

A Comparison Of (1) MRI Muscle Fat Content In Psoas And Erector Spinae Muscles And (2) Patient Reported Outcome Measures In Patients With Lumbar Degenerative Disc Disease, L4/5 Degenerative Spondylolisthesis And L5/S1 Lytic Spondylolisthesis

A Cunningham, K Saba and M J H McCarthy
University Hospital Wales, Cardiff



Disclosures / Conflicts of Interest

- A Cunningham – none
- K Saba – none
- M J H McCarthy – Educational agreement with Globus Medical (not relevant to this study)



Introduction

- Muscular atrophy + LBP
- LBP – increased fat instead of muscle?
- MRI fat infiltration seen
- ↑PROMs use

Fat Content of Lumbar Paraspinal Muscles in Patients with Chronic Low Back Pain and in Asymptomatic Volunteers: Quantification with MR Spectroscopy¹

Ann Spine J (2000) 9: 266–272
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SSE CLINICAL SCIENCE AWARD 2000

Lieven A. Dannaels
Guy G. Vanderstraeten
Dirk C. Cambier
Erik E. Wuytens
Hugo J. De Cuyper

CT imaging of trunk muscles in chronic low back pain patients and healthy control subjects

Objectives

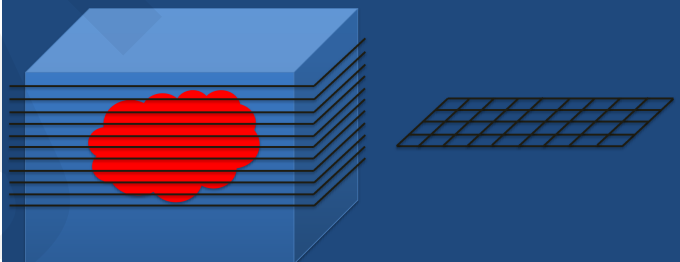


- Analyse M:F in 3 common conditions
- Compare to PROMS

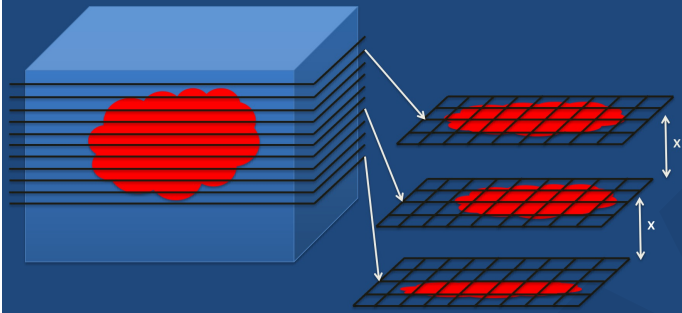
Systematic Random Approach Cavalieri Principle



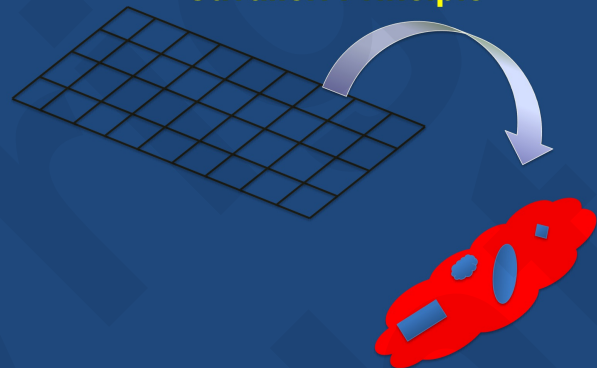
Systematic Random Approach Cavalieri Principle



Systematic Random Approach Cavalieri Principle



Systematic Random Approach Cavalieri Principle



Systematic Random Approach Cavalieri Principle



- Estimate surface area +/- volume of objects

Method

- 30 pts randomly selected each condition (senior authors PROM database)
- MRI scans available in
 - 29 DDD
 - 29 4/5 SPL
 - 21 5/1 Lytic SPL

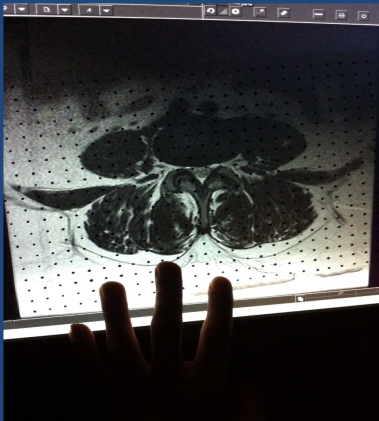
Method - PROMs

- VAS back
- VAS leg
- ODI
- PHQ 9
- GAD 7

Method - Measurement

- 2 observers
- Set magnification
- Pre-made grid applied mid-discal T2 weighted axial
- No. points touching muscle and fat recorded
 - L3/4, 4/5 and 5/1
 - Left and Right
 - Erector Spinae and Psoas
- Compared to PROMs

