus)	0.5% indigo carmine	High-concentration	Not Reported	No	Colonoscopies were performed by two experienced endoscopists

15	Leong 2017 A	CRC surveillance in IBD patients	Both	N/A	N/A	N/A	Yes	No	Two experienced endoscopists performed all procedures. One endoscopist (RWL) had prior formal training with FUSE.
13	Iacucci 2016/2018	Dysplasia detection in long-standing IBD	Targeted	I-scan (Pentax)	0.04% methylene blue or 0.03% indigo carmine	Low-concentration	Yes	No	All procedures were performed by a single operator (MI) experienced in dye, optical, and virtual chromoendoscopy techniques to ensure uniformity in technique and skill.
16	Gulatti 2018	Surveillance in long-standing colitis	Not Reported	FICE (Fuji)	0.2% indigo carmine	High concentration	Not Reported	Not Reported	Two experienced endoscopists with proficiency in both CE and VCE (>3000 diagnostic colonoscopies and >250 IBD surveillance colonoscopies) performed all procedures.
17	Vleugels 2018	Dysplasia surveillance in patients with longstanding UC.	Both	N/A	0.1% methylene blue solution or 0.2% indigo carmine	High-concentration	No	No	Two experienced endoscopists per centre conducted the procedures. Each endoscopist had experience performing over 500 colonoscopies, as well as extensive experience with CE and AFI. Endoscopists participated in a one-day clinical teaching session before the study began.
18	Bisschops 2018	CRC surveillance in Long-standing ulcerative colitis	Targeted	NBI (Olympus)	0.1% methylene blue	High-concentration	Yes	Yes	Five dedicated endoscopists performed the procedures, including RB, who had long-standing experience in both CE and NBI, while the others were trained before the study.
19	Lord 2018	Dysplasia detection in IBD patients	Both	N/A	Indigo carmine with different concentration - pump or spray catheter	High concentration and low concentration arms	No	No	Not mentioned
20	Yang 2019	CRC surveillance in Long-standing ulcerative colitis	Both	N/A	0.05% initially then 0.16% for suspected lesions (indigo carmine)	Low-concentration	Not Reported	Yes	9 endoscopists, each with a minimum of 6 years of experience, using HD colonoscopes.
21	Alexanderss on 2020	CRC surveillance in Long-standing ulcerative colitis	Both	N/A	0.3%-0.5% indigo carmine	High-concentration	No	No	Twenty-five endoscopists

									performed the colonoscopies, giving a median number of 6 examinations per endoscopist (range, 1–56). The experience of CE in IBD surveillance varied among the endoscopists, but all had performed CE in this setting before the trial
22	Feuerstein 2020	CRC surveillance in IBD	Not Reported	N/A	Not Reported	Not Reported	Not Reported	Not Reported	Not reported
23	Kandiah 2021	CRC surveillance in longstanding IBD	Both	I-scan (Pentax)	N/A	N/A	Yes	Not Reported	Not mentioned.
24	Gonzalez-Bernardo 2021	CRC screening in IBD patients	Targeted	I-scan (Pentax)	0.03% indigo carmine	Low-concentration	Not Reported	No	All procedures were performed by a single experienced endoscopist (OGB) with over 10 years of experience, performing about 1000 colonoscopies annually.
25	Sinonquel 2022	Neoplasia detection in patients with longstanding UC.	Targeted	I-scan (Pentax)	0.1% methylene blue	High-concentration	Yes	Not Reported	Not specifically detailed
26	Te Groen 2024	Colitis-associated CRN surveillance	Targeted	N/A	Methylene blue (0.04 -0.1%) and indigo carmine (0.4%)	Mixed	No	Yes	Not mentioned

UC (Ulcerative Colitis), NBI (Narrow Band Imaging), PSC (Primary Sclerosing Cholangitis), CE (Chromoendoscopy), VCE (Virtual Chromoendoscopy), FICE (Fuji Intelligent Chromo Endoscopy), FUSE (Full Spectrum Endoscopy), AFI (Autofluorescence Imaging), IN (Intraepithelial Neoplasia), HD (High Definition), IC (Indigo Carmine), IG (Intervention Group), CG (Control Group), CRN (Colorectal Neoplasia).

eTable 2. Study Sponsor Details

Study ID	Study Sponsor or Funding	Conflict of Interest
Alexandersson 2020	J.M.L., K.M.L. (Ji Min Lee and Kang-Moon-Lee) Study funded partly by Pharmbio Korea Co., Ltd, Seoul, Korea.	Study was an investigator-initiated study funded partly by Pharmbio Korea Co., Ltd, Seoul, Korea.
Feuerstein 2020	Not Reported	Not Reported
Kandiah 2021	Not Reported	Nothing to disclose
Yang 2019	Not Reported	Not Reported
Bisschops 2018	rB, MF and gVa are supported by a grant of research Foundation – Flanders (FWO). rB has received a study grant from the Belgian Society of gastrointestinal endoscopy (BSgie).	rB has received speaker's fee and research support from Olympus, not related to this trial.
Watanabe 2016 B	Not Reported	Not Reported
Iacucci 2016/2018	No financial support was provided for this manuscript.	M. Iacucci received an unrestricted research grant from Pentax USA (2013–2016) and speaker's fee from Pentax (2016). The remaining authors declare no conflict of interest.
Sinonquel 2022	Not Reported	Not Reported
Lord 2018	Not Reported	Not Reported
Gonzalez-Bernardo 2021	SR has received research or education funding from MSD, Abbvie, Hospira, Pfizer, Takeda, Janssen, Ferring, Faes Farma, Shire Pharmaceuticals, Dr. Falk Pharma, and Tillotts Pharma.	SR has served as a speaker or has received research or education funding from MSD, Abbvie, Hospira, Pfizer, Takeda, Janssen, Ferring, Faes Farma, Shire Pharmaceuticals, Dr. Falk Pharma, and Tillotts Pharma. No other authors have conflicts of interest.
Gulatti 2018	This study was supported by the United Kingdom Clinical Research Collaboration-registered King's Clinical Trials Unit at King's Health Partners, which is part funded by the NIHR Biomedical Research Centre for Mental Health at South London and Maudsley NHS Foundation Trust and King's College	Not Reported

	London and the NIHR Evaluation, Trials and Studies Coordinating Centre. This article presents independent research funded by the National Institute of Health Research (NIHR) under its Research for Patient Benefit Programme (grant no. PB-PG-0614-34040). The views expressed are those of the authors and not necessarily those of the NHS, the NIHR or the Department of Health.	
Leong 2017 A	Funding Endochoice, Alpharetta, Georgia, USA, provided an unrestricted investigator initiated research grant to support a part-time research assistant to screen patients. Funding application and approval occurred after the study already had commenced, hence the sponsor had no role in the trial design, execution, data analysis, interpretation, decision to submit the paper, or manuscript preparation. The authors have not been paid to write this article	This author discloses the following: Rupert W. Leong has received an unrestricted investigator-initiated research grant from Endochoice, USA. The remaining authors disclose no conflicts.
Vleugels 2018	Olympus Europe and Olympus Keymed provided research equipment on loan for this 38 study, Olympus Europe and Olympus Keymed provided an unrestricted research grant for this study 39 and had no involvement in the design, recruitment, data collection, analysis or interpretation of 40 writing of the manuscript. J. E. East and S. P. L. Travis were supported by the National Institute for 41 Health Research (NIHR) Oxford Biomedical Research Centre (BRC). K. Ragunath and S. Samuel were 42 supported by the National Institute for Health Research (NIHR) Nottingham Biomedical Research 43 3 Centre (BRC). The views expressed are those of the author(s) and not necessarily those of the NHS, 1	JV reports grants and non-financial support from Olympus Europe, during the conduct of the study. 4 MR reports grants and non-financial support from Olympus Keymed, during the conduct of the study. 5 KR reports grants and non-financial from Olympus Keymed, during the conduct of the study; personal 6 fees from Olympus Keymed and Olympus Europe, outside the submitted work. CR reports grants and 7 non-financial from Olympus Keymed, during the conduct of the study; grants, personal fees and 8 other from NORGINE and ARC medical, non-financial support from Boston, outside the submitted 9 work. CP reports grants and non-financial support from Olympus Europe, during the conduct of the 10 study. CL reports grants and non-financial support from Olympus Keymed, during the conduct of the 11 study. SK reports grants and non-financial support from Olympus Keymed, during the conduct of the 12 study. LW reports grants and non-financial support from Olympus Europe, during the conduct of the 13 study. SS reports grants and non-financial support from Olympus Keymed, during the conduct of the 14 study. FB reports grants and non-financial support from Olympus Keymed, during the conduct of the 15 study. TK reports grants and non-financial support from Olympus Europe, during the conduct of the 16 study. ST reports grants and non-financial support from Olympus Keymed, during the conduct of the 17 study; personal fees from Abbvie, Bristol Myers Squibb, Cosmo technologies, Genentech, Guiliani, 18 Takeda, Pfizer, Shire Pharma, NPS, Proximagen, VHSquared, Topivert, Ferring Pharmaceuticals, 19 Celgene, Glaxo Smith Kline, Amgen, Biogen, Enterome, Immunocore, Immunometabolism, Bioclinica, 20 Boerrhinger Ingelheim, Gilead, Grunenthal, Janssen, Novartis, Celgene, Receptos, PharmOlam, 21 SigmoidPharma, Theravance, and grants from Ferring, Abbvie, Schering-Plough, Merck Sharpe & 22 Dhome, Procter & Gamble, Warner Chilcott, Lilly, UCB, Vifor outside the submitted work. GDH 23 reports grants and non-financial support from Olympus Europe, during the conduct of the study; 24

	the NIHR or the Department of Health.	grants and personal fees from AbbVie, grants and personal fees from Medtronic, personal fees from 25 Ablynx, personal fees from Boehringer-Ingelheim, personal fees from Celgene, personal fees from 26 Celltrion, personal fees from Galapagos NV, grants and personal fees from Pfizer, grants and personal 27 fees from Takeda, grants and personal fees from Johnson and Johnson, personal fees from Gilead, 28 personal fees from Topivert, personal fees from Immunic, personal fees from Robarts Clinical Trials, 29 grants and personal fees from Prometheus Laboratories, personal fees from Eli Lily, grants and 30 personal fees from GSK, outside the submitted work. LMW reports grants and non-financial support 31 from Olympus Keymed, during the conduct of the study. SvE reports grants and non-financial support 32 from Olympus Europe, during the conduct of the study. JE reports grants and non-financial support 33 from Olympus Keymed, during the conduct of the study; reports personal fees from Lumendi, from 34 Boston Scientific, outside the submitted work. ED reports grants and non-financial support from 35 Olympus Europe, during the conduct of the study; grants, personal fees and non-financial support 36 from FujiFilm, personal fees from Tillots, outside the submitted work.
Dekker 2007	Not Reported	Not Reported
Drastich 2013	Not Reported	Not Reported
Feitosa 2011	Not Reported	Not Reported
Freire 2014	Not Reported	Not Reported
Ignjatovic 2012	Not Reported	Not Reported
Kiesslich 2003	Not Reported	Not Reported
Kiesslich 2007	Not Reported	Not Reported
Leifield 2015	Not Reported	Not Reported
Mohammed 2015	Not Reported	Not Reported
Pelise 2017	Not Reported	Not Reported
Van de Broek 2008	Not Reported	Not Reported
Van de Broek 2011	Not Reported	Not Reported

Te Groen 2024	Not Reported	Not Reported

eTable 3. Excluded Studies and Reasons for Exclusion

Study ID	Reasons for exclusion
Watanabe 2016	Wrong intervention
Wan 2020	Wrong intervention
Abdulhamid 2021	Not an RCT
Clarke 2020	Not an RCT
Hartery 2017	Not an RCT
Kang 2019	Not an RCT
Kim 2020	Not an RCT
Naik 2020	Not an RCT
Pelitari 2016	Not an RCT
Picco 2019	Not an RCT
Sobrero 2019	Not an RCT
TenHove 2016	Not an RCT
Vaziri 2017	Not an RCT
Sekra 2018	Not an RCT
Ozdinc 2021	Not an RCT
Cassinotti 2023 A/B	Not an RCT

Levartovsky 2023	Not an RCT
Correia 2022	Not an RCT
Lopez-Serrano 2017 A/B	Not an RCT
Lopez-Serrano 2021	Not an RCT
Fluxa 2022	Not an RCT
Gupta 2021	Not an RCT
Alsamman 2018	Not an RCT
Sobrero 2019-a	Not an RCT
Kim 2022	Not an RCT
Coelho-Prabhu 2019	Not an RCT
Elhanafi 2017	Not an RCT
Maeda 2022	Not an RCT
Picardo 2022	Not an RCT
Yoshioka 2016	Not an RCT
Marion 2016	Not an RCT
Kudo 2022	Not an RCT
Pallotta 2017	Not an RCT

RCT: Randomized Controlled Trial

eTable 4. Ongoing Studies

Study ID
Zhang 2022
NCT00816491 2008
NCT04291976 2020
NCT02138318 2014

eTable 5. Studies awaiting classification (completed but no results available)

Study ID
NCT00587236 2007
NCT01505842 2011
NCT01882205 2013
NCT02772406 2016
NCT03250780 2017
NCT04191655 2019
NCT04257084 2020
NTR2362 2010
KCT0001195 2014 – Could not be retrieved
ACTRN12617001364369 2017
NCT05171634 2021

eTable 6. Risk of Bias Details

Alexandersson 2020		
Bias	**Author's judgement**	**Support for judgement**
Random sequence generation (selection bias)	Low risk	At screening visit, participants were randomly assigned using a computer-generated lists of number
Allocation concealment (selection bias)	Unclear risk	No info
Blinding of participants and personnel (performance bias)	High risk	Patients were unblinded but colonoscopists and assistant nurses were blinded
Blinding of outcome assessment (detection bias)	Low risk	Patients were unblinded but colonoscopists and assistant nurses were blinded
Incomplete outcome data (attrition bias)	Low risk	Similar withdrawals numbers per group and similar reasons
Selective reporting (reporting bias)	Unclear risk	No trial protocol
Other bias	Low risk	No major imbalances

Bisschops 2018		
Bias	**Author's judgement**	**Support for judgement**
Random sequence generation (selection bias)	Unclear risk	No info

Allocation concealment (selection bias)	Low risk	Sealed (opaque and unresectable) envelopes that were created by an independent research assistant. After inclusion and prior to the procedure, one envelope was drawn by an independent research assistant, otherwise not involved in the procedure, and opened just before the colonoscopy
Blinding of participants and personnel (performance bias)	High risk	Not blinded
Blinding of outcome assessment (detection bias)	High risk	Not blinded
Incomplete outcome data (attrition bias)	Low risk	Flow chart of patients including randomized and assessed, drop outs equal between groups and reasons given
Selective reporting (reporting bias)	Low risk	Protocol/plan as per clinical trial nct01882205
Other bias	Low risk	No concerns

Dekker 2007		
Bias	**Author's judgement**	**Support for judgement**
Random sequence generation (selection bias)	Unclear risk	No info
Allocation concealment (selection bias)	Low risk	Sealed envelopes
Blinding of participants and personnel (performance bias)	High risk	Not blinded for personnel at first pass. endoscopists were blinded at second pass for the results of the first
Blinding of outcome assessment (detection bias)	Unclear risk	no mention

Incomplete outcome data (attrition bias)	Low risk	No imbalances per groups and reasons given
Selective reporting (reporting bias)	Unclear risk	No trial registration or protocol
Other bias	Unclear risk	No baseline characteristics per group

Drastisch 2013		
Bias	**Author's judgement**	**Support for judgement**
Random sequence generation (selection bias)	Unclear risk	No info
Allocation concealment (selection bias)	Unclear risk	No info
Blinding of participants and personnel (performance bias)	High risk	No mention, but intervention unlikely to be blinded for endoscopists
Blinding of outcome assessment (detection bias)	Unclear risk	No info
Incomplete outcome data (attrition bias)	Unclear risk	No info
Selective reporting (reporting bias)	Unclear risk	No info
Other bias	Unclear risk	No info

Feitosa 2011		
Bias	**Author's judgement**	**Support for judgement**

Random sequence generation (selection bias)	Low risk	Computer-randomized with Excel
Allocation concealment (selection bias)	Unclear risk	No info
Blinding of participants and personnel (performance bias)	High risk	No mention, but intervention unlikely to be blinded for endoscopists
Blinding of outcome assessment (detection bias)	Unclear risk	No mention
Incomplete outcome data (attrition bias)	Low risk	34 randomized, and 34 colonoscopies performed, none left
Selective reporting (reporting bias)	Unclear risk	No info
Other bias	Low risk	No imbalances

Feuerstein 2020		
Bias	**Author's judgement**	**Support for judgement**
Random sequence generation (selection bias)	Unclear risk	No info
Allocation concealment (selection bias)	Unclear risk	No info
Blinding of participants and personnel (performance bias)	High risk	Patients were unblinded
Blinding of outcome assessment (detection bias)	Unclear risk	No info
Incomplete outcome data (attrition bias)	Low risk	Similar numbers per groups (this is an ongoing study: (This is a preliminary analysis of an ongoing study)
Selective reporting (reporting bias)	Unclear risk	No trial protocol mentioned

Other bias	Low risk	Baseline demographic is balanced

Freire 2014		
Bias	**Author's judgement**	**Support for judgement**
Random sequence generation (selection bias)	Low risk	Computer generated
Allocation concealment (selection bias)	Unclear risk	No info
Blinding of participants and personnel (performance bias)	High risk	No mention, but intervention unlikely to be blinded for personnel
Blinding of outcome assessment (detection bias)	Low risk	Histopathologists who evaluated the biopsies were blinded
Incomplete outcome data (attrition bias)	Low risk	Similar attrition and balanced reasons
Selective reporting (reporting bias)	Unclear risk	No info
Other bias	Low risk	Baseline characteristics balanced

Gonzalez-Bernardo 2021		
Bias	**Author's judgement**	**Support for judgement**
Random sequence generation (selection bias)	Low risk	Use of a random number generator
Allocation concealment (selection bias)	Unclear risk	Unclear
Blinding of participants and personnel (performance bias)	High risk	Unlikely to be blinded for personnel

Blinding of outcome assessment (detection bias)	Low risk	Author response: Pathologists who evaluated biopsies were blind
Incomplete outcome data (attrition bias)	Low risk	Flow chart of patients including randomized and assessed, dropouts equal between groups and reasons given
Selective reporting (reporting bias)	Unclear risk	No clinical trial registration
Other bias	Low risk	Baseline demographics balanced

Gulatti 2018		
Bias	**Author's judgement**	**Support for judgement**
Random sequence generation (selection bias)	Low risk	KCTU web-based randomization system designed to conceal allocation from researchers, the chief investigator, and the statistician
Allocation concealment (selection bias)	Low risk	KCTU web-based randomization system designed to conceal allocation from researchers, the chief investigator, and the statistician. A research fellow not performing the colonoscopy revealed each allocation
Blinding of participants and personnel (performance bias)	High risk	Open label- Unblinded study design
Blinding of outcome assessment (detection bias)	Unclear risk	No mention
Incomplete outcome data (attrition bias)	Low risk	Flow chart of patients including randomized and assessed, dropouts equal between groups and reasons given
Selective reporting (reporting bias)	Low risk	Protocol/plan as per clinical trial
Other bias	Low risk	Baseline demographics balanced

Iacucci 2018		
Bias	**Author's judgement**	**Support for judgement**
Random sequence generation (selection bias)	Low risk	Computer generated allocation
Allocation concealment (selection bias)	Low risk	Computer generated allocation. The randomization was assigned before the colonoscopy by an independent coordinator blinded to the patients' history. The patients were randomized consecutively without stratification by presence or absence of primary sclerosing cholangitis, family history, or by gender.
Blinding of participants and personnel (performance bias)	High risk	Patients were not blinded
Blinding of outcome assessment (detection bias)	Low risk	The histology was assessed by XG, SU, and PM, who were blinded to the endoscopic reports.
Incomplete outcome data (attrition bias)	Low risk	Flow chart of patients including randomized and assessed, dropouts equal between groups and reasons given
Selective reporting (reporting bias)	Low risk	NCT02098798 and no deviations
Other bias	Low risk	Baseline demographics balanced

Ignjatovic 2012		
Bias	**Author's judgement**	**Support for judgement**
Random sequence generation (selection bias)	Low risk	Randomization results obtained using a computer-generated sequence were kept in sealed opaque envelopes that were opened by the research nurse once the cecum had been reached

Allocation concealment (selection bias)	Low risk	Randomization results obtained using a computer-generated sequence were kept in sealed opaque envelopes that were opened by the research nurse once the cecum had been reached
Blinding of participants and personnel (performance bias)	High risk	Could not blind
Blinding of outcome assessment (detection bias)	Low risk	Author Ana Wilson verbally confirmed assessors were blinded
Incomplete outcome data (attrition bias)	Low risk	No dropouts
Selective reporting (reporting bias)	Low risk	NCT00292175, no deviations
Other bias	Low risk	No concerns

Kandiah 2021		
Bias	**Author's judgement**	**Support for judgement**
Random sequence generation (selection bias)	Unclear risk	No info
Allocation concealment (selection bias)	Unclear risk	No info
Blinding of participants and personnel (performance bias)	High risk	No info, unlikely blinded for personnel
Blinding of outcome assessment (detection bias)	Unclear risk	No info
Incomplete outcome data (attrition bias)	Unclear risk	No clear details of dropouts
Selective reporting (reporting bias)	Unclear risk	No trial protocol mentioned
Other bias	Low risk	Baseline demographics is balanced

Kiesslich 2003		
Bias	**Author's judgement**	**Support for judgement**
Random sequence generation (selection bias)	Low risk	Computer-aided system
Allocation concealment (selection bias)	Low risk	The respective randomization results were kept in sealed envelopes that were opened directly before the colonoscopy by an independent person who was blinded to the study question
Blinding of participants and personnel (performance bias)	High risk	Could not blind
Blinding of outcome assessment (detection bias)	Low risk	The pathologist was blinded to the recorded assessment of the endoscopist
Incomplete outcome data (attrition bias)	Low risk	Reasons given per group, balanced
Selective reporting (reporting bias)	Unclear risk	No trial reg or protocol
Other bias	Low risk	No concerns

Kiesslich 2007		
Bias	**Author's judgement**	**Support for judgement**
Random sequence generation (selection bias)	Low risk	Patients were randomized by random numbers at a 1:1 ratio into groups using a computer-aided system

Allocation concealment (selection bias)	Low risk	The respective randomization results were kept in sealed envelopes that were opened directly before the colonoscopy by an independent person
Blinding of participants and personnel (performance bias)	High risk	Could not blind
Blinding of outcome assessment (detection bias)	Low risk	The pathologist was blinded to the recorded assessment of the endoscopist
Incomplete outcome data (attrition bias)	Unclear risk	Out of 81 and 80 patients, 80 and 73 completed the protocol, due to poor bowel prep (1 vs 7 poor bowel prep per group
Selective reporting (reporting bias)	Unclear risk	No trial reg or protocol
Other bias	Low risk	Few baseline characteristics reported but balanced

Leifield 2015		
Bias	**Author's judgement**	**Support for judgement**
Random sequence generation (selection bias)	Unclear risk	No info
Allocation concealment (selection bias)	Unclear risk	No info
Blinding of participants and personnel (performance bias)	Low risk	Not blind endoscopists. They were blinded regarding the histopathologic findings of the first examination
Blinding of outcome assessment (detection bias)	Low risk	Each histopathologic examination was performed by2 different pathologists in 2 pathology institutes (University of Cologne and University of Regensburg). Pathologists were blinded regarding the endoscopic procedure chosen and the other pathologist's histopath-ologic diagnosis

Incomplete outcome data (attrition bias)	Unclear risk	159/186 randomised completed the protocol. No reasons given per group
Selective reporting (reporting bias)	Unclear risk	No trial reg or protocol
Other bias	Unclear risk	No characteristics per group

Leong 2017		
Bias	**Author's judgement**	**Support for judgement**
Random sequence generation (selection bias)	Low risk	Computer generated code
Allocation concealment (selection bias)	Low risk	The randomization code was concealed in an opaque envelope and was revealed after informed consent was obtained
Blinding of participants and personnel (performance bias)	High risk	Endoscopists could not be blinded
Blinding of outcome assessment (detection bias)	Low risk	The primary endpoint was dysplasia missed by the first colonoscopy diagnosed by an expert gastrointestinal pathologist blinded to the colonoscope allocation in consensus with a second expert pathologist
Incomplete outcome data (attrition bias)	Low risk	flow of patients including randomized and assessed, drop outs equal between groups and reasons given
Selective reporting (reporting bias)	Low risk	protocol or pe-published plan and followed as per authors statement, key efficacy outcomes and a safety outcome reported
Other bias	Low risk	Baseline demographics balanced

Lord 2018		
Bias	**Author's judgement**	**Support for judgement**
Random sequence generation (selection bias)	Low risk	From thesis: Patients were randomised at the start of the procedure by an independent coordinator blinded to the patient's history. Patients would be randomised into one of two indigo carmine concentrations according to a computer-generated random number sequence, with even numbers assigned to the 0.2%concentration with spray catheter and odd numbers assigned to 0.03% concentration using the foot pump
Allocation concealment (selection bias)	Low risk	From thesis: Patients were randomised at the start of the procedure by an independent coordinator blinded to the patient's history. Patients would be randomised into one of two indigo carmine concentrations according to a computer-generated random number sequence, with even numbers assigned to the 0.2%concentration with spray catheter and odd numbers assigned to 0.03% concentration using the foot pump
Blinding of participants and personnel (performance bias)	High risk	Endoscopists unlikely to be blinded
Blinding of outcome assessment (detection bias)	Low risk	Biopsies were processed as standard procedure and reviewed by an expert tertiary centred gastrointestinal (GI) histopathologist based locally, who was blinded to the randomisation
Incomplete outcome data (attrition bias)	Low risk	144 vs 146 had procedures done from an original of 150 each. Unlikely to have major imbalances in reasons of withdrawal
Selective reporting (reporting bias)	Low risk	NCT03250780. The primary outcome has been registered, the secondary ones not

Other bias	Low risk	No concerns

Mohammed 2015		
Bias	**Author's judgement**	**Support for judgement**
Random sequence generation (selection bias)	Low risk	From author: Computer generated random blocks
Allocation concealment (selection bias)	Low risk	A closed envelope randomisation with block sequence was used and minimization techniques were utilised
Blinding of participants and personnel (performance bias)	High risk	Open label
Blinding of outcome assessment (detection bias)	Low risk	Blinded histopathologists
Incomplete outcome data (attrition bias)	Low risk	No imbalances
Selective reporting (reporting bias)	Low risk	NCT02138318. No major discrepancies
Other bias	Low risk	No major imbalances

Pelise 2017		
Bias	**Author's judgement**	**Support for judgement**
Random sequence generation (selection bias)	Unclear risk	No info
Allocation concealment (selection bias)	Unclear risk	No info

Blinding of participants and personnel (performance bias)	High risk	Could not blind
Blinding of outcome assessment (detection bias)	Low risk	Any specimens exhib-iting dysplasia were reviewed by an independent pathol-ogist (M.C.), and in the event of interobserver disagree-ment, a consensus was reached. For purposes of this study, the pathologists were blinded to the endoscopic technique in question, but were aware of the clinical data of the relevant patient and the type of biopsy
Incomplete outcome data (attrition bias)	Unclear risk	No explanation of dropouts per group
Selective reporting (reporting bias)	Unclear risk	No trial reg or protocol
Other bias	Low risk	There is sex imbalance but no major concerns

Sinonquel 2022		
Bias	**Author's judgement**	**Support for judgement**
Random sequence generation (selection bias)	Unclear risk	No info
Allocation concealment (selection bias)	Unclear risk	No info
Blinding of participants and personnel (performance bias)	High risk	No info - unlikely endoscopists were blind
Blinding of outcome assessment (detection bias)	Unclear risk	No info
Incomplete outcome data (attrition bias)	Unclear risk	No info
Selective reporting (reporting bias)	Unclear risk	No info
Other bias	Unclear risk	No info

Te Groen 2024		
Bias	**Author's judgement**	**Support for judgement**
Random sequence generation (selection bias)	Unclear risk	No info
Allocation concealment (selection bias)	Unclear risk	No info
Blinding of participants and personnel (performance bias)	High risk	Non-blinded study
Blinding of outcome assessment (detection bias)	High risk	Non-blinded study
Incomplete outcome data (attrition bias)	Unclear risk	Numbers and reasons for not completing the procedure are given and explained. HD-CE had 23 people not completing it while HDWL 8 and single pass HD-WL 3. HD CL had also quite higher numbers (17) of delays/logistics than the other two (10, 6). Taken from ECCO 24 presentation slides
Selective reporting (reporting bias)	Low risk	NCT04291976. The outcomes of our interest in the trial registration have been reported
Other bias	Low risk	Some discrepancies in baseline characteristics but not major enough to cause bias probably

Van de Broek 2008		
Bias	**Author's judgement**	**Support for judgement**
Random sequence generation (selection bias)	Unclear risk	No info

Allocation concealment (selection bias)	Low risk	One hundred opaque sealed envelopes contained notes with ‘‘AFI’’ or ‘‘WLE’’ written on them (1:1) for randomisation.
Blinding of participants and personnel (performance bias)	High risk	Could not blind
Blinding of outcome assessment (detection bias)	Low risk	Biopsies were evaluated by two blinded pathologists
Incomplete outcome data (attrition bias)	Low risk	No dropouts
Selective reporting (reporting bias)	Unclear risk	ISRCTN05272746. Retrospectively registered and vague outcome registration.
Other bias	Low risk	No imbalances

Van de Broek 2011		
Bias	**Author’s judgement**	**Support for judgement**
Random sequence generation (selection bias)	Unclear risk	No info
Allocation concealment (selection bias)	Low risk	Randomization was done by opening opaque sealed envelopes (containing notes with either “HDE first” or “NBI first” in a 1 : 1 ratio) once the cecum had been reached during the first procedure
Blinding of participants and personnel (performance bias)	High risk	Could not blind
Blinding of outcome assessment (detection bias)	Low risk	Biopsy material and endoscopic resection specimens were processed using standard procedures and evaluated by two pathologists, one of whom was a gastrointestinal expert. The pathologists were blinded to detection techniques and endoscopic diag-nosis.

