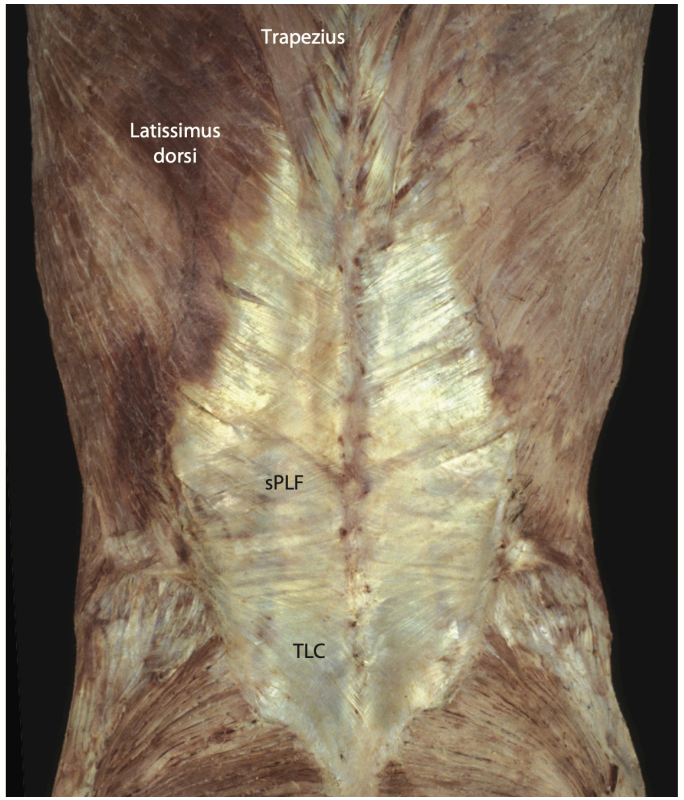


Laboratoire d'Anatomie Biomécanique et Organogenèse

Le fascia thoraco-lombaire peut-il être cause d'une lombalgie ?

Olivier Snoeck, PhD

Professeur d'anatomie auprès des Facultés des Sciences de la Motricité (FSM) et de Pharmacie de l'ULB

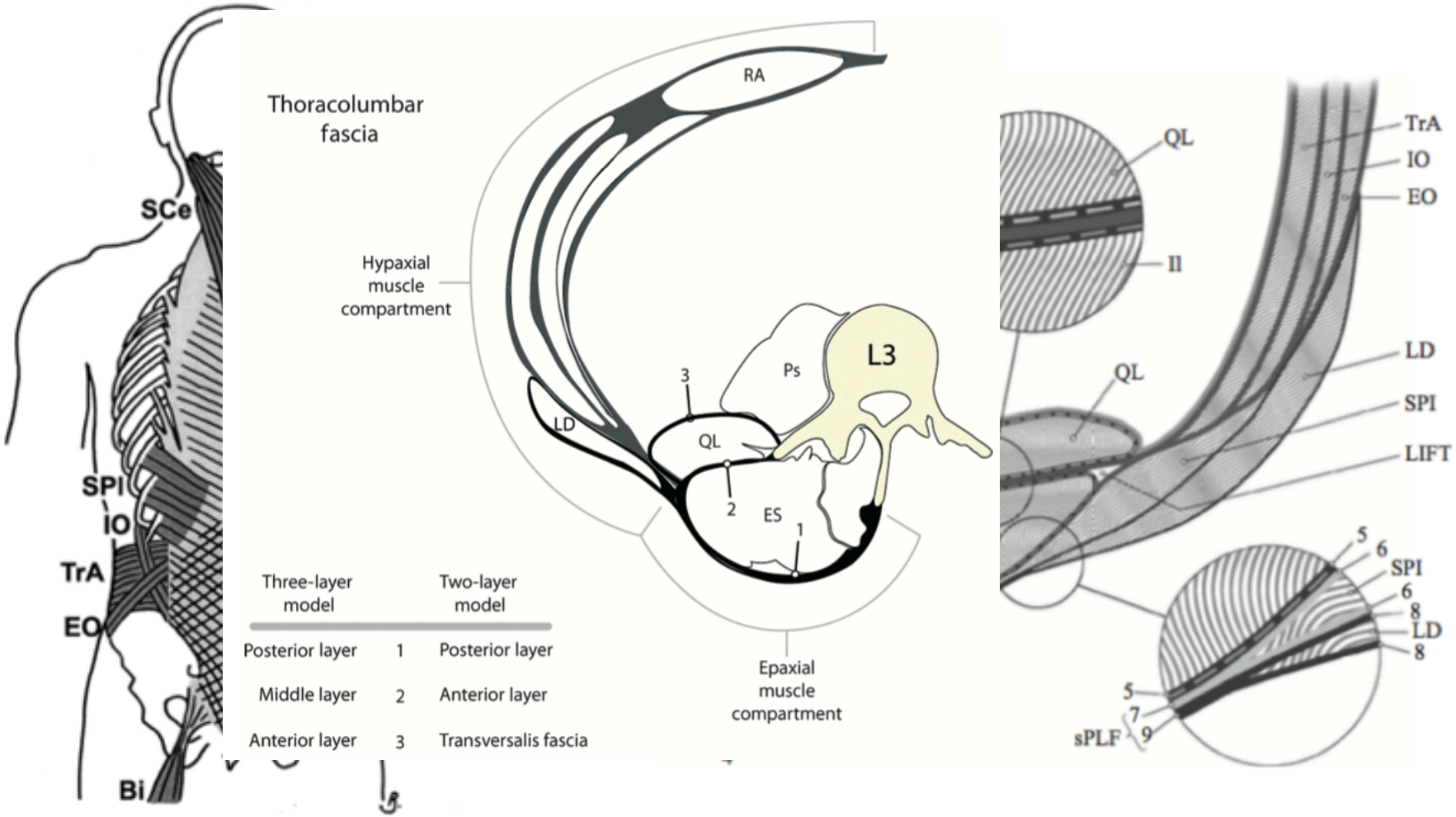
Anatomie

REVIEW

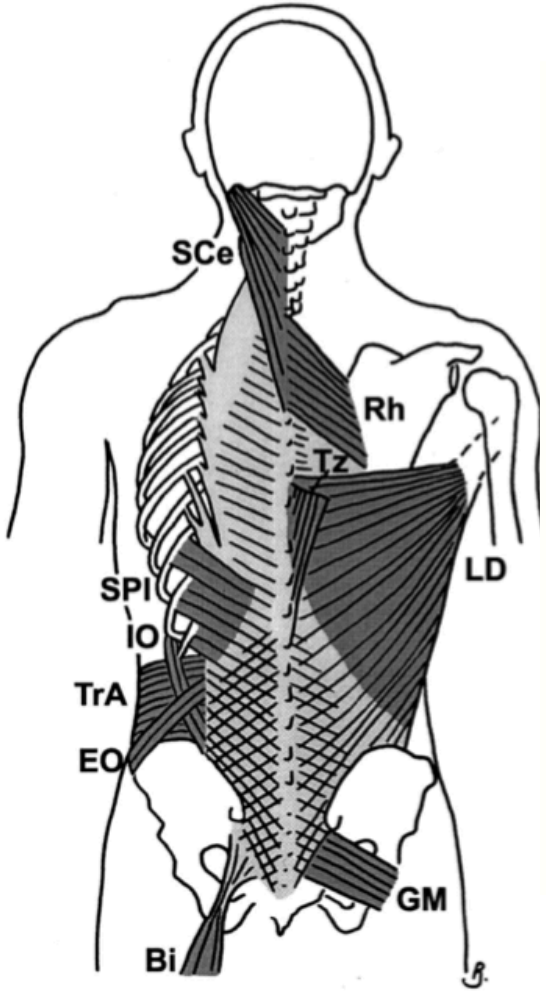
The thoracolumbar fascia: anatomy, function and clinical considerations

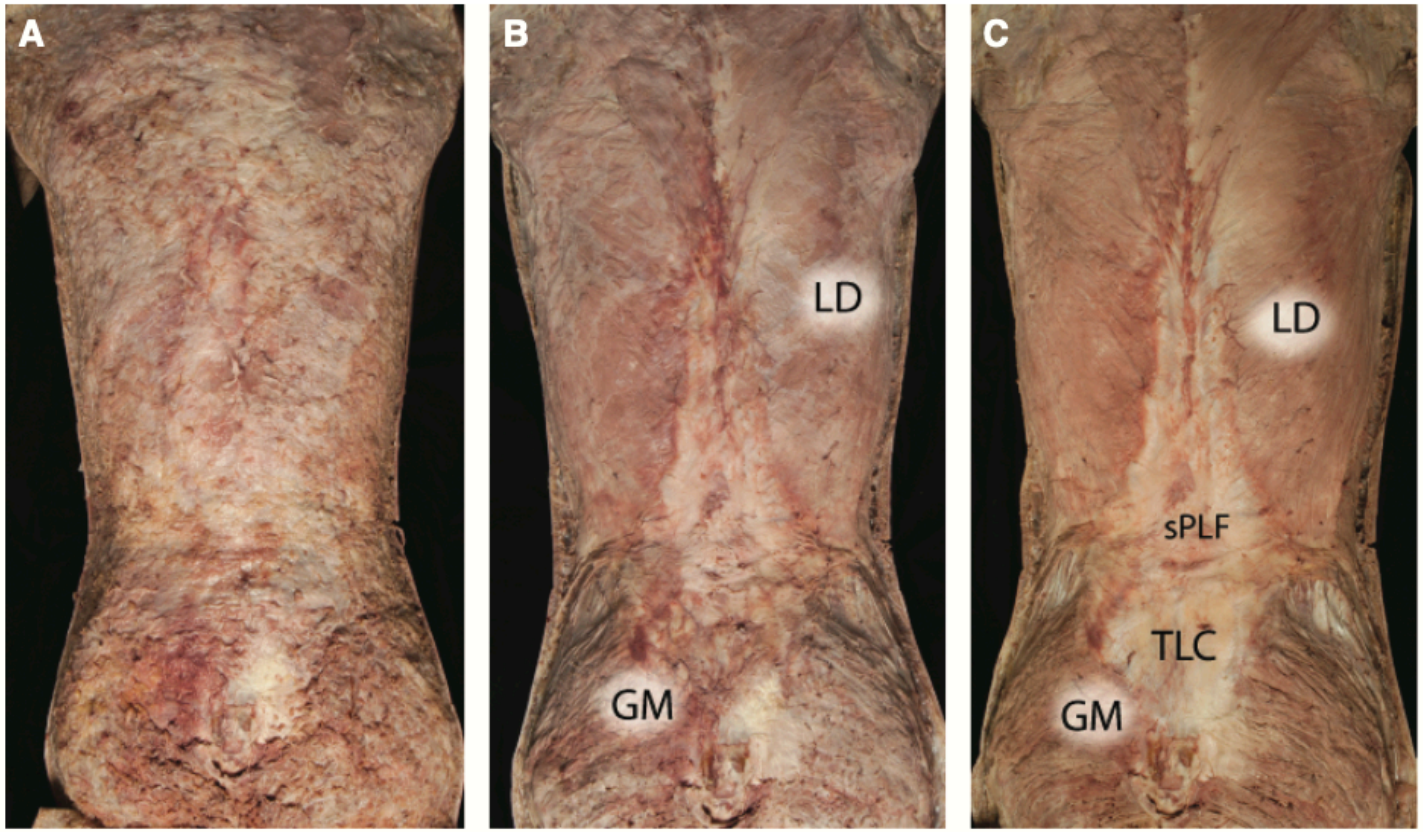
F. H. Willard,[1] A. Vleeming,[1,2] M. D. Schuenke,[1] L. Danneels[2] and R. Schleip[3]