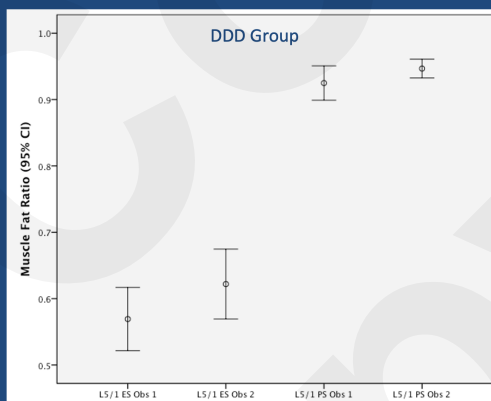
Method - Measurement



Results – Observer Error

- Cronbachs alpha
 - range 0.67-0.99 (majority >0.9)
- Intraclass correlation coefficients
 - range 0.68-0.98 (majority >0.9)
- Measuring the same thing

Results – Observer Error



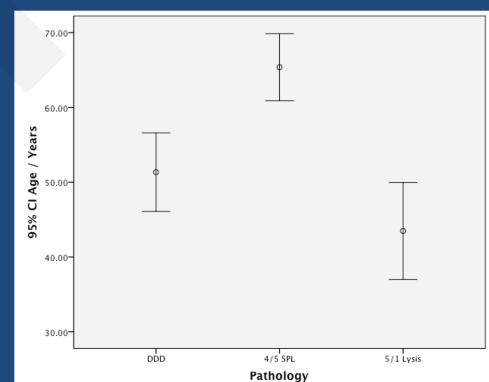
Results

- No difference L+R sides for ES and Psoas
- No difference PROMs between groups
- No association between M:F and PROMs
- Patient age 4/5 SPL significantly higher

Results - PROMs

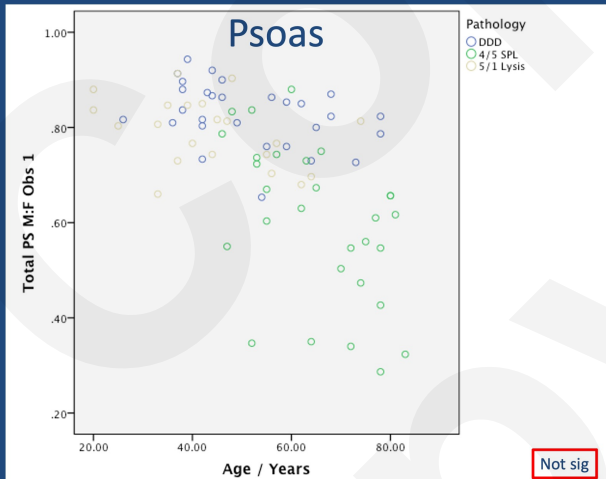
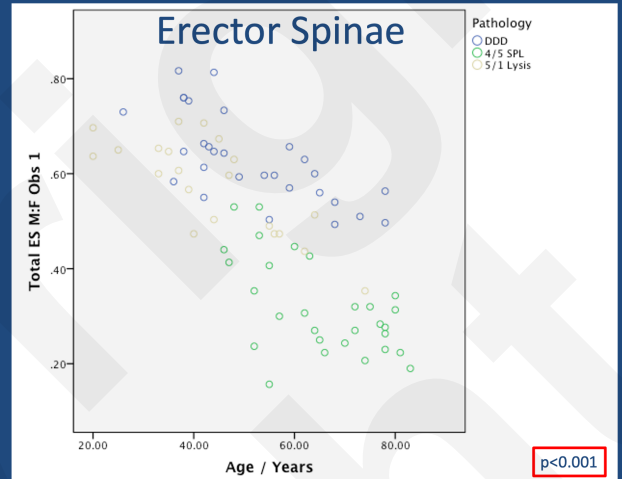
Mean (95%CI)	DDD	4/5 SPL	5/1 Lytic SPL
Age / Years	51.3 (66.1-56.6)	65.4 (60.9-69.9)	43.5 (37.0-50.0)
VAS Back	7.8 (7.0-8.5)	7.3 (6.5-8.0)	6.3 (5.4-7.2)
VAS Leg	5.8 (4.8-6.7)	6.1 (5.1-7.1)	5.6 (4.3-7.0)
ODI	52.2 (44.1-60.3)	48.8 (43.2-54.4)	46.4 (38.3-54.5)
PHQ9	12.3 (8.6-16.1)	10.8 (7.9-13.6)	13.6 (9.8-17.3)
GAD7	8.2 (5.1-11.4)	8.1 (5.7-10.6)	10.1 (6.8-13.3)