Incomplete outcome data (attrition bias)	Low risk	48/53 completed the protocol. Reasons given but no per group. Unlikely to cause bias.
Selective reporting (reporting bias)	Unclear risk	ISRCTN56671833
Other bias	Unclear risk	No characteristics per group

Vleugels 2018		
Bias	**Author's judgement**	**Support for judgement**
Random sequence generation (selection bias)	Low risk	Online randomisation program used
Allocation concealment (selection bias)	Unclear risk	Allocation by research assistant. No details about their relation to the study
Blinding of participants and personnel (performance bias)	High risk	Could not blind
Blinding of outcome assessment (detection bias)	High risk	Could not blind
Incomplete outcome data (attrition bias)	Low risk	No dropouts
Selective reporting (reporting bias)	Unclear risk	NTR4062, but could not be accessed
Other bias	Low risk	No imbalances

Watanabe 2016		
Bias	**Author's judgement**	**Support for judgement**
Random sequence generation (selection bias)	Unclear risk	No info

Allocation concealment (selection bias)	Unclear risk	No info
Blinding of participants and personnel (performance bias)	High risk	Unlikely
Blinding of outcome assessment (detection bias)	Unclear risk	No info
Incomplete outcome data (attrition bias)	Unclear risk	No info
Selective reporting (reporting bias)	Low risk	UMIN000013527, no deviations
Other bias	Unclear risk	No info

Yang 2019		
Bias	**Author's judgement**	**Support for judgement**
Random sequence generation (selection bias)	Low risk	Patients were randomized in a 1:1 ratio by consecutive numbering according to a computer-generated 4-block permuted randomization table developed by an independent statistician.
Allocation concealment (selection bias)	Unclear risk	No info
Blinding of participants and personnel (performance bias)	High risk	Could not blind
Blinding of outcome assessment (detection bias)	Low risk	The pathology of targeted and random biopsy specimens was reviewed by board certified pathologists at each institution, and each biopsy specimen suspicious for dysplasia was reviewed by a central pathologist (H.K.),who was blinded to the randomization
Incomplete outcome data (attrition bias)	Low risk	Flow chart of patients including randomized and assessed, drop outs equal between groups and reasons given

Selective reporting (reporting bias)	Low risk	KCT0001195: 4-2013-0622 Protocol/plan as per clinical trial
Other bias	Low risk	No concerns

eTable 7. Summary of Findings tables and GRADE decisions (red colouring means the results cross the line of no effect)

Patients with at least one dysplastic lesion detected						
Patient or population: people with IBD undergoing CRC surveillance						
Settings: hospital setting						
Intervention: all modalities at RCT level						
Comparison: HD White Light						
Treatment	**Network evidence**		**Anticipated absolute effects for network**			**Notes**
	RR (95% CI)	**Certainty**	**Detections with HD White Light[a]**	**Detections with modality**	**% Detection Difference**	
Full spectrum endoscopy	3.24 (0.66 to 15.87)	Low ⊕⊕⊖⊖	113 per 1,000	366 per 1,000 (75 to 1000)	25.3% more (3.8% less to 100%)	It may be no different to HD White Light (small detection numbers less to large more)
HD chromoendoscopy (all)	1.42 (1.02 to 1.98)	Low ⊕⊕⊖⊖	113 per 1,000	160 per 1,000 (115 to 224)	4.7% more (0.2% more to 11.1% more)	It may detect a small amount more patients with at least one dysplastic lesion (trivial to moderate)
HD White Light with SR	1.35 (0.66 to 2.77)	Very Low ⊕⊖⊖⊖	113 per 1,000	153 per 1,000 (75 to 313)	4% more (3.8% less to 20% more)	The evidence is very inconclusive
Auto-fluorescence imaging	1.18 (0.55 to 2.57)	Very Low ⊕⊖⊖⊖	113 per 1,000	133 per 1,000 (62 to 290)	2% more (5.1% less to 17.7% more)	The evidence is very inconclusive
HD virtual chromoendoscopy (all)	0.99 (0.69 to 1.43)	Very low ⊕⊖⊖⊖	113 per 1,000	112 per 1,000 (78 to 162)	0.1% less (3.5% less to 4.9% more)	The evidence is very inconclusive
GRADE Working Group grades of evidence						
High certainty: we are very confident that the true effect lies close to that of the estimate of the effect.						
Moderate certainty: we are moderately confident in the effect estimate; the true effect is likely to be close to the estimate of the effect, but there is a possibility that it is substantially different.						
Low certainty: our confidence in the effect estimate is limited; the true effect may be substantially different from the estimate of the effect.						
Very low certainty: we have very little confidence in the effect estimate; the true effect is likely to be substantially different from the estimate of effect.						
CI: confidence interval; RR: risk ratio						
[a]The risk with HDWL has been calculated based on the cumulative HDWL rates of all studies with a HDWL arm						

Sucra	Intervention (n=6)	network estimate RR	lower 95%CI	higher 95% CI	Number of direct studies to HD White Light	Direct GRADE	Reasons for direct downgrade	Indirect GRADE	Reasons for indirect downgrade	Network GRADE	Reasons for network downgrade
1	Full spectrum endoscopy	3.24	0.66	15.87	1	high	no reason	x	x	low	twice imprecision
2	HD chromoendoscopy (all)	1.42	1.02	1.98	6	moderate	once RoB	moderate	once RoB	low	once imprecision
3	HD White Light with SR	1.35	0.66	2.77	1	low	twice RoB	low	twice RoB	very low	once imprecision
4	Auto-fluorescence imaging	1.18	0.55	2.57	1	moderate	once RoB	moderate	once RoB	very low	twice imprecision, twice incoherence
6	HD White Light	1									
5	HD virtual chromoendoscopy (all)	0.99	0.69	1.43	4	moderate	once RoB	moderate	once RoB	very low	once imprecision, once incoherence

Patients with at least one dysplastic lesion detected from targeted biopsies						
Patient or population: people with IBD undergoing CRC surveillance						
Settings: hospital setting						
Intervention: all modalities at RCT level						
Comparison: HD White Light						
Treatment	**Network evidence**		**Anticipated absolute effects for network estimate**			**Notes**
	RR (95% CI)	**Certainty**	**Detections with HD White Light[a]**	**Detections with modality**	**% Detection Difference**	
Full spectrum endoscopy	3.24 (0.67 to 15.62)	Low ⊕⊕⊖⊖	100 per 1,000	324 per 1,000 (67 to 1000)	22.4% more (3.3% less to 100% more)	It may be no different to HD White Light (trivial detection numbers less to large more)
HD chromoendoscopy (all)	1.41 (1 to 1.98)	Very low ⊕⊖⊖⊖	100 per 1,000	141 per 1,000 (100 to 198)	4.1% more (0% to 9.8% more)	The evidence is very inconclusive
HD White Light with SR	1.34 (0.67 to 2.67)	Very Low ⊕⊖⊖⊖	100 per 1,000	134 per 1,000 (67 to 267)	3.4% more (3.3% less to 16.7% more)	The evidence is very inconclusive
Auto-fluorescence imaging	1.16 (0.55 to 2.48)	Very Low ⊕⊖⊖⊖	100 per 1,000	116 per 1,000 (55 to 248)	1.6% more (4.5% less to 14.8% more)	The evidence is very inconclusive
HD virtual chromoendoscopy (all)	1.06 (0.72 to 1.55)	Very low ⊕⊖⊖⊖	100 per 1,000	106 per 1,000 (72 to 155)	0.6% more (2.8% less to 5.5% more)	The evidence is very inconclusive
GRADE Working Group grades of evidence						
High certainty: we are very confident that the true effect lies close to that of the estimate of the effect.						
Moderate certainty: we are moderately confident in the effect estimate; the true effect is likely to be close to the estimate of the effect, but there is a possibility that it is substantially different.						
Low certainty: our confidence in the effect estimate is limited; the true effect may be substantially different from the estimate of the effect.						
Very low certainty: we have very little confidence in the effect estimate; the true effect is likely to be substantially different from the estimate of effect.						
CI: confidence interval; RR: risk ratio						
[a]The risk with HDWL has been calculated based on the cumulative HDWL rates of all studies with a HDWL arm						

Intervention (n=6)	network estimate RR	lower 95%CI	higher 95% CI	Number of direct studies to HD White Light	Direct GRADE	Reasons for direct downgrade	Indirect GRADE	Reasons for indirect downgrade	Network GRADE	Reasons for network downgrade
Full spectrum endoscopy	3.24	0.67	15.62	1	high	no reason	x	x	low	twice imprecision
HD chromoendoscopy (all)	1.41	1	1.98	6	moderate	once RoB	moderate	once RoB	very low	twice imprecision
HD White Light with SR	1.34	0.67	2.67	1	low	twice RoB	low	twice RoB	very low	once imprecision
Auto-fluorescence imaging	1.16	0.55	2.48	1	moderate	once RoB	moderate	once RoB	very low	twice imprecision, twice incoherence
HD virtual chromoendoscopy (all)	1.06	0.72	1.55	3	moderate	once RoB	moderate	once RoB	very low	once imprecision, once incoherence
HD White Light	1									

Patients with at least one lesion (of any type) detected						
Patient or population: people with IBD undergoing CRC surveillance						
Settings: hospital setting						
Intervention: all modalities at RCT level						
Comparison: HD White Light						
Treatment	**Network evidence**		**Anticipated absolute effects for network estimate**			**Notes**
	RR (95% CI)	**Certainty**	**Detections with HD White Light[a]**	**Detections with modality**	**% Detection Difference**	
HD chromoendoscopy (all)	1.34 (0.89 to 2.01)	Very Low ⨁⊖⊖⊖	187 per 1,000	251 per 1,000 (166 to 376)	6.4% more (2.1% less to 18.9% more)	The evidence is very inconclusive
Auto-fluorescence imaging	1.32 (0.7 to 2.49)	Very Low ⨁⊖⊖⊖	187 per 1,000	247 per 1,000 (131 to 466)	6% more (5.6% less to 27.9% more)	The evidence is very inconclusive
HD virtual chromoendoscopy (all)	0.98 (0.58 to 1.66)	Very low ⨁⊖⊖⊖	187 per 1,000	183 per 1,000 (108 to 310)	0.4% less (7.9% less to 12.3% more)	The evidence is very inconclusive
GRADE Working Group grades of evidence						
High certainty: we are very confident that the true effect lies close to that of the estimate of the effect.						
Moderate certainty: we are moderately confident in the effect estimate; the true effect is likely to be close to the estimate of the effect, but there is a possibility that it is substantially different.						
Low certainty: our confidence in the effect estimate is limited; the true effect may be substantially different from the estimate of the effect.						
Very low certainty: we have very little confidence in the effect estimate; the true effect is likely to be substantially different from the estimate of effect.						
CI: confidence interval; RR: risk ratio						
[a]The risk with HDWL has been calculated based on the cumulative HDWL rates of all studies with a HDWL arm						

Sucra	Intervention (n=6)	network estimate	lower 95%	higher 95% CI	Number of direct studies to HD White Light	Direct GRADE	Reasons for direct downgrade	Indirect GRADE	Reasons for indirect downgrade	Network GRADE	Reasons for network downgrade
1	HD chromoendoscopy (all)	1.34	0.89	2.01	4	low	once RoB, once inconsistency	very low	once RoB, twice inconsistency	very low	twice imprecision
2	Auto-fluorescence imaging	1.32	0.7	2.49	1	moderate	once RoB	moderate	once RoB	very low	twice imprecision, twice incoherence
3	HD virtual chromoendoscopy (all)	0.98	0.58	1.66	2	low	twice inconsistency	very low	once RoB, twice inconsistency	very low	twice imprecision
4	HD White Light	1									

eTable 8. Predefined magnitude effect thresholds

	Trivial to Small	Small to Moderate	Moderate to Large
Dysplasia	3.3%	5.8%	11.2%
Dysplasia - targeted	3.4%	6.7%	10.9%
Dysplasia - random	3.5%	6.2%	10%
SAEs	2.6%	5.1%	8.4%
All lesions	4.1%	7.9%	15.1%

eTable 9. Extracted outcome data

Patients with at least one dysplastic lesion detected (Vienna 2-5)

Study ID	Outcome 1 - Dysplasia (Vienna 205) Detection
Alexandersson 2020	HD WLE: 9/153 (5.88%) HD CE: 21/152 (13.82%)
Feuerstein 2020	HD WLE: 2/48 (4.17%) HD CE: 4/41 (9.76%)
Kandiah 2021	HD WLE: 22/102 (21.59%) HD VCE: 14/102 (13.73%)
Yang 2019	HD WLE: 7/108 (6.48%) HD CE: 9/102 (8.82%)
Bisschops 2018	HD CE: 14/74 (18.92%) HD VCE: 14/83 (16.87%)
Watanabe 2016 B	HD CE: 16/130 (12.31%) HD VCE: 14/133 (10.53%)
Iacucci 2016/2018	HD WLE: 23/90 (25.56%) HD CE: 22/90 (24.44%) HD VCE: 14/90 (15.56%)
Sinonquel 2022	HD CE:13/71(18.31%) HD VCE: 18/65 (27.69%)
Lord 2018	HD CE: 35/150 (23.33%) HD CE 0.03%: 32/150 (21.33%)
Gonzalez-Bernardo 2021	HD CE: 9/67 (13.43%) HD VCE: 7/62 (11.29%)
Gulatti 2018	HD CE: 8/25 (32%) HD VCE:1/23 (4.35%)
Leong 2017 A	HD WLE: 2/27(7.41%) FUSE: 6/25 (24%)

Vleugels 2018	HD CE: 20/105 (19.05%) AFI: 13/105 (12.38%)
Dekker 2007	WLE: NR/22 VCE (first generation): NR/ 20
Drastich 2013	WLE: NR/NR AFI: NR/NR
Feitosa 2011	HD CE: 4/18 (22.22%) HD VCE: 0/16 (0%)
Freire 2014	CE: 6/72 (8.33%) WLE: 4/73 (5.48%)
Ignjatovic 2012	HD WLE: 6/56 (10.71%) HD VCE: 5/56 (8.93%)
Kiesslich 2003	CE: 13/84 (15.48%) WLE: 6/81(7.41%)
Kiesslich 2007	CE: 11/81 (13.58%) WLE: 4/80 (5.00%)
Leifield 2015	WLE: NR/NR NBI: NR/NR
Mohammed 2015	HC CE: 20/79 (25.32) HD WLE: 10/79 (12.66)
Pelise 2017	HD CE: 4/27 (14.81%) HD VCE: 4/33 (12.12%)
Van de Broek 2008	HD WLE: 2/25 (8.00%) AFI: 6/25 (24.00%)
Van de Broek 2011	HD WLE: 6/25 (24.00%) HD VCE: 5/23 (21.74%)
Te Groen 2024	HD WLE: 7/133 (5.26%) HD CE: 28/268 (10.45%) HD WLE with SR: 24/265 (9.06%)

Patients with at least one dysplastic lesion detected from targeted biopsies

Study ID	
Alexandersson 2020	HD WLE: 7/153 (4.58%) HD CE: 17/152 (11.18%)
Feuerstein 2020	HD WLE: 2/48 (4.17%) CE: 4/41 (9.76%)
Kandiah 2021	HD WLE: 21/102 (20.59%) HD VCE: 14/102 (13.73%)
Yang 2019	HD WLE: 2/108 (1.85%) HD CE: 4/102 (3.92%)
Bisschops 2018	HD CE: 14/74 (18.92%) HD VCE: 14/83 (16.87%)
Watanabe 2016 B	HD CE: 16/130 (12.31%) HD VCE: 14/133 (10.53%)
Iacucci 2016/2018	HD WLE: 23/90 (25.56%) HD CE: 22/90 (24.44%) HD VCE: 14/90 (15.56%)
Sinonquel 2022	HD CE: 13/71 (18.31%) HD VCE: 18/65 (27.69%)
Lord 2018	HD CE 0.2%: 32/150 (21.33%) HD CE 0.03%: 26/150 (17.33%)
Gonzalez-Bernardo 2021	HD CE: 9/67 (13.43%) HD VCE: 7/62 (11.29%)
Gulatti 2018	CE: NR/ 67 VCE: NR/62
Leong 2017 A	HD WLE: 2/27 (7.41%) FUSE: 6/25 (24.00%)
Vleugels 2018	HD CE: 20/105 (19.05%) AFI: 13/105 (12.38%)
Dekker 2007	WLE: NR/22

	VCE: NR/ 20
Drastich 2013	WLE: NR/NR AFI: NR/NR
Feitosa 2011	CE: NR/18 NBI: NR/16
Freire 2014	CE: NR/72 CC: NR/73
Ignjatovic 2012	WLE: 6/56 (10.71%) NBI: 5/56 (8.93%)
Kiesslich 2003	CE: 13/84 (15.48%) CC: 6/81 (7.41%)
Kiesslich 2007	CE: NR/81 CC: NR/ 80
Leifield 2015	WLE: NR/NR NBI: NR/NR
Mohammed 2015	HD CE: 20/79 (25.32%) HD WLE: 10/79 (12.66%)
Pelise 2017	CE: 4/27 (14.18%) NBI: 4/33 (12.12%)
Van de Broek 2008	WLE: 2/25 (8.00%) AFI: 6/25 (24.00%)
Van de Broek 2011	HD CE: NR/ 25 NBI: NR/23
Te Groen 2024	HD WLE: 7/133 (5.26%) HD CE: 28/268 (10.45%) HD WLE with SR: 24/265 (9.06%)

Patients with at least one dysplastic lesion detected from random biopsies

Study ID	
Alexandersson 2020	HD WLE: 3/153 (1.96%) HD CE: 6/152 (3.95%)
Feuerstein 2020	HD WLE: NR/48 CE: NR/41
Kandiah 2021	HD WLE: 1/102 (0.98%) HD VCE: 0/102 (0%)
Yang 2019	HD WLE: 4/108 (3.70%) HD CE: 0/102 (0%)
Bisschops 2018	HD CE: NR/74 HD VCE: NR/83
Watanabe 2016 B	HD CE: NR/130 HD VCE: NR/133
Iacucci 2016/2018	HD WLE: NR/90 HD CE: NR/90 HD VCE: NR/90
Sinonquel 2022	HD CE: NR/71 HD VCE: NR/65
Lord 2018	HD CE 0.2%: 3/150 (2.00%) HD CE 0.03%: 6/150 (4.00%)
Gonzalez-Bernardo 2021	HD CE: NR/67 HD VCE: NR/62
Gulatti 2018	CE: NR/25 VCE: NR/23
Leong 2017 A	HD WLE: NR/27 FUSE: NR/25
Vleugels 2018	HD CE: NR/105 AFI: NR/105
Dekker 2007	WLE: NR/22

	VCE: NR/20
Drastich 2013	WLE: NR/NR AFI: NR/NR
Feitosa 2011	CE: NR/18 NBI: NR/16
Freire 2014	CE: NR/72 CC: NR/73
Ignjatovic 2012	WLE: 0/56 (0%) NBI: 1/56 (1.79%)
Kiesslich 2003	CE: NR/84 CC: NR/81
Kiesslich 2007	CE: 0/81 (0%) CC: 2/80 (2.50%)
Leifield 2015	WLE: NR/NR NBI: NR/NR
Mohammed 2015	HD CE: 0/79 (0%) HD WLE: 1/79 (1.27%)
Pelise 2017	CE: NR/27 NBI: NR/33
Van de Broek 2008	WLE: 0/25 (0%) AFI: 0/25 (0%)
Van de Broek 2011	HD CE: NR/25 NBI: NR/23
Te Groen 2024	HD WLE: 0/133 (0%) HD CE: 0/268 (0%) HD WLE with SR: 0/265 (0%)

Patients with serious adverse events

Study ID	
Alexandersson 2020	HD WLE : NR/153 HD CE : NR/152
Feuerstein 2020	HD WLE : 0/48 (0.00%) CE : 0/41 (0.00%)
Kandiah 2021	HD WLE : 0/102 (0.00%) HD VCE : 0/102 (0.00%)
Yang 2019	HD WLE : 0/108 (0.00%) HD CE : 0/102 (0.00%)
Bisschops 2018	CE : NR/74 NBI : NR/83
Watanabe 2016 B	PCE : NR/130 NBI : NR/133
Iacucci 2016/2018	HD WLE : 0/90 (0.00%) CE : 0/90 (0.00%) HD VCE : 0/90 (0.00%)
Sinonquel 2022	DCE : NR/71 VCE : NR/65
Lord 2018	HD CE 0.2%: NR/150 HD CE 0.03% : NR/150
Gonzalez-Bernardo 2021	CE : NR/67 VCE : NR/62
Gulatti 2018	CE : 0/25 (0.00%) VCE : 0/23 (0.00%)
Leong 2017 A	FV CE : 0/27 (0.00%) FUSE : 0/25 (0.00%)
Vleugels 2018	CE : 1/105 (0.95%) AFI : 0/105 (0.00%)
Dekker 2007	WLE : NR/22

	NBI : NR/20
Drastich 2013	NOT MENTIONED : NR/NR NOT MENTIONED : NR/NR
Feitosa 2011	CE : NR/13 NBI : NR/16
Freire 2014	CE : NR/72 CC : NR/73
Ignjatovic 2012	WLE : 0/56 (0.00%) NBI : 0/56 (0.00%)
Kiesslich 2003	CE : NR/84 CC : NR/81
Kiesslich 2007	CE : NR/81 CC : NR/80
Leifield 2015	WLE : NR/NR NBI : NR/NR
Mohammed 2015	HD CE : 0/79 (0.00%) HD WLE : 0/79 (0.00%)
Pelise 2017	CE : NR/27 NBI : NR/33
Van de Broek 2008	WLE : 0/25 (0.00%) AFI : NR/0
Van de Broek 2011	HD CE : NR/25 NBI : NR/23
Te Groen 2024	HD WLE : 0/133 (0.00%) HD CE : 1/268 (0.37%) HD WLE SR : 0/265 (0.00%)

Patients with at least one lesion of any type detected (Vienna 1-5)

Study ID	
Alexandersson 2020	HD WLE : 9/153 (5.88%) HD CE : 21/152 (13.82%)
Feuerstein 2020	HD WLE : 16/48 (33.33%) HD CE : 21/41 (51.22%)
Kandiah 2021	HD WLE : NR/102 HD VCE : NR/102
Yang 2019	HD WLE : 13/108 (12.04%)) HD CE : 21/102 (20.59%)
Bisschops 2018	HD CE : NR/74 HD VCE: NR/83
Watanabe 2016 B	PCE : NR/130 NBI : NR/133
Iacucci 2016/2018	HD WLE : 26/90 (28.89%) HD CE : 23/90(25.56%) CE : 15/90 (16.67%)
Sinonquel 2022	HD CE : NR/71 HD VCE : NR/65
Lord 2018	HD CE : NR/150 HD CE 0.03% : NR/150
Gonzalez-Bernardo 2021	HD CE : 12/67 (17.91%) HD VCE : 12/62 (19.35%)
Gulatti 2018	HD CE : 8/25 (32.00%) HD VCE : 1/23 (4.35%)
Leong 2017 A	HD WLE : NR/27 FUSE : NR/25
Vleugels 2018	HD CE : 16/105 (15.24%) AFI : 26/105 (24.76%)
Dekker 2007	WLE : NR/22

	NBI : NR/20
Drastich 2013	NOT MENTIONED : NR/NR NOT MENTIONED : NR/NR
Feitosa 2011	HD CE : NR/18 HD VCE : 0/16(0.00%)
Freire 2014	CE : NR/72 WLE : NR/73
Ignjatovic 2012	HD WLE : 8/56(14.29%) HD VCE :13/56 (23.21%)
Kiesslich 2003	CE : NR/84 WLE : NR/81
Kiesslich 2007	CE : NR/81 WLE : NR/80
Leifield 2015	WLE : NR/NR NBI : NR/NR
Mohammed 2015	HD CE: NR/79 HD WLE : NR/79
Pelise 2017	HD CE : 17/27 (62.96%) HD VCE :16/33(48.48%)
Van de Broek 2008	HD WLE: 18/25 (72.00%) AFI : 16/25 (64.00%)
Van de Broek 2011	HD WLE : NR/25 HD VCE : NR/23
Te Groen 2024	HD WLE : NR/133 HD CE : NR/268 HD WLE SR NR/265

Patients with any adverse events

Study ID	
Alexandersson 2020	Not reported
Feuerstein 2020	Not reported
Kandiah 2021	Not reported
Yang 2019	None
Bisschops 2018	Not reported
Watanabe 2016 B	Not reported
Iacucci 2016/2018	None
Sinonquel 2022	Not reported
Lord 2018	Not reported
Gonzalez-Bernardo 2021	Not reported
Gulatti 2018	None
Leong 2017 A	Temporary urine discoloration : FVC - 7 patients/ 27 total patients, FUSE - 7 patients / 25 total patients. Transient abdominal bloating : FVC - 14 patients / 27 total patients, FUSE - 9 patients / 25 total patients.
Vleugels 2018	5 patients / 210 patients
Dekker 2007	Not reported

Drastich 2013	Not reported
Feitosa 2011	Not reported
Freire 2014	None
Ignjatovic 2012	Not reported
Kiesslich 2003	Not reported
Kiesslich 2007	Not reported
Leifield 2015	Not reported
Mohammed 2015	Not reported
Pelise 2017	Not reported
Van de Broek 2008	Not reported
Van de Broek 2011	None
Te Groen 2024	Not reported

Withdrawals due to adverse events

Study ID	
Alexandersson 2020	Not reported
Feuerstein 2020	Not reported
Kandiah 2021	Not reported
Yang 2019	None
Bisschops 2018	Not reported
Watanabe 2016 B	Not reported
Iacucci 2016/2018	None
Sinonquel 2022	Not reported
Lord 2018	Not reported
Gonzalez-Bernardo 2021	Not reported
Gulatti 2018	None
Leong 2017 A	None
Vleugels 2018	Not reported
Dekker 2007	Not reported
Drastich 2013	Not reported
Feitosa 2011	Not reported

Freire 2014	None
Ignjatovic 2012	Not reported
Kiesslich 2003	Not reported
Kiesslich 2007	Not reported
Leifield 2015	Not reported
Mohammed 2015	Not reported
Pelise 2017	Not reported
Van de Broek 2008	Not reported
Van de Broek 2011	None
Te Groen 2024	Not reported

eTable 10. Additional extracted Details of the Included Studies

Serial No.	Study ID	Inclusion criteria: (age, type of IBD, IBD activity, previous therapy, concurrent disease eg. anorexia, PSC, Post cancer surveillance or post surgery),	Exclusion criteria: (e.g. organic causes, previous surgery)	Age per IG/CG Mean or median and measure of spread	Sex (M/F) per IG/CG: Mean or median and measure of spread	Details of Endoscopy technology – if reported	Additional Procedure details – if reported	Concurrent therapies per IG/CG: Was any other treatment allowed/given (e.g. meds, rescue meds)? anything given to all or any ammendments or additions to imaging allowed Report numbers per group or percentage (state)	Description of the intervention (including way of delivery and regimen) per IG/CG: type of imaging, tech, company, manufacturer per GROUP,
1.	Kiesslich 2003	Clinically and histologically verified UC Disease duration >8 years Colitis Activity Index <8 Activity index of Truelove and Witts: mild	Known intraepithelial neoplasia or colorectal cancer or any other malignancy Coagulopathy Prothrombin time <50% of control Partial thromboplastin time >50 seconds Impaired renal function Creatinine >1.2 mg/dL Pregnancy Inability to obtain informed consent Known allergy to methylene blue	Conventional - 38.7. Chromoendoscopy - 42.2	not reported	Magnification endoscopy with Pentax (EC 3831 FZ) and Olympus Exera magnification colonoscope (CF-Q160 ZI)	N/A	Maintenance with Mesalamine CE 52, CG - 44	Chromoendoscopy: Methylene blue was used for staining in a final concentration of 0.1%. The colon was stained in a segmental fashion (30 cm of colon at a time). Excess dye was removed by suction. Conventional colonoscopy: Conventional video-colonoscopes (Pentax EC 3830FK). Inflammatory changes were classified similarly to the chromoendoscopy group. Sequential biopsy specimens were taken in a systematic fashion in both groups; every 10 cm, 5 biopsy specimens were taken.
2.	Kiesslich 2007	Clinically and histologically verified UC. Disease duration >8 y. Colitis Activity	Known intraepithelial neoplasia or colorectal cancer, Coagulopathy (Prothrombin time <50%, partial thromboplastin time >50 sec), Impaired renal function	Group A (IG) - 46.2. Group B (CG) - 41.9	not reported	Confocal laser endoscope	N/A	Maintenance mesalamine therapy: 63.8% (IG), 80.8% (CG).	IG: Chromoscopy with endomicroscopy using fluorescein and methylene blue.

