SEMG investigation of lower limb and abdominal muscles during progressions of a core stability exercise

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Background

- What is core stability?
- Segmental extension – (Arokoski et al, 2001 and Akuthota and Nadler, 2004)
- Minimal compensation

Background

- Clinical presentations
- Low level exercises
  - Posterior pelvic tilt exercise

Evidence

- SEMG of Abdominals
  - Vezina and Hubley-Kozey (2000) – healthy
  - Hubley-Kozey and Vezina (2002) – LBP
  - Drysdale et al (2004) – healthy
  - Urquhart et al (2004) – healthy

Gaps in evidence base

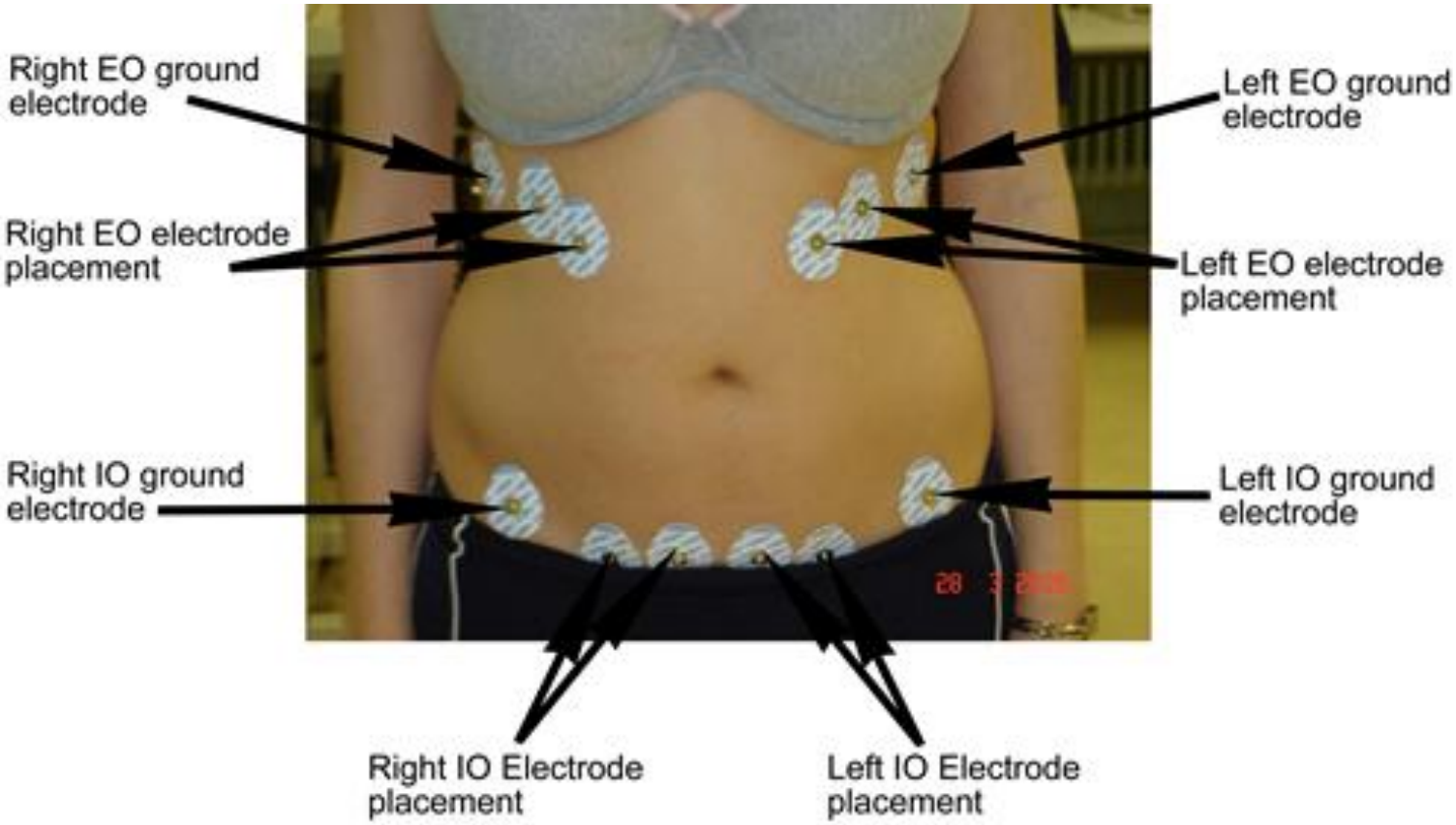
- PPTE investigating IO and EO activity
- Progression of PPTE exercises
- Consideration of compensatory activity

Aim

- Investigate bilateral IO and EO during a low level core stability exercise (PPTE) , with two progressions (right leg drop out and a bilateral arm raise) and to monitor LL (bilateral hamstrings and Quadriceps) activity.