Results - PROMs



Results – M:F

- M:F ↓ with age in ES in **ALL** groups ($p < 0.001$)
- Generally maintained in Psoas with ↑ age
- M:F 4/5 SPL significantly less than the other 2 groups ($p < 0.001$)
- M:F Psoas > ES ($p < 0.001$)



Average Total M:F Obs 1

Psoas		ES
0.83 (0.80-0.85)	DDD	0.63 (0.59-0.67)
0.60 (0.54-0.66)	4/5 SPL	0.32 (0.28-0.36)
0.79 (0.76-0.82)	5/1 Lytic SPL	0.58 (0.53-0.62)

Conclusion

- The M:F in the ES and PS does **not** appear to be related to PROMs in DDD, 4/5 SPL and 5/1 Lytic SPL
- As age increases M:F decreases

Future Work

- Increase sample size
- Narrow the age range
- Expand disease pathology
- Include “true” normal / controls
 - Is psoas M:F increased in disease states?



Eur Spine J (2013) 22:1965–1971
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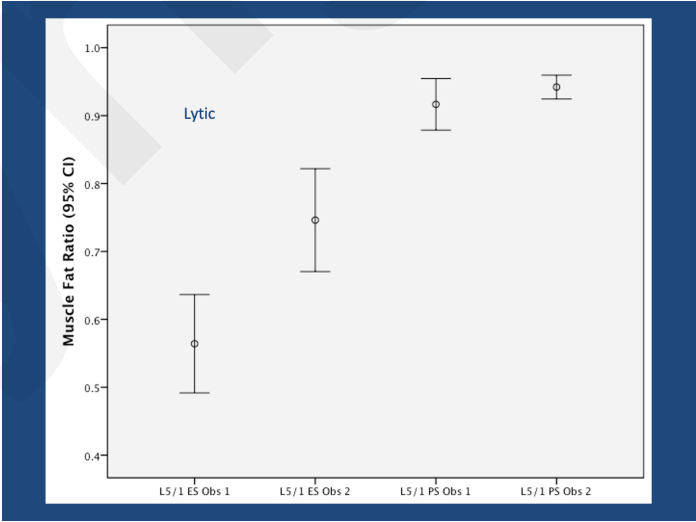
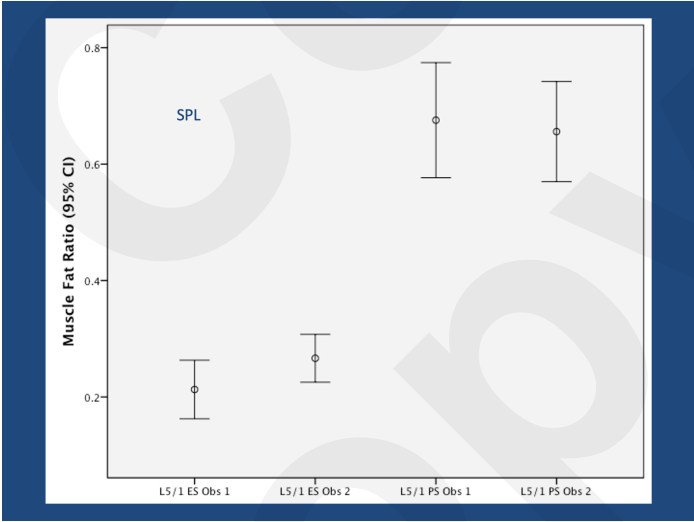
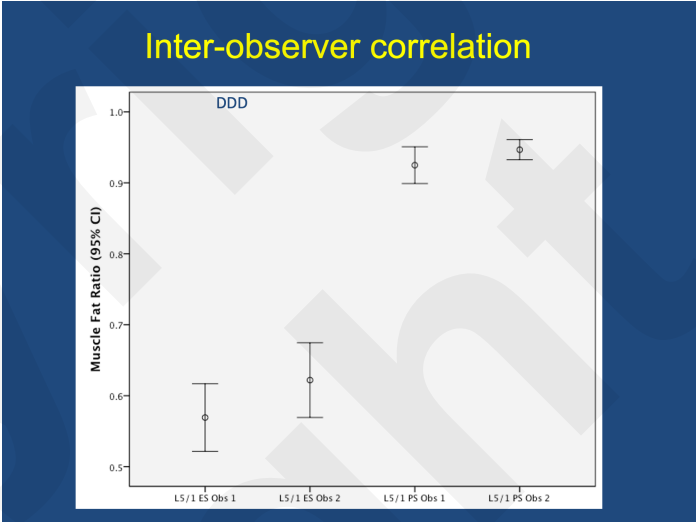
ORIGINAL ARTICLE