		Index equal to or < 8. Activity index of Truelove and Witts: mild.	(Creatinine >1.2 mg/dL), Pregnancy or breastfeeding, Inability to obtain informed consent, Known allergy to methylene blue or fluorescein						CG: Standard video endoscopy with random biopsy. Mucosal abnormalities were recorded in both groups with regard to location (distance from the anus in centimeters), morphology (polypoid, flat, depressed), and size. On withdrawal of the colonoscope from the cecum to the anus, sequential biopsy specimens were taken in a systematic fashion in both groups. In group A, endomicroscopy was performed every 10 –15 cm and biopsy specimens were taken only in the presence of in vivo mucosal irregularities.
3.	Dekker Endoscopy 2007	The inclusion criteria for participation were an objective diagnosis of ulcerative colitis(based on endoscopic and/or histopathological assessment), a history of pancolitis, disease duration of 8 years or more, and inactive	Exclusion criteria were non-correctable coagulopathy, age ≤ 18 years, and inability to give informed consent.	mean age (SD) of 50 +/- 11.2 years	The study group comprised 31 men and 11 women	White−light endoscopy was performed with conventional video colonoscopes (CF−140 or CF−160 series; Olympus Medical Systems Europe, Hamburg, Germany). No magnification or dye spray was used in this arm of the study. Narrow−band imaging was performed using a first−generation prototype	All patients were prepared with four liters of hypertonic poly−ethylene glycol solution (Kleanprep; Helix Bio−pharma Corp., Aurora, Ontario, Canada). The procedures were performed under conscious sedation using midazolam and/or fentanyl. Cecal intubation was confirmed by identification	37 patients (88%) were on disease−modifying drugs, mostly (in 74% of cases) mesalamines or combined therapies with mesalamines and azathioprine.	When performing Narrow Band Imaging colonoscopy, the endoscope was advanced into the cecum using the WLE mode. On reaching the cecum, the imaging mode was switched to Narrow Band Imaging, which was used for the entire withdrawal. During colonoscopy by both Narrow Band Imaging and WLE, the number of

		disease assessed by the modified Truelove and Witts severity index.				endoscopic imaging system (Evis CV−240, CF−Q240 endoscope; Olympus Medical Systems, Tokyo, Japan), which has two imaging modes (WLE and Narrow Band Imaging). An experimental light source (Olympus Evis CLV−U40) was used, in which the excita− tion light is sequentially separated into red, green, and blue.	of the appendiceal orifice and ileocecal valve. At the start of withdrawal of the endoscope, 20 mg butyl scopolamine was given intravenously to reduce colonic motility and repeated at the discretion of the endoscopist		lesions suspicious for neoplasia was noted and targeted biopsies were taken from these areas. Suspicious lesions on Narrow Band Imaging were defined as polypoid or irregular mucosal structures with Kudo pit patterns III±V unusual ulcers, strictures, or areas with increased vascular intensity revealed by dark discoloration. On WLE, suspicion was aroused by polypoid or irregular mucosa, and unusual ulcers or strictures. During WLE (but not during Narrow Band Imaging) additional four−quadrant random biopsies were taken every 10 cm of colon. For both procedures, the number of suspicious lesions, the number of targeted biopsies, and the procedure time were recorded.
4.	van de Broek 2008	Ulcerative colitis, disease duration >8 years, inactive pancolitis, Truelove and Witts Index <2.	Exclusion criteria Non-correctable coagulopathy, age <18, poor bowel preparation	Mean age AFI= 50 WLE= 51	AFI = M 17, F8 WLE= M14, F11	All colonoscopies were performed with a prototype ETMI system (Olympus Inc., Tokyo, Japan). The light source (XCLV260HP) contains two rotating red-green–blue RGB filters; one conventional for WLE and one additional for	Patients were prepared with 4 litres of hypertonic polyethylene glycol solution (Kleanprep; Norgine, Marburg, Germany) and received conscious sedation.	92% (IG) and 72% (CG) of patients were on disease-modifying drugs	The endoscope was advanced in the WLE mode and caecal intubation was confirmed by identification of the appendiceal orifice and ileocaecal valve. No biopsies were taken during insertion of the endoscope. During withdrawal of the colonoscope, each colonic segment

						Narrow Band Imaging, in which the band-pass ranges are narrowed to wavelengths of 530–550 nm (green) and 390–445 nm (blue). The zoom video-colonoscope (XCF-H240FZL; magnification 6100) contains two charge-coupled devices, one for WLE/Narrow Band Imaging and one for AFI.			was inspected twice: once with AFI and once with WLE. The hepatic and splenic flexures separated the colonic segments; in case of indistinct flexures a biopsy was taken for reference during the second inspection.
5.	van den Broek 2011	The inclusion criteria were: disease history at least 8 years, and endoscopically proven colitis proximal to the splenic flexure in the past with currently inactive disease defined by a Truelove and Witts activity index of 2 or less . An objective diagnosis of ulcerative colitis was also mandatory, based on former endoscopic and histopathological findings	Exclusion criteria were: noncorrectable coagulopathy, age 18 years or less, insufficient bowel preparation for accurate mucosal inspection, and inability to provide informed consent.	mean age = 56	Not mentioned	Colonoscopies were performed using the Lucera system with sequential red–green–blue illumination (CV-H260; Olympus, Tokyo, Japan) incorporating HDE, Narrow Band Imaging, and optical magnification (× 100). Switching between these imaging modes was done by pressing a button on the shaft of the endoscope (CF-H260; Olympus). High-definition monitors (1080i) were used during the procedures.	Patients were prepared with 4 L of hypertonic polyethylene glycol solution (Kleanprep; Norgine Inc., Amsterdam, the Netherlands) and underwent both colonoscopies under conscious sedation with midazolam and/or fentanyl.	Anti-inflammatory drug use overall -,39 (81%)	A time interval of at least 3 weeks between the two procedures was chosen to allow healing of biopsy sites, so that the sampling sites could not be recognized during the second examination. The endoscope was first advanced to the cecum using the HDE mode in all patients. Lesions found during the insertion phase were neglected and left unharmed. For the Narrow Band Imaging examination, the endoscope was switched to Narrow Band Imaging mode once the cecum had been reached. Cecal intubation was confirmed by identification of the appendiceal orifice and ileocecal valve or by intubation of the

									ileum. At the start of withdrawal, 20 mg butyl scopolamine was given to reduce colonic motility, and this was repeated at the discretion of the endoscopist. During withdrawal from the cecum, the colon was scrutinized for the presence of dysplasia-associated lesions or masses (DALMs), mucosal irregularities, ulcers, and strictures. Any detected lesions were classified according to the macroscopic classification of early gastrointestinal neoplasia
6.	Feitosa 2011	Not mentioned	Not mentioned	Mean age Chromoendoscopy= 50.3 years Narrow Band Imaging= 49.5 years	Chromoendoscopy= (9F,4M) Narrow Band Imaging=(11F,5M)	Not mentioned	Not mentioned	Not mentioned	Not mentioned
7.	Ignjatovic 2012	an objective diagnosis of left -sided or pancolitis (endoscopic and histological), disease duration of >8 years for pancolitis and >10 years for left -sided colitis, with evidence of histological infl ammation at the previous colonoscopy. Because of slow	age ≤ 18 years, inability or unwillingness to consent to the procedure, and severe active colitis (endoscopist assessment).	WLE - 52, Narrow Band Imaging - 53	WLE- 25 females and 31 males. Narrow Band Imaging - 34 males and 22 females	Th e Olympus Lucera Spectrum video endoscopy system with high-defi nition colonoscopes was used for all cases (XCF_x0002_H240 FZL / I and CF-H260AZL video colonoscopes, XCLV-260HP xenon light source and XCV-260HP video system center; Olympus, Tokyo, Japan; Narrow Band Imaging filters: blue, centered on 415 nm; green, centered on 540	Patients were prepared with Senna and two sachets of magnesium citrate (Citramag, Sanochemia, Vienna, Austria) or 4 liters of PEG solution (Klean-Prep, Norgine, Harefi eld, Middlesex, UK). Colonoscopies were performed with patients unsedated or under conscious sedation using	WLE Group (n = 56): Maintenance 5-ASA: 29 patients (52%) Maintenance Sulphasalazine: 13 patients (23%) Maintenance Azathioprine: 13 patients (23%) NBI Group (n = 56): Maintenance 5-ASA: 27 patients (48%) Maintenance Sulphasalazine: 12 patients (21%) Maintenance Azathioprine: 13 patients (23%)	The colon was examined segmentally, with targeted biopsies or definite resection (snare polypectomy or endoscopic mucosal resection) of any suspected dysplastic lesions. Areas suspicious for dysplasia were defined as any mucosal irregularity, strictur_x0002_ing, or ulceration not consistent with active or chronic UC as seen with WLE. In addition to

		recruitment, the last inclusion criterion was abolished after 40 patients had been recruited				nm). Output was to a high-definition 1080i (i.e. 1,080 lines of vertical resolution), 14-inch monitor (OEV181H, Olym_x0002_pus).	midazolam and pethidine. Patients were given 20 mg of intravenous hyoscine butylbromide at the start of the procedure or on reaching the cecum, with additional antispasmodic given at the discretion of the endoscopist. Assessment of bowel preparation was made once the cecum was reached as follows: good (only liquid stool present removable with suction), adequate (some semi-formed stool obscuring < 10 % of the mucosa aft er suction), and poor (>10 % of the mucosa obscured by solid stool after suction).		these, suspicious lesions on Narrow Band Imaging were defined as those with increased vascular intensity and Kudo pit pattern III – V. The size (measured against open biopsy forceps), position (colonic segment), shape (Paris classification), and endo_x0002_scopi c diagnosis were recorded for each lesion. Once a lesion was resected, quadrantic biopsies from the surrounding mucosa were taken. Targeted biopsies were sent to histopathology in a separate pot. In both arms of the study, random, nontargeted quadrantic biopsies were taken every 10 cm on withdrawal and the number of suspicious lesions; the number of targeted biopsies and withdrawal times were recorded.
8.	Drastich 2013	Not mentioned	Not mentioned	Not mentioned	Not mentioned	Not mentioned	Not mentioned	Not mentioned	Each colonic segment was inspected twice, once with autofluorescence imaging (AFI) and once with white-light endoscopy (WLE), in random order. Biopsies from all suspected lesions and

									standard four quadrant random biopsies every 10 cm were taken
9.	Freire 2014	The inclusion criteria consisted of patients aged 18 years or older, with a confirmed diagnosis (based on established clinical, endoscopic, radiological, and histological criteria) of longstanding (>8 yr) left side or extending UC, clinically inactive (Simple Clinical Colitis Activity Index).	Exclusion criteria were as follows: unwillingness to consent to the protocol, personal history of IN or CRC, diagnosis of PSC, known allergy to methylene blue or fluorescein, pregnant or nursing women, coagulopathy (prothrombin time <50% of control, partial thromboplastin time >50 sec), or impaired renal function (creatinine level >1.2 mg/dL)	Mean age Group A CGE = 49.2 +/- 13.5 Group B CC= 51.7 +/- 15.6	Not mentioned	Pentax EC-3870CIFK (endomicroscopy function only used in group A)	All patients received a standard bowel preparation (4L polyethylene glycol). Patients were under propofol-induced sedation or conscious sedation with intravenous midazolam if required.	Maintenance therapy were not significantly different between the 2 groups	Group A (CGE): After reaching the cecum, the colon was stained using methylene blue 0.1% following chromoendoscopy guidelines. Abnormalities (circumscribed lesions) were evaluated by endomicroscopy and then biopsied or removed. Only circumscribed lesions were evaluated. Sodium fluorescein 10% was injected for contrast during endomicroscopy, and lesions were graded using the Mainz–Kiesslich confocal pattern classification. Group B (CC): After cecal extubation, 4-quadrant random biopsies were taken every 10 cm, along with targeted biopsies or resections of abnormal-appearing mucosa. Biopsies were processed in individual formalin pots based on the distance from the anal verge.
10.	Leifeld 2015	The inclusion criteria were clinically and histologically proven pancolitis for more than 8 years and	The exclusion criteria were contraindications to colonoscopy, history of partial colectomy, and reasonable doubts regarding patient cooperation.	Age, mean (SD): 48.0 ± 11.3 years	64% male in both groups	NBI (Narrow-band imaging) vs. WLE (White-light endoscopy)	Bowel cleansing was performed according to the standards of each study center.	Not reporterd	The study involved experienced endoscopists at each center, using standardized techniques across all procedures. Each center was

		leftsided UC for more than 15 years, age older than 18 years, last surveillance colonoscopy more than 10 months ago, and clinical remission of UC.							equipped with Olympus Evis Exera II video systems and videocolonoscopes . In WLE, stepwise random biopsy specimens (4 biopsies every 10 cm) were taken along with targeted biopsies from suspicious areas. In Narrow Band Imaging, segmental and targeted biopsies were taken. The primary endpoint was the detection of IN, with a focus on non-adenoma-like and adenoma-like lesions.
11.	Mohammed 2015	1. Patients with longstanding (more than 8 years of disease), extensive (extending proximal to splenic flexure) colitis attending for surveillance colonoscopy 2. Patients aged over 18 years of age.	Pre-intubation 1. Pregnancy 2. Unwilling or unable to give informed consent 3. Severe active colitis (as assessed by endoscopists) Pre-randomization 1. Poor bowel preparation (solid stool or <90% of mucosal area cannot be visualized even after jet washing using the Aronchik scale score of > 3)	mean age in HDWL-55.5 HDChromoendoscopy - 55	M-49 in both F- 30 in both	HD scopes (Olympus CF260L or 290L) and processors (Olympus Spectrum CV260 or Elite CV290) and HD monitors.	Not reported	Not reported	HD Chromoendoscopy. HDWLE
12.	Watanabe 2016 B	Left-sided or pancolitis. A disease duration exceeding 7 years.Partial Mayo score of up to 2 (0 or 1 endoscopic subscore).	Not mentioned.	Not mentioned. Total = median age 51.0	Not mentioned.	The Olympus EVIS LUCRA ELITE system with a CF-HQ2901 video colonoscope was used mainly used for targeted biopsies.	N/A	Not reported	To compare the newly-developed pancolonic Narrow Band Imaging endoscopy procedure with panchromoendoscopy for the detection of neoplastic lesions and in terms of procedure time in patients with UC.
13.	Iacucci 2018	Patients included had extensive or	Patients were excluded if they were pregnant, had active inflammatory disease, did not	HD= 48.14 (SD±13.73) Dye Chromoendoscopy=	HD= 45M, 45F DChromoendoscopy = 46M, 44F	All endoscopic procedures were performed using	The quality of bowel preparation was	In the **HD group**, 32.2% of patients were on mesalamine, 13.3% on	Colonoscopies were performed by a single operator

		left-sided ulcerative colitis, colonic Crohn's disease, or unclassified colitis affecting at least one-third of the colon. The inclusion criteria required a disease duration of more than 8 years or any duration with primary sclerosing cholangitis (PSC). Patients needed to be in clinical and endoscopic remission, defined as a Mayo total score <3, a Mayo endoscopic subscore of 0 or 1 (no segment with a score >1), or for Crohn's disease, a Harvey–Bradshaw Index <5 and a SES-CD ≤4.	have optimal bowel preparation, had coagulopathy, had a known allergy to dye spray, or were unable to provide informed consent.	49.92(SD±11.96) Virtual Chromoendoscopy= 48.03 (SD±14.6)	VChromoendoscopy= 57M, 33F	the HD+ iSCAN Pentax EC-3490Fi with the EPKi 7000 (Pentax) video processor. The iSCAN system includes three algorithm types: Surface Enhancement (iSCAN 1) for detecting abnormalities and lesions in the gastrointestinal tract, and Tone Enhancement and Contrast Enhancement (iSCAN 2 and 3) for pattern and vascular characterization. Each algorithm set could be activated by pressing a pre-assigned button on the scope's hand-piece.	assessed using the Ottawa Bowel Preparation Scale, rated as excellent, good, fair, poor, or inadequate. Only patients with excellent or good bowel preparation were included in the study. Endoscopic disease activity was assessed using the Mayo endoscopic subscore for ulcerative colitis and the SES-CD for Crohn's disease. The colonoscope was advanced to the cecum, and the mucosa was thoroughly washed using a water jet pump. On withdrawal, each segment of the colon was examined: Group A using HD endoscopy, Group B using chromoendoscopy with 0.04% methylene blue or 0.03% indigo carmine, and Group C using virtual chromoendoscopy (iSCAN 2 and 3 mode). Lesions were detected and characterized during withdrawal after applying dye or activating iSCAN, as well as with HD-WLE.	immunosuppressants, 20% on biologics, 15.6% on combination treatment, 17.8% received no treatment, and 2.2% were on steroids. In the **DCE group**, 37.8% of patients were on mesalamine, 12.2% on immunosuppressants, 25.6% on biologics, 7.8% on combination treatment, 15.6% received no treatment, and 2.2% were on steroids. In the **VCE group**, 28.9% of patients were on mesalamine, 12.2% on immunosuppressants, 22.2% on biologics, 17.8% on combination treatment, 15.6% received no treatment, and 1.1% were on steroids.	(MI), experienced in dye-based, optical, and digital virtual chromoendoscopy techniques, as well as in characterizing colonic lesions. This ensured uniform application of technique and cognitive skills across all procedures. Histology was assessed by XG, SU, and PM, who were blinded to the endoscopic reports. The colonoscope was advanced to the cecum, and the colonic mucosa was thoroughly washed using a water jet pump. During withdrawal, each segment (cecum, ascending colon, transverse colon, descending colon-sigmoid, and rectum) was sequentially examined for lesions. Group A was examined using the HD endoscopic technique, Group B using chromoendoscopy with 0.04% methylene blue or 0.03% indigo carmine, and Group C using virtual chromoendoscopy (iSCAN 2 and 3 mode). Consistent with the protocol used in the Kiesslich et al. study, lesion detection was not emphasized during scope insertion.

									The withdrawal time from the cecum to the rectum was recorded for all patients across the different groups.
14.	Pellise GIE 2017	Long-standing ulcerative colitis (UC) or Crohn's disease (CD) involving at least one-third of the colon, disease duration ≥8 years.	Patients were excluded if they had previous colorectal cancer, a previous surgical resection of the colon or rectum, coagulopathy, a known allergy to indigo carmine, or if they did not consent	mean age Chromoendoscopy= 47.26 Narrow Band Imaging= 49.36	Chromoendoscopy= 11M,16F Narrow Band Imaging= 22M,11F	A high-resolution wide-angle video endoscope (Olympus prototype XCF H160AY2L, H180 series; Olympus Europe, Hamburg, Germany) with a high-resolution 1080-line screen was used for the study	Bowel preparation included ingestion of 3 to 4 L of polyethylene glycol electrolyte solution before the examination and a dietary restriction of solid food 2 days before the procedure. During extubation, each segment was thoroughly washed with a saline solution mixed with N-acetylcysteine and dimethicone.	Treatment with mesalazine, CE - 11 (40.7) NBI 14 (42.4) Treatment with immunosuppressants, CE - 14 (51.9) NBI - 11 (33.3)	□ Chromoendoscopy: Following SURFACE Chromoendoscopy guidelines, 0.5% indigo carmine was sprayed in segments using a specialized catheter during the procedure. □ Narrow Band Imaging (NBI): After reaching the cecum, NBI mode was activated for the withdrawal process, focusing on vessel network and hue differences between lesions and surrounding mucosa.
15.	Leong 2017 A	Patients with long-standing ulcerative colitis or Crohn's colitis (>8 years) or with any disease duration in the presence of PSC were included	Exclusion criteria included insufficient time since the previous surveillance colonoscopy according to guidelines, severe comorbidities, adverse reactions or contraindications to methylene blue, pregnancy or breastfeeding, prior colonic resection (except limited cecal resection with ileal resection in Crohn's disease), coagulopathy or anticoagulant use, symptomatic IBD flare (Crohn's Disease Activity Index >150 for CD, Mayo Score >2 for UC), and active colitis (Mayo score >2 for UC, simple endoscopic score CD >4 in one colonic segment).	FUSE= 46 (35.5 - 59.5), FVC= 41 (33-50)	FUSE= (14M, 11F), FVC= (17M, 10F)	The FUSE colonoscope with three cameras provides a 330° field of view, compared to the forward-viewing colonoscope (FVC) with a 170° view. Both systems used high-definition monitors.	Ottawa Bowel Preparation Scale was used to evaluate bowel cleanliness Two random biopsy specimens were taken from each bowel segment to assess for histologic inflammation and invisible dysplasia. Colonoscopy and withdrawal times were measured using a stopwatch, which was paused during cleansing, lesion	Concurrent therapies included 5-aminosalicylic acid (5-ASA), immunomodulators, and biologic agents	Two back-to-back high-definition colonoscopies were performed. The first used white-light on both insertion and withdrawal, while the second used white-light on insertion and chromoendoscopy with methylene blue 0.1% on withdrawal. Random biopsies were performed after dye-spray inspection. Visible lesions were removed by polypectomy or endoscopic mucosal resection.

							removal, and dye-spray application.		Irresectable lesions were biopsied, and lesion size was measured with biopsy forceps or a snare. Pathologists were blinded to whether lesions were identified by white-light or chromoendoscopy.
16.	Gulatti 2018	Included patients were between the ages of 18 and 75 years and had colitis with UC extending at least to the splenic flexure or CD affecting at least half the colon	Exclusion criteria included severe active colitis, inadequate bowel preparation, allergy to indigo carmine, and colonic resection	Age, mean (SD): IG - 48.4 ± 14.6 years, CG - 41.4 ± 12.3 years	IG - 14 males, CG - 16 males	Chromoendoscopy was performed using Olympus CF-H260ZL, processor CLV-260, or Fujinon EC600ZWL series, processor Fujinon EPX 4450HD (Fujinon Medical Systems GmBH, Dusseldorf, Germany) using 0.2% indigo carmine through the same disposable spray catheter. VChromoendoscopy was performed using Fuji 600Z series using the predefined FIChromoendoscopy-8 (R 540 nm G 415 nm B 415 nm) mode.	Jet irrigation was performed using saline/simethicone solution via a disposable spray catheter (Olympus PW-5V-1) during insertion to the cecum. During withdrawal, each bowel segment by was examined by high-definition white light examination (HD-WLE), followed by either VChromoendoscopy or Chromoendoscopy, per randomization.	Concurrent therapies: 5-ASA - 18 in IG, 12 in CG; biologics - 2 in IG, 3 in CG; immunosuppressants - 7 in IG, 8 in CG	Lesions were recorded by colonic segment, distance from the anal verge, morphology (Paris classification), and size during both procedures. All lesions were biopsied in both procedures, with dysplastic lesions resected during the second procedure. Pseudopolyps were not routinely biopsied or included in lesion detection data. Data were recorded by a dedicated research fellow in a bespoke database, with histopathology follow-up. If dysplasia was missed during the second procedure, the research fellow informed the endoscopist to revisit the area before extubation.
17.	Vleugels 2018	Patients were considered eligible who were aged 18 years or older and had been diagnosed with extensive colitis (Montreal E3)	Exclusion criteria included poor bowel preparation, active colitis, prior colonic resection, severe comorbidity, coagulopathy or use of anticoagulant drugs	AFI= 56.3 (SD 13.1), Chromoendoscopy= 56.1 (SD 12.3)	AFI= (61M, 44F), Chromoendoscopy= (61M, 44F)	Both arms used CFH240AZL/I colonoscopes and Lucera Elite video processor system (Olympus Medical Systems Co., Tokyo, Japan). High-definition monitor output was used for both	The procedures were conducted under conscious sedation with intravenous benzodiazepines and opiates as needed. Carbon dioxide insufflation was used for all	IG=AFI, CG=Chromoendoscopy Previous or current use of immunomodulating therapy: IG - 53.3%, CG - 57.1%	When allocated to the autofluorescence imaging (AFI) group, the imaging mode was switched to AFI upon reaching the cecum to inspect the entire colon for suspicious areas,

		at least 8 years ago or left-sided colitis (Montreal E2) at least 15 years ago				arms placed at appropriate viewing distances at the discretion of the endoscopist.	colonoscopies, and the endoscope was advanced to the cecum using high-definition white light endoscopy (HD-WLE). Caecal intubation was confirmed by identifying the appendiceal orifice and ileocecal valve. Bowel preparation was assessed using the Boston Bowel Preparation Score (BBPS), and patients with a score <6 or active colitis were excluded. For those with sufficient bowel preparation and no active inflammation, colonoscopy proceeded. During withdrawal, 20 mg of hyoscine butylbromide (Buscopan) was optionally administered to reduce colonic motility.		mucosal irregularities, ulcers, or strictures during withdrawal. In the chromoendoscopy arm, each colonic segment was sprayed with 0.1% methylene blue or 0.2% indigo carmine solution during withdrawal, and the colon was examined in HD-WLE. Suspicious areas were classified using the Paris classification, with lesion size, location, and relation to inflamed areas recorded. Digital images of lesions and adjacent mucosa were taken. All detected lesions and surrounding normal mucosa were sampled for histopathology, with up to three biopsies for hyperplastic or inflammatory lesions. Two random biopsies were taken from each segment to assess histologic inflammation and invisible dysplasia.
18.	Bisschops 2018	All adult patients (age >18 years) with long-standing UC (8 years after onset of symptoms for patients with extensive or pan-colitis, and 10 years after onset of symptoms for	subjects unwilling to consent to the study protocol, pregnant or nursing women, patients with a history of colorectal cancer or referred with known dysplasia, inadequate bowel preparation (defined as stool remnants that could not be washed off, corresponding to Boston Bowel preparation Score12 (BBPS) 2 in at least one segment), active UC (defined as Mayo score >1) noted on colonoscopy to	Chromoendoscopy= 52.5 (43.0–60.0), Narrow Band Imaging= 52.0 (44.5–63.5)	Chromoendoscopy= 40M 26F, Narrow Band Imaging= 33M 32F	. The commercially available H180Q series colonoscope from Olympus Corporation, Japan, was used to carry out all procedures. The endoscope was connected via an Excera II processor to an HD screen, using the HD serial digital	All patients were prepared using a split-dose 4 L polyethylene glycol (PEG) solution, which is a standard bowel preparation method aimed at improving colon cleanliness and ensuring clear	□ Chromoendoscopy Group (n=66): ● 5-ASA: 54 patients (82%) ● Immunosuppressants: 22 patients (33%) ● Biologicals: 26 patients (40%) □ Narrow Band Imaging Group (n=65): ● 5-ASA: 46 patients (71%)	□ Chromoendoscopy with 0.1% Methylene Blue: After advancing the colonoscope to the cecum and performing water cleansing, a 7 Fr spray catheter was used to apply 0.1% methylene blue during scope withdrawal. Excess

		patients with left-sided colitis) who could sign the informed consent form and had not had a surveillance colonoscopy within the previous year.	extend over 20 cm from the anal verge13 and allergy/intolerance to methylene blue dye			interface (SDI) signal	visibility during the procedure. Adequate water cleansing was performed before starting chromoendoscopy or NBI. Hyoscine butylbromide (Buscopan) was optionally used to reduce colonic motility during the procedure.	• Immunosuppressants: 15 patients (23%) • Biologicals: 27 patients (41%)	dye was removed after 1 minute, and the scope was reinserted to inspect for suspicious lesions. Lesions were biopsied along with surrounding mucosa. The examination was performed in segments—first the ascending colon, then the transverse colon, and finally the left colon. □ Narrow Band Imaging (NBI): Using the Olympus H180Q colonoscope, WLE was employed during scope insertion, and the NBI mode was activated upon reaching the cecum. Suspicious lesions (circumscribed or with increased vascular intensity) were biopsied during withdrawal. Visible mucosal abnormalities (seen during Chromoendoscopy or Narrow Band Imaging) were either biopsied (if resection is not feasible) or resected and two biopsies from surrounding mucosa were performed using disposable biopsy forceps (Boston Scientific Radial Jaw 4 standard capacity forceps).

									All lesions were classified according to the Kudo pit pattern clas sification. Only typical pseudopolyps with pit pattern 1 were not biopsied or resected
19.	Lord 2018	Not mentioned	Not mentioned	Not mentioned	Not mentioned	HD scopes (Olym pus CF-HQ290L) and processors (Elite CV 290) were used.	Not mentioned	Not mentioned	A parallel group randomised controlled trial (ClinicalTrials.gov ID: NCT03250780) in which patients undergoing surveillance endoscopy for IBD colitis were randomized into either HD Chromoendoscopy using 0.2% IC using a spray catheter or HD Chromoendoscopy using 0.03% IC via a foot pump. HD scopes (Olympus CF-HQ290L) and processors (Elite CV 290) were used.Two expert GI histopathologists confirmed presence of dysplasia. Time of withdrawal and ampoules of IC were also recorded.
20.	Yang 2019	Patients included were ≥19 years old, with a diagnosis of ulcerative colitis (UC) based on clinical, endoscopic, and histologic findings. They had	Patients were excluded if they had a history of colorectal cancer (CRC), any type of colectomy, coagulopathy(proth rombin time <50% or activated partial thromboplastin time >50 seconds), or impaired renal function (serum creatinine >1.2 mg/dL).	IG= HDChromoendosco py-T CG= HDWL-R IG median(range) = 52 (25-78), CG 51 (23-79)	IG= HDChromoendoscop y-T CG= HDWL-R IG male: female = 57:45, CG male:female= 62:46	HD colonoscope (CF-HQ260 or CF-HQ290, Olympus co., Tokyo, Japan)	Patients underwent bowel preparation using a polyethylene glycol (PEG) solution. The quality of bowel preparation was assessed using the Boston Bowel Preparation Scale (BBPS). If	Medications: 5-ASA in 96.3% IG, 98.0% CG; corticosteroids in 2.9% IG, 2.0% CG; immunomodulators in 24.5% IG, 25.0% CG; anti-TNF agents in 0% IG, 3% CG	IG= HD Chromoendoscopy-T CG= HDWL-R For the HDWL-R Group (High-Definition White Light Endoscopy with Random Biopsies): Targeted biopsies were taken from any suspected dysplastic lesions

		either extensive colitis with ≥8 years or left-sided colitis with ≥10 years of disease duration. All patients were in clinical remission, defined by a simple clinical colitis activity index ≤8 and a mild Truelove and Witts disease activity score. Informed consent was obtained from all enrolled patients.					the BBPS score was less than 6, or if there was active colitis, the patient was excluded from the study. In the HD Chromoendoscopy-T Group, a transparent cap containing a water supply tube (distal attachment cap; ERBE, Germany) was attached to the distal end of the colonoscope. If the scope had its own water infusion channel, a conventional transparent cap was attached instead. After cecal intubation, a 0.05% indigo carmine solution was sprayed onto the colonic segments via the water infusion channel.		visible under white-light (WL) colonoscopy. Additionally, 4-quadrant random biopsies were taken every 10 cm from the cecum to the rectum. Narrow Band Imaging (NBI) or Chromoendoscopy was allowed for examining suspected dysplastic lesions detected under WL colonoscopy. □ HD Chromoendoscopy-T Group (High-Definition Chromoendoscopy with Targeted Biopsies): For this group, 2 biopsy specimens were taken from the cecum, transverse colon, sigmoid colon, and rectum, even in the absence of suspicion of dysplasia, to assess the microscopic extent of colitis. If a suspected dysplastic lesion was detected, 0.16% indigo carmine was sprayed, and at least 2 biopsy specimens were obtained.
21.	Alexanderss on 2020	Inclusion criteria were extensive ulcerative colitis or Crohn's colitis involving at least one-	Exclusion criteria included refusal to participate, inability to provide informed consent, and an increased risk of bleeding (bleeding disorders and use of antithrombotic agents)	Age (mean ± SD): IG - 50.0 ± 15.7 years, CG - 49.7 ± 16.0 years	Males IG: 102 CG: 109 Females IG: 50 CG: 44	HD colo_xFFFE_noscopes (CF-H180AL/CF-H190AL, Olympus Medical	Random biopsies were taken from 8 different segments of the colon (cecum, ascending colon, hepatic flexure, transverse	Not mentioned	IG (Intervention Group) = HD Chromoendoscopy, CG (Control Group) = HD White Light Endoscopy (HD-WLE).