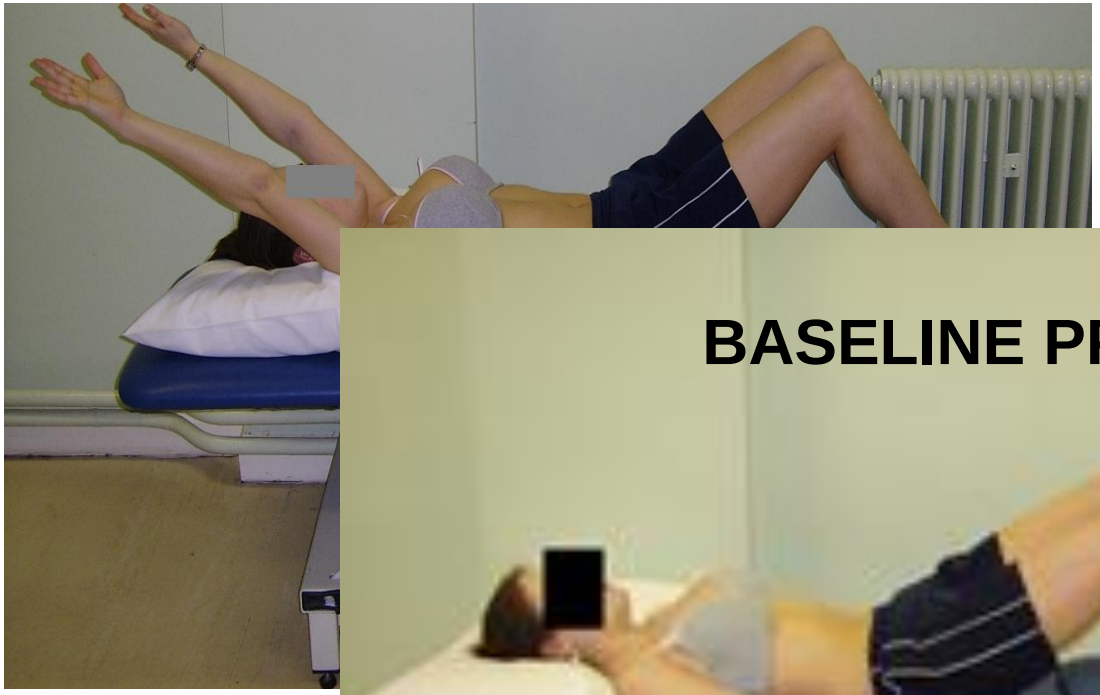
Design and method

- Same subject experimental design
- Convenience Sample – healthy (n=22, females= 19 (mean 21.9 yrs)
- Measure – SEMG bipolar, Bilaterally, Skin prep (Turker, 1993)
- Same day standard protocol - Intra tester reliability for abdominals - (Ng et al, 2003 - ICC = 0.75-0.89)
- MVC (Dankaerts et al, 2003 – ICC 0.91)
- Ethical approval / Data protection Act (1998)