Journal of Anatomy

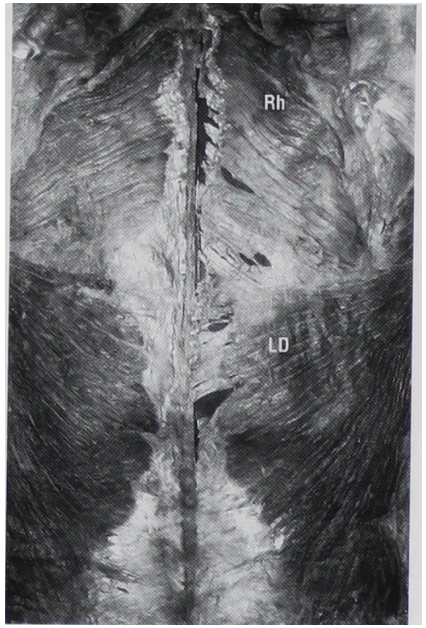


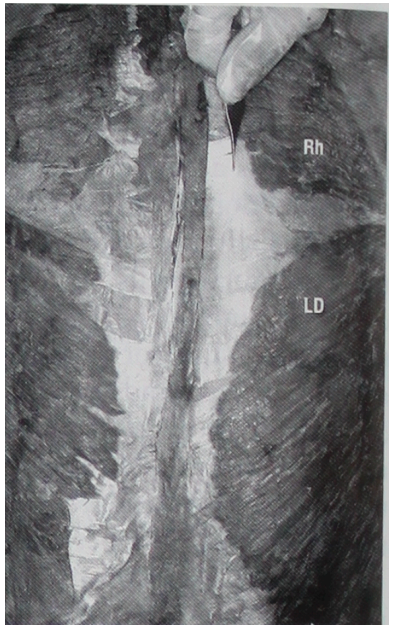
Couche postérieure: lame superficielle





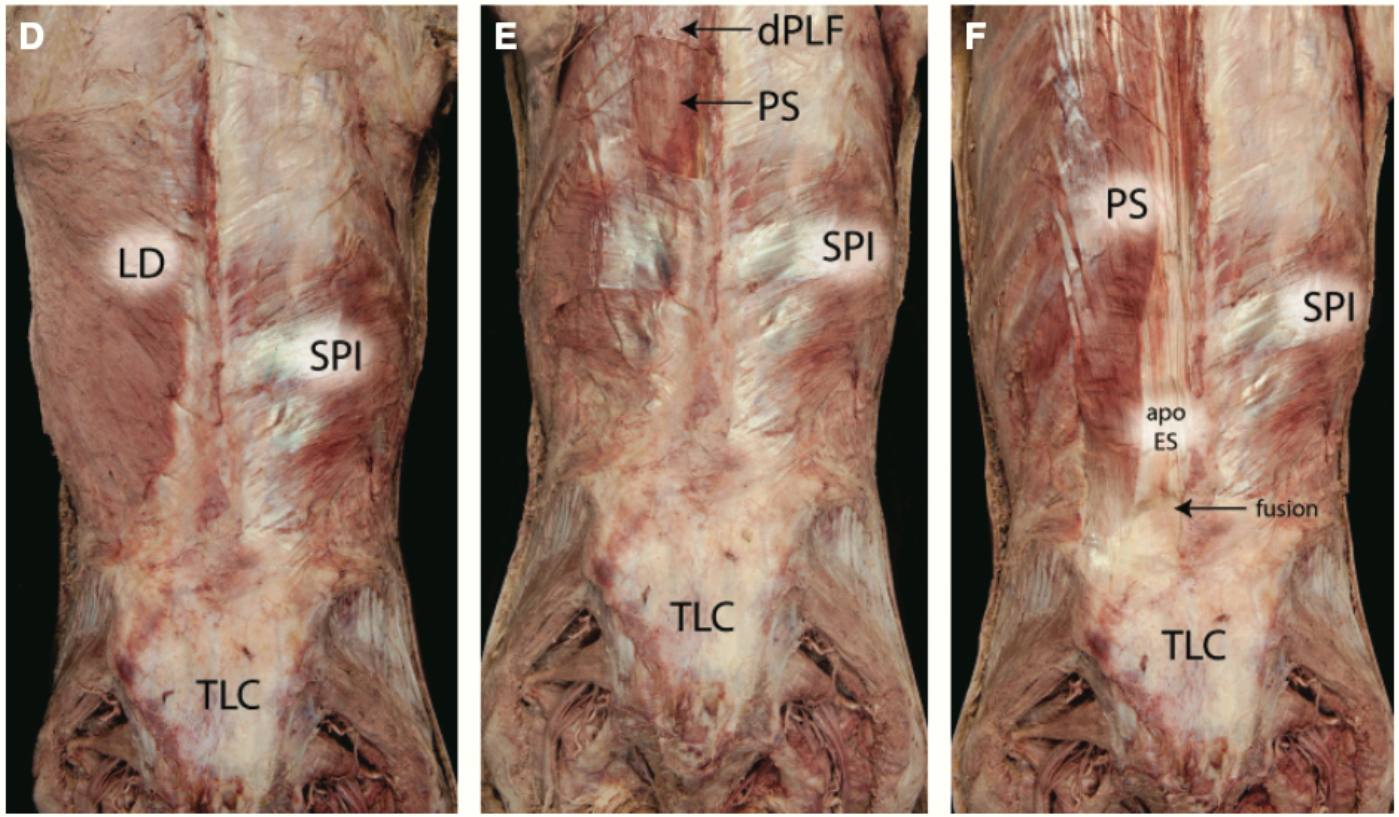
Fascia profond+ épimysium

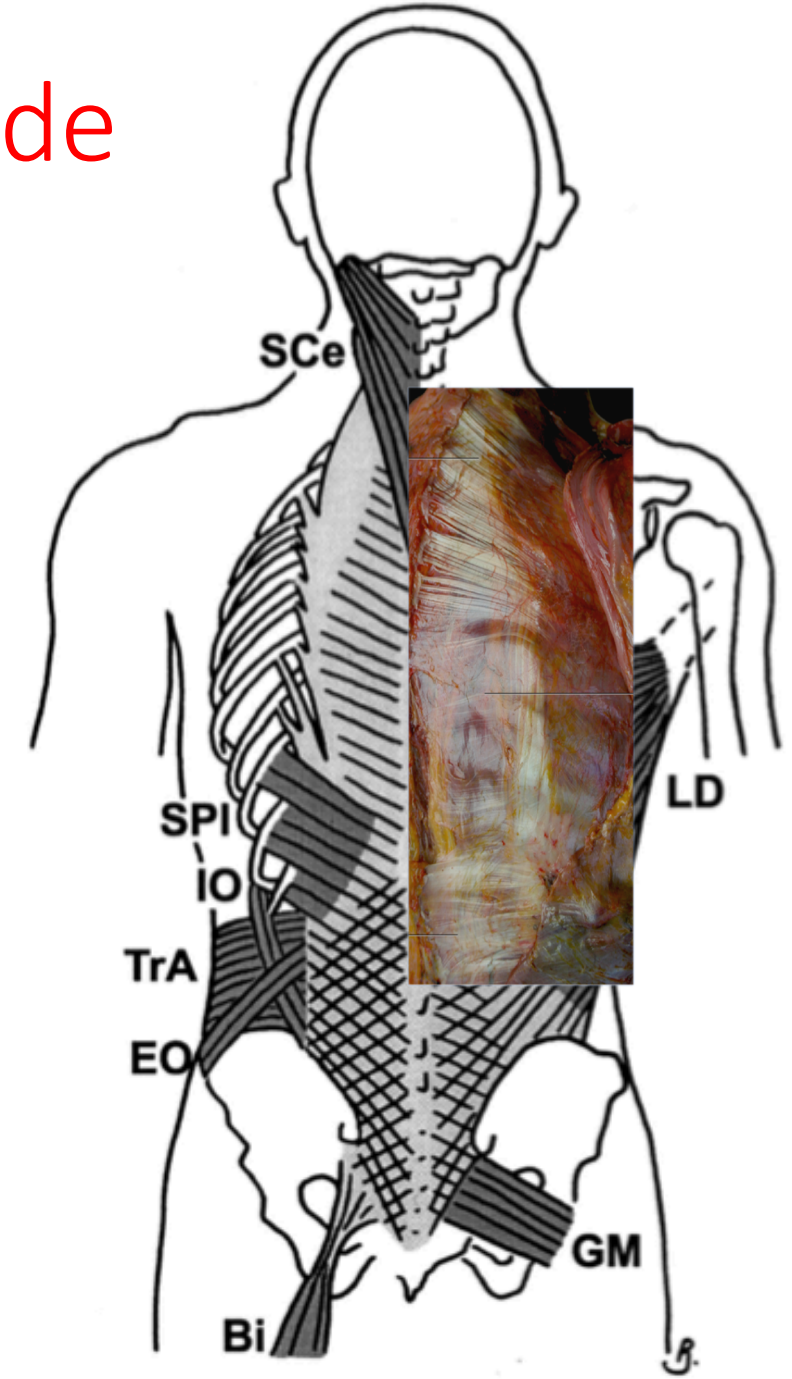




Barker P.J, 1999; 2004 ; Willard et al., 2012; Zorn A., 2007

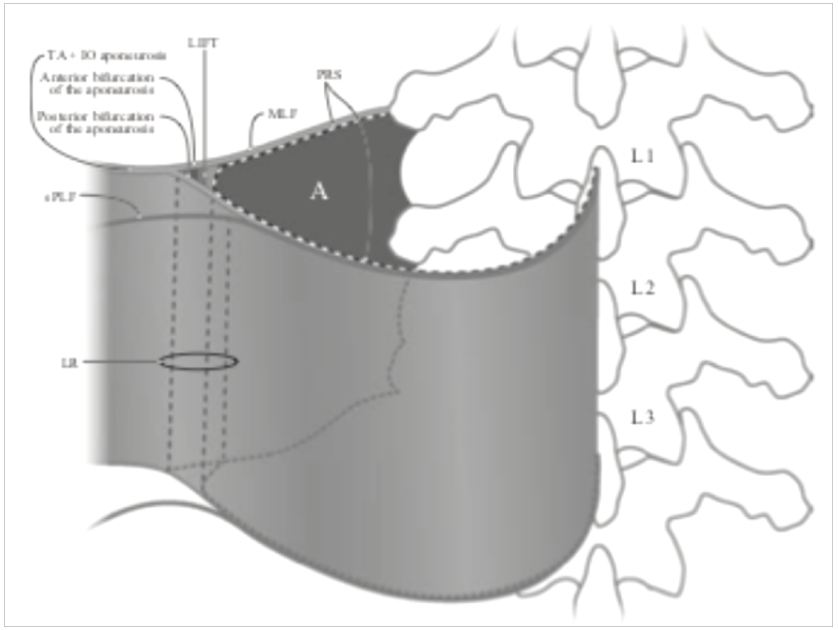
Couche postérieure: lame profonde

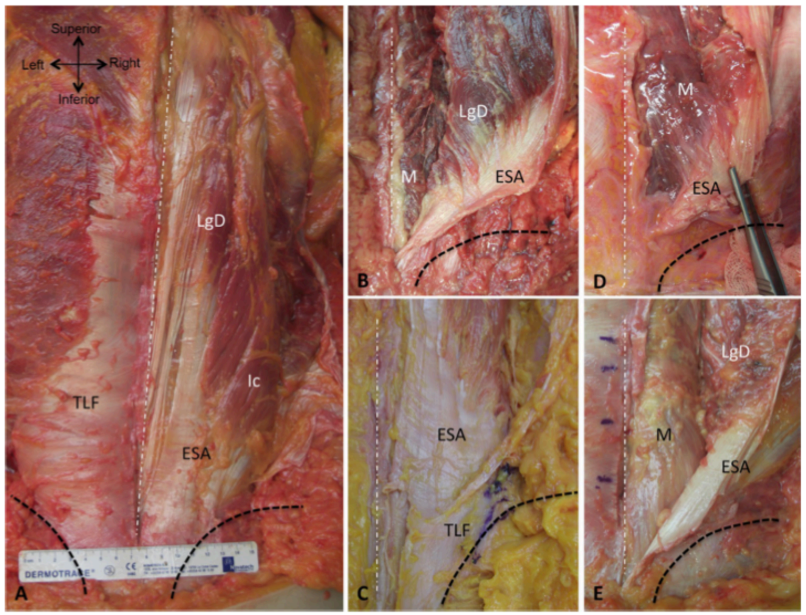


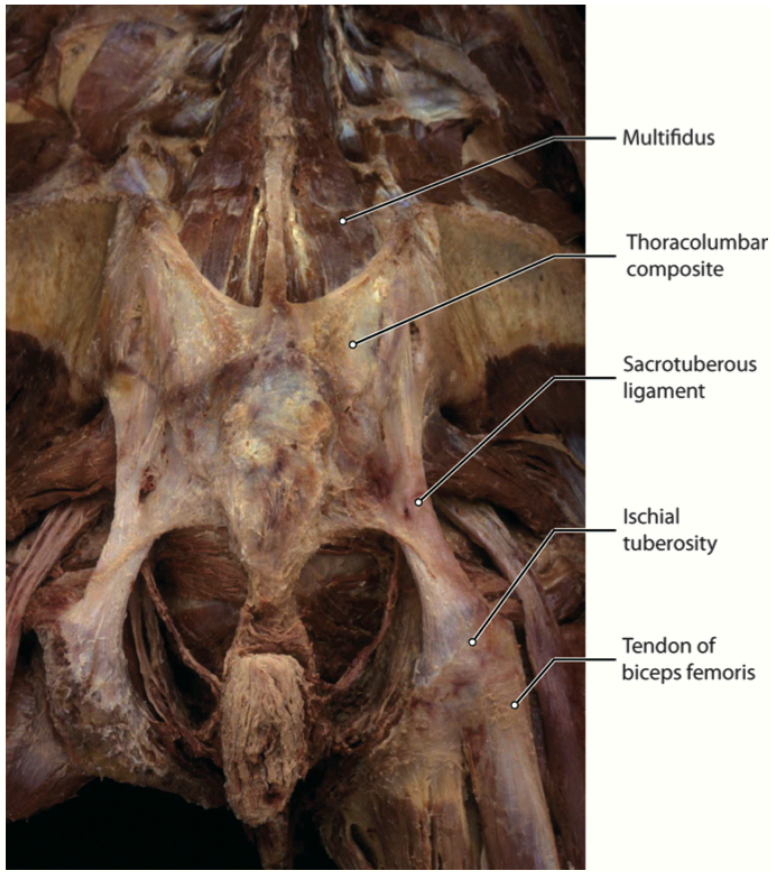


Barker P.J et al., 2004; Willard et al., 2012; Stecco C, 2015

Vleeming A.