		third of the colon, IBD with primary sclerosing cholangitis (PSC), IBD with previous dysplasia in colon biopsies, or a family history of colon cancer in a first-degree relative					colon, splenic flexure, descending colon, sigmoid colon, and rectum), with 4 biopsies per segment, totaling 32 random biopsies per colonoscopy. Visible lesions were documented, and details about their size, location, method of removal, and morphology wer e recorded. All lesions (except pseudopolyps and inflammatory polyps) were removed when possible.		1.HD Chromoendoscopy Group: The endoscope was first advanced to the terminal ileum or cecum. During withdrawal, 0.3%–0.5% indigo carmine was used to stain the colon in a segmental fashion (20–30 cm at a time) using a spraying catheter that ensured homogeneous application of the dye. After each segment was stained, the endoscope was advanced through the stained area, and the colon and rectum were examined for visible lesions. After the removal of visible lesions, nontargete d random biopsies were collected. 2.HD-WLE Group: The endoscope was advanced to the terminal ileum or cecum. During withdrawal, the colon and rectum were examined for visible lesions under white-light endoscopy. After the removal of visible lesions, nontargete d random biopsies were collected from the colon.
22.	Feuerstein 2020	Not mentioned	Not mentioned	Chromoendoscopy= 49.83 (SD 14.7),	Chromoendoscopy=(15F, 26M), HD-WLC= (17F, 31M)	Not mentioned	N/A	IG=Chromoendoscopy, CG=HD-WLC Not mentioned	Performed a prospective randomized control

				HD-WLC= 48.94 (SD 15.29)					trial comparing chromoendoscopy and HD WLC with biopsies every 10cm in patients with IBD involving at least 1/3 of the colon and 8 years of disease duration or with underlying IBD and primary sclerosing cholangitis at Beth Israel Deaconess Medical Center, Boston MA. Endoscopists were blinded to which technique would be used until immediately before the procedure. Background patient demographics and IBD related histories were obtained. Prior and current medications and prior endoscopic procedures were reviewed.
23.	Kandiah 2021	Patients with clinically inactive inflammatory bowel disease (IBD), either Crohn's disease or ulcerative colitis, were included in the study	Patients with active disease, inadequate bowel preparation, or those unable to give consent were excluded	54y (20y - 80y) not specified	□ HDWL Group: 46 males, 48 females. □ HD-Chromoendoscopy (HDV) Group: 55 males, 39 females	Pentax iScan OE2 system was used in both HD-WLE and HD-Chromoendoscopy groups. The chromoendoscopy group used dye-based chromoendoscopy in conjunction with high-definition imaging	All patients received standard polyethylene glycol-based Bowel preparation prior to the procedure.	In the **HDWL group**, 2% of patients were on steroids, 81% on ASA, 31% on immunosuppressants, and 10% on biologics, while in the **HDV group**, 1% were on steroids, 85% on ASA, 29% on immunosuppressants, and 6% on biologics.	Patients with clinically inactive disease were randomly assigned to undergo surveillance colonoscopy using either HDWLE or HD-Chromoendoscopy. All neoplastic lesions detected were resected and all patients had four quadrant random biopsies taken at 10cm intervals.
24.	Gonzalez-Bernardo 2021	Patients with IBD undergoing colonoscopy for colorectal cancer	Patients with inadequate bowel preparation (using the Boston Bowel Preparation Scale [BBPS] <6) or those with active endoscopic disease (Mayo endoscopic index >1 or SES-CD >4) were excluded	Chromoendoscopy= 49.5(SD ± 14), VC= 51.3(SD ± 12)	Chromoendoscopy=31M 36F, VC=31M 31F	All tests were scheduled in an ordinary outpatient endoscopy schedule and carried out using a Pentax EC-3490Fi	N/A	Not mentioned IG= Chromoendoscopy, CG=VC □ Chromoendoscopy Group: • Mesalazine: 70.2%	□ Chromoendoscopy Group: 0.03% indigo carmine was injected via a fluid infusion pump system through an

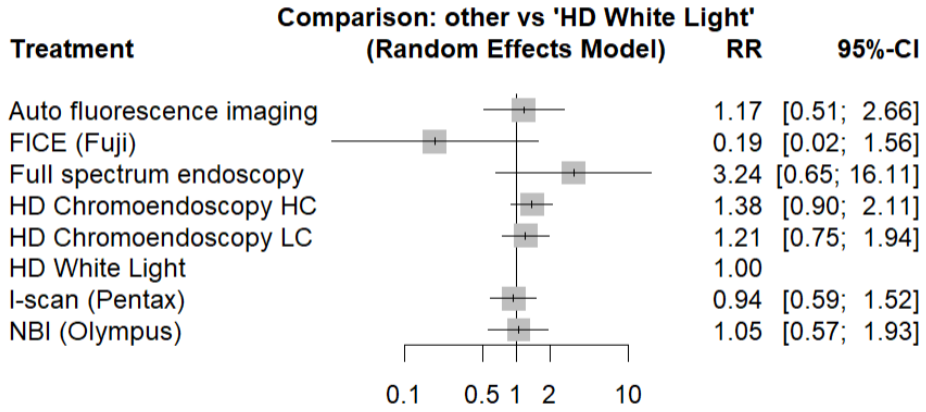
		screening were included				with EPKi 7000 Pentax video processor with HD and the iSCAN VC system.		• Immunomodulators: 34.3% • Biologics: 16.4% • No treatment: 7.5% □ Virtual Chromoendoscopy Group: • Mesalazine: 80.7% • Immunomodulators: 19.4% • Biologics: 12.9% • No treatment: 8.1%	auxiliary channel of the colonoscope. The entire colon was examined on withdrawal, and random biopsies were collected from segments not properly stained. Visible lesions were resected (Gonzalez-Bernardo 2021). □ Virtual Chromoendoscopy Group: The iSCAN 1 mode was activated, and the colon was examined in a similar manner. Lesions were also resected, and random biopsies were collected (Gonzalez-Bernardo 2021).
25.	Sinonquel 2022	Not mentioned	Not mentioned	Not mentioned	Not mentioned	Not mentioned	Not mentioned	IG=Chromoendoscopy CG= i-scan Not mentioned	Biopsies were taken from visible lesions and surrounding mucosa. Neoplastic lesions were defined as any type of dysplasia, adenoma, sessile serrated polyp or carcinoma. Statistical analysis was performed using t-test for continuous data and Fishers' exact for comparison of proportions.
26.	Te Groen 2024	Eligible patients were aged ≥18 years and scheduled for colitis-associated CRN surveillance according to Dutch IBD	Patients were excluded in case of insufficient bowel cleansing, active colitis, or if >50% of the colon was resected.	median age of 51 years (interquartile range 35-63). HD-WLE with SR – 51.47 (35.91-61.98) HD-CE – 50.29 (37.29-62.80) Single pass HD-WLE – 48.26 (32.39 -62.85)	Male sex % HD-WLE with SR – 53.4% HD-CE – 48.6% Single pass HD-WLE – 54.8%	HD endoscopy	Not mentioned	Not mentioned	Not mentioned

		surveillance guidelines.							

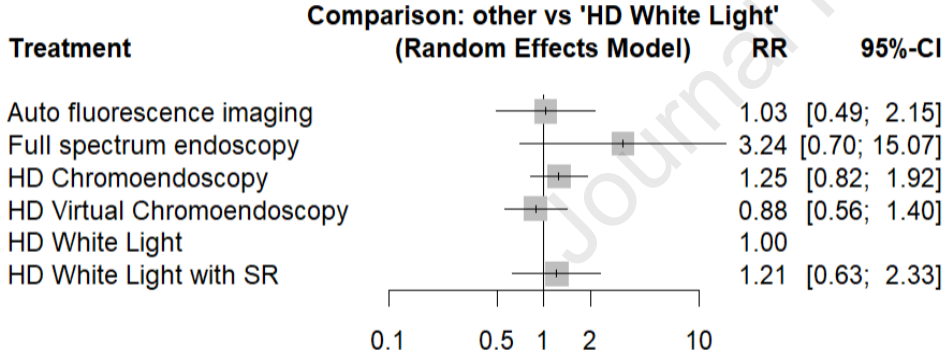
IBD (Inflammatory Bowel Disease), HDWL (High Definition White Light), HDWLE (High Definition White Light Endoscopy), CD (Crohn's Disease), WLE (White Light Endoscopy), OE (Optical Enhancement), SR (Submucosal Resection), CRN (Colorectal Neoplasia), ASA (Acetylsalicylic Acid), TNF (Tumor Necrosis Factor), SES-CD (Simple Endoscopic Score for Crohn's Disease), BBPS (Boston Bowel Preparation Scale)

eFigures 1. Subgroup and sensitivity analyses

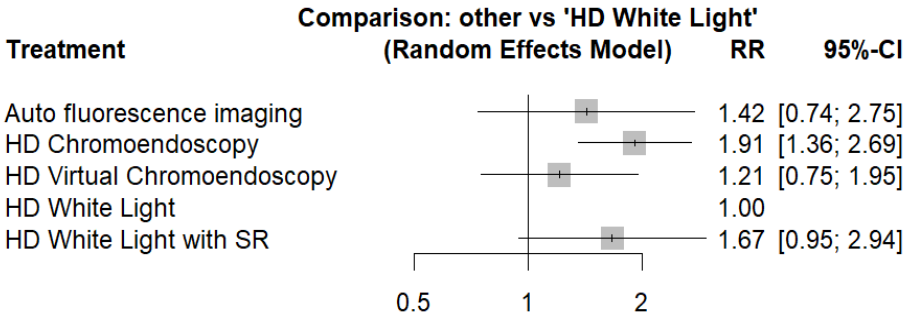
Subgroup analysis for modality subtypes, where HD chromoendoscopy has been subgrouped in High Concentration (HC) and Low Concentration (LC) and HD Virtual Chromoendoscopy into subtypes. (The RCT 'Lord 2018' compared HC and LC HD Chromoendoscopies, and therefore was included in this analysis but could not be included in the main analysis).



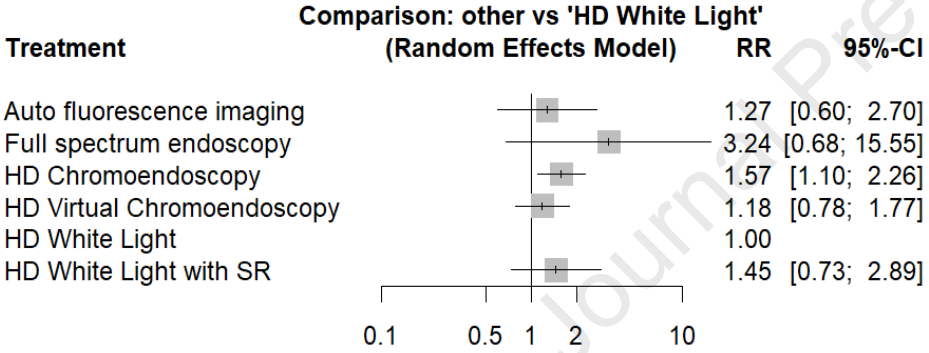
Sensitivity analysis for studies including participants with inactive disease only



Sensitivity analysis for studies were serrated lesions were not considered

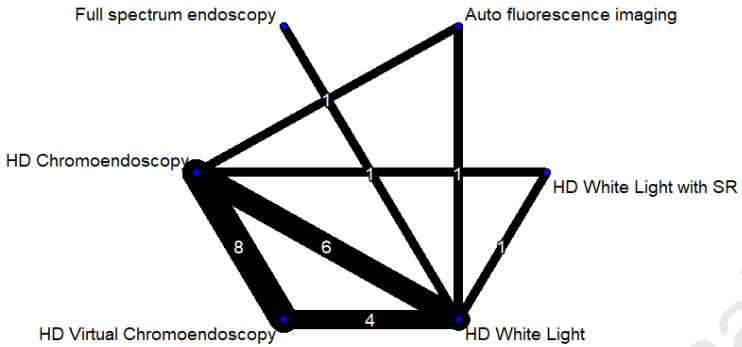


Sensitivity analysis for studies with more than one endoscopists who performed the trial endoscopies

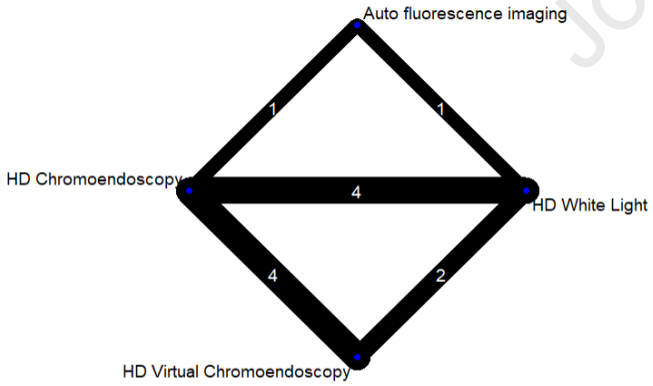


eFigures 2. Network plots

Patients with at least one dysplastic lesion detected (Vienna 2-5) & Patients with at least one dysplastic lesion detected from targeted biopsies

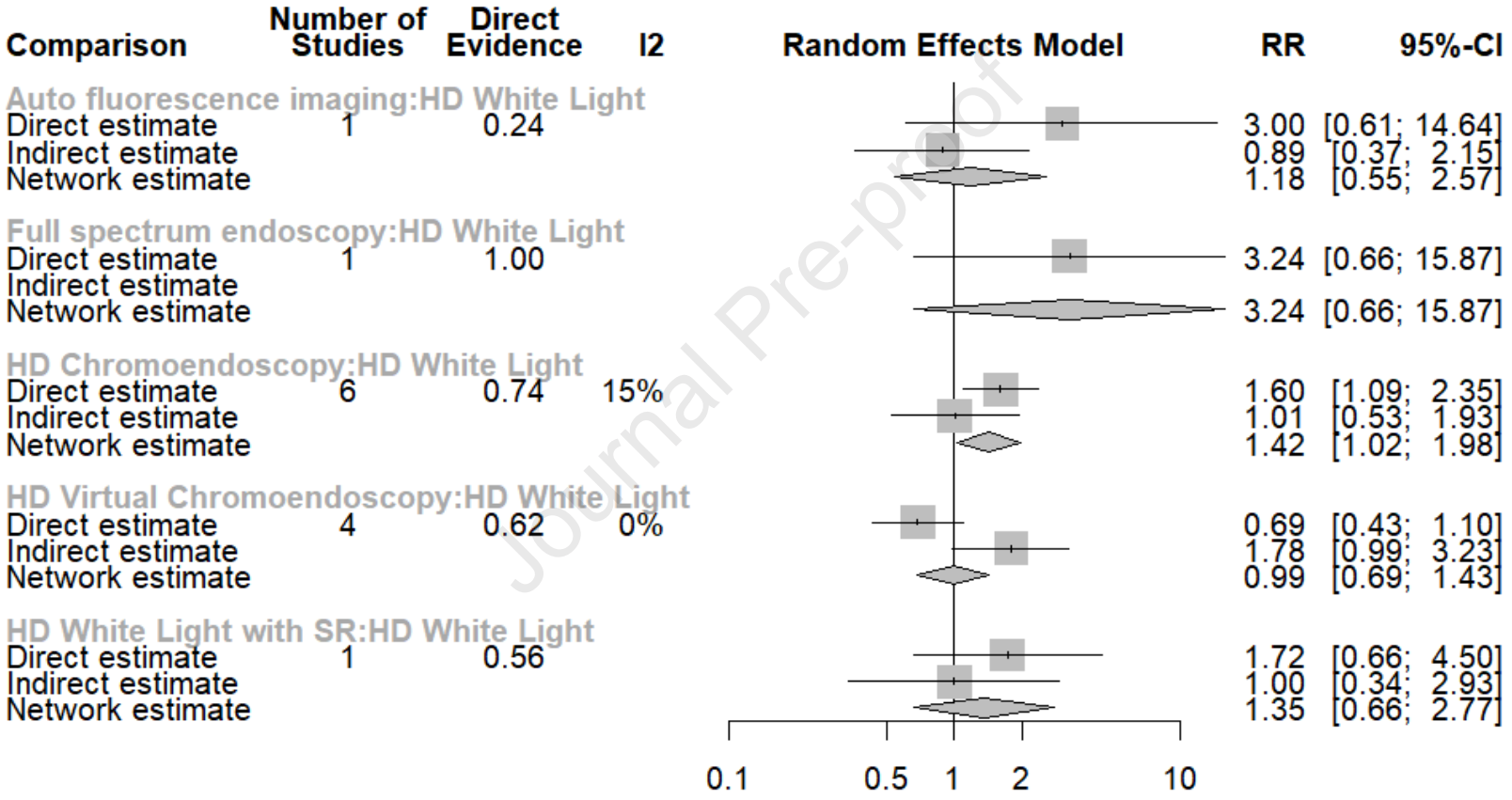


Patients with at least one lesion of any type detected (Vienna 1-5)

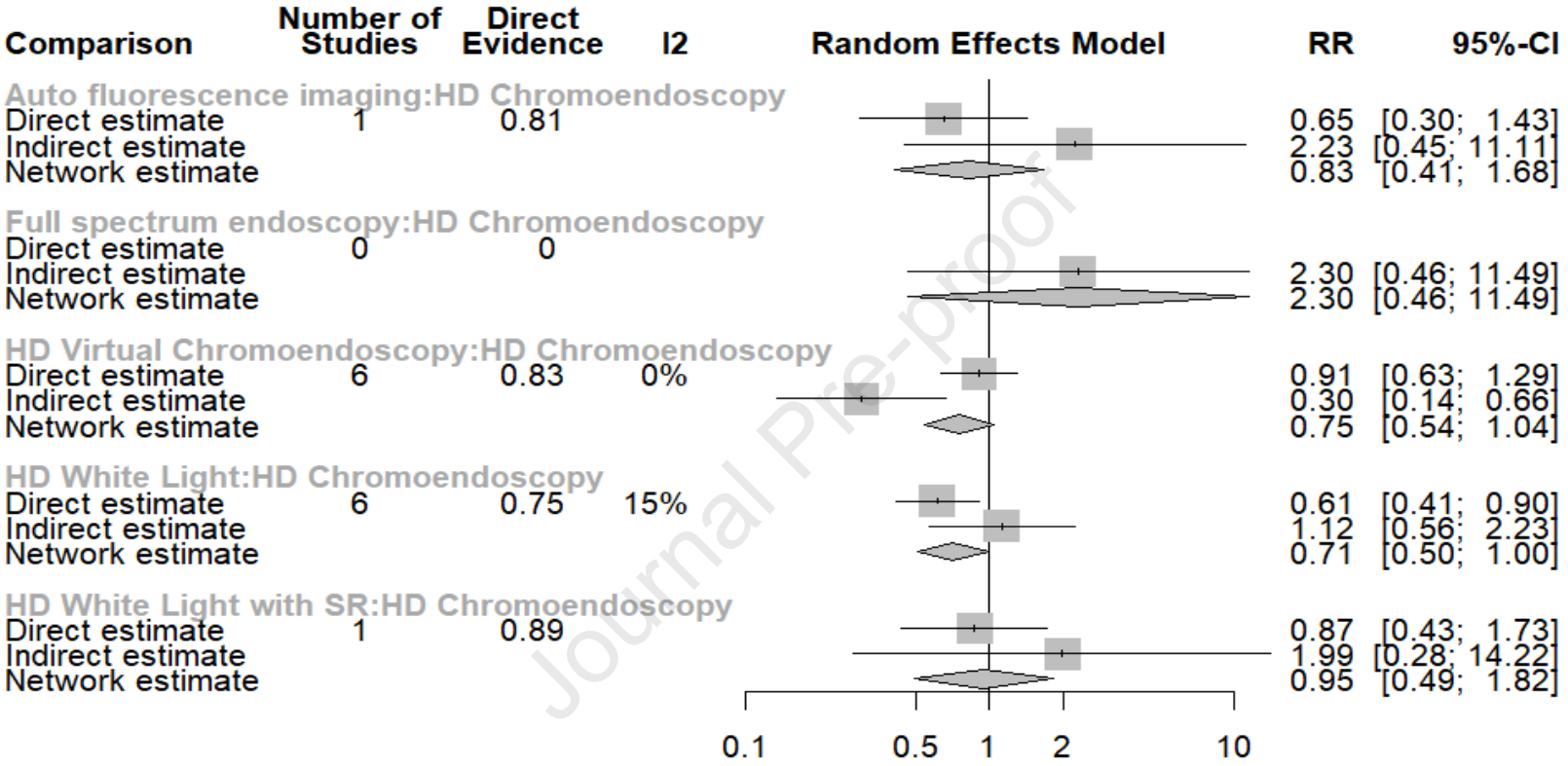


eFigures 3. Direct, indirect and network result plots (vs HD White Light)

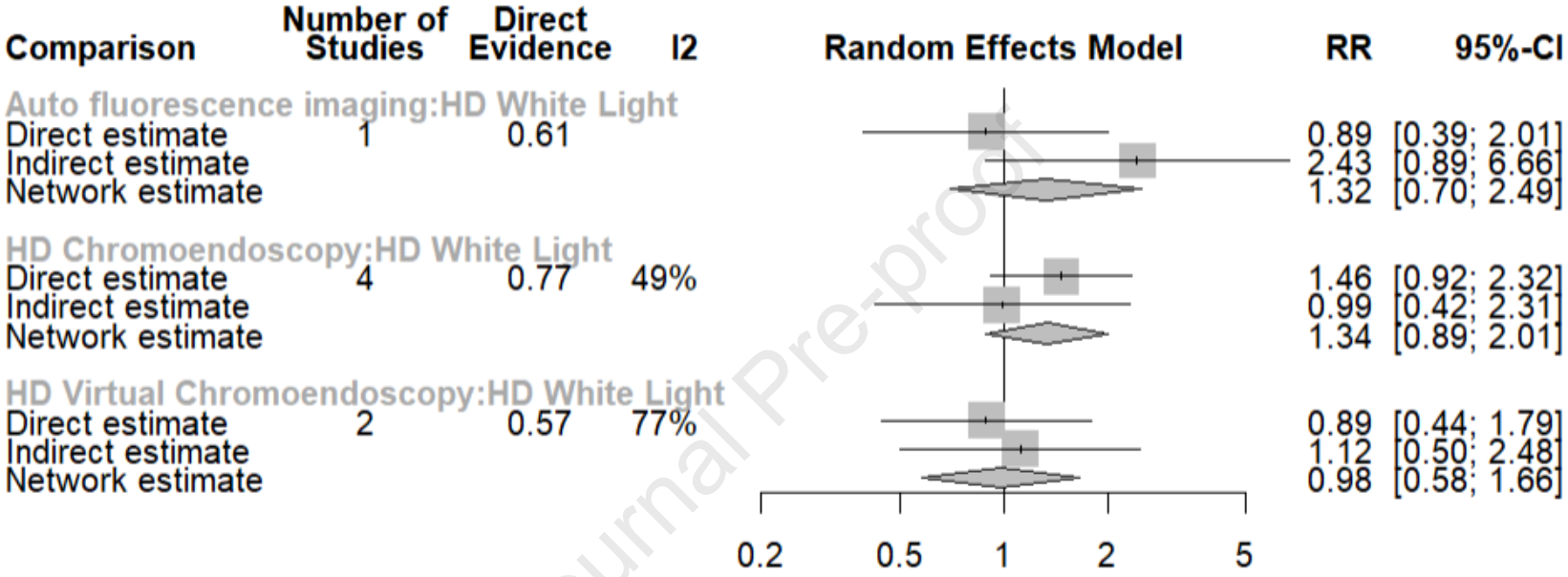
Patients with at least one dysplastic lesion detected (Vienna 2-5)



Patients with at least one dysplastic lesion detected from targeted biopsies



Patients with at least one lesion of any type detected (Vienna 1-5)



eFigures 4. SUCRA rankings

Patients with at least one dysplastic lesion detected (Vienna 2-5)

	SUCRA (common)	SUCRA (random)
Full spectrum endoscopy	0.876	0.880
HD Chromoendoscopy	0.688	0.690
HD White Light with SR	0.518	0.560
Auto fluorescence imaging	0.436	0.386
HD White Light	0.254	0.252
HD Virtual Chromoendoscopy	0.228	0.232

Patients with at least one dysplastic lesion detected from targeted biopsies

	SUCRA (common)	SUCRA (random)
Full spectrum endoscopy	0.878	0.890
HD Chromoendoscopy	0.700	0.674
HD White Light with SR	0.560	0.534
Auto fluorescence imaging	0.348	0.410
HD Virtual Chromoendoscopy	0.262	0.320
HD White Light	0.252	0.172

Patients with at least one lesion of any type detected (Vienna 1-5)

	SUCRA (common)	SUCRA (random)
HD Chromoendoscopy	0.8500	0.7733
Auto fluorescence imaging	0.6567	0.6967
HD White Light	0.3233	0.2800
HD Virtual Chromoendoscopy	0.1700	0.2500

eAppendix.

Search strategies

Search date: 11th September 2023

Number of results: 9425

Duplicates removed: 1682

Records to screen: 7734

CENTRAL

Issue 8 of 12, August 2023

Date Run: 11/09/2023 02:59:26

#1 ([mh "Inflammatory Bowel Disease"] OR Crohn* OR Ulcerative Colitis OR IBD OR Inflammatory Bowel Disease*) AND (Colon OR Colorectal OR Rectal) AND (Cancer* OR Neoplas* OR Dysplasia) AND (Detect* OR Screen* OR Diagnos* OR Assess* OR Surveillance) with Cochrane Library publication date Between Sep 2016 and Sep 2023, in Trials **386 records**

ClinicalTrials.gov

Classic Interface

Advanced Search

Condition or disease: (Crohn OR Ulcerative Colitis OR IBD OR Inflammatory Bowel Disease) AND (Colon Cancer OR Colorectal Cancer OR Rectal Cancer OR Colon Dysplasia OR Colorectal Dysplasia OR Rectal Dysplasia)

Other terms: Detection OR Screening OR Diagnosis OR Assessment OR Surveillance

First Posted: From 09/08/2016 To 09/11/2023

45 records

Embase via Ovid SP

Database: Embase <1974 to 2023 September 08>

1 exp Inflammatory Bowel Disease/ or (Crohn* or Ulcerative Colitis* or IBD or Inflammatory Bowel Disease*).mp. (241336)

2 (Colon or Colorectal or Rectal).mp. (831257)

3 (Cancer* or Neoplas* or Dysplasia).mp. (4993938)

4 (Detect* or Screen* or Diagnos* or Assess* or Surveillance).mp. (15712633)

5 and/1-4 (16015)

6 limit 5 to medline (791)

7 5 not 6 (15224)

8 limit 7 to dc=20160920-20230908 (7095)

9 limit 7 to dd=20160920-20230908 (3485)

10 8 or 9 (7104)

11 (rat or rats or mouse or mice or swine or porcine or murine or sheep or lambs or pigs or piglets or rabbit or rabbits or cat or cats or dog or dogs or cattle or bovine or monkey or monkeys or trout or marmoset$1).ti. and animal experiment/ (1219722)

12 Animal experiment/ not (human experiment/ or human/) (2561951)

13 11 or 12 (2630003)

14 10 not 13 **(6773 records)**

MEDLINE via Ovid SP

Database: Ovid MEDLINE(R) ALL <1946 to September 08, 2023>

1 exp Inflammatory Bowel Disease/ or (Crohn* or Ulcerative Colitis* or IBD or Inflammatory Bowel Disease*).mp. (140530)

2 (Colon or Colorectal or Rectal).mp. (490013)

3 (Cancer* or Neoplas* or Dysplasia).mp. (4120072)

4 (Detect* or Screen* or Diagnos* or Assess* or Surveillance).mp. (11357535)

5 and/1-4 (6355)

6 limit 5 to ed=20160920-20230908 (1776)

7 limit 5 to dt=20160920-20230908 (2072)

8 6 or 7 (2283)

9 exp Animals/ not Humans.sh. (5153293)

10 8 not 9 (**2188 records**)

WHO ICTRP

(Crohn OR Ulcerative Colitis OR IBD OR Inflammatory Bowel Disease) AND (Colon Cancer OR Colorectal Cancer OR Rectal Cancer OR Colon Dysplasia OR Colorectal Dysplasia OR Rectal Dysplasia) AND (Detection OR Screening OR Diagnosis OR Assessment OR Surveillance)

33 records for 33 trials found

Included studies references

Supplementary Content

eTable 1. Interventional and Procedural Details of the Included Studies

Serial No.	Study ID	Purpose of colonoscopy	Targeted/both/ Not Reported	Type of Virtual Chromoendoscopy (if applicable)	Type of Chromoendoscopy dye concentration (if applicable)	Dye concentration dichotomous categorization	Serrated polyps included (yes or no)	Indefinite for dysplasia included (yes or no)	Endoscopists details
1	Kiesslich 2003	Colonoscopic surveillance for cancer in patients with ulcerative colitis	Targeted	N/A	0.1% methylene blue	High-concentration	Not Reported	No	Not mentioned
2	Kiesslich 2007	Surveillance of patients with long standing ulcerative colitis	Targeted only for Chromoendoscopy. Both for White Light	N/A	0.1% methylene blue	High-concentration	Not Reported	No	Not mentioned
3	Dekker 2007	Surveillance - patients with longstanding UC	Targeted	NBI (Olympus) - first gen	N/A	N/A	Not Reported	No	All colonoscopies were performed by one of three experienced endoscopists (E.D., S.v.D., D.H.), each blinded to the findings of the previous procedure.
4	Van de Broek 2008	Surveillance - patients with longstanding UC	Both	N/A	N/A	N/A	No	No	Three experienced endoscopists performed all colonoscopies. Each had completed more than 2500 colonoscopies prior to the study.
5	Van de Broek 2011	Surveillance - patients with longstanding UC	Both	NBI (Olympus)	N/A	N/A	No	Not Reported	Four experienced endoscopists performed the procedures, each with at least 3 years of clinical experience with NBI.
6	Feitosa 2011	Detection of colonic dysplasia in long-standing inflammatory bowel disease:	Not Reported	NBI (Olympus)	Indigo carmine - concentration Not Reported	Not Reported	Not Reported	Not Reported	Not reported
7	Ignjatovic 2012	Dysplasia surveillance in longstanding IBD	Both	NBI (Olympus)	N/A	N/A	Not Reported	Yes	Six experienced colonoscopists performed the procedures, with two

									endoscopists performing the majority (88 colonoscopies).
8	Drastich 2013	Surveillance - Patients With Primary Sclerosing Cholangitis and Ulcerative Colitis	Targeted	N/A	N/A	N/A	Not Reported	Not Reported	Not mentioned
9	Freire 2014	Intraepithelial neoplasia (IN) detection in patients with longstanding UC without primary sclerosing cholangitis and/or history of IN.	Both	N/A	0.1% methylene blue	High-concentration	Not Reported	No	Single experienced endoscopist with extensive practice in UC surveillance, including use of chromoendoscopy, and has appropriate training in endomicroscopy
10	Leifield 2015	Surveillance colonoscopies for long-standing UC	Both	NBI (Olympus)	N/A	N/A	Not Reported	Not Reported	Not mentioned
11	Mohammed 2015	surveillance for extensive ulcerative colitis.	Both	N/A	0.2% indigo carmine	High-concentration	Not Reported	No	Not mentioned
12	Watanabe 2016 B	Surveillance in Longstanding left-sided or pancolitis	Targeted	NBI (Olympus)	Indigo carmine - concentration not eported	Not Reported	No	No	The procedures were performed by experienced endoscopists. Further training or specific endoscopist experience details are not provided
14	Pelise 2017	Detection of colitis-associated intraepithelial neoplasia (IN) in patients with long-standing inflammatory bowel disease (IBD).	Targeted	NBI (Olympus)	0.5% indigo carmine	High-concentration	Not Reported	No	Colonoscopies were performed by two experienced endoscopists