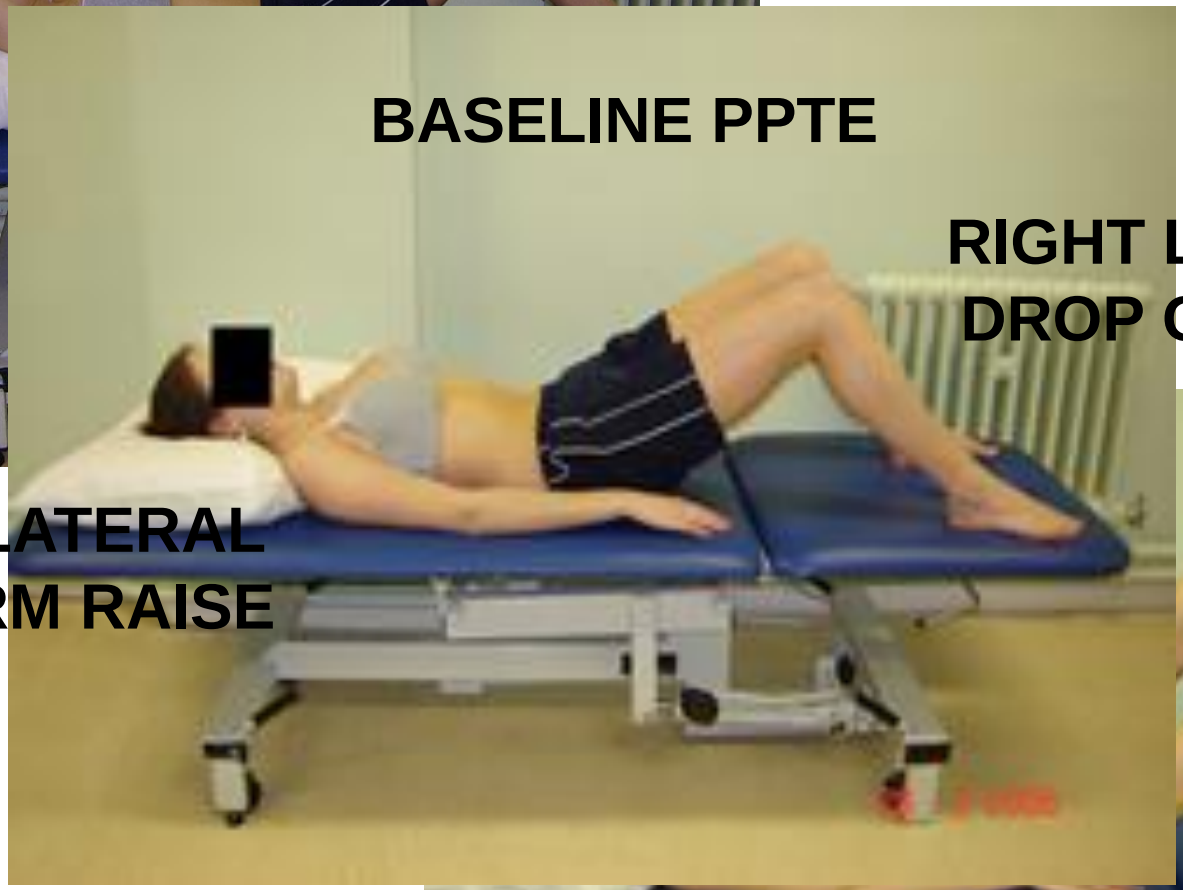


Add electrodes LL

(Freriks et al, 1999)