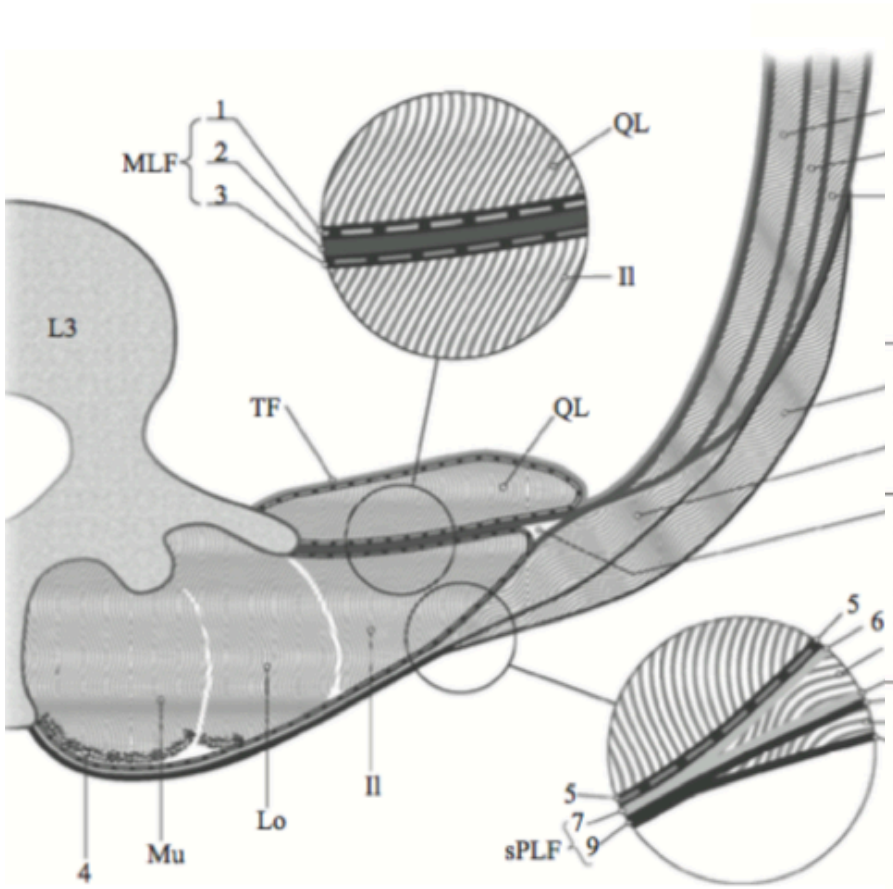


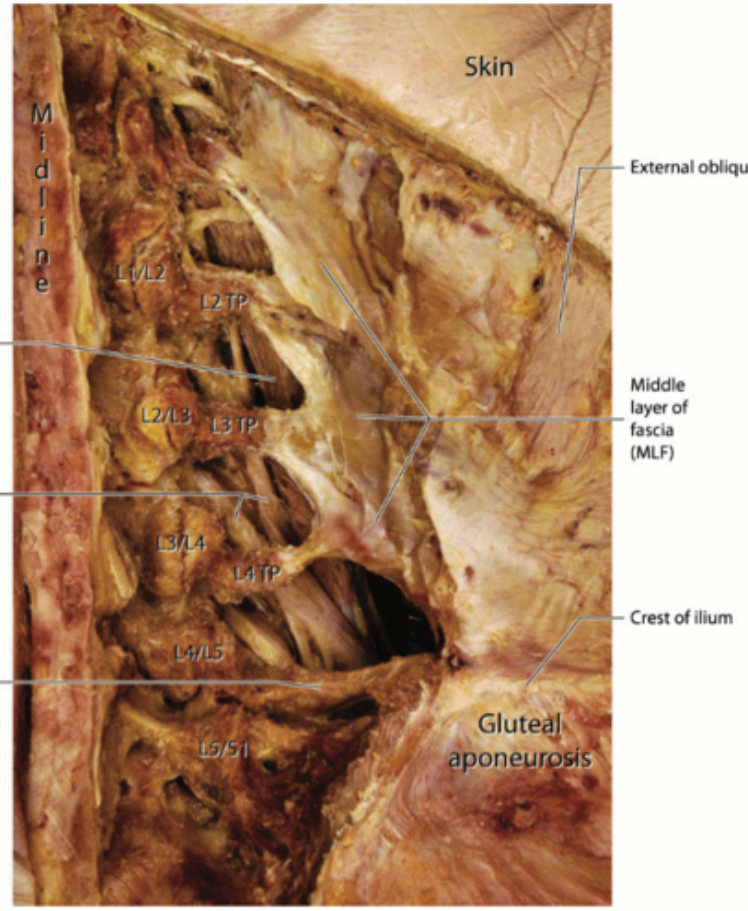




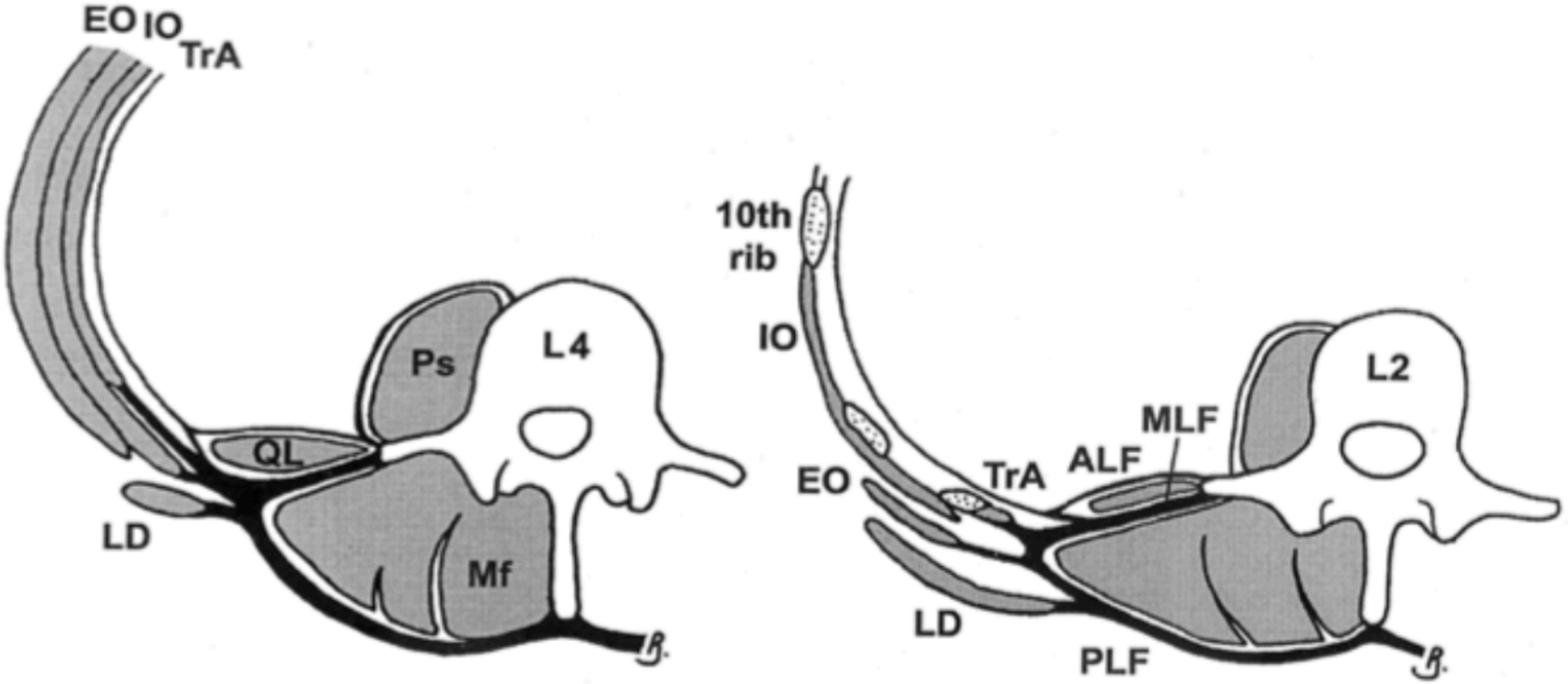
Crey et al., 2018; Willard F.H. et al., 2012