15	Leong 2017 A	CRC surveillance in IBD patients	Both	N/A	N/A	N/A	Yes	No	Two experienced endoscopists performed all procedures. One endoscopist (RWL) had prior formal training with FUSE.
13	Iacucci 2016/2018	Dysplasia detection in long-standing IBD	Targeted	I-scan (Pentax)	0.04% methylene blue or 0.03% indigo carmine	Low-concentration	Yes	No	All procedures were performed by a single operator (MI) experienced in dye, optical, and virtual chromoendoscopy techniques to ensure uniformity in technique and skill.
16	Gulatti 2018	Surveillance in long-standing colitis	Not Reported	FICE (Fuji)	0.2% indigo carmine	High concentration	Not Reported	Not Reported	Two experienced endoscopists with proficiency in both CE and VCE (>3000 diagnostic colonoscopies and >250 IBD surveillance colonoscopies) performed all procedures.
17	Vleugels 2018	Dysplasia surveillance in patients with longstanding UC.	Both	N/A	0.1% methylene blue solution or 0.2% indigo carmine	High-concentration	No	No	Two experienced endoscopists per centre conducted the procedures. Each endoscopist had experience performing over 500 colonoscopies, as well as extensive experience with CE and AFI. Endoscopists participated in a one-day clinical teaching session before the study began.
18	Bisschops 2018	CRC surveillance in Long-standing ulcerative colitis	Targeted	NBI (Olympus)	0.1% methylene blue	High-concentration	Yes	Yes	Five dedicated endoscopists performed the procedures, including RB, who had long-standing experience in both CE and NBI, while the others were trained before the study.
19	Lord 2018	Dysplasia detection in IBD patients	Both	N/A	Indigo carmine with different concentration - pump or spray catheter	High concentration and low concentration arms	No	No	Not mentioned
20	Yang 2019	CRC surveillance in Long-standing ulcerative colitis	Both	N/A	0.05% initially then 0.16% for suspected lesions (indigo carmine)	Low-concentration	Not Reported	Yes	9 endoscopists, each with a minimum of 6 years of experience, using HD colonoscopes.
21	Alexanderss on 2020	CRC surveillance in Long-standing ulcerative colitis	Both	N/A	0.3%-0.5% indigo carmine	High-concentration	No	No	Twenty-five endoscopists

									performed the colonoscopies, giving a median number of 6 examinations per endoscopist (range, 1–56). The experience of CE in IBD surveillance varied among the endoscopists, but all had performed CE in this setting before the trial
22	Feuerstein 2020	CRC surveillance in IBD	Not Reported	N/A	Not Reported	Not Reported	Not Reported	Not Reported	Not reported
23	Kandiah 2021	CRC surveillance in longstanding IBD	Both	I-scan (Pentax)	N/A	N/A	Yes	Not Reported	Not mentioned.
24	Gonzalez-Bernardo 2021	CRC screening in IBD patients	Targeted	I-scan (Pentax)	0.03% indigo carmine	Low-concentration	Not Reported	No	All procedures were performed by a single experienced endoscopist (OGB) with over 10 years of experience, performing about 1000 colonoscopies annually.
25	Sinonquel 2022	Neoplasia detection in patients with longstanding UC.	Targeted	I-scan (Pentax)	0.1% methylene blue	High-concentration	Yes	Not Reported	Not specifically detailed
26	Te Groen 2024	Colitis-associated CRN surveillance	Targeted	N/A	Methylene blue (0.04 -0.1%) and indigo carmine (0.4%)	Mixed	No	Yes	Not mentioned

UC (Ulcerative Colitis), NBI (Narrow Band Imaging), PSC (Primary Sclerosing Cholangitis), CE (Chromoendoscopy), VCE (Virtual Chromoendoscopy), FICE (Fuji Intelligent Chromo Endoscopy), FUSE (Full Spectrum Endoscopy), AFI (Autofluorescence Imaging), IN (Intraepithelial Neoplasia), HD (High Definition), IC (Indigo Carmine), IG (Intervention Group), CG (Control Group), CRN (Colorectal Neoplasia).

eTable 2. Study Sponsor Details

Study ID	Study Sponsor or Funding	Conflict of Interest
Alexandersson 2020	J.M.L., K.M.L. (Ji Min Lee and Kang-Moon-Lee) Study funded partly by Pharmbio Korea Co., Ltd, Seoul, Korea.	Study was an investigator-initiated study funded partly by Pharmbio Korea Co., Ltd, Seoul, Korea.
Feuerstein 2020	Not Reported	Not Reported
Kandiah 2021	Not Reported	Nothing to disclose
Yang 2019	Not Reported	Not Reported
Bisschops 2018	rB, MF and gVa are supported by a grant of research Foundation – Flanders (FWO). rB has received a study grant from the Belgian Society of gastrointestinal endoscopy (BSgie).	rB has received speaker's fee and research support from Olympus, not related to this trial.
Watanabe 2016 B	Not Reported	Not Reported
Iacucci 2016/2018	No financial support was provided for this manuscript.	M. Iacucci received an unrestricted research grant from Pentax USA (2013–2016) and speaker's fee from Pentax (2016). The remaining authors declare no conflict of interest.
Sinonquel 2022	Not Reported	Not Reported
Lord 2018	Not Reported	Not Reported
Gonzalez-Bernardo 2021	SR has received research or education funding from MSD, Abbvie, Hospira, Pfizer, Takeda, Janssen, Ferring, Faes Farma, Shire Pharmaceuticals, Dr. Falk Pharma, and Tillotts Pharma.	SR has served as a speaker or has received research or education funding from MSD, Abbvie, Hospira, Pfizer, Takeda, Janssen, Ferring, Faes Farma, Shire Pharmaceuticals, Dr. Falk Pharma, and Tillotts Pharma. No other authors have conflicts of interest.
Gulatti 2018	This study was supported by the United Kingdom Clinical Research Collaboration-registered King's Clinical Trials Unit at King's Health Partners, which is part funded by the NIHR Biomedical Research Centre for Mental Health at South London and Maudsley NHS Foundation Trust and King's College	Not Reported

	London and the NIHR Evaluation, Trials and Studies Coordinating Centre. This article presents independent research funded by the National Institute of Health Research (NIHR) under its Research for Patient Benefit Programme (grant no. PB-PG-0614-34040). The views expressed are those of the authors and not necessarily those of the NHS, the NIHR or the Department of Health.	
Leong 2017 A	Funding Endochoice, Alpharetta, Georgia, USA, provided an unrestricted investigator initiated research grant to support a part-time research assistant to screen patients. Funding application and approval occurred after the study already had commenced, hence the sponsor had no role in the trial design, execution, data analysis, interpretation, decision to submit the paper, or manuscript preparation. The authors have not been paid to write this article	This author discloses the following: Rupert W. Leong has received an unrestricted investigator-initiated research grant from Endochoice, USA. The remaining authors disclose no conflicts.
Vleugels 2018	Olympus Europe and Olympus Keymed provided research equipment on loan for this 38 study, Olympus Europe and Olympus Keymed provided an unrestricted research grant for this study 39 and had no involvement in the design, recruitment, data collection, analysis or interpretation of 40 writing of the manuscript. J. E. East and S. P. L. Travis were supported by the National Institute for 41 Health Research (NIHR) Oxford Biomedical Research Centre (BRC). K. Ragunath and S. Samuel were 42 supported by the National Institute for Health Research (NIHR) Nottingham Biomedical Research 43 3 Centre (BRC). The views expressed are those of the author(s) and not necessarily those of the NHS, 1	JV reports grants and non-financial support from Olympus Europe, during the conduct of the study. 4 MR reports grants and non-financial support from Olympus Keymed, during the conduct of the study. 5 KR reports grants and non-financial from Olympus Keymed, during the conduct of the study; personal 6 fees from Olympus Keymed and Olympus Europe, outside the submitted work. CR reports grants and 7 non-financial from Olympus Keymed, during the conduct of the study; grants, personal fees and 8 other from NORGINE and ARC medical, non-financial support from Boston, outside the submitted 9 work. CP reports grants and non-financial support from Olympus Europe, during the conduct of the 10 study. CL reports grants and non-financial support from Olympus Keymed, during the conduct of the 11 study. SK reports grants and non-financial support from Olympus Keymed, during the conduct of the 12 study. LW reports grants and non-financial support from Olympus Europe, during the conduct of the 13 study. SS reports grants and non-financial support from Olympus Keymed, during the conduct of the 14 study. FB reports grants and non-financial support from Olympus Keymed, during the conduct of the 15 study. TK reports grants and non-financial support from Olympus Europe, during the conduct of the 16 study. ST reports grants and non-financial support from Olympus Keymed, during the conduct of the 17 study; personal fees from Abbvie, Bristol Myers Squibb, Cosmo technologies, Genentech, Guiliani, 18 Takeda, Pfizer, Shire Pharma, NPS, Proximagen, VHSquared, Topivert, Ferring Pharmaceuticals, 19 Celgene, Glaxo Smith Kline, Amgen, Biogen, Enterome, Immunocore, Immunometabolism, Bioclinica, 20 Boerrhinger Ingelheim, Gilead, Grunenthal, Janssen, Novartis, Celgene, Receptos, PharmOlam, 21 SigmoidPharma, Theravance, and grants from Ferring, Abbvie, Schering-Plough, Merck Sharpe & 22 Dhome, Procter & Gamble, Warner Chilcott, Lilly, UCB, Vifor outside the submitted work. GDH 23 reports grants and non-financial support from Olympus Europe, during the conduct of the study; 24

	the NIHR or the Department of Health.	grants and personal fees from AbbVie, grants and personal fees from Medtronic, personal fees from 25 Ablynx, personal fees from Boehringer-Ingelheim, personal fees from Celgene, personal fees from 26 Celltrion, personal fees from Galapagos NV, grants and personal fees from Pfizer, grants and personal 27 fees from Takeda, grants and personal fees from Johnson and Johnson, personal fees from Gilead, 28 personal fees from Topivert, personal fees from Immunic, personal fees from Robarts Clinical Trials, 29 grants and personal fees from Prometheus Laboratories, personal fees from Eli Lily, grants and 30 personal fees from GSK, outside the submitted work. LMW reports grants and non-financial support 31 from Olympus Keymed, during the conduct of the study. SvE reports grants and non-financial support 32 from Olympus Europe, during the conduct of the study. JE reports grants and non-financial support 33 from Olympus Keymed, during the conduct of the study; reports personal fees from Lumendi, from 34 Boston Scientific, outside the submitted work. ED reports grants and non-financial support from 35 Olympus Europe, during the conduct of the study; grants, personal fees and non-financial support 36 from FujiFilm, personal fees from Tillots, outside the submitted work.
Dekker 2007	Not Reported	Not Reported
Drastich 2013	Not Reported	Not Reported
Feitosa 2011	Not Reported	Not Reported
Freire 2014	Not Reported	Not Reported
Ignjatovic 2012	Not Reported	Not Reported
Kiesslich 2003	Not Reported	Not Reported
Kiesslich 2007	Not Reported	Not Reported
Leifield 2015	Not Reported	Not Reported
Mohammed 2015	Not Reported	Not Reported
Pelise 2017	Not Reported	Not Reported
Van de Broek 2008	Not Reported	Not Reported
Van de Broek 2011	Not Reported	Not Reported

Te Groen 2024	Not Reported	Not Reported

eTable 3. Excluded Studies and Reasons for Exclusion

Study ID	Reasons for exclusion
Watanabe 2016	Wrong intervention
Wan 2020	Wrong intervention
Abdulhamid 2021	Not an RCT
Clarke 2020	Not an RCT
Hartery 2017	Not an RCT
Kang 2019	Not an RCT
Kim 2020	Not an RCT
Naik 2020	Not an RCT
Pelitari 2016	Not an RCT
Picco 2019	Not an RCT
Sobrero 2019	Not an RCT
TenHove 2016	Not an RCT
Vaziri 2017	Not an RCT
Sekra 2018	Not an RCT
Ozdinc 2021	Not an RCT
Cassinotti 2023 A/B	Not an RCT

Levartovsky 2023	Not an RCT
Correia 2022	Not an RCT
Lopez-Serrano 2017 A/B	Not an RCT
Lopez-Serrano 2021	Not an RCT
Fluxa 2022	Not an RCT
Gupta 2021	Not an RCT
Alsamman 2018	Not an RCT
Sobrero 2019-a	Not an RCT
Kim 2022	Not an RCT
Coelho-Prabhu 2019	Not an RCT
Elhanafi 2017	Not an RCT
Maeda 2022	Not an RCT
Picardo 2022	Not an RCT
Yoshioka 2016	Not an RCT
Marion 2016	Not an RCT
Kudo 2022	Not an RCT
Pallotta 2017	Not an RCT

RCT: Randomized Controlled Trial

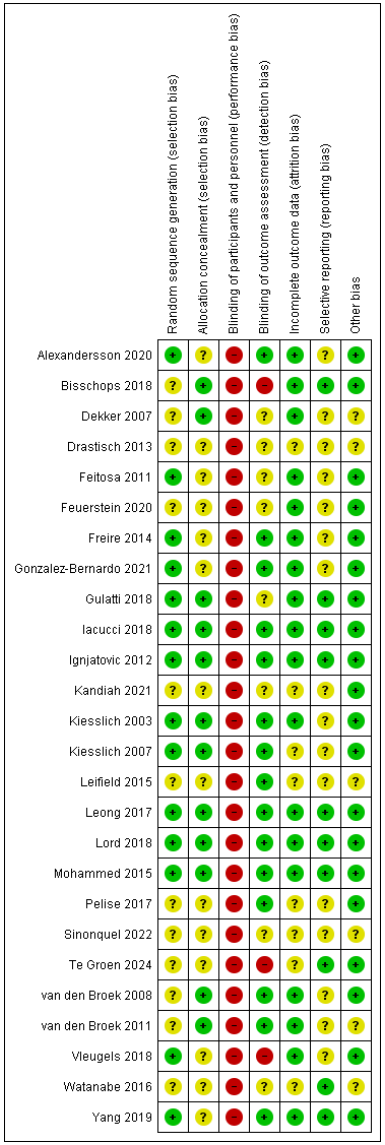
eTable 4. Ongoing Studies

Study ID
Zhang 2022
NCT00816491 2008
NCT04291976 2020
NCT02138318 2014

eTable 5. Studies awaiting classification (completed but no results available)

Study ID
NCT00587236 2007
NCT01505842 2011
NCT01882205 2013
NCT02772406 2016
NCT03250780 2017
NCT04191655 2019
NCT04257084 2020
NTR2362 2010
KCT0001195 2014 – Could not be retrieved
ACTRN12617001364369 2017
NCT05171634 2021

eTable 6. Risk of bias summary and details for the included studies



Alexandersson 2020		
Bias	**Author's judgement**	**Support for judgement**
Random sequence generation (selection bias)	Low risk	At screening visit, participants were randomly assigned using a computer-generated lists of number
Allocation concealment (selection bias)	Unclear risk	No info
Blinding of participants and personnel (performance bias)	High risk	Patients were unblinded but colonoscopists and assistant nurses were blinded
Blinding of outcome assessment (detection bias)	Low risk	Patients were unblinded but colonoscopists and assistant nurses were blinded
Incomplete outcome data (attrition bias)	Low risk	Similar withdrawals numbers per group and similar reasons
Selective reporting (reporting bias)	Unclear risk	No trial protocol
Other bias	Low risk	No major imbalances

Bisschops 2018		
Bias	**Author's judgement**	**Support for judgement**
Random sequence generation (selection bias)	Unclear risk	No info

Allocation concealment (selection bias)	Low risk	Sealed (opaque and unresectable) envelopes that were created by an independent research assistant. After inclusion and prior to the procedure, one envelope was drawn by an independent research assistant, otherwise not involved in the procedure, and opened just before the colonoscopy
Blinding of participants and personnel (performance bias)	High risk	Not blinded
Blinding of outcome assessment (detection bias)	High risk	Not blinded
Incomplete outcome data (attrition bias)	Low risk	Flow chart of patients including randomized and assessed, drop outs equal between groups and reasons given
Selective reporting (reporting bias)	Low risk	Protocol/plan as per clinical trial nct01882205
Other bias	Low risk	No concerns

Dekker 2007		
Bias	**Author's judgement**	**Support for judgement**
Random sequence generation (selection bias)	Unclear risk	No info
Allocation concealment (selection bias)	Low risk	Sealed envelopes
Blinding of participants and personnel (performance bias)	High risk	Not blinded for personnel at first pass. endoscopists were blinded at second pass for the results of the first
Blinding of outcome assessment (detection bias)	Unclear risk	no mention

Incomplete outcome data (attrition bias)	Low risk	No imbalances per groups and reasons given
Selective reporting (reporting bias)	Unclear risk	No trial registration or protocol
Other bias	Unclear risk	No baseline characteristics per group

Drastisch 2013		
Bias	**Author's judgement**	**Support for judgement**
Random sequence generation (selection bias)	Unclear risk	No info
Allocation concealment (selection bias)	Unclear risk	No info
Blinding of participants and personnel (performance bias)	High risk	No mention, but intervention unlikely to be blinded for endoscopists
Blinding of outcome assessment (detection bias)	Unclear risk	No info
Incomplete outcome data (attrition bias)	Unclear risk	No info
Selective reporting (reporting bias)	Unclear risk	No info
Other bias	Unclear risk	No info

Feitosa 2011		
Bias	**Author's judgement**	**Support for judgement**

Random sequence generation (selection bias)	Low risk	Computer-randomized with Excel
Allocation concealment (selection bias)	Unclear risk	No info
Blinding of participants and personnel (performance bias)	High risk	No mention, but intervention unlikely to be blinded for endoscopists
Blinding of outcome assessment (detection bias)	Unclear risk	No mention
Incomplete outcome data (attrition bias)	Low risk	34 randomized, and 34 colonoscopies performed, none left
Selective reporting (reporting bias)	Unclear risk	No info
Other bias	Low risk	No imbalances

Feuerstein 2020		
Bias	**Author's judgement**	**Support for judgement**
Random sequence generation (selection bias)	Unclear risk	No info
Allocation concealment (selection bias)	Unclear risk	No info
Blinding of participants and personnel (performance bias)	High risk	Patients were unblinded
Blinding of outcome assessment (detection bias)	Unclear risk	No info
Incomplete outcome data (attrition bias)	Low risk	Similar numbers per groups (this is an ongoing study: (This is a preliminary analysis of an ongoing study)
Selective reporting (reporting bias)	Unclear risk	No trial protocol mentioned

Other bias	Low risk	Baseline demographic is balanced

Freire 2014		
Bias	**Author's judgement**	**Support for judgement**
Random sequence generation (selection bias)	Low risk	Computer generated
Allocation concealment (selection bias)	Unclear risk	No info
Blinding of participants and personnel (performance bias)	High risk	No mention, but intervention unlikely to be blinded for personnel
Blinding of outcome assessment (detection bias)	Low risk	Histopathologists who evaluated the biopsies were blinded
Incomplete outcome data (attrition bias)	Low risk	Similar attrition and balanced reasons
Selective reporting (reporting bias)	Unclear risk	No info
Other bias	Low risk	Baseline characteristics balanced

Gonzalez-Bernardo 2021		
Bias	**Author's judgement**	**Support for judgement**
Random sequence generation (selection bias)	Low risk	Use of a random number generator
Allocation concealment (selection bias)	Unclear risk	Unclear
Blinding of participants and personnel (performance bias)	High risk	Unlikely to be blinded for personnel

Blinding of outcome assessment (detection bias)	Low risk	Author response: Pathologists who evaluated biopsies were blind
Incomplete outcome data (attrition bias)	Low risk	Flow chart of patients including randomized and assessed, dropouts equal between groups and reasons given
Selective reporting (reporting bias)	Unclear risk	No clinical trial registration
Other bias	Low risk	Baseline demographics balanced

Gulatti 2018		
Bias	**Author's judgement**	**Support for judgement**
Random sequence generation (selection bias)	Low risk	KCTU web-based randomization system designed to conceal allocation from researchers, the chief investigator, and the statistician
Allocation concealment (selection bias)	Low risk	KCTU web-based randomization system designed to conceal allocation from researchers, the chief investigator, and the statistician. A research fellow not performing the colonoscopy revealed each allocation
Blinding of participants and personnel (performance bias)	High risk	Open label- Unblinded study design
Blinding of outcome assessment (detection bias)	Unclear risk	No mention
Incomplete outcome data (attrition bias)	Low risk	Flow chart of patients including randomized and assessed, dropouts equal between groups and reasons given
Selective reporting (reporting bias)	Low risk	Protocol/plan as per clinical trial
Other bias	Low risk	Baseline demographics balanced

Iacucci 2018		
Bias	**Author's judgement**	**Support for judgement**
Random sequence generation (selection bias)	Low risk	Computer generated allocation
Allocation concealment (selection bias)	Low risk	Computer generated allocation. The randomization was assigned before the colonoscopy by an independent coordinator blinded to the patients' history. The patients were randomized consecutively without stratification by presence or absence of primary sclerosing cholangitis, family history, or by gender.
Blinding of participants and personnel (performance bias)	High risk	Patients were not blinded
Blinding of outcome assessment (detection bias)	Low risk	The histology was assessed by XG, SU, and PM, who were blinded to the endoscopic reports.
Incomplete outcome data (attrition bias)	Low risk	Flow chart of patients including randomized and assessed, dropouts equal between groups and reasons given
Selective reporting (reporting bias)	Low risk	NCT02098798 and no deviations
Other bias	Low risk	Baseline demographics balanced

Ignjatovic 2012		
Bias	**Author's judgement**	**Support for judgement**
Random sequence generation (selection bias)	Low risk	Randomization results obtained using a computer-generated sequence were kept in sealed opaque envelopes that were opened by the research nurse once the cecum had been reached

Allocation concealment (selection bias)	Low risk	Randomization results obtained using a computer-generated sequence were kept in sealed opaque envelopes that were opened by the research nurse once the cecum had been reached
Blinding of participants and personnel (performance bias)	High risk	Could not blind
Blinding of outcome assessment (detection bias)	Low risk	Author Ana Wilson verbally confirmed assessors were blinded
Incomplete outcome data (attrition bias)	Low risk	No dropouts
Selective reporting (reporting bias)	Low risk	NCT00292175, no deviations
Other bias	Low risk	No concerns

Kandiah 2021		
Bias	**Author's judgement**	**Support for judgement**
Random sequence generation (selection bias)	Unclear risk	No info
Allocation concealment (selection bias)	Unclear risk	No info
Blinding of participants and personnel (performance bias)	High risk	No info, unlikely blinded for personnel
Blinding of outcome assessment (detection bias)	Unclear risk	No info
Incomplete outcome data (attrition bias)	Unclear risk	No clear details of dropouts
Selective reporting (reporting bias)	Unclear risk	No trial protocol mentioned
Other bias	Low risk	Baseline demographics is balanced

Kiesslich 2003		
Bias	**Author's judgement**	**Support for judgement**
Random sequence generation (selection bias)	Low risk	Computer-aided system
Allocation concealment (selection bias)	Low risk	The respective randomization results were kept in sealed envelopes that were opened directly before the colonoscopy by an independent person who was blinded to the study question
Blinding of participants and personnel (performance bias)	High risk	Could not blind
Blinding of outcome assessment (detection bias)	Low risk	The pathologist was blinded to the recorded assessment of the endoscopist
Incomplete outcome data (attrition bias)	Low risk	Reasons given per group, balanced
Selective reporting (reporting bias)	Unclear risk	No trial reg or protocol
Other bias	Low risk	No concerns

Kiesslich 2007		
Bias	**Author's judgement**	**Support for judgement**
Random sequence generation (selection bias)	Low risk	Patients were randomized by random numbers at a 1:1 ratio into groups using a computer-aided system

Allocation concealment (selection bias)	Low risk	The respective randomization results were kept in sealed envelopes that were opened directly before the colonoscopy by an independent person
Blinding of participants and personnel (performance bias)	High risk	Could not blind
Blinding of outcome assessment (detection bias)	Low risk	The pathologist was blinded to the recorded assessment of the endoscopist
Incomplete outcome data (attrition bias)	Unclear risk	Out of 81 and 80 patients, 80 and 73 completed the protocol, due to poor bowel prep (1 vs 7 poor bowel prep per group
Selective reporting (reporting bias)	Unclear risk	No trial reg or protocol
Other bias	Low risk	Few baseline characteristics reported but balanced

Leifield 2015		
Bias	**Author's judgement**	**Support for judgement**
Random sequence generation (selection bias)	Unclear risk	No info
Allocation concealment (selection bias)	Unclear risk	No info
Blinding of participants and personnel (performance bias)	Low risk	Not blind endoscopists. They were blinded regarding the histopathologic findings of the first examination
Blinding of outcome assessment (detection bias)	Low risk	Each histopathologic examination was performed by2 different pathologists in 2 pathology institutes (University of Cologne and University of Regensburg). Pathologists were blinded regarding the endoscopic procedure chosen and the other pathologist's histopath-ologic diagnosis

Incomplete outcome data (attrition bias)	Unclear risk	159/186 randomised completed the protocol. No reasons given per group
Selective reporting (reporting bias)	Unclear risk	No trial reg or protocol
Other bias	Unclear risk	No characteristics per group

Leong 2017		
Bias	**Author's judgement**	**Support for judgement**
Random sequence generation (selection bias)	Low risk	Computer generated code
Allocation concealment (selection bias)	Low risk	The randomization code was concealed in an opaque envelope and was revealed after informed consent was obtained
Blinding of participants and personnel (performance bias)	High risk	Endoscopists could not be blinded
Blinding of outcome assessment (detection bias)	Low risk	The primary endpoint was dysplasia missed by the first colonoscopy diagnosed by an expert gastrointestinal pathologist blinded to the colonoscope allocation in consensus with a second expert pathologist
Incomplete outcome data (attrition bias)	Low risk	flow of patients including randomized and assessed, drop outs equal between groups and reasons given
Selective reporting (reporting bias)	Low risk	protocol or pe-published plan and followed as per authors statement, key efficacy outcomes and a safety outcome reported
Other bias	Low risk	Baseline demographics balanced

Lord 2018		
Bias	**Author's judgement**	**Support for judgement**
Random sequence generation (selection bias)	Low risk	From thesis: Patients were randomised at the start of the procedure by an independent coordinator blinded to the patient's history. Patients would be randomised into one of two indigo carmine concentrations according to a computer-generated random number sequence, with even numbers assigned to the 0.2%concentration with spray catheter and odd numbers assigned to 0.03% concentration using the foot pump
Allocation concealment (selection bias)	Low risk	From thesis: Patients were randomised at the start of the procedure by an independent coordinator blinded to the patient's history. Patients would be randomised into one of two indigo carmine concentrations according to a computer-generated random number sequence, with even numbers assigned to the 0.2%concentration with spray catheter and odd numbers assigned to 0.03% concentration using the foot pump
Blinding of participants and personnel (performance bias)	High risk	Endoscopists unlikely to be blinded
Blinding of outcome assessment (detection bias)	Low risk	Biopsies were processed as standard procedure and reviewed by an expert tertiary centred gastrointestinal (GI) histopathologist based locally, who was blinded to the randomisation
Incomplete outcome data (attrition bias)	Low risk	144 vs 146 had procedures done from an original of 150 each. Unlikely to have major imbalances in reasons of withdrawal
Selective reporting (reporting bias)	Low risk	NCT03250780. The primary outcome has been registered, the secondary ones not

Other bias	Low risk	No concerns

Mohammed 2015		
Bias	**Author's judgement**	**Support for judgement**
Random sequence generation (selection bias)	Low risk	From author: Computer generated random blocks
Allocation concealment (selection bias)	Low risk	A closed envelope randomisation with block sequence was used and minimization techniques were utilised
Blinding of participants and personnel (performance bias)	High risk	Open label
Blinding of outcome assessment (detection bias)	Low risk	Blinded histopathologists
Incomplete outcome data (attrition bias)	Low risk	No imbalances
Selective reporting (reporting bias)	Low risk	NCT02138318. No major discrepancies
Other bias	Low risk	No major imbalances

Pelise 2017		
Bias	**Author's judgement**	**Support for judgement**
Random sequence generation (selection bias)	Unclear risk	No info
Allocation concealment (selection bias)	Unclear risk	No info

Blinding of participants and personnel (performance bias)	High risk	Could not blind
Blinding of outcome assessment (detection bias)	Low risk	Any specimens exhib-iting dysplasia were reviewed by an independent pathol-ogist (M.C.), and in the event of interobserver disagree-ment, a consensus was reached. For purposes of this study, the pathologists were blinded to the endoscopic technique in question, but were aware of the clinical data of the relevant patient and the type of biopsy
Incomplete outcome data (attrition bias)	Unclear risk	No explanation of dropouts per group
Selective reporting (reporting bias)	Unclear risk	No trial reg or protocol
Other bias	Low risk	There is sex imbalance but no major concerns

Sinonquel 2022		
Bias	**Author's judgement**	**Support for judgement**
Random sequence generation (selection bias)	Unclear risk	No info
Allocation concealment (selection bias)	Unclear risk	No info
Blinding of participants and personnel (performance bias)	High risk	No info - unlikely endoscopists were blind
Blinding of outcome assessment (detection bias)	Unclear risk	No info
Incomplete outcome data (attrition bias)	Unclear risk	No info
Selective reporting (reporting bias)	Unclear risk	No info
Other bias	Unclear risk	No info

Te Groen 2024		
Bias	**Author's judgement**	**Support for judgement**
Random sequence generation (selection bias)	Unclear risk	No info
Allocation concealment (selection bias)	Unclear risk	No info
Blinding of participants and personnel (performance bias)	High risk	Non-blinded study
Blinding of outcome assessment (detection bias)	High risk	Non-blinded study
Incomplete outcome data (attrition bias)	Unclear risk	Numbers and reasons for not completing the procedure are given and explained. HD-CE had 23 people not completing it while HDWL 8 and single pass HD-WL 3. HD CL had also quite higher numbers (17) of delays/logistics than the other two (10, 6). Taken from ECCO 24 presentation slides
Selective reporting (reporting bias)	Low risk	NCT04291976. The outcomes of our interest in the trial registration have been reported
Other bias	Low risk	Some discrepancies in baseline characteristics but not major enough to cause bias probably

Van de Broek 2008		
Bias	**Author's judgement**	**Support for judgement**
Random sequence generation (selection bias)	Unclear risk	No info

Allocation concealment (selection bias)	Low risk	One hundred opaque sealed envelopes contained notes with ‘‘AFI’’ or ‘‘WLE’’ written on them (1:1) for randomisation.
Blinding of participants and personnel (performance bias)	High risk	Could not blind
Blinding of outcome assessment (detection bias)	Low risk	Biopsies were evaluated by two blinded pathologists
Incomplete outcome data (attrition bias)	Low risk	No dropouts
Selective reporting (reporting bias)	Unclear risk	ISRCTN05272746. Retrospectively registered and vague outcome registration.
Other bias	Low risk	No imbalances

Van de Broek 2011		
Bias	**Author’s judgement**	**Support for judgement**
Random sequence generation (selection bias)	Unclear risk	No info
Allocation concealment (selection bias)	Low risk	Randomization was done by opening opaque sealed envelopes (containing notes with either “HDE first” or “NBI first” in a 1 : 1 ratio) once the cecum had been reached during the first procedure
Blinding of participants and personnel (performance bias)	High risk	Could not blind
Blinding of outcome assessment (detection bias)	Low risk	Biopsy material and endoscopic resection specimens were processed using standard procedures and evaluated by two pathologists, one of whom was a gastrointestinal expert. The pathologists were blinded to detection techniques and endoscopic diag-nosis.