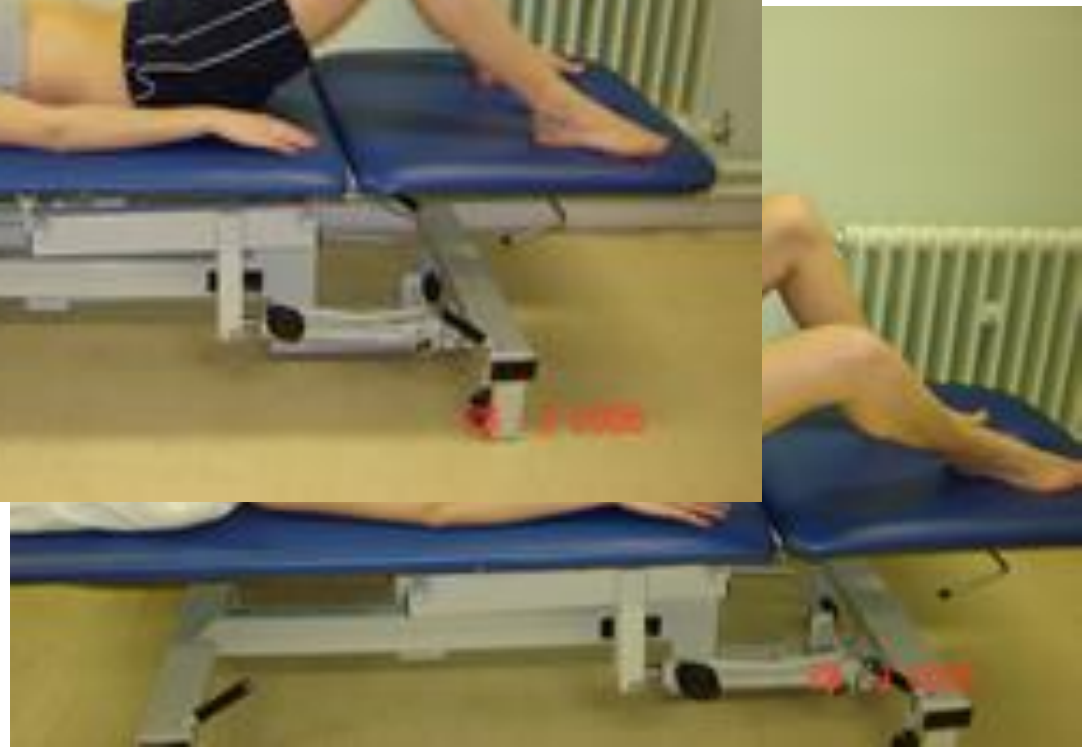


BILATERAL
ARM RAISE



BASELINE PPTE

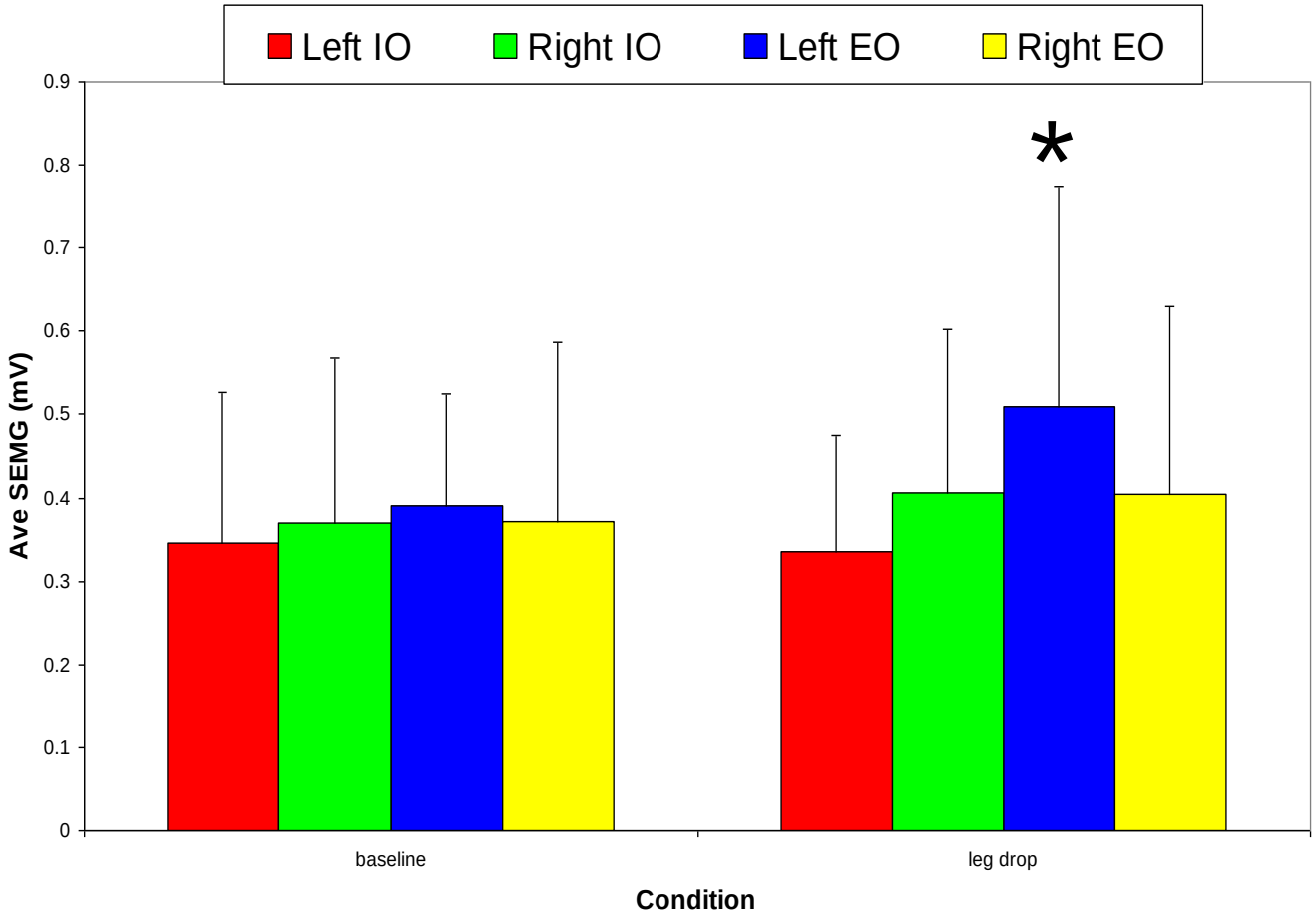
RIGHT LEG
DROP OUT



Data processing / analysis

- RSM average requested
- Normalised