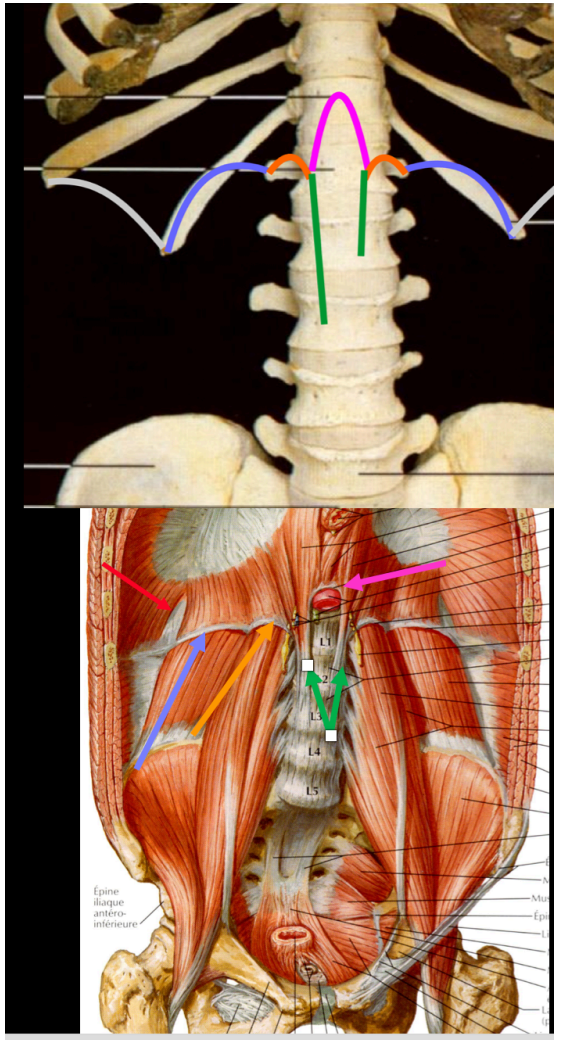
Couche moyenne



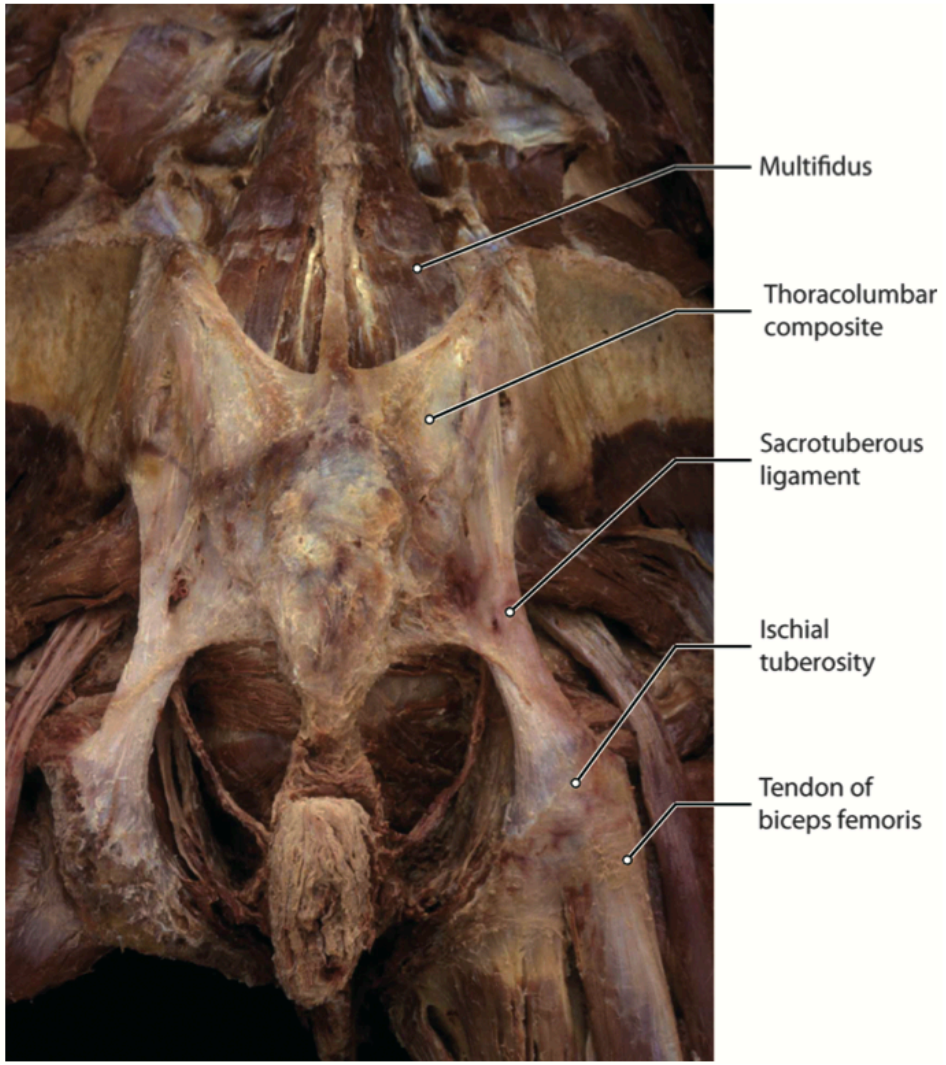


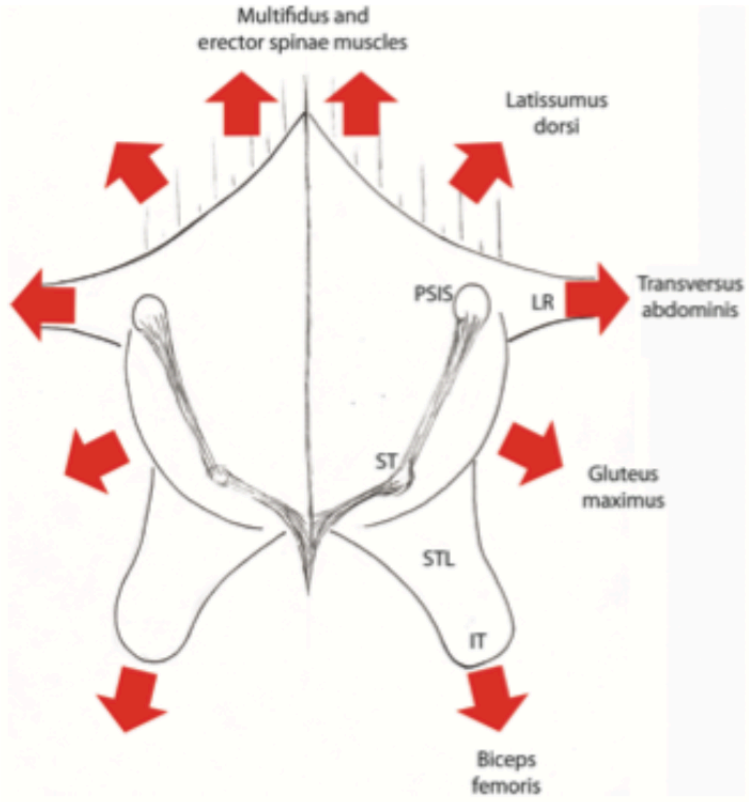
Couche antérieure

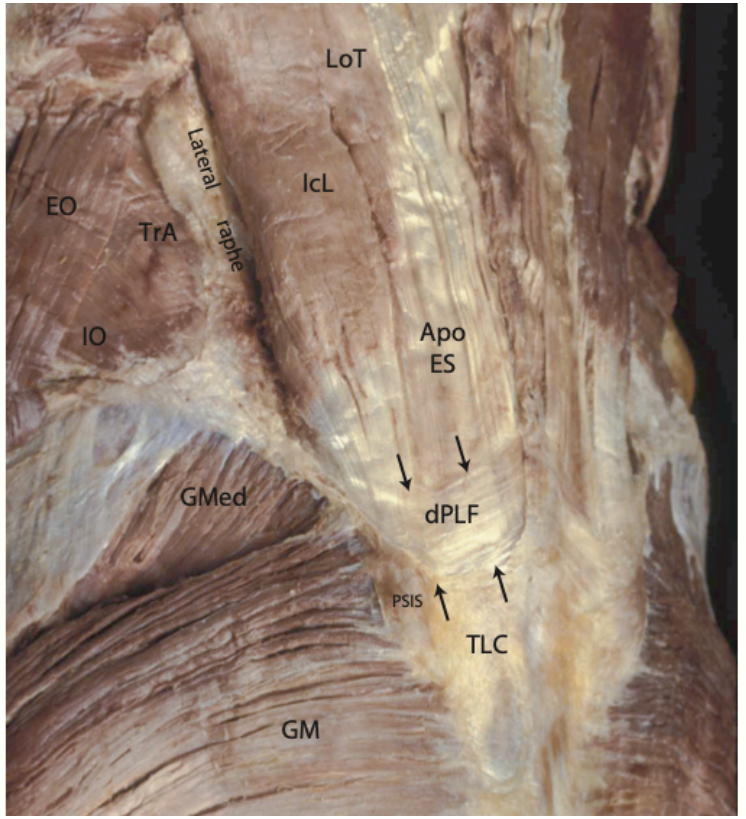




Vleeming, A., 1995





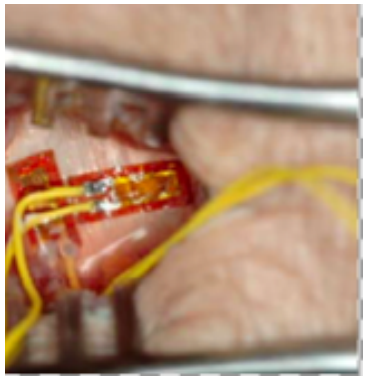


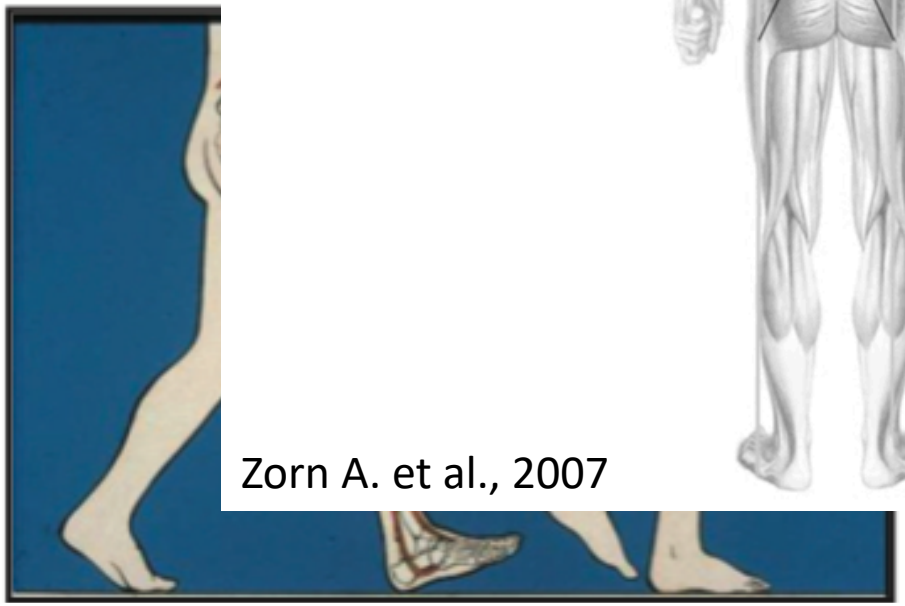
Willard F. H. et al., 2012

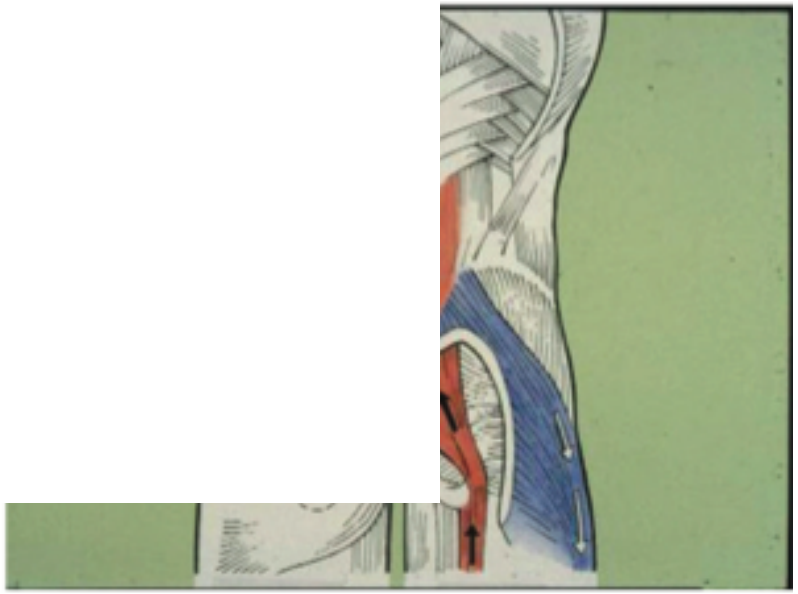
Surprising differences in fascial strain transmissions

Strain transmission during straight leg raise (compared to strain of posterior thigh)
Franklyn-M

- Iliotibial t
- Ipsilatera
- Lateral cr
- Achilles t
- Contralate
- Plantar fa







Zorn A. et al., 2007

Franklyn-Miller, 2009; Carvalhais et al, 2013

Myofascial force transmission between the latissimus dorsi and gluteus maximus muscles: An in vivo experiment

Viviane Otoni do Carmo Carvalhais, Juliana de Melo Ocarino, Vanessa Lara Araújo, Thales Rezende Souza, Paula Lanna Pereira Silva, Sérgio Teixeira Fonseca*

Journal of Biomechanics 46 (2013) 1003–1007

Contents lists available at SciVerse ScienceDirect

Journal of Biomechanics

journal homepage: www.elsevier.com/locate/jbiomech
www.JBiomech.com

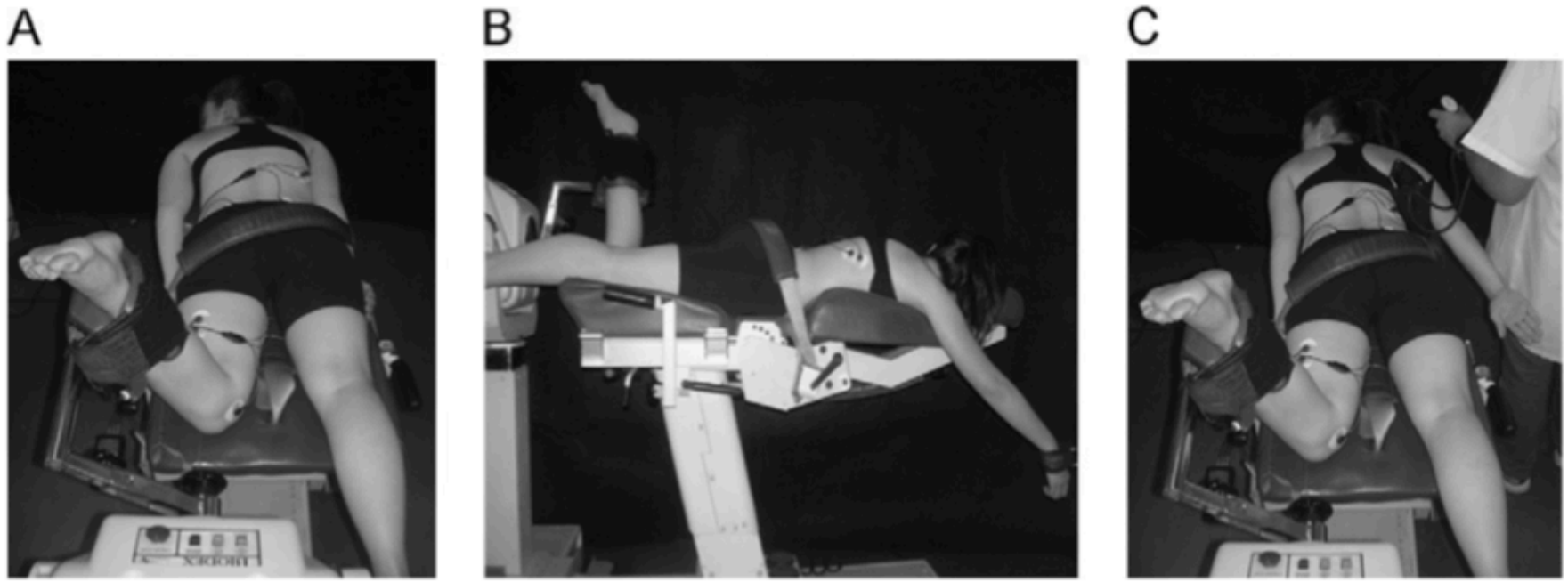
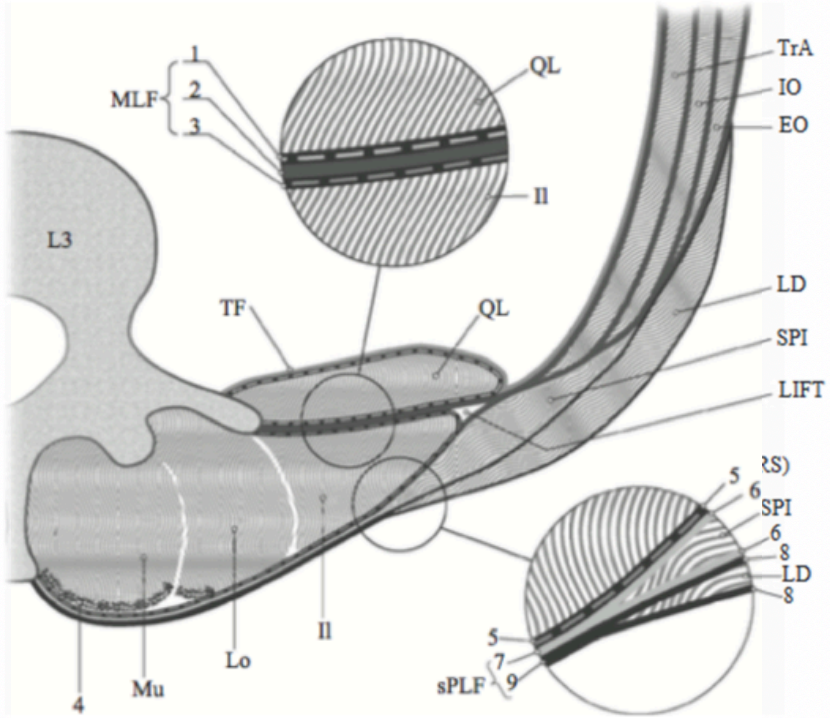
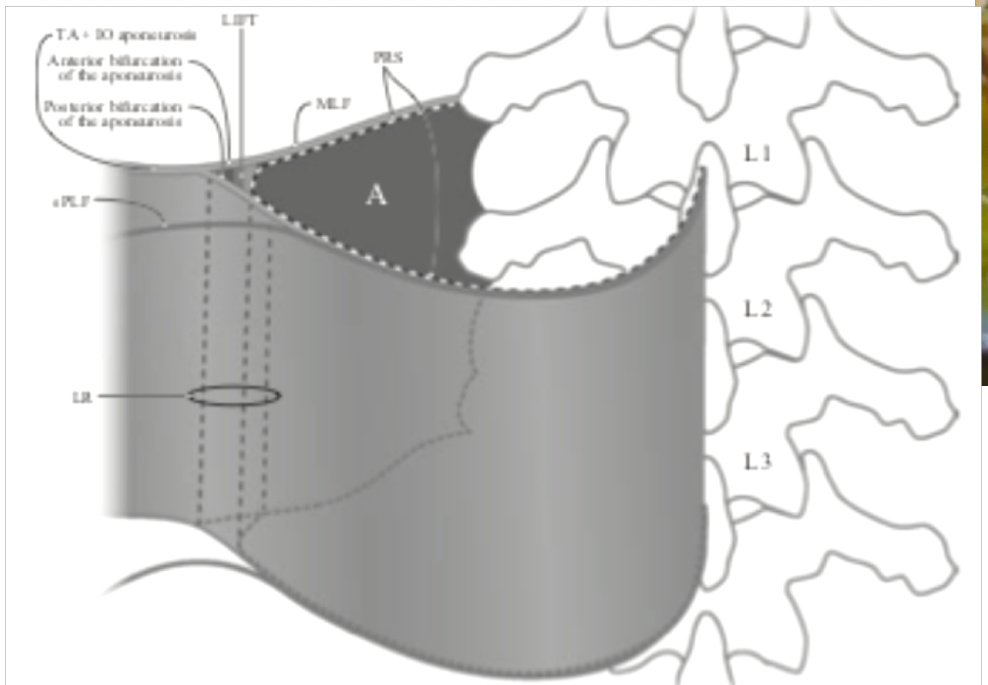