Incomplete outcome data (attrition bias)	Low risk	48/53 completed the protocol. Reasons given but no per group. Unlikely to cause bias.
Selective reporting (reporting bias)	Unclear risk	ISRCTN56671833
Other bias	Unclear risk	No characteristics per group

Vleugels 2018		
Bias	**Author's judgement**	**Support for judgement**
Random sequence generation (selection bias)	Low risk	Online randomisation program used
Allocation concealment (selection bias)	Unclear risk	Allocation by research assistant. No details about their relation to the study
Blinding of participants and personnel (performance bias)	High risk	Could not blind
Blinding of outcome assessment (detection bias)	High risk	Could not blind
Incomplete outcome data (attrition bias)	Low risk	No dropouts
Selective reporting (reporting bias)	Unclear risk	NTR4062, but could not be accessed
Other bias	Low risk	No imbalances

Watanabe 2016		
Bias	**Author's judgement**	**Support for judgement**
Random sequence generation (selection bias)	Unclear risk	No info

Allocation concealment (selection bias)	Unclear risk	No info
Blinding of participants and personnel (performance bias)	High risk	Unlikely
Blinding of outcome assessment (detection bias)	Unclear risk	No info
Incomplete outcome data (attrition bias)	Unclear risk	No info
Selective reporting (reporting bias)	Low risk	UMIN000013527, no deviations
Other bias	Unclear risk	No info

Yang 2019		
Bias	**Author's judgement**	**Support for judgement**
Random sequence generation (selection bias)	Low risk	Patients were randomized in a 1:1 ratio by consecutive numbering according to a computer-generated 4-block permuted randomization table developed by an independent statistician.
Allocation concealment (selection bias)	Unclear risk	No info
Blinding of participants and personnel (performance bias)	High risk	Could not blind
Blinding of outcome assessment (detection bias)	Low risk	The pathology of targeted and random biopsy specimens was reviewed by board certified pathologists at each institution, and each biopsy specimen suspicious for dysplasia was reviewed by a central pathologist (H.K.),who was blinded to the randomization
Incomplete outcome data (attrition bias)	Low risk	Flow chart of patients including randomized and assessed, drop outs equal between groups and reasons given

Selective reporting (reporting bias)	Low risk	KCT0001195: 4-2013-0622 Protocol/plan as per clinical trial
Other bias	Low risk	No concerns

eTable 7. Summary of Findings tables and GRADE decisions (red colouring means the results cross the line of no effect)

Patients with at least one dysplastic lesion detected						
Patient or population: people with IBD undergoing CRC surveillance						
Settings: hospital setting						
Intervention: all modalities at RCT level						
Comparison: HD White Light						
Treatment	**Network evidence**		**Anticipated absolute effects for network estimate**			**Magnitude size (95% CI range of magnitude size)***
	RR (95% CI)	**Certainty**	**Detections with HD White Light[a]**	**Detections with modality (95% CI)**	**% Detection Difference (95% CI)**	
Full spectrum endoscopy	3.24 (0.66 to 15.87)	Low ⨁⨁◯◯	113 per 1,000	366 per 1,000 (75 to 1000)	25.3% more (3.8% less to 100%)	It may be no different to HD White Light (small detection numbers less to large more)
HD chromoendoscopy (all)	1.42 (1.02 to 1.98)	Low ⨁⨁◯◯	113 per 1,000	160 per 1,000 (115 to 224)	4.7% more (0.2% more to 11.1% more)	It may detect a small amount more patients with at least one dysplastic lesion (trivial to moderate)
HD White Light with SR	1.35 (0.66 to 2.77)	Very Low ⨁◯◯◯	113 per 1,000	153 per 1,000 (75 to 313)	4% more (3.8% less to 20% more)	The evidence is very inconclusive
Auto-fluorescence imaging	1.18 (0.55 to 2.57)	Very Low ⨁◯◯◯	113 per 1,000	133 per 1,000 (62 to 290)	2% more (5.1% less to 17.7% more)	The evidence is very inconclusive
HD virtual chromoendoscopy (all)	0.99 (0.69 to 1.43)	Very low ⨁◯◯◯	113 per 1,000	112 per 1,000 (78 to 162)	0.1% less (3.5% less to 4.9% more)	The evidence is very inconclusive
GRADE Working Group grades of evidence						
High certainty: we are very confident that the true effect lies close to that of the estimate of the effect.						
Moderate certainty: we are moderately confident in the effect estimate; the true effect is likely to be close to the estimate of the effect, but there is a possibility that it is substantially different.						
Low certainty: our confidence in the effect estimate is limited; the true effect may be substantially different from the estimate of the effect.						
Very low certainty: we have very little confidence in the effect estimate; the true effect is likely to be substantially different from the estimate of effect.						
CI: confidence interval; RR: risk ratio						
[a]The risk with HDWL has been calculated based on the cumulative HDWL rates of all studies with a HDWL arm						
*The range of magnitude were calculated based on the 95% CI possibility within which the actual magnitude lies, and do not imply a definitive range of benefit						

Sucra	Intervention (n=6)	network estimate RR	lower 95%CI	higher 95% CI	Number of direct studies to HD White Light	Direct GRADE	Reasons for direct downgrade	Indirect GRADE	Reasons for indirect downgrade	Network GRADE	Reasons for network downgrade
1	**Full spectrum endoscopy**	3.24	0.66	15.87	1	high	no reason	x	x	low	twice imprecision
2	**HD chromoendoscopy (all)**	1.42	1.02	1.98	6	moderate	once RoB	moderate	once RoB	low	once imprecision
3	**HD White Light with SR**	1.35	0.66	2.77	1	low	twice RoB	low	twice RoB	very low	once imprecision
4	**Auto-fluorescence imaging**	1.18	0.55	2.57	1	moderate	once RoB	moderate	once RoB	very low	twice imprecision, twice incoherence
6	**HD White Light**	1									
5	**HD virtual chromoendoscopy (all)**	0.99	0.69	1.43	4	moderate	once RoB	moderate	once RoB	very low	once imprecision, once incoherence

Patients with at least one dysplastic lesion detected from targeted biopsies						
Patient or population: people with IBD undergoing CRC surveillance						
Settings: hospital setting						
Intervention: all modalities at RCT level						
Comparison: HD White Light						
Treatment	**Network evidence**		**Anticipated absolute effects for network estimate**			**Magnitude size (95% CI range of magnitude size)***
	RR (95% CI)	**Certainty**	**Detections with HD White Light[a]**	**Detections with modality**	**% Detection Difference**	
Full spectrum endoscopy	3.24 (0.67 to 15.62)	Low ⊕⊕⊖⊖	100 per 1,000	324 per 1,000 (67 to 1000)	22.4% more (3.3% less to 100% more)	It may be no different to HD White Light (trivial detection numbers less to large more)
HD chromoendoscopy (all)	1.41 (1 to 1.98)	Very low ⊕⊖⊖⊖	100 per 1,000	141 per 1,000 (100 to 198)	4.1% more (0% to 9.8% more)	The evidence is very inconclusive
HD White Light with SR	1.34 (0.67 to 2.67)	Very Low ⊕⊖⊖⊖	100 per 1,000	134 per 1,000 (67 to 267)	3.4% more (3.3% less to 16.7% more)	The evidence is very inconclusive
Auto-fluorescence imaging	1.16 (0.55 to 2.48)	Very Low ⊕⊖⊖⊖	100 per 1,000	116 per 1,000 (55 to 248)	1.6% more (4.5% less to 14.8% more)	The evidence is very inconclusive
HD virtual chromoendoscopy (all)	1.06 (0.72 to 1.55)	Very low ⊕⊖⊖⊖	100 per 1,000	106 per 1,000 (72 to 155)	0.6% more (2.8% less to 5.5% more)	The evidence is very inconclusive
GRADE Working Group grades of evidence						
High certainty: we are very confident that the true effect lies close to that of the estimate of the effect.						
Moderate certainty: we are moderately confident in the effect estimate; the true effect is likely to be close to the estimate of the effect, but there is a possibility that it is substantially different.						
Low certainty: our confidence in the effect estimate is limited; the true effect may be substantially different from the estimate of the effect.						
Very low certainty: we have very little confidence in the effect estimate; the true effect is likely to be substantially different from the estimate of effect.						
CI: confidence interval; RR: risk ratio						
[a]The risk with HDWL has been calculated based on the cumulative HDWL rates of all studies with a HDWL arm						
*The range of magnitude were calculated based on the 95% CI possibility within which the actual magnitude lies, and do not imply a definitive range of benefit						

Intervention (n=6)	network estimate RR	lower 95%CI	higher 95% CI	Number of direct studies to HD White Light	Direct GRADE	Reasons for direct downgrade	Indirect GRADE	Reasons for indirect downgrade	Network GRADE	Reasons for network downgrade
Full spectrum endoscopy	3.24	0.67	15.62	1	high	no reason	x	x	low	twice imprecision
HD chromoendoscopy (all)	1.41	1	1.98	6	moderate	once RoB	moderate	once RoB	very low	twice imprecision
HD White Light with SR	1.34	0.67	2.67	1	low	twice RoB	low	twice RoB	very low	once imprecision
Auto-fluorescence imaging	1.16	0.55	2.48	1	moderate	once RoB	moderate	once RoB	very low	twice imprecision, twice incoherence
HD virtual chromoendoscopy (all)	1.06	0.72	1.55	3	moderate	once RoB	moderate	once RoB	very low	once imprecision, once incoherence
HD White Light	1									

Patients with at least one lesion (of any type) detected						
Patient or population: people with IBD undergoing CRC surveillance						
Settings: hospital setting						
Intervention: all modalities at RCT level						
Comparison: HD White Light						
Treatment	**Network evidence**		**Anticipated absolute effects for network estimate**			**Magnitude size (95% CI range of magnitude size)***
	RR (95% CI)	**Certainty**	**Detections with HD White Light[a]**	**Detections with modality**	**% Detection Difference**	
HD chromoendoscopy (all)	1.34 (0.89 to 2.01)	Very Low ⊕⊖⊖⊖	187 per 1,000	251 per 1,000 (166 to 376)	6.4% more (2.1% less to 18.9% more)	The evidence is very inconclusive
Auto-fluorescence imaging	1.32 (0.7 to 2.49)	Very Low ⊕⊖⊖⊖	187 per 1,000	247 per 1,000 (131 to 466)	6% more (5.6% less to 27.9% more)	The evidence is very inconclusive
HD virtual chromoendoscopy (all)	0.98 (0.58 to 1.66)	Very low ⊕⊖⊖⊖	187 per 1,000	183 per 1,000 (108 to 310)	0.4% less (7.9% less to 12.3% more)	The evidence is very inconclusive
GRADE Working Group grades of evidence						
High certainty: we are very confident that the true effect lies close to that of the estimate of the effect.						
Moderate certainty: we are moderately confident in the effect estimate; the true effect is likely to be close to the estimate of the effect, but there is a possibility that it is substantially different.						
Low certainty: our confidence in the effect estimate is limited; the true effect may be substantially different from the estimate of the effect.						
Very low certainty: we have very little confidence in the effect estimate; the true effect is likely to be substantially different from the estimate of effect.						
CI: confidence interval; RR: risk ratio						
[a]The risk with HDWL has been calculated based on the cumulative HDWL rates of all studies with a HDWL arm						
*The range of magnitude were calculated based on the 95% CI possibility within which the actual magnitude lies, and do not imply a definitive range of benefit						

Sucra	Intervention (n=6)	network estimate	lower 95%	higher 95% CI	Number of direct studies to HD White Light	Direct GRADE	Reasons for direct downgrade	Indirect GRADE	Reasons for indirect downgrade	Network GRADE	Reasons for network downgrade
1	**HD chromoendoscopy (all)**	1.34	0.89	2.01	4	low	once RoB, once inconsistency	very low	once RoB, twice inconsistency	very low	twice imprecision
2	**Auto-fluorescence imaging**	1.32	0.7	2.49	1	moderate	once RoB	moderate	once RoB	very low	twice imprecision, twice incoherence
3	**HD virtual chromoendoscopy (all)**	0.98	0.58	1.66	2	low	twice inconsistency	very low	once RoB, twice inconsistency	very low	twice imprecision
4	**HD White Light**	1									

eTable 8. Predefined magnitude effect thresholds

	Trivial to Small	Small to Moderate	Moderate to Large
Dysplasia	3.3%	5.8%	11.2%
Dysplasia - targeted	3.4%	6.7%	10.9%
Dysplasia - random	3.5%	6.2%	10%
SAEs	2.6%	5.1%	8.4%
All lesions	4.1%	7.9%	15.1%

eTable 9. Extracted outcome data

Patients with at least one dysplastic lesion detected (Vienna 2-5)

Study ID	Outcome 1 - Dysplasia (Vienna 205) Detection
Alexandersson 2020	HD WLE: 9/153 (5.88%) HD CE: 21/152 (13.82%)
Feuerstein 2020	HD WLE: 2/48 (4.17%) HD CE: 4/41 (9.76%)
Kandiah 2021	HD WLE: 22/102 (21.59%) HD VCE: 14/102 (13.73%)
Yang 2019	HD WLE: 7/108 (6.48%) HD CE: 9/102 (8.82%)
Bisschops 2018	HD CE: 14/74 (18.92%) HD VCE: 14/83 (16.87%)
Watanabe 2016 B	HD CE: 16/130 (12.31%) HD VCE: 14/133 (10.53%)
Iacucci 2016/2018	HD WLE: 23/90 (25.56%) HD CE: 22/90 (24.44%) HD VCE: 14/90 (15.56%)
Sinonquel 2022	HD CE:13/71(18.31%) HD VCE: 18/65 (27.69%)
Lord 2018	HD CE: 35/150 (23.33%) HD CE 0.03%: 32/150 (21.33%)
Gonzalez-Bernardo 2021	HD CE: 9/67 (13.43%) HD VCE: 7/62 (11.29%)
Gulatti 2018	HD CE: 8/25 (32%) HD VCE:1/23 (4.35%)
Leong 2017 A	HD WLE: 2/27(7.41%) FUSE: 6/25 (24%)

Vleugels 2018	HD CE: 20/105 (19.05%) AFI: 13/105 (12.38%)
Dekker 2007	WLE: NR/22 VCE (first generation): NR/ 20
Drastich 2013	WLE: NR/NR AFI: NR/NR
Feitosa 2011	HD CE: 4/18 (22.22%) HD VCE: 0/16 (0%)
Freire 2014	CE: 6/72 (8.33%) WLE: 4/73 (5.48%)
Ignjatovic 2012	HD WLE: 6/56 (10.71%) HD VCE: 5/56 (8.93%)
Kiesslich 2003	CE: 13/84 (15.48%) WLE: 6/81(7.41%)
Kiesslich 2007	CE: 11/81 (13.58%) WLE: 4/80 (5.00%)
Leifield 2015	WLE: NR/NR NBI: NR/NR
Mohammed 2015	HC CE: 20/79 (25.32) HD WLE: 10/79 (12.66)
Pelise 2017	HD CE: 4/27 (14.81%) HD VCE: 4/33 (12.12%)
Van de Broek 2008	HD WLE: 2/25 (8.00%) AFI: 6/25 (24.00%)
Van de Broek 2011	HD WLE: 6/25 (24.00%) HD VCE: 5/23 (21.74%)
Te Groen 2024	HD WLE: 7/133 (5.26%) HD CE: 28/268 (10.45%) HD WLE with SR: 24/265 (9.06%)

Patients with at least one dysplastic lesion detected from targeted biopsies

Study ID	
Alexandersson 2020	HD WLE: 7/153 (4.58%) HD CE: 17/152 (11.18%)
Feuerstein 2020	HD WLE: 2/48 (4.17%) CE: 4/41 (9.76%)
Kandiah 2021	HD WLE: 21/102 (20.59%) HD VCE: 14/102 (13.73%)
Yang 2019	HD WLE: 2/108 (1.85%) HD CE: 4/102 (3.92%)
Bisschops 2018	HD CE: 14/74 (18.92%) HD VCE: 14/83 (16.87%)
Watanabe 2016 B	HD CE: 16/130 (12.31%) HD VCE: 14/133 (10.53%)
Iacucci 2016/2018	HD WLE: 23/90 (25.56%) HD CE: 22/90 (24.44%) HD VCE: 14/90 (15.56%)
Sinonquel 2022	HD CE: 13/71 (18.31%) HD VCE: 18/65 (27.69%)
Lord 2018	HD CE 0.2%: 32/150 (21.33%) HD CE 0.03%: 26/150 (17.33%)
Gonzalez-Bernardo 2021	HD CE: 9/67 (13.43%) HD VCE: 7/62 (11.29%)
Gulatti 2018	CE: NR/ 67 VCE: NR/62
Leong 2017 A	HD WLE: 2/27 (7.41%) FUSE: 6/25 (24.00%)
Vleugels 2018	HD CE: 20/105 (19.05%) AFI: 13/105 (12.38%)
Dekker 2007	WLE: NR/22

	VCE: NR/ 20
Drastich 2013	WLE: NR/NR AFI: NR/NR
Feitosa 2011	CE: NR/18 NBI: NR/16
Freire 2014	CE: NR/72 CC: NR/73
Ignjatovic 2012	WLE: 6/56 (10.71%) NBI: 5/56 (8.93%)
Kiesslich 2003	CE: 13/84 (15.48%) CC: 6/81 (7.41%)
Kiesslich 2007	CE: NR/81 CC: NR/ 80
Leifield 2015	WLE: NR/NR NBI: NR/NR
Mohammed 2015	HD CE: 20/79 (25.32%) HD WLE: 10/79 (12.66%)
Pelise 2017	CE: 4/27 (14.18%) NBI: 4/33 (12.12%)
Van de Broek 2008	WLE: 2/25 (8.00%) AFI: 6/25 (24.00%)
Van de Broek 2011	HD CE: NR/ 25 NBI: NR/23
Te Groen 2024	HD WLE: 7/133 (5.26%) HD CE: 28/268 (10.45%) HD WLE with SR: 24/265 (9.06%)

Patients with at least one dysplastic lesion detected from random biopsies

Study ID	
Alexandersson 2020	HD WLE: 3/153 (1.96%) HD CE: 6/152 (3.95%)
Feuerstein 2020	HD WLE: NR/48 CE: NR/41
Kandiah 2021	HD WLE: 1/102 (0.98%) HD VCE: 0/102 (0%)
Yang 2019	HD WLE: 4/108 (3.70%) HD CE: 0/102 (0%)
Bisschops 2018	HD CE: NR/74 HD VCE: NR/83
Watanabe 2016 B	HD CE: NR/130 HD VCE: NR/133
Iacucci 2016/2018	HD WLE: NR/90 HD CE: NR/90 HD VCE: NR/90
Sinonquel 2022	HD CE: NR/71 HD VCE: NR/65
Lord 2018	HD CE 0.2%: 3/150 (2.00%) HD CE 0.03%: 6/150 (4.00%)
Gonzalez-Bernardo 2021	HD CE: NR/67 HD VCE: NR/62
Gulatti 2018	CE: NR/25 VCE: NR/23
Leong 2017 A	HD WLE: NR/27 FUSE: NR/25
Vleugels 2018	HD CE: NR/105 AFI: NR/105
Dekker 2007	WLE: NR/22

	VCE: NR/20
Drastich 2013	WLE: NR/NR AFI: NR/NR
Feitosa 2011	CE: NR/18 NBI: NR/16
Freire 2014	CE: NR/72 CC: NR/73
Ignjatovic 2012	WLE: 0/56 (0%) NBI: 1/56 (1.79%)
Kiesslich 2003	CE: NR/84 CC: NR/81
Kiesslich 2007	CE: 0/81 (0%) CC: 2/80 (2.50%)
Leifield 2015	WLE: NR/NR NBI: NR/NR
Mohammed 2015	HD CE: 0/79 (0%) HD WLE: 1/79 (1.27%)
Pelise 2017	CE: NR/27 NBI: NR/33
Van de Broek 2008	WLE: 0/25 (0%) AFI: 0/25 (0%)
Van de Broek 2011	HD CE: NR/25 NBI: NR/23
Te Groen 2024	HD WLE: 0/133 (0%) HD CE: 0/268 (0%) HD WLE with SR: 0/265 (0%)

Patients with serious adverse events

Study ID	
Alexandersson 2020	HD WLE : NR/153 HD CE : NR/152
Feuerstein 2020	HD WLE : 0/48 (0.00%) CE : 0/41 (0.00%)
Kandiah 2021	HD WLE : 0/102 (0.00%) HD VCE : 0/102 (0.00%)
Yang 2019	HD WLE : 0/108 (0.00%) HD CE : 0/102 (0.00%)
Bisschops 2018	CE : NR/74 NBI : NR/83
Watanabe 2016 B	PCE : NR/130 NBI : NR/133
Iacucci 2016/2018	HD WLE : 0/90 (0.00%) CE : 0/90 (0.00%) HD VCE : 0/90 (0.00%)
Sinonquel 2022	DCE : NR/71 VCE : NR/65
Lord 2018	HD CE 0.2%: NR/150 HD CE 0.03% : NR/150
Gonzalez-Bernardo 2021	CE : NR/67 VCE : NR/62
Gulatti 2018	CE : 0/25 (0.00%) VCE : 0/23 (0.00%)
Leong 2017 A	FV CE : 0/27 (0.00%) FUSE : 0/25 (0.00%)
Vleugels 2018	CE : 1/105 (0.95%) AFI : 0/105 (0.00%)
Dekker 2007	WLE : NR/22

	NBI : NR/20
Drastich 2013	NOT MENTIONED : NR/NR NOT MENTIONED : NR/NR
Feitosa 2011	CE : NR/13 NBI : NR/16
Freire 2014	CE : NR/72 CC : NR/73
Ignjatovic 2012	WLE : 0/56 (0.00%) NBI : 0/56 (0.00%)
Kiesslich 2003	CE : NR/84 CC : NR/81
Kiesslich 2007	CE : NR/81 CC : NR/80
Leifield 2015	WLE : NR/NR NBI : NR/NR
Mohammed 2015	HD CE : 0/79 (0.00%) HD WLE : 0/79 (0.00%)
Pelise 2017	CE : NR/27 NBI : NR/33
Van de Broek 2008	WLE : 0/25 (0.00%) AFI : NR/0
Van de Broek 2011	HD CE : NR/25 NBI : NR/23
Te Groen 2024	HD WLE : 0/133 (0.00%) HD CE : 1/268 (0.37%) HD WLE SR : 0/265 (0.00%)

Patients with at least one lesion of any type detected (Vienna 1-5)

Study ID	
Alexandersson 2020	HD WLE : 9/153 (5.88%) HD CE : 21/152 (13.82%)
Feuerstein 2020	HD WLE : 16/48 (33.33%) HD CE : 21/41 (51.22%)
Kandiah 2021	HD WLE : NR/102 HD VCE : NR/102
Yang 2019	HD WLE : 13/108 (12.04%)) HD CE : 21/102 (20.59%)
Bisschops 2018	HD CE : NR/74 HD VCE: NR/83
Watanabe 2016 B	PCE : NR/130 NBI : NR/133
Iacucci 2016/2018	HD WLE : 26/90 (28.89%) HD CE : 23/90(25.56%) CE : 15/90 (16.67%)
Sinonquel 2022	HD CE : NR/71 HD VCE : NR/65
Lord 2018	HD CE : NR/150 HD CE 0.03% : NR/150
Gonzalez-Bernardo 2021	HD CE : 12/67 (17.91%) HD VCE : 12/62 (19.35%)
Gulatti 2018	HD CE : 8/25 (32.00%) HD VCE : 1/23 (4.35%)
Leong 2017 A	HD WLE : NR/27 FUSE : NR/25
Vleugels 2018	HD CE : 16/105 (15.24%) AFI : 26/105 (24.76%)
Dekker 2007	WLE : NR/22

	NBI : NR/20
Drastich 2013	NOT MENTIONED : NR/NR NOT MENTIONED : NR/NR
Feitosa 2011	HD CE : NR/18 HD VCE : 0/16(0.00%)
Freire 2014	CE : NR/72 WLE : NR/73
Ignjatovic 2012	HD WLE : 8/56(14.29%) HD VCE :13/56 (23.21%)
Kiesslich 2003	CE : NR/84 WLE : NR/81
Kiesslich 2007	CE : NR/81 WLE : NR/80
Leifield 2015	WLE : NR/NR NBI : NR/NR
Mohammed 2015	HD CE: NR/79 HD WLE : NR/79
Pelise 2017	HD CE : 17/27 (62.96%) HD VCE :16/33(48.48%)
Van de Broek 2008	HD WLE: 18/25 (72.00%) AFI : 16/25 (64.00%)
Van de Broek 2011	HD WLE : NR/25 HD VCE : NR/23
Te Groen 2024	HD WLE : NR/133 HD CE : NR/268 HD WLE SR NR/265

Patients with any adverse events

Study ID	
Alexandersson 2020	Not reported
Feuerstein 2020	Not reported
Kandiah 2021	Not reported
Yang 2019	None
Bisschops 2018	Not reported
Watanabe 2016 B	Not reported
Iacucci 2016/2018	None
Sinonquel 2022	Not reported
Lord 2018	Not reported
Gonzalez-Bernardo 2021	Not reported
Gulatti 2018	None
Leong 2017 A	Temporary urine discoloration : FVC - 7 patients/ 27 total patients, FUSE - 7 patients / 25 total patients. Transient abdominal bloating : FVC - 14 patients / 27 total patients, FUSE - 9 patients / 25 total patients.
Vleugels 2018	5 patients / 210 patients
Dekker 2007	Not reported

Drastich 2013	Not reported
Feitosa 2011	Not reported
Freire 2014	None
Ignjatovic 2012	Not reported
Kiesslich 2003	Not reported
Kiesslich 2007	Not reported
Leifield 2015	Not reported
Mohammed 2015	Not reported
Pelise 2017	Not reported
Van de Broek 2008	Not reported
Van de Broek 2011	None
Te Groen 2024	Not reported

Withdrawals due to adverse events

Study ID	
Alexandersson 2020	Not reported
Feuerstein 2020	Not reported
Kandiah 2021	Not reported
Yang 2019	None
Bisschops 2018	Not reported
Watanabe 2016 B	Not reported
Iacucci 2016/2018	None
Sinonquel 2022	Not reported
Lord 2018	Not reported
Gonzalez-Bernardo 2021	Not reported
Gulatti 2018	None
Leong 2017 A	None
Vleugels 2018	Not reported
Dekker 2007	Not reported
Drastich 2013	Not reported
Feitosa 2011	Not reported

Freire 2014	None
Ignjatovic 2012	Not reported
Kiesslich 2003	Not reported
Kiesslich 2007	Not reported
Leifield 2015	Not reported
Mohammed 2015	Not reported
Pelise 2017	Not reported
Van de Broek 2008	Not reported
Van de Broek 2011	None
Te Groen 2024	Not reported

eTable 10. Additional extracted Details of the Included Studies

Serial No.	Study ID	Inclusion criteria: (age, type of IBD, IBD activity, previous therapy, concurrent disease eg. anorexia, PSC, Post cancer surveillance or post surgery),	Exclusion criteria: (e.g. organic causes, previous surgery)	Age per IG/CG Mean or median and measure of spread	Sex (M/F) per IG/CG: Mean or median and measure of spread	Details of Endoscopy technology – if reported	Additional Procedure details – if reported	Concurrent therapies per IG/CG: Was any other treatment allowed/given (e.g. meds, rescue meds)? anything given to all or any ammendments or additions to imaging allowed Report numbers per group or percentage (state)	Description of the intervention (including way of delivery and regimen) per IG/CG: type of imaging, tech, company, manufacturer per GROUP,
1.	Kiesslich 2003	Clinically and histologically verified UC Disease duration >8 years Colitis Activity Index <8 Activity index of Truelove and Witts: mild	Known intraepithelial neoplasia or colorectal cancer or any other malignancy Coagulopathy Prothrombin time <50% of control Partial thromboplastin time >50 seconds Impaired renal function Creatinine >1.2 mg/dL Pregnancy Inability to obtain informed consent Known allergy to methylene blue	Conventional - 38.7. Chromoendoscopy - 42.2	not reported	Magnification endoscopy with Pentax (EC 3831 FZ) and Olympus Exera magnification colonoscope (CF-Q160 ZI)	N/A	Maintenance with Mesalamine CE 52, CG - 44	Chromoendoscopy: Methylene blue was used for staining in a final concentration of 0.1%. The colon was stained in a segmental fashion (30 cm of colon at a time). Excess dye was removed by suction. Conventional colonoscopy: Conventional video-colonoscopes (Pentax EC 3830FK). Inflammatory changes were classified similarly to the chromoendoscopy group. Sequential biopsy specimens were taken in a systematic fashion in both groups; every 10 cm, 5 biopsy specimens were taken.
2.	Kiesslich 2007	Clinically and histologically verified UC. Disease duration >8 y. Colitis Activity	Known intraepithelial neoplasia or colorectal cancer, Coagulopathy (Prothrombin time <50%, partial thromboplastin time >50 sec), Impaired renal function	Group A (IG) - 46.2. Group B (CG) - 41.9	not reported	Confocal laser endoscope	N/A	Maintenance mesalamine therapy: 63.8% (IG), 80.8% (CG).	IG: Chromoscopy with endomicroscopy using fluorescein and methylene blue.