- Averaged over three repetitions
- Repeated measures ANOVA ($p =< 0.05$)

Bar graph showing abdominal muscle activity levels from Baseline to right leg drop out



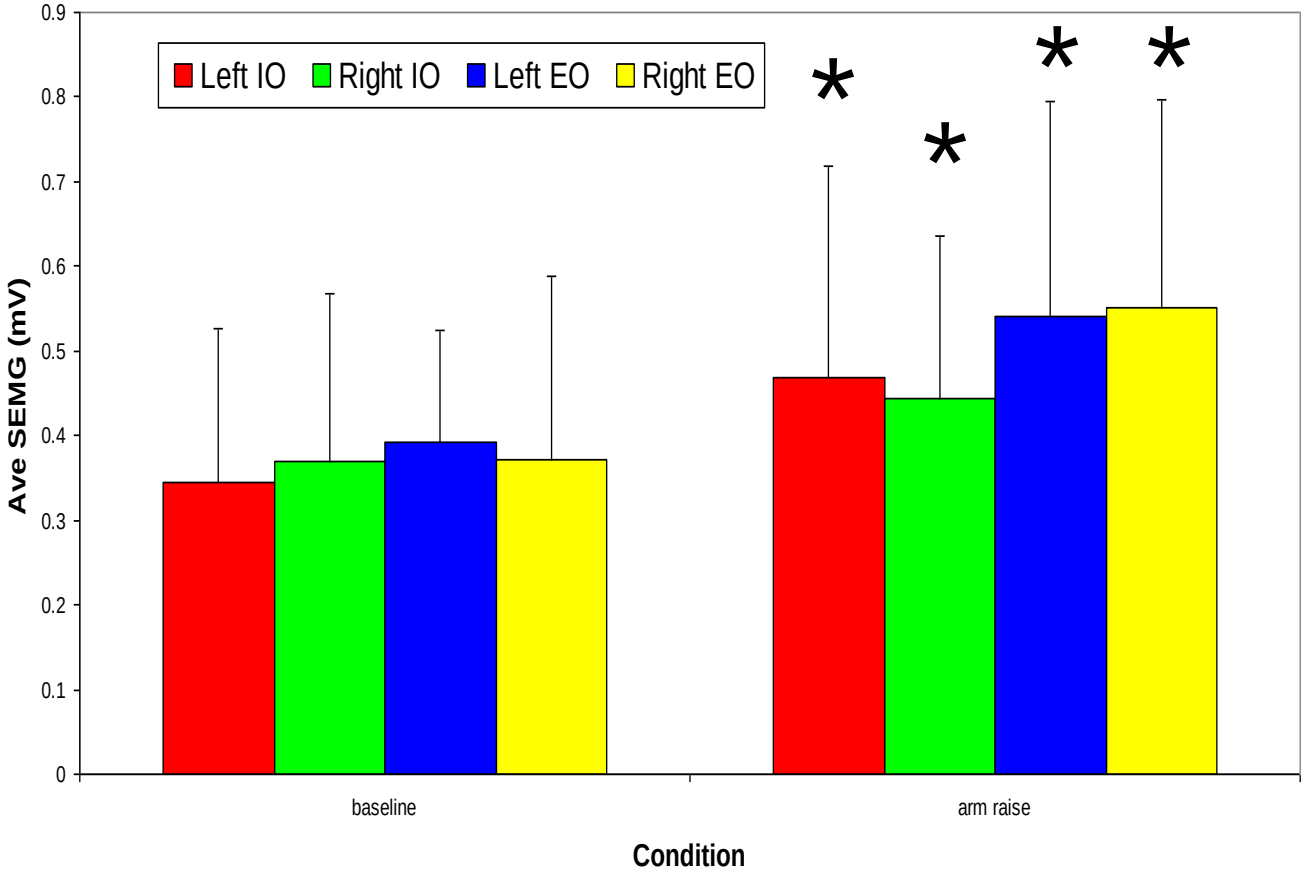
Left IO decreased (p=0.667)