MRI features of the psoas major muscle in patients with low back pain

Juraj Arbanas · Ivan Pavlovic · Verner Marijancic · Hrvoje Vlahovic · Gordana Starcevic-Klasan · Stanislav Peharec · Snjezana Bajek · Damir Miletic · Daniela Malnar

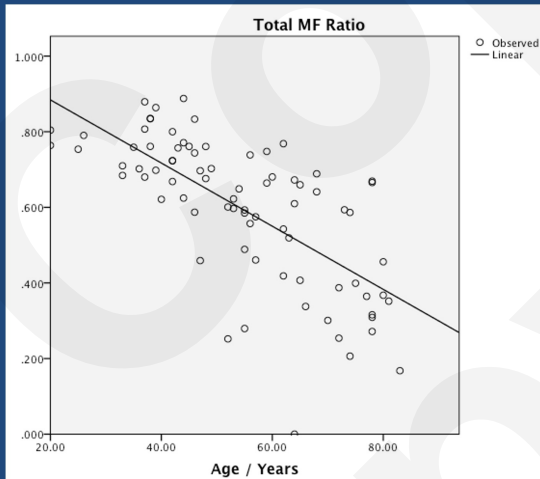
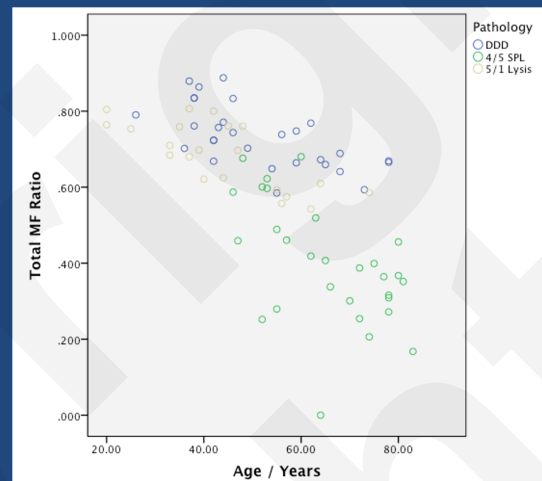
	Left muscle	Right muscle	P value*
Controls			
L3/L4	0.50 (0.28–0.86)	0.49 (0.29–0.91)	0.918
L4/L5	0.59 (0.36–1.16)	0.55 (0.34–1.11)	0.841
L5/S1	0.57 (0.33–1.29)	0.58 (0.33–1.22)	0.962
Patients			
L3/L4	0.63 (0.40–0.98)	0.60 (0.38–1.05)	0.780
L4/L5	0.66 (0.46–1.17)	0.65 (0.43–1.00)	0.676
L5/S1	0.67 (0.35–1.07)	0.67 (0.33–1.09)	0.496

**No difference right and left
Similar to our study**



Ratio between ES and PS

Erector Spinae vs Psoas RATIO	DDD	SPL	Lytic
Obs 1			
L3/4	0.001	0.001	0.001
L4/5	0.001	NS	0.001
L5/S1	0.001	0.001	0.001
Obs 2			
L3/4	0.001	0.001	0.001
L4/5	0.001	0.001	0.001
L5/S1	0.001	0.001	0.001
	PS>ES	PS>ES	PS>ES



Questions

- Normal cohort – not an incidental scan
- Why those conditions - common
- Clinical relevance – target therapy
- Statistical tests used
 - Correlations / regression for associations
 - Anova and t tests for diff in means
 - Graphs of confidence intervals
 - Cronbach, bland altman, intraclass
 - Why not Kappa?
- Muscle vs everything not muscle