		Index equal to or < 8. Activity index of Truelove and Witts: mild.	(Creatinine >1.2 mg/dL), Pregnancy or breastfeeding, Inability to obtain informed consent, Known allergy to methylene blue or fluorescein						CG: Standard video endoscopy with random biopsy. Mucosal abnormalities were recorded in both groups with regard to location (distance from the anus in centimeters), morphology (polypoid, flat, depressed), and size. On withdrawal of the colonoscope from the cecum to the anus, sequential biopsy specimens were taken in a systematic fashion in both groups. In group A, endomicroscopy was performed every 10 –15 cm and biopsy specimens were taken only in the presence of in vivo mucosal irregularities.
3.	Dekker Endoscopy 2007	The inclusion criteria for participation were an objective diagnosis of ulcerative colitis(based on endoscopic and/or histopathological assessment), a history of pancolitis, disease duration of 8 years or more, and inactive	Exclusion criteria were non-correctable coagulopathy, age ≤ 18 years, and inability to give informed consent.	mean age (SD) of 50 +/- 11.2 years	The study group comprised 31 men and 11 women	White−light endoscopy was performed with conventional video colonoscopes (CF−140 or CF−160 series; Olympus Medical Systems Europe, Hamburg, Germany). No magnification or dye spray was used in this arm of the study. Narrow−band imaging was performed using a first−generation prototype	All patients were prepared with four liters of hypertonic poly−ethylene glycol solution (Kleanprep; Helix Bio−pharma Corp., Aurora, Ontario, Canada). The procedures were performed under conscious sedation using midazolam and/or fentanyl. Cecal intubation was confirmed by identification	37 patients (88%) were on disease−modifying drugs, mostly (in 74% of cases) mesalamines or combined therapies with mesalamines and azathioprine.	When performing Narrow Band Imaging colonoscopy, the endoscope was advanced into the cecum using the WLE mode. On reaching the cecum, the imaging mode was switched to Narrow Band Imaging, which was used for the entire withdrawal. During colonoscopy by both Narrow Band Imaging and WLE, the number of

		disease assessed by the modified Truelove and Witts severity index.				endoscopic imaging system (Evis CV−240, CF−Q240 endoscope; Olympus Medical Systems, Tokyo, Japan), which has two imaging modes (WLE and Narrow Band Imaging). An experimental light source (Olympus Evis CLV−U40) was used, in which the excita− tion light is sequentially separated into red, green, and blue.	of the appendiceal orifice and ileocecal valve. At the start of withdrawal of the endoscope, 20 mg butyl scopolamine was given intravenously to reduce colonic motility and repeated at the discretion of the endoscopist		lesions suspicious for neoplasia was noted and targeted biopsies were taken from these areas. Suspicious lesions on Narrow Band Imaging were defined as polypoid or irregular mucosal structures with Kudo pit patterns III±V unusual ulcers, strictures, or areas with increased vascular intensity revealed by dark discoloration. On WLE, suspicion was aroused by polypoid or irregular mucosa, and unusual ulcers or strictures. During WLE (but not during Narrow Band Imaging) additional four−quadrant random biopsies were taken every 10 cm of colon. For both procedures, the number of suspicious lesions, the number of targeted biopsies, and the procedure time were recorded.
4.	van de Broek 2008	Ulcerative colitis, disease duration >8 years, inactive pancolitis, Truelove and Witts Index <2.	Exclusion criteria Non-correctable coagulopathy, age <18, poor bowel preparation	Mean age AFI= 50 WLE= 51	AFI = M 17, F8 WLE= M14, F11	All colonoscopies were performed with a prototype ETMI system (Olympus Inc., Tokyo, Japan). The light source (XCLV260HP) contains two rotating red-green–blue RGB filters; one conventional for WLE and one additional for	Patients were prepared with 4 litres of hypertonic polyethylene glycol solution (Kleanprep; Norgine, Marburg, Germany) and received conscious sedation.	92% (IG) and 72% (CG) of patients were on disease-modifying drugs	The endoscope was advanced in the WLE mode and caecal intubation was confirmed by identification of the appendiceal orifice and ileocaecal valve. No biopsies were taken during insertion of the endoscope. During withdrawal of the colonoscope, each colonic segment

						Narrow Band Imaging, in which the band-pass ranges are narrowed to wavelengths of 530–550 nm (green) and 390–445 nm (blue). The zoom video-colonoscope (XCF-H240FZL; magnification 6100) contains two charge-coupled devices, one for WLE/Narrow Band Imaging and one for AFI.			was inspected twice: once with AFI and once with WLE. The hepatic and splenic flexures separated the colonic segments; in case of indistinct flexures a biopsy was taken for reference during the second inspection.
5.	van den Broek 2011	The inclusion criteria were: disease history at least 8 years, and endoscopically proven colitis proximal to the splenic flexure in the past with currently inactive disease defined by a Truelove and Witts activity index of 2 or less . An objective diagnosis of ulcerative colitis was also mandatory, based on former endoscopic and histopathological findings	Exclusion criteria were: noncorrectable coagulopathy, age 18 years or less, insufficient bowel preparation for accurate mucosal inspection, and inability to provide informed consent.	mean age = 56	Not mentioned	Colonoscopies were performed using the Lucera system with sequential red–green–blue illumination (CV-H260; Olympus, Tokyo, Japan) incorporating HDE, Narrow Band Imaging, and optical magnification (× 100). Switching between these imaging modes was done by pressing a button on the shaft of the endoscope (CF-H260; Olympus). High-definition monitors (1080i) were used during the procedures.	Patients were prepared with 4 L of hypertonic polyethylene glycol solution (Kleanprep; Norgine Inc., Amsterdam, the Netherlands) and underwent both colonoscopies under conscious sedation with midazolam and/or fentanyl.	Anti-inflammatory drug use overall -,39 (81%)	A time interval of at least 3 weeks between the two procedures was chosen to allow healing of biopsy sites, so that the sampling sites could not be recognized during the second examination. The endoscope was first advanced to the cecum using the HDE mode in all patients. Lesions found during the insertion phase were neglected and left unharmed. For the Narrow Band Imaging examination, the endoscope was switched to Narrow Band Imaging mode once the cecum had been reached. Cecal intubation was confirmed by identification of the appendiceal orifice and ileocecal valve or by intubation of the

									ileum. At the start of withdrawal, 20 mg butyl scopolamine was given to reduce colonic motility, and this was repeated at the discretion of the endoscopist. During withdrawal from the cecum, the colon was scrutinized for the presence of dysplasia-associated lesions or masses (DALMs), mucosal irregularities, ulcers, and strictures. Any detected lesions were classified according to the macroscopic classification of early gastrointestinal neoplasia
6.	Feitosa 2011	Not mentioned	Not mentioned	Mean age Chromoendoscopy= 50.3 years Narrow Band Imaging= 49.5 years	Chromoendoscopy= (9F,4M) Narrow Band Imaging=(11F,5M)	Not mentioned	Not mentioned	Not mentioned	Not mentioned
7.	Ignjatovic 2012	an objective diagnosis of left -sided or pancolitis (endoscopic and histological), disease duration of >8 years for pancolitis and >10 years for left -sided colitis, with evidence of histological infl ammation at the previous colonoscopy. Because of slow	age ≤ 18 years, inability or unwillingness to consent to the procedure, and severe active colitis (endoscopist assessment).	WLE - 52, Narrow Band Imaging - 53	WLE- 25 females and 31 males. Narrow Band Imaging - 34 males and 22 females	Th e Olympus Lucera Spectrum video endoscopy system with high-defi nition colonoscopes was used for all cases (XCF_x0002_H240 FZL / I and CF-H260AZL video colonoscopes, XCLV-260HP xenon light source and XCV-260HP video system center; Olympus, Tokyo, Japan; Narrow Band Imaging filters: blue, centered on 415 nm; green, centered on 540	Patients were prepared with Senna and two sachets of magnesium citrate (Citramag, Sanochemia, Vienna, Austria) or 4 liters of PEG solution (Klean-Prep, Norgine, Harefi eld, Middlesex, UK). Colonoscopies were performed with patients unsedated or under conscious sedation using	WLE Group (n = 56): Maintenance 5-ASA: 29 patients (52%) Maintenance Sulphasalazine: 13 patients (23%) Maintenance Azathioprine: 13 patients (23%) NBI Group (n = 56): Maintenance 5-ASA: 27 patients (48%) Maintenance Sulphasalazine: 12 patients (21%) Maintenance Azathioprine: 13 patients (23%)	The colon was examined segmentally, with targeted biopsies or definite resection (snare polypectomy or endoscopic mucosal resection) of any suspected dysplastic lesions. Areas suspicious for dysplasia were defined as any mucosal irregularity, strictur_x0002_ing, or ulceration not consistent with active or chronic UC as seen with WLE. In addition to

		recruitment, the last inclusion criterion was abolished after 40 patients had been recruited				nm). Output was to a high-definition 1080i (i.e. 1,080 lines of vertical resolution), 14-inch monitor (OEV181H, Olym_x0002_pus).	midazolam and pethidine. Patients were given 20 mg of intravenous hyoscine butylbromide at the start of the procedure or on reaching the cecum, with additional antispasmodic given at the discretion of the endoscopist. Assessment of bowel preparation was made once the cecum was reached as follows: good (only liquid stool present removable with suction), adequate (some semi-formed stool obscuring < 10 % of the mucosa aft er suction), and poor (>10 % of the mucosa obscured by solid stool after suction).		these, suspicious lesions on Narrow Band Imaging were defined as those with increased vascular intensity and Kudo pit pattern III – V. The size (measured against open biopsy forceps), position (colonic segment), shape (Paris classification), and endo_x0002_scopi c diagnosis were recorded for each lesion. Once a lesion was resected, quadrantic biopsies from the surrounding mucosa were taken. Targeted biopsies were sent to histopathology in a separate pot. In both arms of the study, random, nontargeted quadrantic biopsies were taken every 10 cm on withdrawal and the number of suspicious lesions; the number of targeted biopsies and withdrawal times were recorded.
8.	Drastich 2013	Not mentioned	Not mentioned	Not mentioned	Not mentioned	Not mentioned	Not mentioned	Not mentioned	Each colonic segment was inspected twice, once with autofluorescence imaging (AFI) and once with white-light endoscopy (WLE), in random order. Biopsies from all suspected lesions and

									standard four quadrant random biopsies every 10 cm were taken
9.	Freire 2014	The inclusion criteria consisted of patients aged 18 years or older, with a confirmed diagnosis (based on established clinical, endoscopic, radiological, and histological criteria) of longstanding (>8 yr) left side or extending UC, clinically inactive (Simple Clinical Colitis Activity Index).	Exclusion criteria were as follows: unwillingness to consent to the protocol, personal history of IN or CRC, diagnosis of PSC, known allergy to methylene blue or fluorescein, pregnant or nursing women, coagulopathy (prothrombin time <50% of control, partial thromboplastin time >50 sec), or impaired renal function (creatinine level >1.2 mg/dL)	Mean age Group A CGE = 49.2 +/- 13.5 Group B CC= 51.7 +/- 15.6	Not mentioned	Pentax EC-3870CIFK (endomicroscopy function only used in group A)	All patients received a standard bowel preparation (4L polyethylene glycol). Patients were under propofol-induced sedation or conscious sedation with intravenous midazolam if required.	Maintenance therapy were not significantly different between the 2 groups	Group A (CGE): After reaching the cecum, the colon was stained using methylene blue 0.1% following chromoendoscopy guidelines. Abnormalities (circumscribed lesions) were evaluated by endomicroscopy and then biopsied or removed. Only circumscribed lesions were evaluated. Sodium fluorescein 10% was injected for contrast during endomicroscopy, and lesions were graded using the Mainz–Kiesslich confocal pattern classification. Group B (CC): After cecal extubation, 4-quadrant random biopsies were taken every 10 cm, along with targeted biopsies or resections of abnormal-appearing mucosa. Biopsies were processed in individual formalin pots based on the distance from the anal verge.
10.	Leifeld 2015	The inclusion criteria were clinically and histologically proven pancolitis for more than 8 years and	The exclusion criteria were contraindications to colonoscopy, history of partial colectomy, and reasonable doubts regarding patient cooperation.	Age, mean (SD): 48.0 ± 11.3 years	64% male in both groups	NBI (Narrow-band imaging) vs. WLE (White-light endoscopy)	Bowel cleansing was performed according to the standards of each study center.	Not reporterd	The study involved experienced endoscopists at each center, using standardized techniques across all procedures. Each center was

		leftsided UC for more than 15 years, age older than 18 years, last surveillance colonoscopy more than 10 months ago, and clinical remission of UC.							equipped with Olympus Evis Exera II video systems and videocolonoscopes . In WLE, stepwise random biopsy specimens (4 biopsies every 10 cm) were taken along with targeted biopsies from suspicious areas. In Narrow Band Imaging, segmental and targeted biopsies were taken. The primary endpoint was the detection of IN, with a focus on non-adenoma-like and adenoma-like lesions.
11.	Mohammed 2015	1. Patients with longstanding (more than 8 years of disease), extensive (extending proximal to splenic flexure) colitis attending for surveillance colonoscopy 2. Patients aged over 18 years of age.	Pre-intubation 1. Pregnancy 2. Unwilling or unable to give informed consent 3. Severe active colitis (as assessed by endoscopists) Pre-randomization 1. Poor bowel preparation (solid stool or <90% of mucosal area cannot be visualized even after jet washing using the Aronchik scale score of > 3)	mean age in HDWL-55.5 HDChromoendoscopy - 55	M-49 in both F- 30 in both	HD scopes (Olympus CF260L or 290L) and processors (Olympus Spectrum CV260 or Elite CV290) and HD monitors.	Not reported	Not reported	HD Chromoendoscopy. HDWLE
12.	Watanabe 2016 B	Left-sided or pancolitis. A disease duration exceeding 7 years.Partial Mayo score of up to 2 (0 or 1 endoscopic subscore).	Not mentioned.	Not mentioned. Total = median age 51.0	Not mentioned.	The Olympus EVIS LUCRA ELITE system with a CF-HQ2901 video colonoscope was used mainly used for targeted biopsies.	N/A	Not reported	To compare the newly-developed pancolonic Narrow Band Imaging endoscopy procedure with panchromoendoscopy for the detection of neoplastic lesions and in terms of procedure time in patients with UC.
13.	Iacucci 2018	Patients included had extensive or	Patients were excluded if they were pregnant, had active inflammatory disease, did not	HD= 48.14 (SD±13.73) Dye Chromoendoscopy=	HD= 45M, 45F DChromoendoscopy = 46M, 44F	All endoscopic procedures were performed using	The quality of bowel preparation was	In the **HD group**, 32.2% of patients were on mesalamine, 13.3% on	Colonoscopies were performed by a single operator

		left-sided ulcerative colitis, colonic Crohn's disease, or unclassified colitis affecting at least one-third of the colon. The inclusion criteria required a disease duration of more than 8 years or any duration with primary sclerosing cholangitis (PSC). Patients needed to be in clinical and endoscopic remission, defined as a Mayo total score <3, a Mayo endoscopic subscore of 0 or 1 (no segment with a score >1), or for Crohn's disease, a Harvey–Bradshaw Index <5 and a SES-CD ≤4.	have optimal bowel preparation, had coagulopathy, had a known allergy to dye spray, or were unable to provide informed consent.	49.92(SD±11.96) Virtual Chromoendoscopy= 48.03 (SD±14.6)	VChromoendoscopy= 57M, 33F	the HD+ iSCAN Pentax EC-3490Fi with the EPKi 7000 (Pentax) video processor. The iSCAN system includes three algorithm types: Surface Enhancement (iSCAN 1) for detecting abnormalities and lesions in the gastrointestinal tract, and Tone Enhancement and Contrast Enhancement (iSCAN 2 and 3) for pattern and vascular characterization. Each algorithm set could be activated by pressing a pre-assigned button on the scope's hand-piece.	assessed using the Ottawa Bowel Preparation Scale, rated as excellent, good, fair, poor, or inadequate. Only patients with excellent or good bowel preparation were included in the study. Endoscopic disease activity was assessed using the Mayo endoscopic subscore for ulcerative colitis and the SES-CD for Crohn's disease. The colonoscope was advanced to the cecum, and the mucosa was thoroughly washed using a water jet pump. On withdrawal, each segment of the colon was examined: Group A using HD endoscopy, Group B using chromoendoscopy with 0.04% methylene blue or 0.03% indigo carmine, and Group C using virtual chromoendoscopy (iSCAN 2 and 3 mode). Lesions were detected and characterized during withdrawal after applying dye or activating iSCAN, as well as with HD-WLE.	immunosuppressants, 20% on biologics, 15.6% on combination treatment, 17.8% received no treatment, and 2.2% were on steroids. In the **DCE group**, 37.8% of patients were on mesalamine, 12.2% on immunosuppressants, 25.6% on biologics, 7.8% on combination treatment, 15.6% received no treatment, and 2.2% were on steroids. In the **VCE group**, 28.9% of patients were on mesalamine, 12.2% on immunosuppressants, 22.2% on biologics, 17.8% on combination treatment, 15.6% received no treatment, and 1.1% were on steroids.	(MI), experienced in dye-based, optical, and digital virtual chromoendoscopy techniques, as well as in characterizing colonic lesions. This ensured uniform application of technique and cognitive skills across all procedures. Histology was assessed by XG, SU, and PM, who were blinded to the endoscopic reports. The colonoscope was advanced to the cecum, and the colonic mucosa was thoroughly washed using a water jet pump. During withdrawal, each segment (cecum, ascending colon, transverse colon, descending colon-sigmoid, and rectum) was sequentially examined for lesions. Group A was examined using the HD endoscopic technique, Group B using chromoendoscopy with 0.04% methylene blue or 0.03% indigo carmine, and Group C using virtual chromoendoscopy (iSCAN 2 and 3 mode). Consistent with the protocol used in the Kiesslich et al. study, lesion detection was not emphasized during scope insertion.

									The withdrawal time from the cecum to the rectum was recorded for all patients across the different groups.
14.	Pellise GIE 2017	Long-standing ulcerative colitis (UC) or Crohn's disease (CD) involving at least one-third of the colon, disease duration ≥8 years.	Patients were excluded if they had previous colorectal cancer, a previous surgical resection of the colon or rectum, coagulopathy, a known allergy to indigo carmine, or if they did not consent	mean age Chromoendoscopy= 47.26 Narrow Band Imaging= 49.36	Chromoendoscopy= 11M,16F Narrow Band Imaging= 22M,11F	A high-resolution wide-angle video endoscope (Olympus prototype XCF H160AY2L, H180 series; Olympus Europe, Hamburg, Germany) with a high-resolution 1080-line screen was used for the study	Bowel preparation included ingestion of 3 to 4 L of polyethylene glycol electrolyte solution before the examination and a dietary restriction of solid food 2 days before the procedure. During extubation, each segment was thoroughly washed with a saline solution mixed with N-acetylcysteine and dimethicone.	Treatment with mesalazine, CE - 11 (40.7) NBI 14 (42.4) Treatment with immunosuppressants, CE - 14 (51.9) NBI - 11 (33.3)	□ Chromoendoscopy: Following SURFACE Chromoendoscopy guidelines, 0.5% indigo carmine was sprayed in segments using a specialized catheter during the procedure. □ Narrow Band Imaging (NBI): After reaching the cecum, NBI mode was activated for the withdrawal process, focusing on vessel network and hue differences between lesions and surrounding mucosa.
15.	Leong 2017 A	Patients with long-standing ulcerative colitis or Crohn's colitis (>8 years) or with any disease duration in the presence of PSC were included	Exclusion criteria included insufficient time since the previous surveillance colonoscopy according to guidelines, severe comorbidities, adverse reactions or contraindications to methylene blue, pregnancy or breastfeeding, prior colonic resection (except limited cecal resection with ileal resection in Crohn's disease), coagulopathy or anticoagulant use, symptomatic IBD flare (Crohn's Disease Activity Index >150 for CD, Mayo Score >2 for UC), and active colitis (Mayo score >2 for UC, simple endoscopic score CD >4 in one colonic segment).	FUSE= 46 (35.5 - 59.5), FVC= 41 (33-50)	FUSE= (14M, 11F), FVC= (17M, 10F)	The FUSE colonoscope with three cameras provides a 330° field of view, compared to the forward-viewing colonoscope (FVC) with a 170° view. Both systems used high-definition monitors.	Ottawa Bowel Preparation Scale was used to evaluate bowel cleanliness Two random biopsy specimens were taken from each bowel segment to assess for histologic inflammation and invisible dysplasia. Colonoscopy and withdrawal times were measured using a stopwatch, which was paused during cleansing, lesion	Concurrent therapies included 5-aminosalicylic acid (5-ASA), immunomodulators, and biologic agents	Two back-to-back high-definition colonoscopies were performed. The first used white-light on both insertion and withdrawal, while the second used white-light on insertion and chromoendoscopy with methylene blue 0.1% on withdrawal. Random biopsies were performed after dye-spray inspection. Visible lesions were removed by polypectomy or endoscopic mucosal resection.

							removal, and dye-spray application.		Irresectable lesions were biopsied, and lesion size was measured with biopsy forceps or a snare. Pathologists were blinded to whether lesions were identified by white-light or chromoendoscopy.
16.	Gulatti 2018	Included patients were between the ages of 18 and 75 years and had colitis with UC extending at least to the splenic flexure or CD affecting at least half the colon	Exclusion criteria included severe active colitis, inadequate bowel preparation, allergy to indigo carmine, and colonic resection	Age, mean (SD): IG - 48.4 ± 14.6 years, CG - 41.4 ± 12.3 years	IG - 14 males, CG - 16 males	Chromoendoscopy was performed using Olympus CF-H260ZL, processor CLV-260, or Fujinon EC600ZWL series, processor Fujinon EPX 4450HD (Fujinon Medical Systems GmBH, Dusseldorf, Germany) using 0.2% indigo carmine through the same disposable spray catheter. VChromoendoscopy was performed using Fuji 600Z series using the predefined FIChromoendoscopy-8 (R 540 nm G 415 nm B 415 nm) mode.	Jet irrigation was performed using saline/simethicone solution via a disposable spray catheter (Olympus PW-5V-1) during insertion to the cecum. During withdrawal, each bowel segment by was examined by high-definition white light examination (HD-WLE), followed by either VChromoendoscopy or Chromoendoscopy, per randomization.	Concurrent therapies: 5-ASA - 18 in IG, 12 in CG; biologics - 2 in IG, 3 in CG; immunosuppressants - 7 in IG, 8 in CG	Lesions were recorded by colonic segment, distance from the anal verge, morphology (Paris classification), and size during both procedures. All lesions were biopsied in both procedures, with dysplastic lesions resected during the second procedure. Pseudopolyps were not routinely biopsied or included in lesion detection data. Data were recorded by a dedicated research fellow in a bespoke database, with histopathology follow-up. If dysplasia was missed during the second procedure, the research fellow informed the endoscopist to revisit the area before extubation.
17.	Vleugels 2018	Patients were considered eligible who were aged 18 years or older and had been diagnosed with extensive colitis (Montreal E3)	Exclusion criteria included poor bowel preparation, active colitis, prior colonic resection, severe comorbidity, coagulopathy or use of anticoagulant drugs	AFI= 56.3 (SD 13.1), Chromoendoscopy= 56.1 (SD 12.3)	AFI= (61M, 44F), Chromoendoscopy= (61M, 44F)	Both arms used CFH240AZL/I colonoscopes and Lucera Elite video processor system (Olympus Medical Systems Co., Tokyo, Japan). High-definition monitor output was used for both	The procedures were conducted under conscious sedation with intravenous benzodiazepines and opiates as needed. Carbon dioxide insufflation was used for all	IG=AFI, CG=Chromoendoscopy Previous or current use of immunomodulating therapy: IG - 53.3%, CG - 57.1%	When allocated to the autofluorescence imaging (AFI) group, the imaging mode was switched to AFI upon reaching the cecum to inspect the entire colon for suspicious areas,

		at least 8 years ago or left-sided colitis (Montreal E2) at least 15 years ago				arms placed at appropriate viewing distances at the discretion of the endoscopist.	colonoscopies, and the endoscope was advanced to the cecum using high-definition white light endoscopy (HD-WLE). Caecal intubation was confirmed by identifying the appendiceal orifice and ileocecal valve. Bowel preparation was assessed using the Boston Bowel Preparation Score (BBPS), and patients with a score <6 or active colitis were excluded. For those with sufficient bowel preparation and no active inflammation, colonoscopy proceeded. During withdrawal, 20 mg of hyoscine butylbromide (Buscopan) was optionally administered to reduce colonic motility.		mucosal irregularities, ulcers, or strictures during withdrawal. In the chromoendoscopy arm, each colonic segment was sprayed with 0.1% methylene blue or 0.2% indigo carmine solution during withdrawal, and the colon was examined in HD-WLE. Suspicious areas were classified using the Paris classification, with lesion size, location, and relation to inflamed areas recorded. Digital images of lesions and adjacent mucosa were taken. All detected lesions and surrounding normal mucosa were sampled for histopathology, with up to three biopsies for hyperplastic or inflammatory lesions. Two random biopsies were taken from each segment to assess histologic inflammation and invisible dysplasia.
18.	Bisschops 2018	All adult patients (age >18 years) with long-standing UC (8 years after onset of symptoms for patients with extensive or pan-colitis, and 10 years after onset of symptoms for	subjects unwilling to consent to the study protocol, pregnant or nursing women, patients with a history of colorectal cancer or referred with known dysplasia, inadequate bowel preparation (defined as stool remnants that could not be washed off, corresponding to Boston Bowel preparation Score12 (BBPS) 2 in at least one segment), active UC (defined as Mayo score >1) noted on colonoscopy to	Chromoendoscopy= 52.5 (43.0–60.0), Narrow Band Imaging= 52.0 (44.5–63.5)	Chromoendoscopy= 40M 26F, Narrow Band Imaging= 33M 32F	. The commercially available H180Q series colonoscope from Olympus Corporation, Japan, was used to carry out all procedures. The endoscope was connected via an Excera II processor to an HD screen, using the HD serial digital	All patients were prepared using a split-dose 4 L polyethylene glycol (PEG) solution, which is a standard bowel preparation method aimed at improving colon cleanliness and ensuring clear	□ Chromoendoscopy Group (n=66): ● 5-ASA: 54 patients (82%) ● Immunosuppressants: 22 patients (33%) ● Biologicals: 26 patients (40%) □ Narrow Band Imaging Group (n=65): ● 5-ASA: 46 patients (71%)	□ Chromoendoscopy with 0.1% Methylene Blue: After advancing the colonoscope to the cecum and performing water cleansing, a 7 Fr spray catheter was used to apply 0.1% methylene blue during scope withdrawal. Excess

		patients with left-sided colitis) who could sign the informed consent form and had not had a surveillance colonoscopy within the previous year.	extend over 20 cm from the anal verge13 and allergy/intolerance to methylene blue dye			interface (SDI) signal	visibility during the procedure. Adequate water cleansing was performed before starting chromoendoscopy or NBI. Hyoscine butylbromide (Buscopan) was optionally used to reduce colonic motility during the procedure.	• Immunosuppressants: 15 patients (23%) • Biologicals: 27 patients (41%)	dye was removed after 1 minute, and the scope was reinserted to inspect for suspicious lesions. Lesions were biopsied along with surrounding mucosa. The examination was performed in segments—first the ascending colon, then the transverse colon, and finally the left colon. □ Narrow Band Imaging (NBI): Using the Olympus H180Q colonoscope, WLE was employed during scope insertion, and the NBI mode was activated upon reaching the cecum. Suspicious lesions (circumscribed or with increased vascular intensity) were biopsied during withdrawal. Visible mucosal abnormalities (seen during Chromoendoscopy or Narrow Band Imaging) were either biopsied (if resection is not feasible) or resected and two biopsies from surrounding mucosa were performed using disposable biopsy forceps (Boston Scientific Radial Jaw 4 standard capacity forceps).