Right IO increased (p=0.185)

Left EO increased (p=0.05) *

Right EO increased (p=0.356)

Bar graph showing abdominal muscle activity levels from Baseline to arm raise



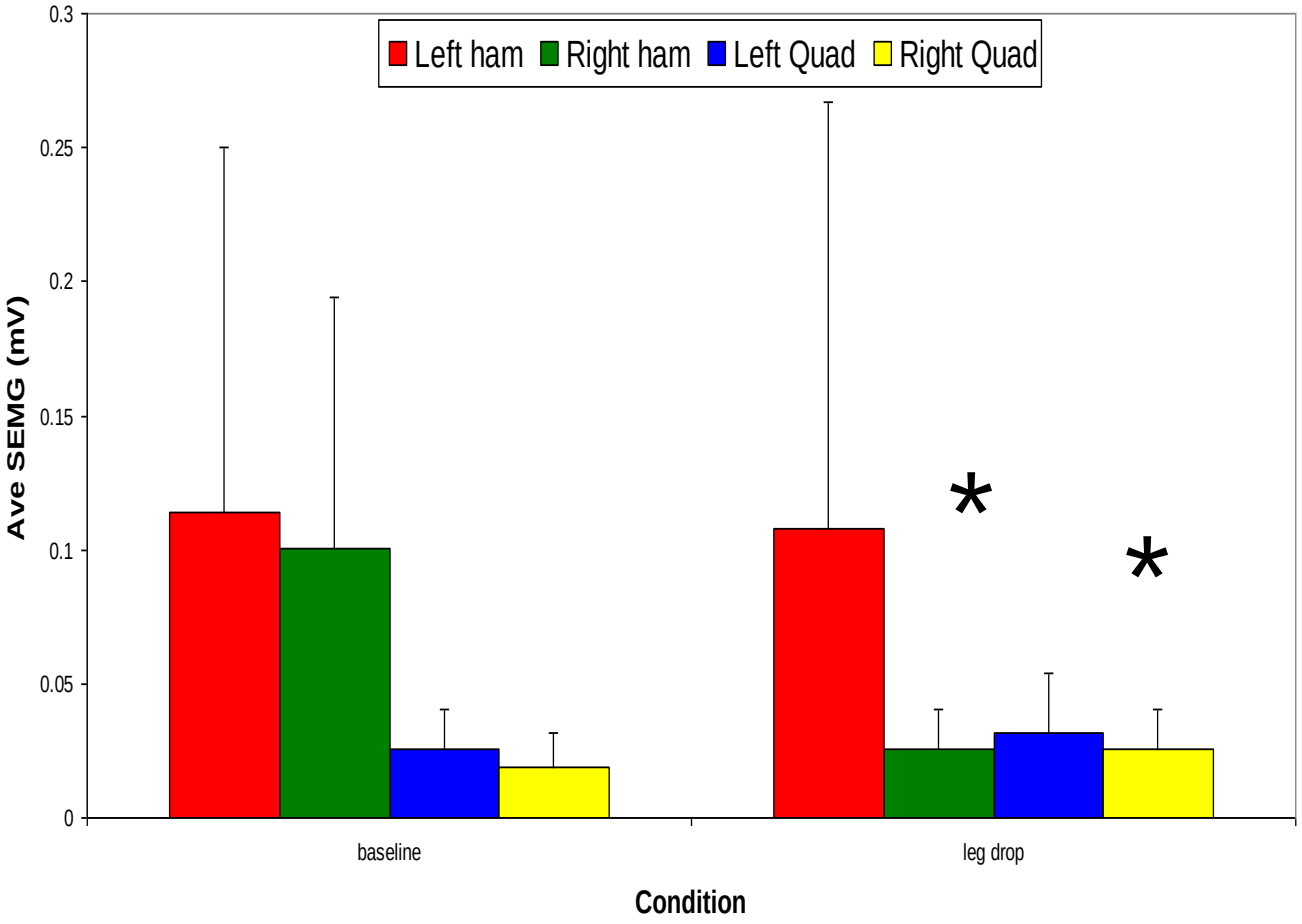
Left IO increased p=0.013) *