Fig. 3. Test conditions: (A) control, (B) passive latissimus dorsi tensioning and (C) active latissimus dorsi tensioning.


MLF
1
2
3
QL
TrA
IO
EO
Il
L3
TF
QL
LD
SPI
LIFT
5
6
SPI
6
8
LD
8
5
7
9
sPLF
Il
Lo
Mu
4

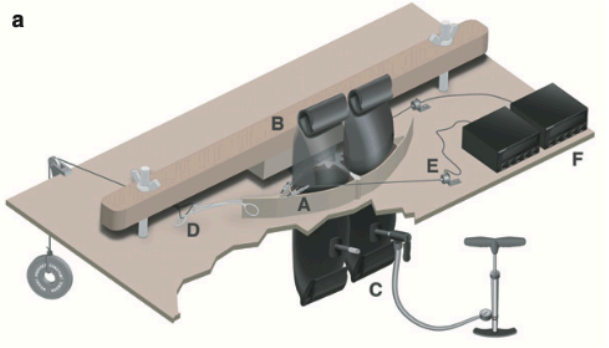

T.A + IO aponeurosis
Anterior bifurcation of the aponeurosis
Posterior bifurcation of the aponeurosis
LIFT
PRS
MLF
A
sPLF
LR
L1
L2
L3

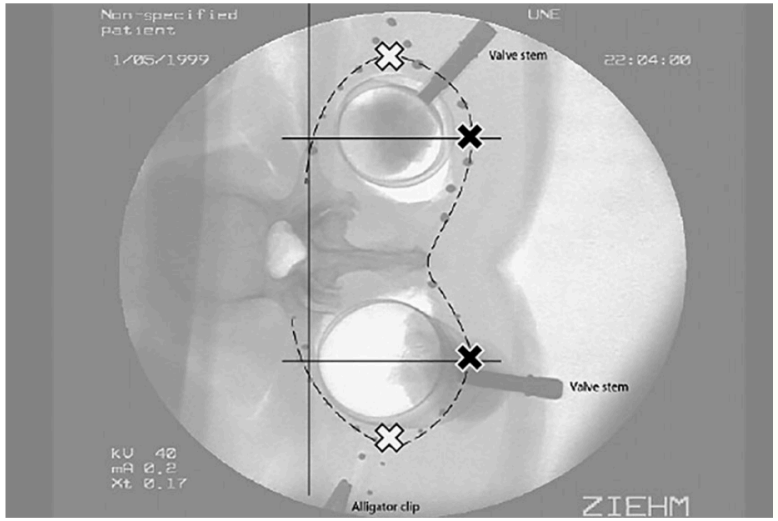
J. Anat. (2014) **225**, pp447–462 doi: 10.1111/joa.12227

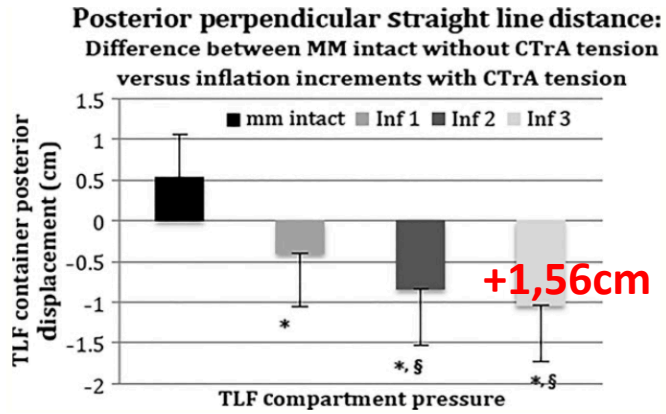
The functional coupling of the deep abdominal and paraspinal muscles: the effects of simulated paraspinal muscle contraction on force transfer to the middle and posterior layer of the thoracolumbar fascia

A. Vleeming,[1,2] M. D. Schuenke,[1] L. Danneels[2] and F. H. Willard[1]

[1]*Department of Anatomy, University of New England College of Osteopathic Medicine, Biddeford, ME, USA*
[2]*Department of Rehabilitation Sciences and Physiotherapy, University of Ghent, Ghent, Belgium*

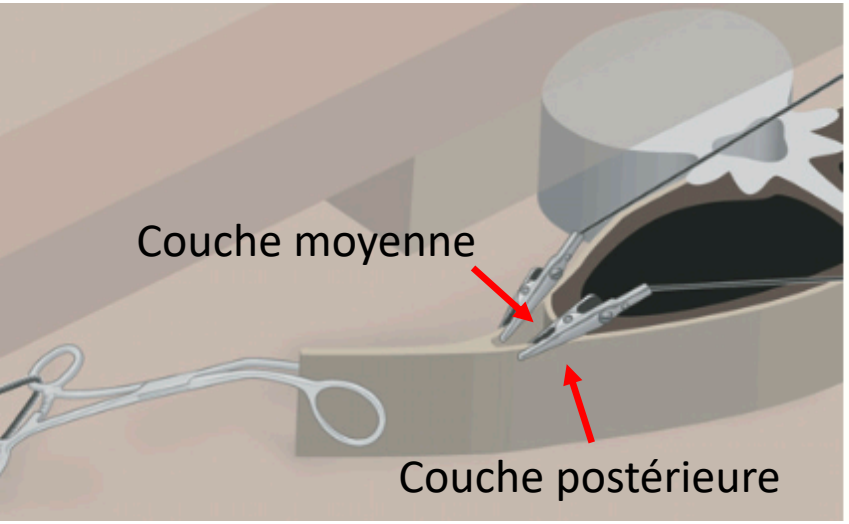






+1,56cm

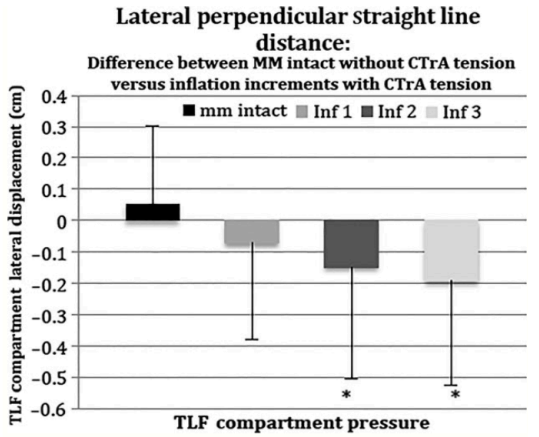
BDL: 6-8 cm en moyenne (Gracovetsky et al. 1981, 1985; McGill & Norman, 1985; Tesh et al. 1987; Hukins et al. 1990; Dolan et al. 1994; Barker et al. 2006; Adams & Dolan, 2007; Gatton et al. 2010).



- Aucune modification de tension suivant les conditions pour de la couche moyenne

- Sans simulation de contraction des érecteurs: **Déplacement antérieur et latéral** de la couche postérieure

-Avec simulation de contraction des érecteurs: **Déplacement postérieur et médial** de la couche postérieure



Journal of Physiology (1999), **520.2**, *pp.*591–604

Voluntary and reflex control of human back muscles during induced pain

Milan Zedka, Arthur Prochazka, Brian Knight*, Debby Gillard and Michel Gauthier

*Division of Neuroscience and *Department of Anesthesiology, University of Alberta, Edmonton, Canada*

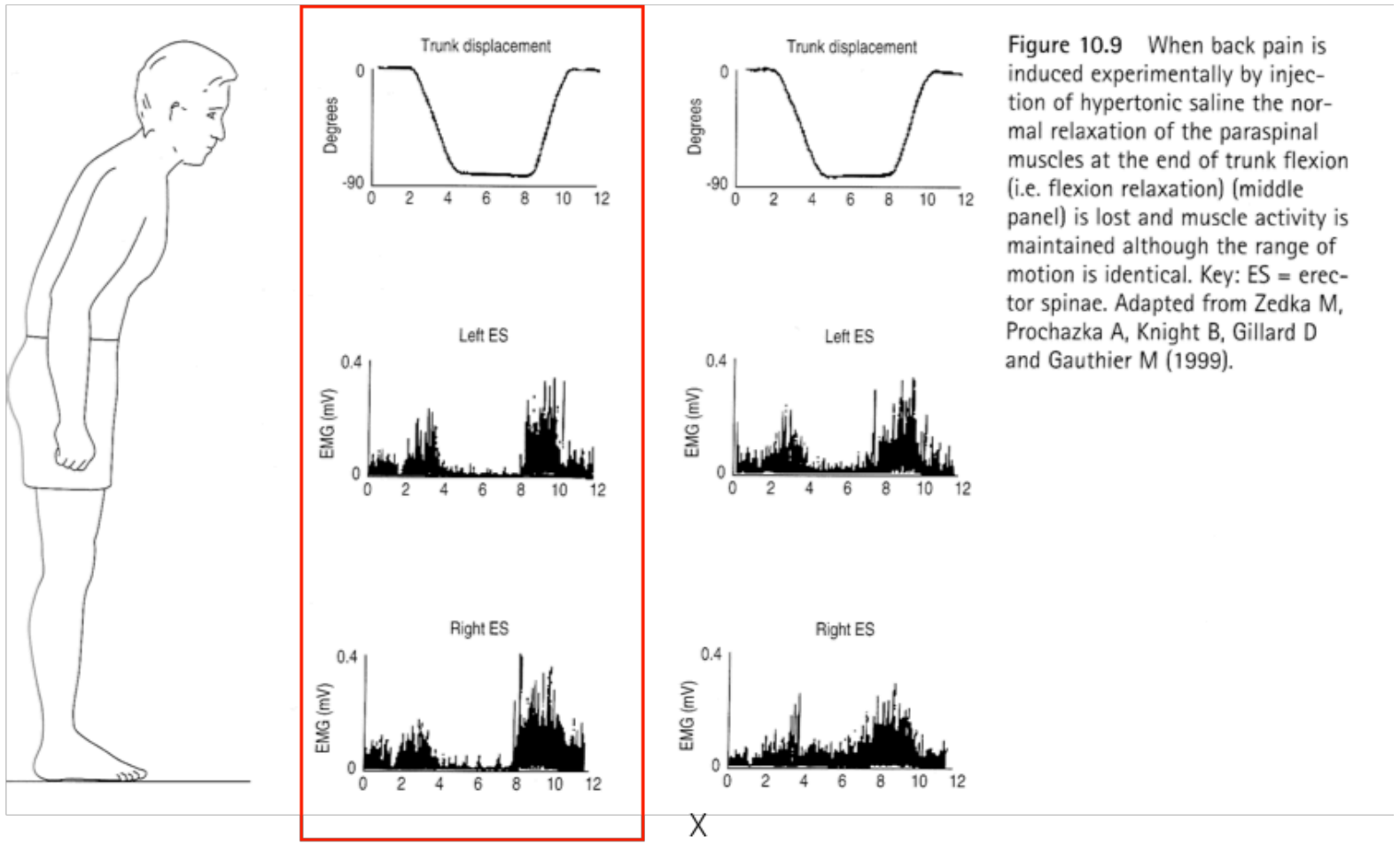


Figure 10.9 When back pain is induced experimentally by injection of hypertonic saline the normal relaxation of the paraspinal muscles at the end of trunk flexion (i.e. flexion relaxation) (middle panel) is lost and muscle activity is maintained although the range of motion is identical. Key: ES = erector spinae. Adapted from Zedka M, Prochazka A, Knight B, Gillard D and Gauthier M (1999).