									All lesions were classified according to the Kudo pit pattern clas sification. Only typical pseudopolyps with pit pattern 1 were not biopsied or resected
19.	Lord 2018	Not mentioned	Not mentioned	Not mentioned	Not mentioned	HD scopes (Olym pus CF-HQ290L) and processors (Elite CV 290) were used.	Not mentioned	Not mentioned	A parallel group randomised controlled trial (ClinicalTrials.gov ID: NCT03250780) in which patients undergoing surveillance endoscopy for IBD colitis were randomized into either HD Chromoendoscopy using 0.2% IC using a spray catheter or HD Chromoendoscopy using 0.03% IC via a foot pump. HD scopes (Olympus CF-HQ290L) and processors (Elite CV 290) were used.Two expert GI histopathologists confirmed presence of dysplasia. Time of withdrawal and ampoules of IC were also recorded.
20.	Yang 2019	Patients included were ≥19 years old, with a diagnosis of ulcerative colitis (UC) based on clinical, endoscopic, and histologic findings. They had	Patients were excluded if they had a history of colorectal cancer (CRC), any type of colectomy, coagulopathy(proth rombin time <50% or activated partial thromboplastin time >50 seconds), or impaired renal function (serum creatinine >1.2 mg/dL).	IG= HDChromoendosco py-T CG= HDWL-R IG median(range) = 52 (25-78), CG 51 (23-79)	IG= HDChromoendoscop y-T CG= HDWL-R IG male: female = 57:45, CG male:female= 62:46	HD colonoscope (CF-HQ260 or CF-HQ290, Olympus co., Tokyo, Japan)	Patients underwent bowel preparation using a polyethylene glycol (PEG) solution. The quality of bowel preparation was assessed using the Boston Bowel Preparation Scale (BBPS). If	Medications: 5-ASA in 96.3% IG, 98.0% CG; corticosteroids in 2.9% IG, 2.0% CG; immunomodulators in 24.5% IG, 25.0% CG; anti-TNF agents in 0% IG, 3% CG	IG= HD Chromoendoscopy-T CG= HDWL-R For the HDWL-R Group (High-Definition White Light Endoscopy with Random Biopsies): Targeted biopsies were taken from any suspected dysplastic lesions

		either extensive colitis with ≥8 years or left-sided colitis with ≥10 years of disease duration. All patients were in clinical remission, defined by a simple clinical colitis activity index ≤8 and a mild Truelove and Witts disease activity score. Informed consent was obtained from all enrolled patients.					the BBPS score was less than 6, or if there was active colitis, the patient was excluded from the study. In the HD Chromoendoscopy-T Group, a transparent cap containing a water supply tube (distal attachment cap; ERBE, Germany) was attached to the distal end of the colonoscope. If the scope had its own water infusion channel, a conventional transparent cap was attached instead. After cecal intubation, a 0.05% indigo carmine solution was sprayed onto the colonic segments via the water infusion channel.		visible under white-light (WL) colonoscopy. Additionally, 4-quadrant random biopsies were taken every 10 cm from the cecum to the rectum. Narrow Band Imaging (NBI) or Chromoendoscopy was allowed for examining suspected dysplastic lesions detected under WL colonoscopy. □ HD Chromoendoscopy-T Group (High-Definition Chromoendoscopy with Targeted Biopsies): For this group, 2 biopsy specimens were taken from the cecum, transverse colon, sigmoid colon, and rectum, even in the absence of suspicion of dysplasia, to assess the microscopic extent of colitis. If a suspected dysplastic lesion was detected, 0.16% indigo carmine was sprayed, and at least 2 biopsy specimens were obtained.
21.	Alexanderss on 2020	Inclusion criteria were extensive ulcerative colitis or Crohn's colitis involving at least one-	Exclusion criteria included refusal to participate, inability to provide informed consent, and an increased risk of bleeding (bleeding disorders and use of antithrombotic agents)	Age (mean ± SD): IG - 50.0 ± 15.7 years, CG - 49.7 ± 16.0 years	Males IG: 102 CG: 109 Females IG: 50 CG: 44	HD colo_xFFFE_noscopes (CF-H180AL/CF-H190AL, Olympus Medical	Random biopsies were taken from 8 different segments of the colon (cecum, ascending colon, hepatic flexure, transverse	Not mentioned	IG (Intervention Group) = HD Chromoendoscopy, CG (Control Group) = HD White Light Endoscopy (HD-WLE).

		third of the colon, IBD with primary sclerosing cholangitis (PSC), IBD with previous dysplasia in colon biopsies, or a family history of colon cancer in a first-degree relative					colon, splenic flexure, descending colon, sigmoid colon, and rectum), with 4 biopsies per segment, totaling 32 random biopsies per colonoscopy. Visible lesions were documented, and details about their size, location, method of removal, and morphology wer e recorded. All lesions (except pseudopolyps and inflammatory polyps) were removed when possible.		1.HD Chromoendoscopy Group: The endoscope was first advanced to the terminal ileum or cecum. During withdrawal, 0.3%–0.5% indigo carmine was used to stain the colon in a segmental fashion (20–30 cm at a time) using a spraying catheter that ensured homogeneous application of the dye. After each segment was stained, the endoscope was advanced through the stained area, and the colon and rectum were examined for visible lesions. After the removal of visible lesions, nontargete d random biopsies were collected. 2.HD-WLE Group: The endoscope was advanced to the terminal ileum or cecum. During withdrawal, the colon and rectum were examined for visible lesions under white-light endoscopy. After the removal of visible lesions, nontargete d random biopsies were collected from the colon.
22.	Feuerstein 2020	Not mentioned	Not mentioned	Chromoendoscopy= 49.83 (SD 14.7),	Chromoendoscopy=(15F, 26M), HD-WLC= (17F, 31M)	Not mentioned	N/A	IG=Chromoendoscopy, CG=HD-WLC Not mentioned	Performed a prospective randomized control

				HD-WLC= 48.94 (SD 15.29)					trial comparing chromoendoscopy and HD WLC with biopsies every 10cm in patients with IBD involving at least 1/3 of the colon and 8 years of disease duration or with underlying IBD and primary sclerosing cholangitis at Beth Israel Deaconess Medical Center, Boston MA. Endoscopists were blinded to which technique would be used until immediately before the procedure. Background patient demographics and IBD related histories were obtained. Prior and current medications and prior endoscopic procedures were reviewed.
23.	Kandiah 2021	Patients with clinically inactive inflammatory bowel disease (IBD), either Crohn's disease or ulcerative colitis, were included in the study	Patients with active disease, inadequate bowel preparation, or those unable to give consent were excluded	54y (20y - 80y) not specified	HDWL Group: 46 males, 48 females. HD-Chromoendoscopy (HDV) Group: 55 males, 39 females	Pentax iScan OE2 system was used in both HD-WLE and HD-Chromoendoscopy groups. The chromoendoscopy group used dye-based chromoendoscopy in conjunction with high-definition imaging	All patients received standard polyethylene glycol-based Bowel preparation prior to the procedure.	In the **HDWL group**, 2% of patients were on steroids, 81% on ASA, 31% on immunosuppressants, and 10% on biologics, while in the **HDV group**, 1% were on steroids, 85% on ASA, 29% on immunosuppressants, and 6% on biologics.	Patients with clinically inactive disease were randomly assigned to undergo surveillance colonoscopy using either HDWLE or HD-Chromoendoscopy. All neoplastic lesions detected were resected and all patients had four quadrant random biopsies taken at 10cm intervals.
24.	Gonzalez-Bernardo 2021	Patients with IBD undergoing colonoscopy for colorectal cancer	Patients with inadequate bowel preparation (using the Boston Bowel Preparation Scale [BBPS] <6) or those with active endoscopic disease (Mayo endoscopic index >1 or SES-CD >4) were excluded	Chromoendoscopy= 49.5(SD ± 14), VC= 51.3(SD ± 12)	Chromoendoscopy=31M 36F, VC=31M 31F	All tests were scheduled in an ordinary outpatient endoscopy schedule and carried out using a Pentax EC-3490Fi	N/A	Not mentioned IG= Chromoendoscopy, CG=VC Chromoendoscopy Group: • Mesalazine: 70.2%	Chromoendoscopy Group: 0.03% indigo carmine was injected via a fluid infusion pump system through an

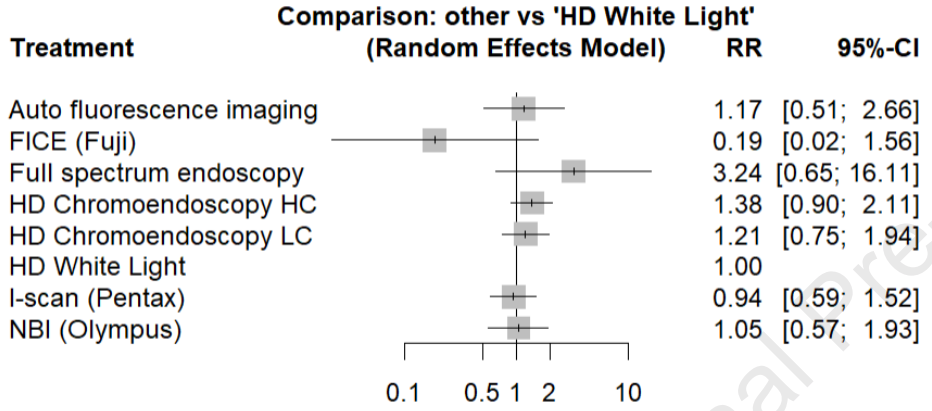
		screening we re included				with EPKi 7000 Pentax video processor with HD and the iSCAN VC system.		• Immunomodulators: 34.3% • Biologics: 16.4% • No treatment: 7.5% □ Virtual Chromoendoscopy Group: • Mesalazine: 80.7% • Immunomodulators: 19.4% • Biologics: 12.9% • No treatment: 8.1%	auxiliary channel of the colonoscope. The entire colon was examined on withdrawal, and random biopsies were collected from segments not properly stained. Visible lesions were resected (Gonzalez-Bernardo 2021). □ Virtual Chromoendoscopy Group: The iSCAN 1 mode was activated, and the colon was examined in a similar manner. Lesions were also resected, and random biopsies were collected (Gonzalez-Bernardo 2021).
25.	Sinonquel 2022	Not mentioned	Not mentioned	Not mentioned	Not mentioned	Not mentioned	Not mentioned	IG=Chromoendoscopy CG= i-scan Not mentioned	Biopsies were taken from visible lesions and surrounding mucosa. Neoplastic lesions were defined as any type of dysplasia, adenoma, sessile serrated polyp or carcinoma. Statistical analysis was performed using t-test for continuous data and Fishers' exact for comparison of proportions.
26.	Te Groen 2024	Eligible patients were aged ≥18 years and scheduled for colitis-associated CRN surveillance according to Dutch IBD	Patients were excluded in case of insufficient bowel cleansing, active colitis, or if >50% of the colon was resected.	median age of 51 years (interquartile range 35-63). HD-WLE with SR – 51.47 (35.91-61.98) HD-CE – 50.29 (37.29-62.80) Single pass HD-WLE – 48.26 (32.39 -62.85)	Male sex % HD-WLE with SR – 53.4% HD-CE – 48.6% Single pass HD-WLE – 54.8%	HD endoscopy	Not mentioned	Not mentioned	Not mentioned

		surveillance guidelines.							

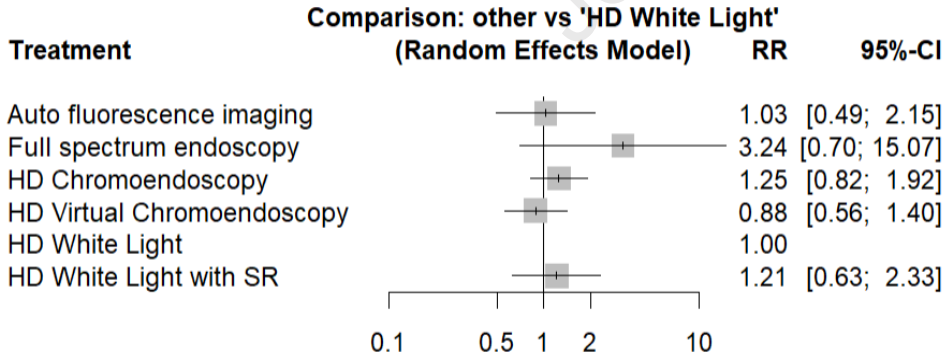
IBD (Inflammatory Bowel Disease), HDWL (High Definition White Light), HDWLE (High Definition White Light Endoscopy), CD (Crohn's Disease), WLE (White Light Endoscopy), OE (Optical Enhancement), SR (Submucosal Resection), CRN (Colorectal Neoplasia), ASA (Acetylsalicylic Acid), TNF (Tumor Necrosis Factor), SES-CD (Simple Endoscopic Score for Crohn's Disease), BBPS (Boston Bowel Preparation Scale)

eFigures 1. Subgroup and sensitivity analyses

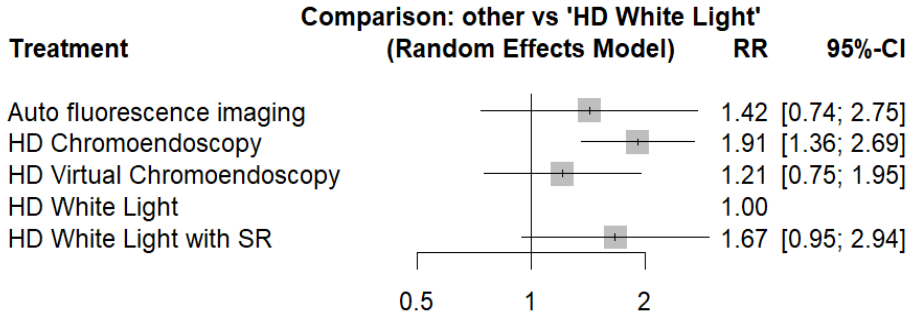
Subgroup analysis for modality subtypes, where HD chromoendoscopy has been subgrouped in High Concentration (HC) and Low Concentration (LC) and HD Virtual Chromoendoscopy into subtypes. (The RCT 'Lord 2018' compared HC and LC HD Chromoendoscopies, and therefore was included in this analysis but could not be included in the main analysis).



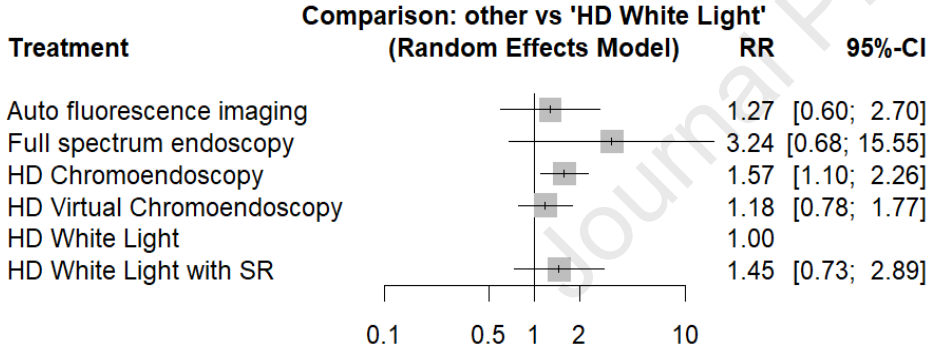
Sensitivity analysis for studies including participants with inactive disease only



Sensitivity analysis for studies were serrated lesions were not considered

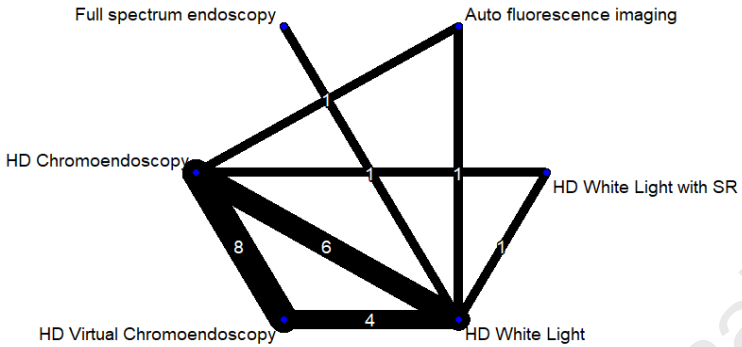


Sensitivity analysis for studies with more than one endoscopists who performed the trial endoscopies

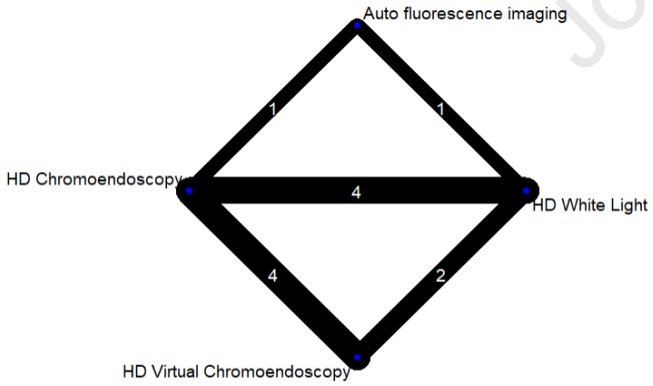


eFigures 2. Network plots

Patients with at least one dysplastic lesion detected (Vienna 2-5) & Patients with at least one dysplastic lesion detected from targeted biopsies

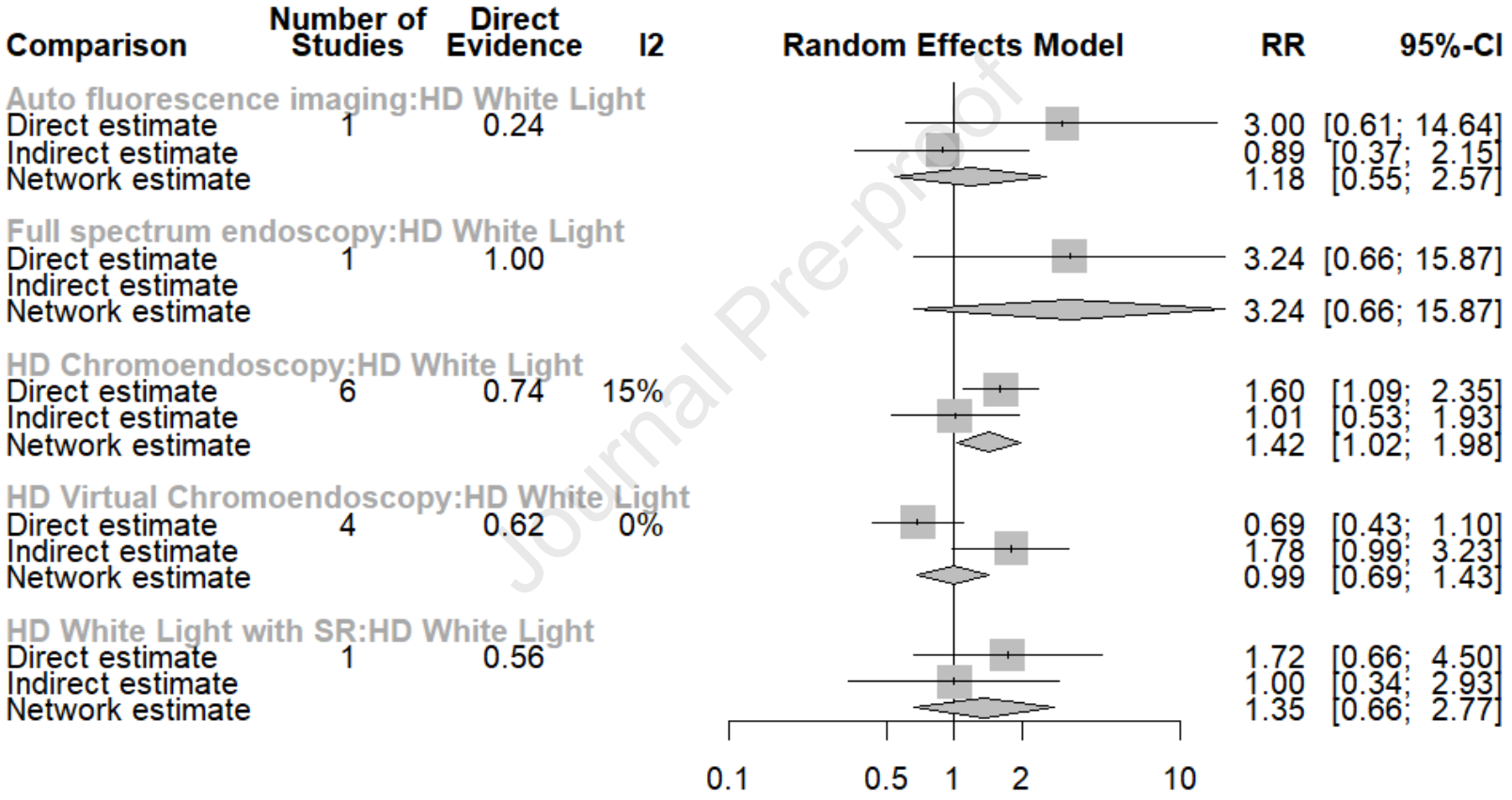


Patients with at least one lesion of any type detected (Vienna 1-5)

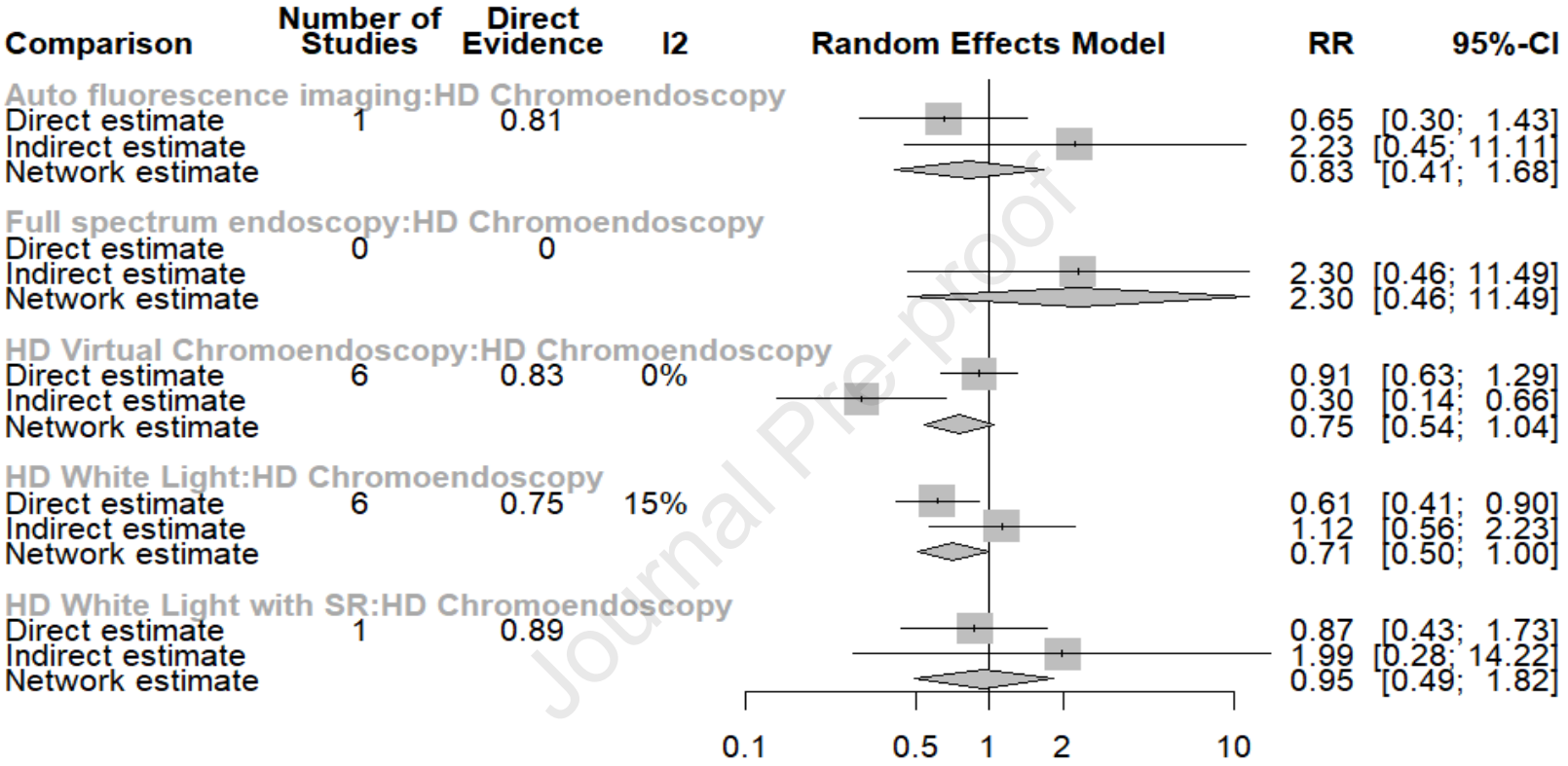


eFigures 3. Direct, indirect and network result plots (vs HD White Light)

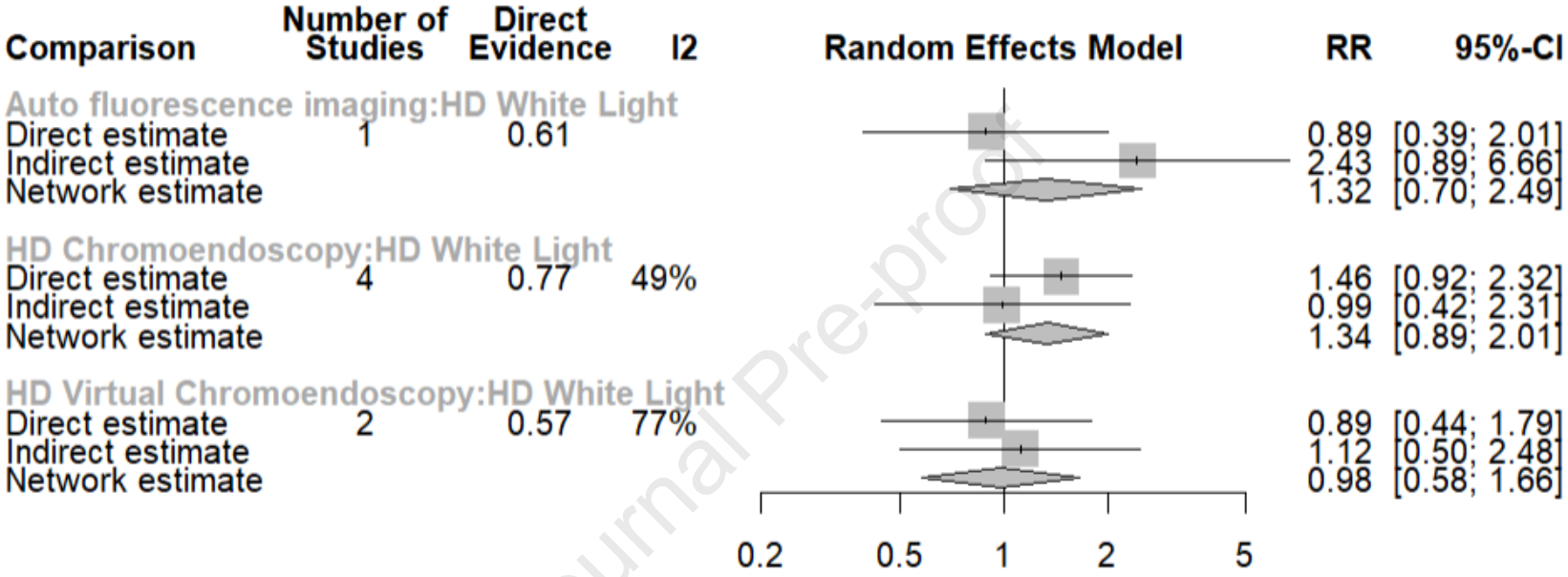
Patients with at least one dysplastic lesion detected (Vienna 2-5)



Patients with at least one dysplastic lesion detected from targeted biopsies



Patients with at least one lesion of any type detected (Vienna 1-5)



eFigures 4. SUCRA rankings

Patients with at least one dysplastic lesion detected (Vienna 2-5)

	SUCRA (common)	SUCRA (random)
Full spectrum endoscopy	0.876	0.880
HD Chromoendoscopy	0.688	0.690
HD White Light with SR	0.518	0.560
Auto fluorescence imaging	0.436	0.386
HD White Light	0.254	0.252
HD Virtual Chromoendoscopy	0.228	0.232

Patients with at least one dysplastic lesion detected from targeted biopsies

	SUCRA (common)	SUCRA (random)
Full spectrum endoscopy	0.878	0.890
HD Chromoendoscopy	0.700	0.674
HD White Light with SR	0.560	0.534
Auto fluorescence imaging	0.348	0.410
HD Virtual Chromoendoscopy	0.262	0.320
HD White Light	0.252	0.172

Patients with at least one lesion of any type detected (Vienna 1-5)

	SUCRA (common)	SUCRA (random)
HD Chromoendoscopy	0.8500	0.7733
Auto fluorescence imaging	0.6567	0.6967
HD White Light	0.3233	0.2800
HD Virtual Chromoendoscopy	0.1700	0.2500

eAppendix.

Search strategies

Search date: 11th September 2023

Number of results: 9425

Duplicates removed: 1682

Records to screen: 7734

CENTRAL

Issue 8 of 12, August 2023

Date Run: 11/09/2023 02:59:26

#1 ([mh "Inflammatory Bowel Disease"] OR Crohn* OR Ulcerative Colitis OR IBD OR Inflammatory Bowel Disease*) AND (Colon OR Colorectal OR Rectal) AND (Cancer* OR Neoplas* OR Dysplasia) AND (Detect* OR Screen* OR Diagnos* OR Assess* OR Surveillance) with Cochrane Library publication date Between Sep 2016 and Sep 2023, in Trials **386 records**

ClinicalTrials.gov

Classic Interface

Advanced Search

Condition or disease: (Crohn OR Ulcerative Colitis OR IBD OR Inflammatory Bowel Disease) AND (Colon Cancer OR Colorectal Cancer OR Rectal Cancer OR Colon Dysplasia OR Colorectal Dysplasia OR Rectal Dysplasia)

Other terms: Detection OR Screening OR Diagnosis OR Assessment OR Surveillance

First Posted: From 09/08/2016 To 09/11/2023

45 records

Embase via Ovid SP

Database: Embase <1974 to 2023 September 08>

1 exp Inflammatory Bowel Disease/ or (Crohn* or Ulcerative Colitis* or IBD or Inflammatory Bowel Disease*).mp. (241336)

2 (Colon or Colorectal or Rectal).mp. (831257)

3 (Cancer* or Neoplas* or Dysplasia).mp. (4993938)

4 (Detect* or Screen* or Diagnos* or Assess* or Surveillance).mp. (15712633)

5 and/1-4 (16015)

6 limit 5 to medline (791)

7 5 not 6 (15224)

8 limit 7 to dc=20160920-20230908 (7095)

9 limit 7 to dd=20160920-20230908 (3485)

10 8 or 9 (7104)

11 (rat or rats or mouse or mice or swine or porcine or murine or sheep or lambs or pigs or piglets or rabbit or rabbits or cat or cats or dog or dogs or cattle or bovine or monkey or monkeys or trout or marmoset$1).ti. and animal experiment/ (1219722)

12 Animal experiment/ not (human experiment/ or human/) (2561951)

13 11 or 12 (2630003)

14 10 not 13 **(6773 records)**

MEDLINE via Ovid SP

Database: Ovid MEDLINE(R) ALL <1946 to September 08, 2023>

1 exp Inflammatory Bowel Disease/ or (Crohn* or Ulcerative Colitis* or IBD or Inflammatory Bowel Disease*).mp. (140530)

2 (Colon or Colorectal or Rectal).mp. (490013)

3 (Cancer* or Neoplas* or Dysplasia).mp. (4120072)

4 (Detect* or Screen* or Diagnos* or Assess* or Surveillance).mp. (11357535)

5 and/1-4 (6355)

6 limit 5 to ed=20160920-20230908 (1776)

7 limit 5 to dt=20160920-20230908 (2072)

8 6 or 7 (2283)

9 exp Animals/ not Humans.sh. (5153293)

10 8 not 9 (**2188 records**)

WHO ICTRP

(Crohn OR Ulcerative Colitis OR IBD OR Inflammatory Bowel Disease) AND (Colon Cancer OR Colorectal Cancer OR Rectal Cancer OR Colon Dysplasia OR Colorectal Dysplasia OR Rectal Dysplasia) AND (Detection OR Screening OR Diagnosis OR Assessment OR Surveillance)

33 records for 33 trials found