Right IO increased (p=0.03) *

Left EO increased (p=0.011) *

Right EO increased (p=0.007) *

Bar graph showing leg muscle activity levels from Baseline to leg drop out



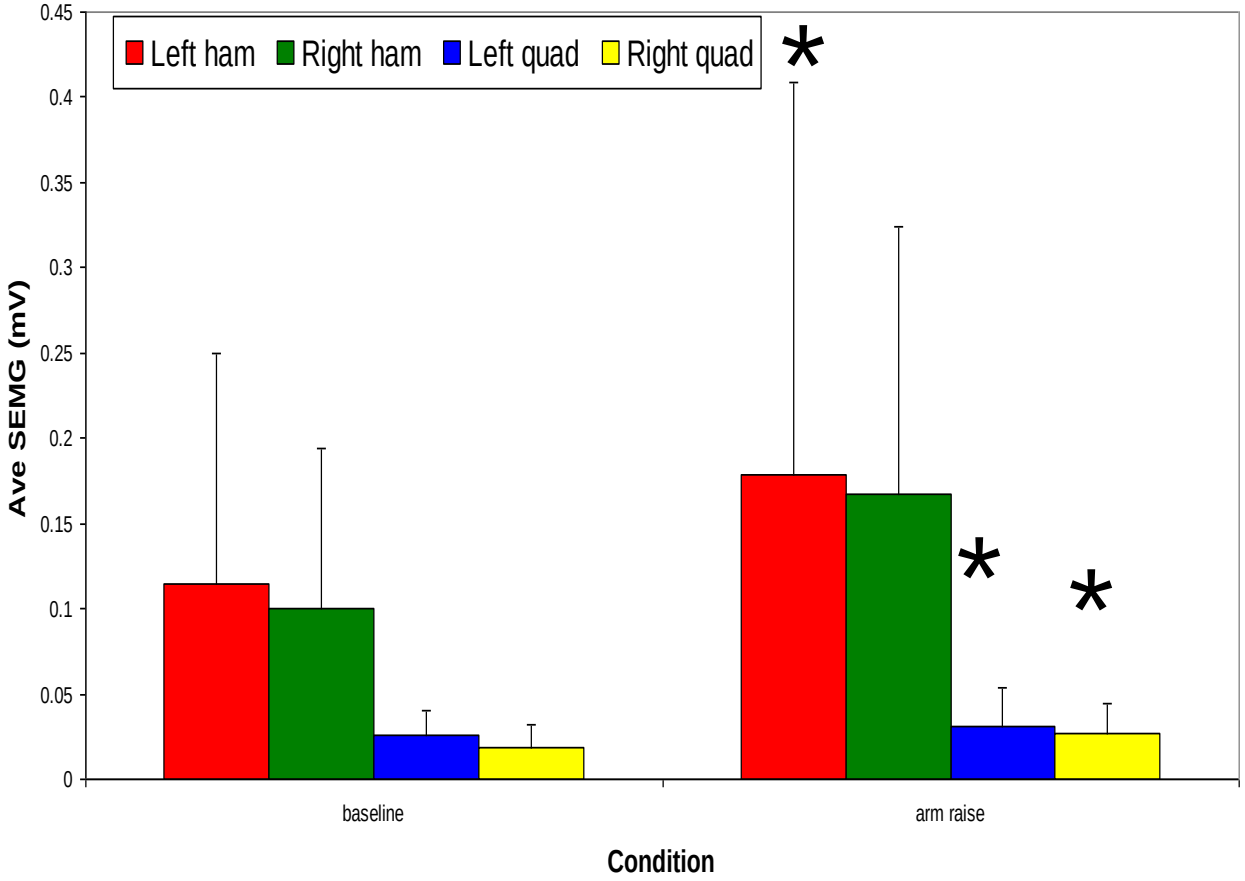
Left hams decreased (p=0.742)