X

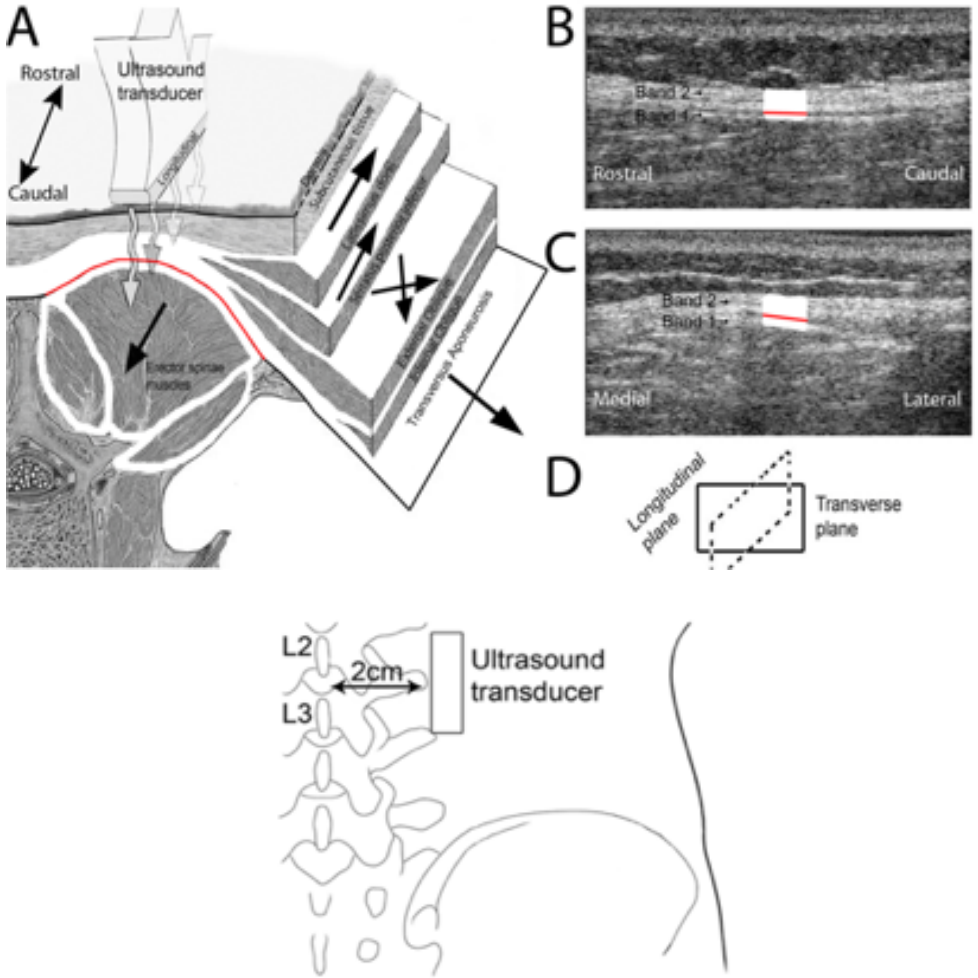
Langevin et al. BMC Musculoskeletal Disorders 2011, 12:203
http://www.biomedcentral.com/1471-2474/12/203

BMC
Musculoskeletal Disorders

RESEARCH ARTICLE Open Access

Reduced thoracolumbar fascia shear strain in human chronic low back pain

Helene M Langevin[1,2*], James R Fox[1], Cathryn Koptiuch[1], Gary J Badger[3], Ann C Greenan- Naumann[4], Nicole A Bouffard[1], Elisa E Konofagou[5], Wei-Ning Lee[5], John J Triano[6] and Sharon M Henry[7]



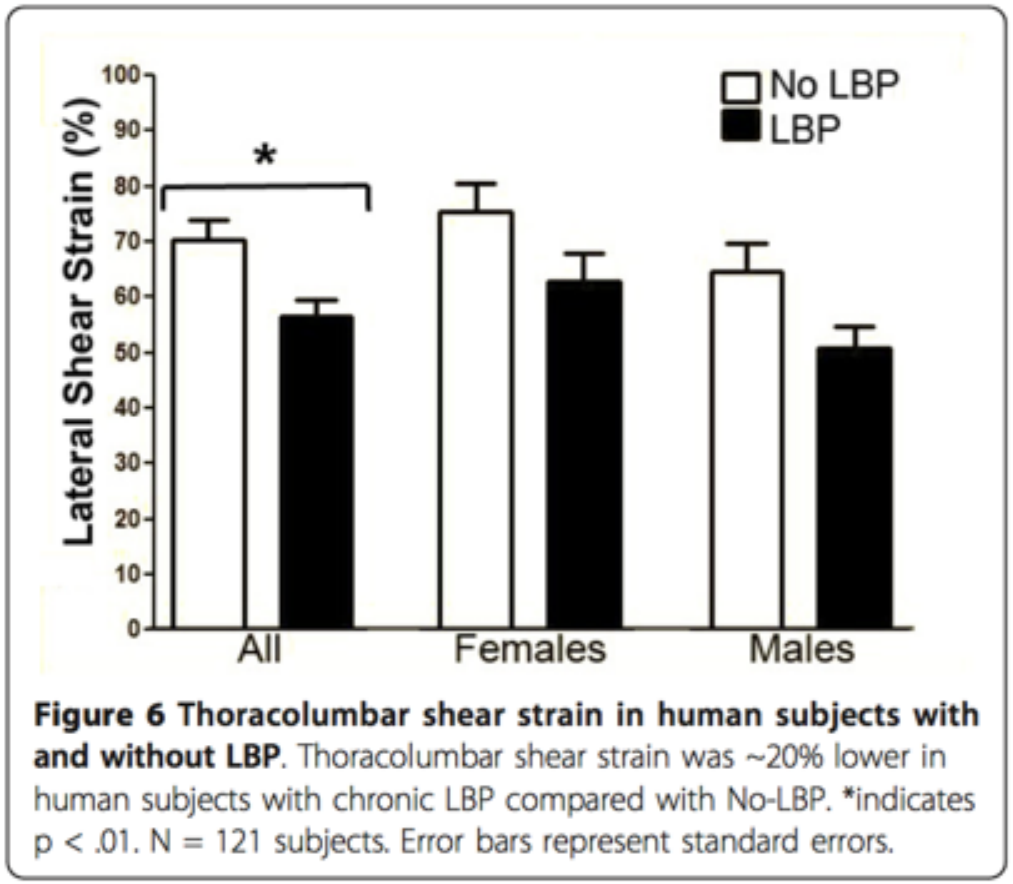
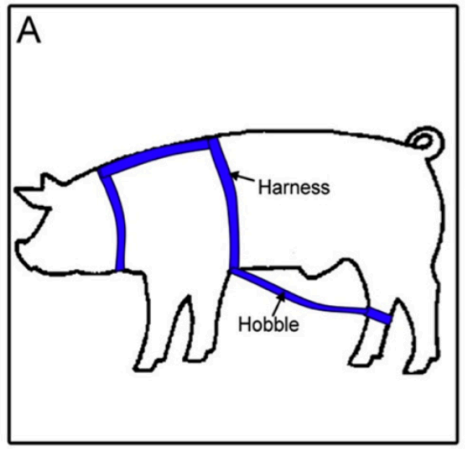


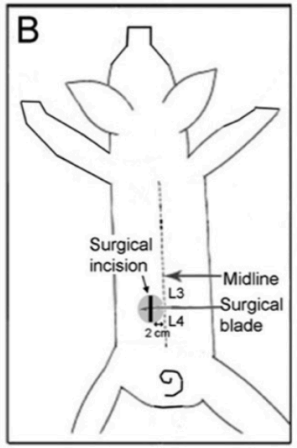
Figure 6 Thoracolumbar shear strain in human subjects with and without LBP. Thoracolumbar shear strain was ~20% lower in human subjects with chronic LBP compared with No-LBP. *indicates $p < .01$. N = 121 subjects. Error bars represent standard errors.

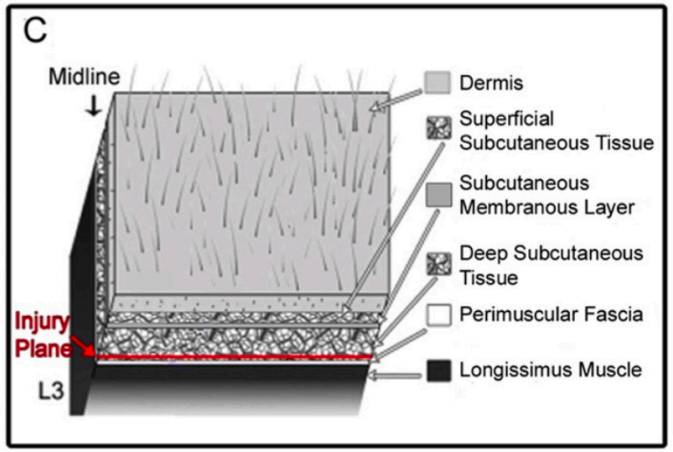
Ultrasound Evaluation of the Combined Effects of Thoracolumbar Fascia Injury and Movement Restriction in a Porcine Model

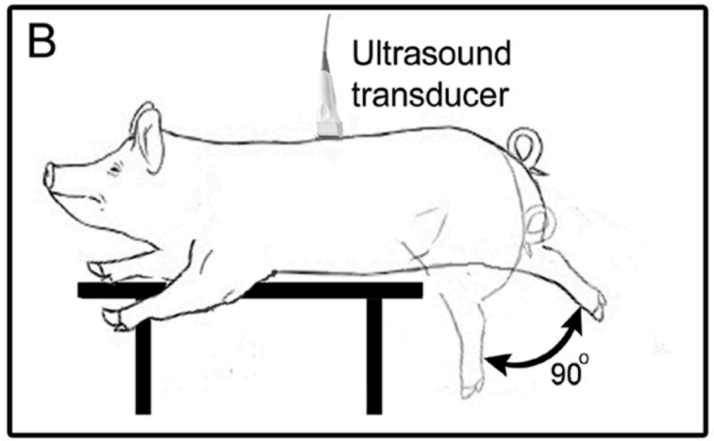
PLOS ONE | DOI:10.1371/journal.pone.0147393 January 28, 2016

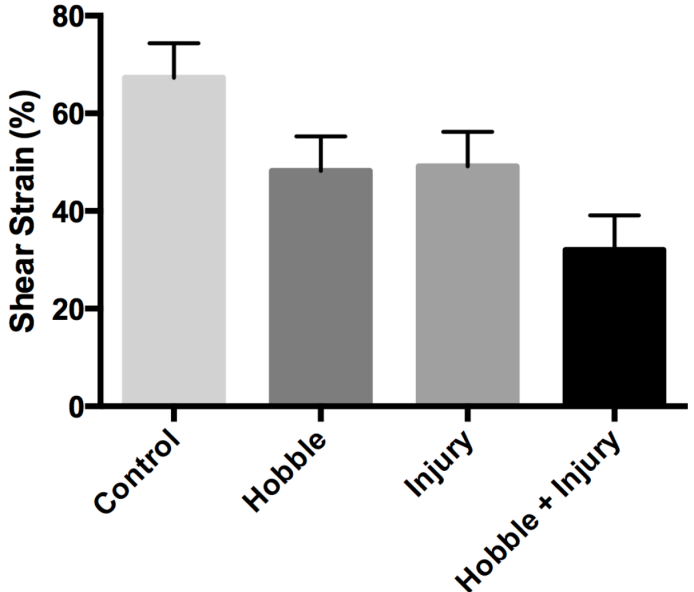
James H. Bishop[1], James R. Fox[1], Rhonda Maple[1], Caitlin Loretan[1], Gary J. Badger[2], Sharon M. Henry[3], Margaret A. Vizzard[1], Helene M. Langevin[1,4]*











- Incision: mobilité ↓
- Écharpe: mobilité ↓
- Incision + écharpe: mobilité ↓ **(52% / Gr contrôle et 28%/ Gr écharpe)**