Right hams decreased (p=0.001) *

Left quads increased (p=0.091)

Right quads increased (p=0.001) *

Bar graph showing leg muscle activity levels from Baseline to arm raise



Left hams increased (p=0.018) *

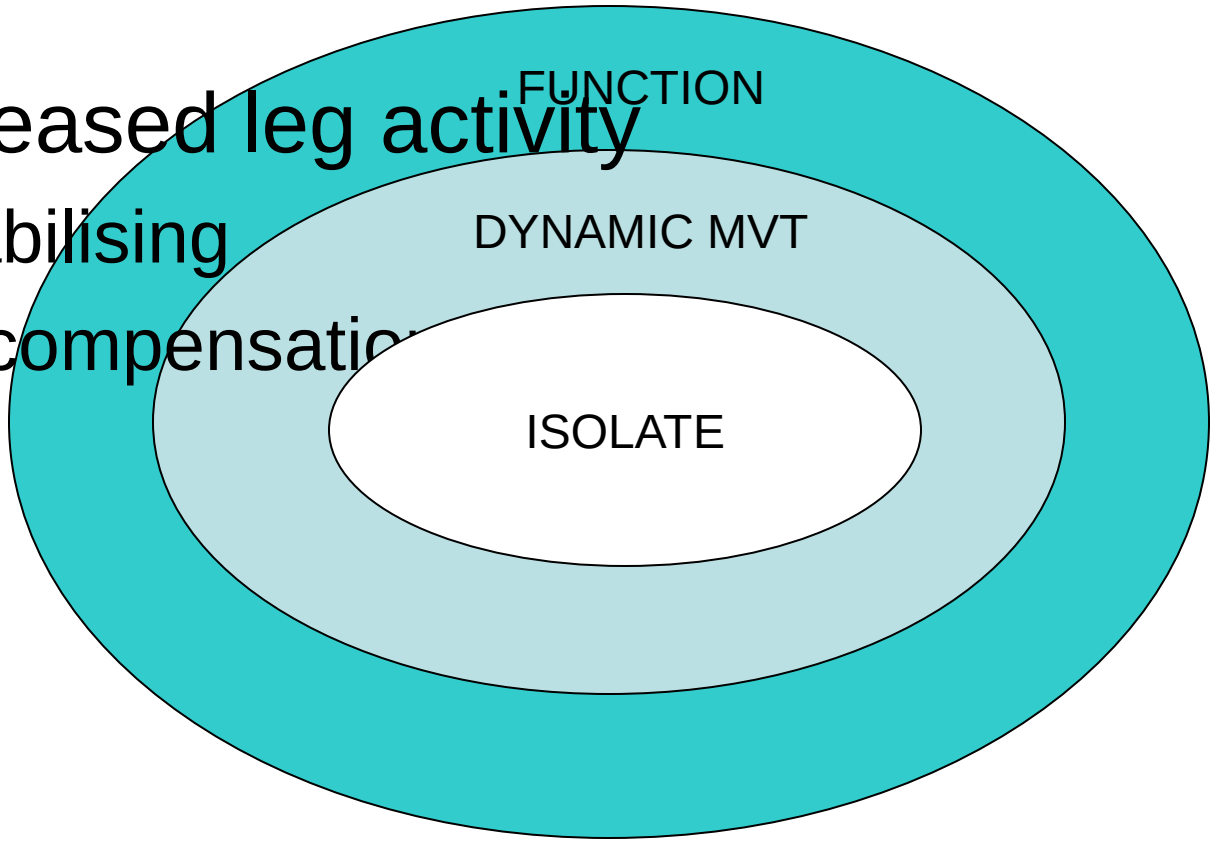
Right hams increased (p=0.065)

Left quads increased (p=0.016) *

Right quads increased (p=0.002) *

Conclusions

- Clinical relevance
- Abdominals
- Role of increased leg activity
  - Normal stabilising
  - Abnormal compensatio



Limitations

- Small sample
- Quality of PPT
- Evaluation of back extensors

QUESTIONS?