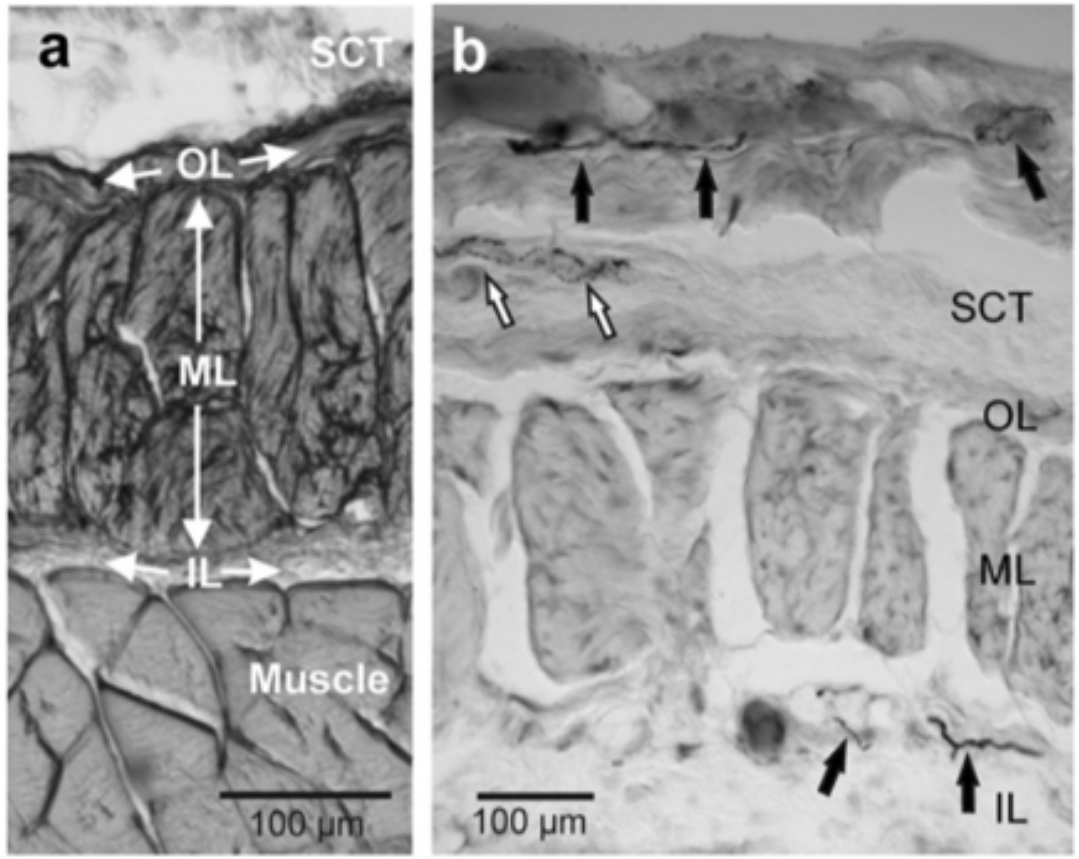
innervation

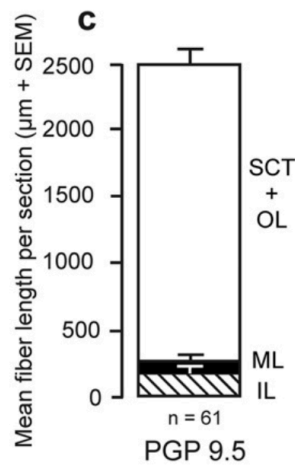
Study	Tissue source	Method	Nerve endings found
Stilwell (1957)	Macaca mulatta (n = 17), rabbit (n = 4)	Methylene blue	Rich supply by FNE. Groups of large Pacinian corpuscles at penetration points of dorsal rami through TLF. Also small Pacinian-like and Golgi-Mazzoni corpuscles*
Hirsch (1963)	Human (n = ?)	Methylene blue	FNE, 'complex unencapsulated endings'*
Yahia et al. (1992)	Human (n = 7)	IH: Neurofilament protein and S-1 00 protein	FNE, Ruffini, Pacini*
Bednar et al. (1995)	Human (n = 12)	IH: neuron-specific enolase	No terminal nerves found*
Corey et al. (2011)	Rats (n = 5)	3-D reconstructions of thick (30–80 μm) tissue sections IH: PGP9.5, CGRP, fast blue	CGRP positive FNE.
Tesarz et al. (2011)	Rat (n = 8) Human (n = 3)	IH: PGP 9.5, TH, CGRP, SP	Rich innervation with terminal nerves. Most nerve fibers located in the outer layer and in the SCT
Benetazzo et al. (in press)	Human (n = 2)	3D reconstruction of serial sections. IH: S100	Study did not investigate nerve terminations

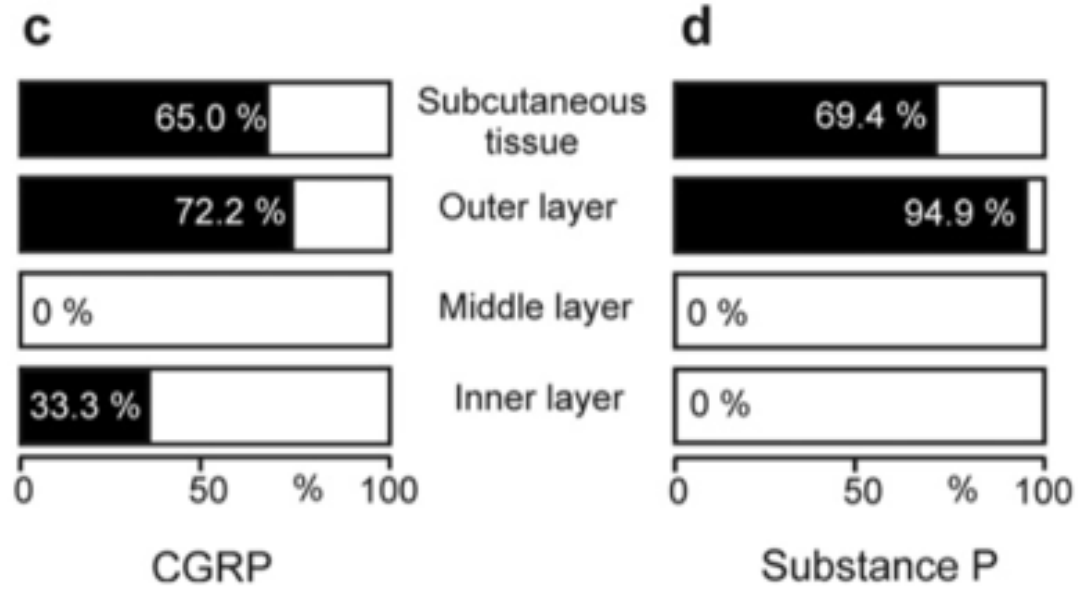
FNE, free nerve endings; IH, immunohistochemical analysis.
*Method of identification of termination of small nerves not mentioned. Not included in this table are stu
interspinous or iliolumbar ligaments.

Neuroscience 194 (2011) 302–308

SENSORY INNERVATION OF THE THORACOLUMBAR FASCIA IN RATS AND HUMANS







European Journal of Pain 15 (2011) 810–815

Nociceptive input from the rat thoracolumbar fascia to lumbar dorsal horn neurones

Ulrich Hoheisel [a,*], Toru Taguchi [b], Rolf-Detlef Treede [a], Siegfried Mense [a]

[a] Department of Neurophysiology, Centre for Biomedicine and Medical Technology Mannheim, Ruprecht-Karls-University Heidelberg, 68167 Mannheim, Germany
[b] Department of Neuroscience II, Research Institute of Environmental Medicine, Nagoya University, Furo-cho, Chikusa-ku, Nagoya 464-8601, Aichi, Japan

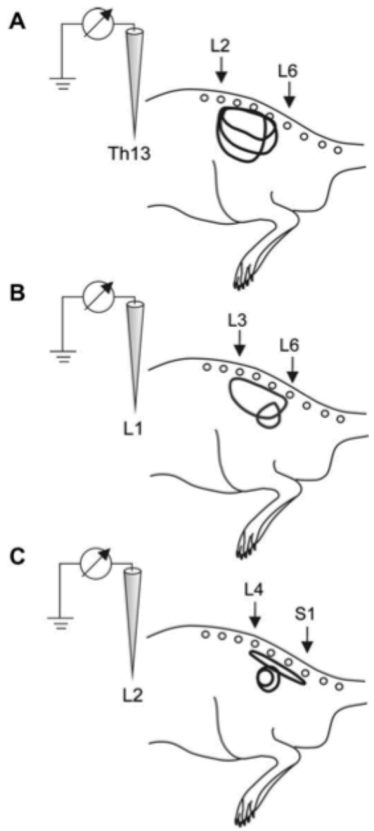


Fig. 3. Location and size of the receptive fields in TLF. (A) Receptive fields (RFs) from dorsal horn neurones recorded in spinal segment Th13 (3 neurones), (B) RFs of dorsal horn neurones in spinal segment L1 (2 neurones), (C) RFs of dorsal horn neurones in spinal segment L2 (3 neurones). Arrows indicate the spinous processes at the level of the receptive fields. Note that the approximated centres of the RFs were consistently shifted 3–4 segments caudally relative to the recording site.

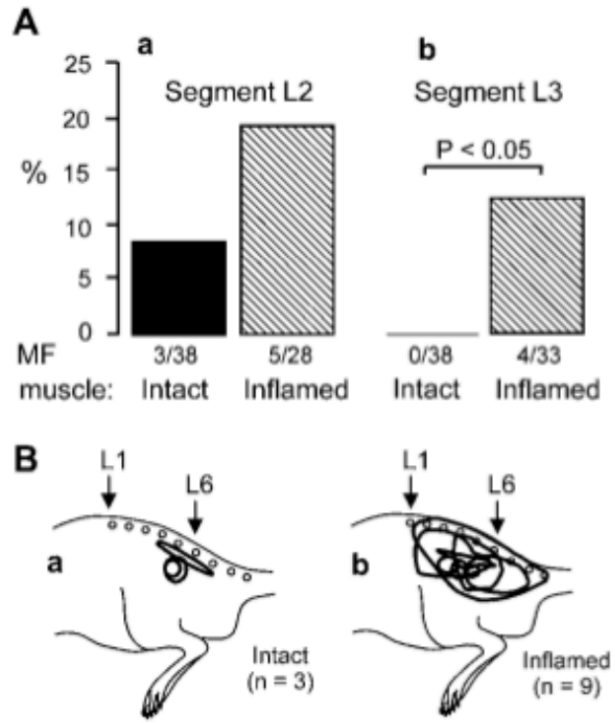


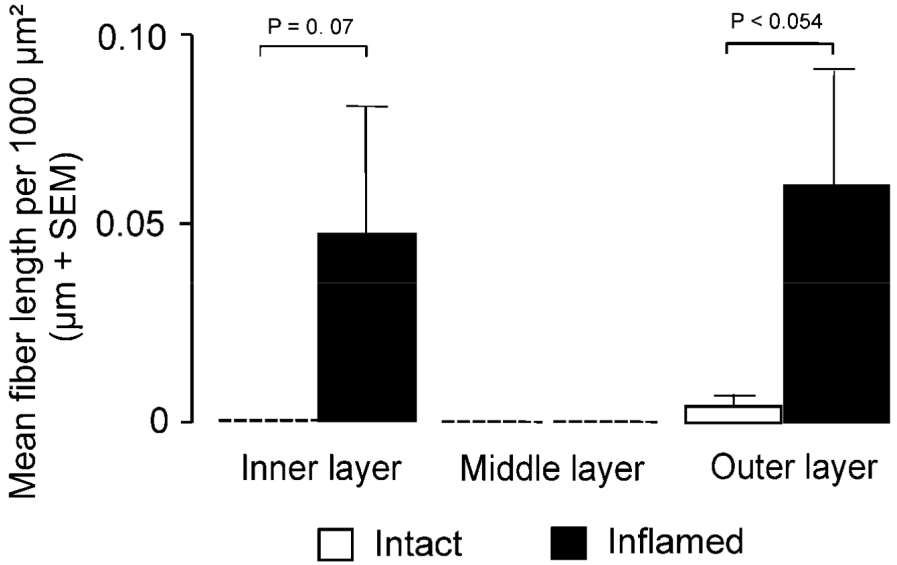
Fig. 5. Proportion of dorsal horn neurones with input from TLF after CFA injection into the MF muscle. (A) Proportion of dorsal horn neurones with TLF input in spinal segment L2: (a) and spinal segment L3 (b), black bars (intact), data from animals with an intact MF muscle; hatched bars (inflamed), data from animals with an inflamed MF muscle. The numbers underneath the bars are those of the neurones from which the bars were constructed. *P* value indicates a significant difference between intact and inflamed animals (Fisher's exact test). (B) Location and size of the receptive fields in the TLF: (a) intact animals, (b) inflamed animals; *n*: number of neurones. Arrows indicate the lumbar spinous processes L1 and L6.

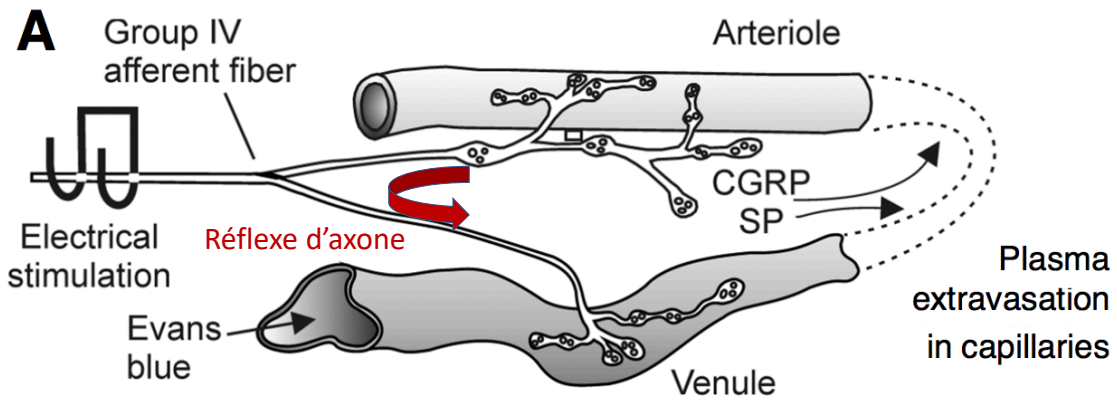
Evidence for the existence of nociceptors in rat thoracolumbar fascia

Prof. Dr. med Siegfried Mense, Ulrich Hoheisel, PhD

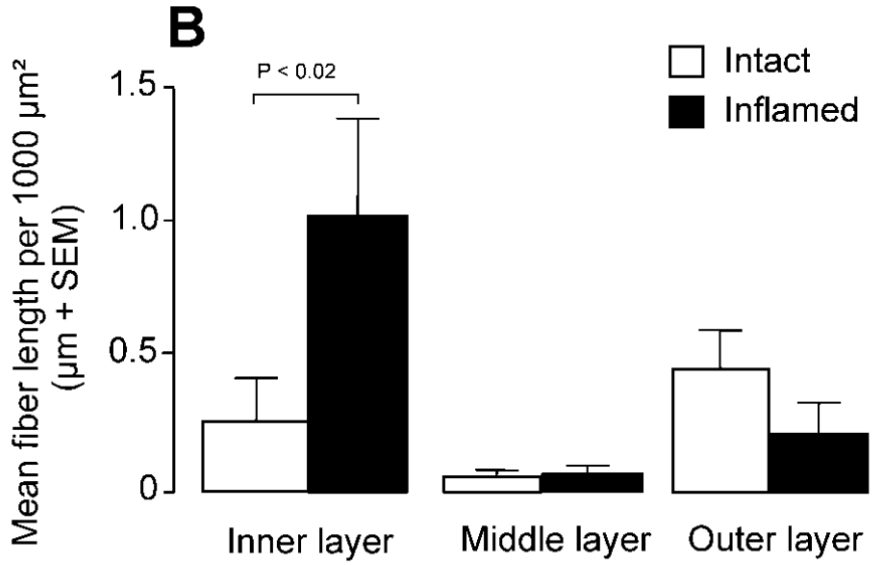
2015

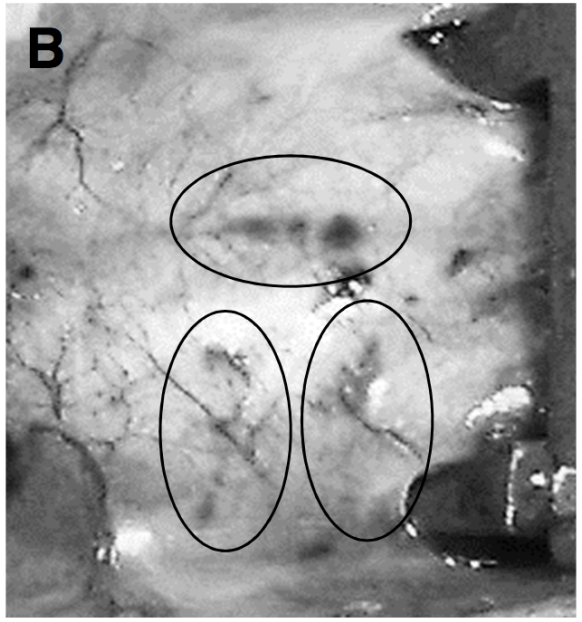
CGRP



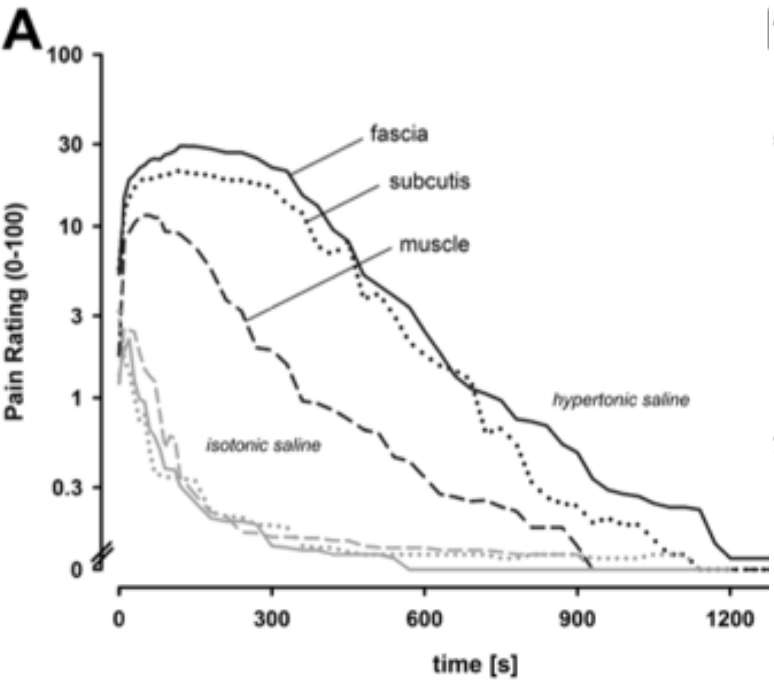


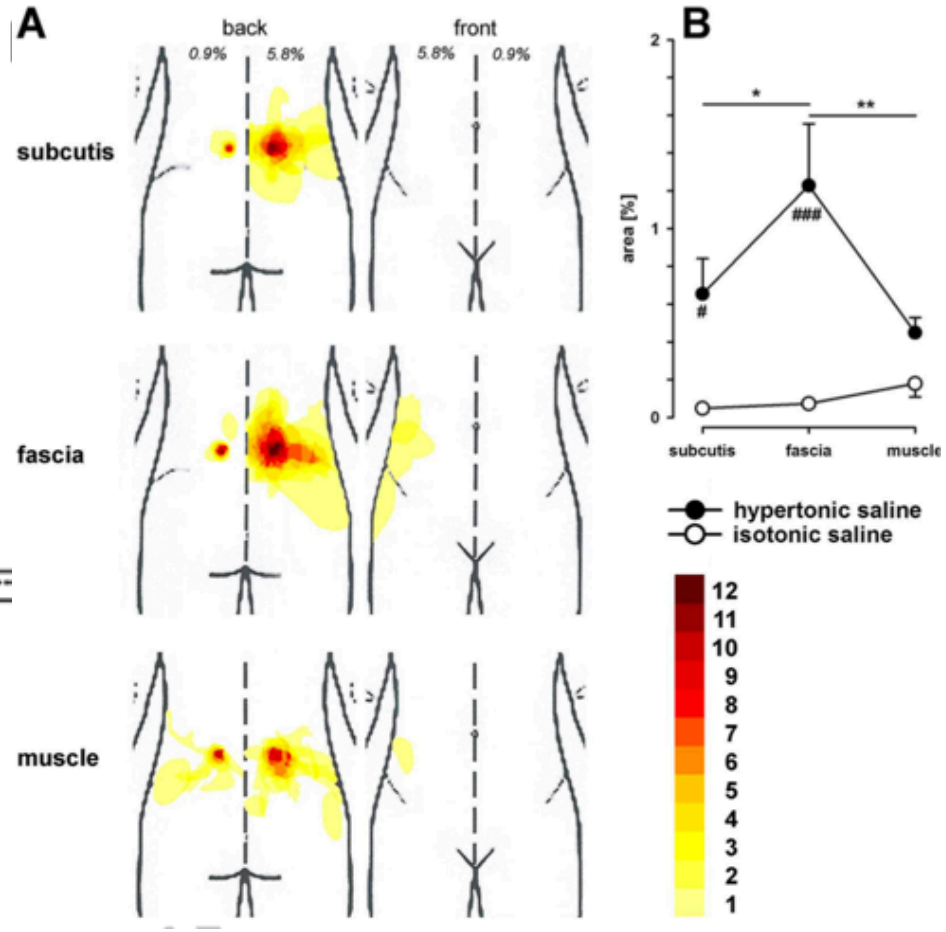
SP

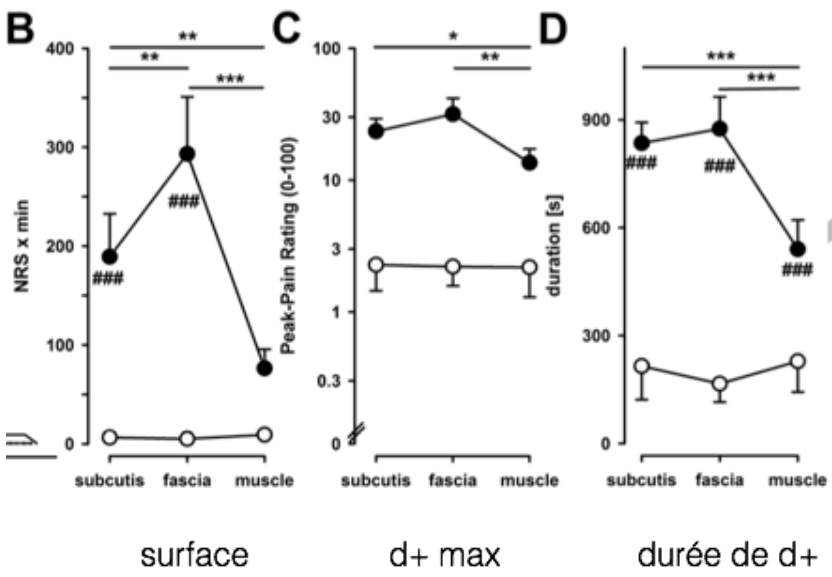




Sensory findings after stimulation of the thoracolumbar fascia with hypertonic saline suggest its contribution to low back pain





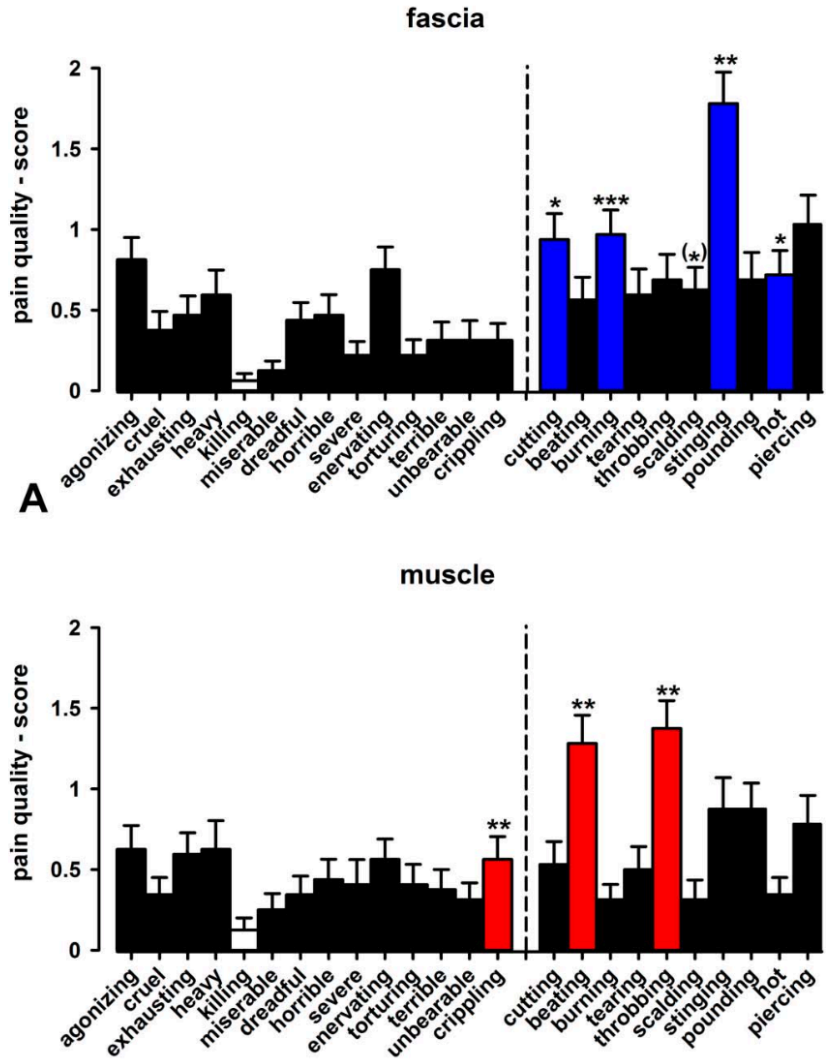


Schilder et al, 2014

PAIN REPORTS®

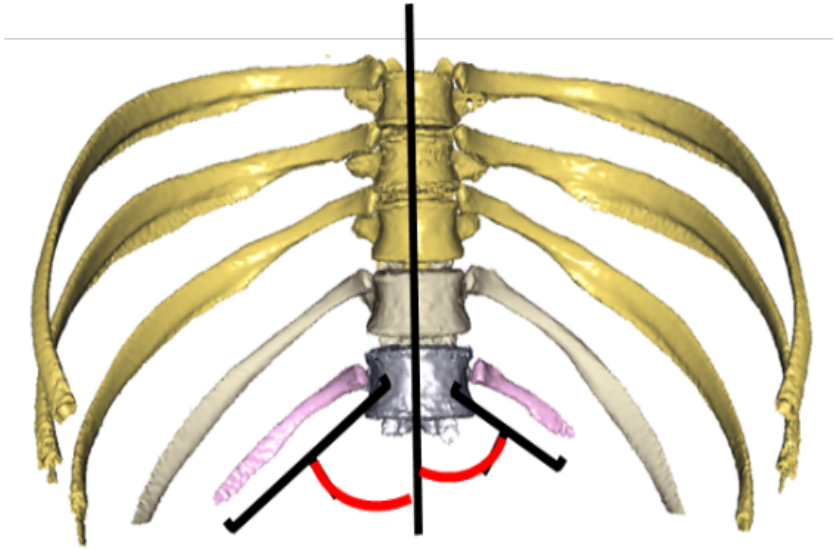
Assessment of pain quality reveals distinct differences between nociceptive innervation of low back fascia and muscle in humans

Andreas Schilder*, Walter Magerl, Thomas Klein, Rolf-Detlef Treede



Conclusion

- 3 couches
- Connexions et transmission de force multi régionales
- Richement innervé:
  - Lame superficielle de la couche postérieure et région sous-cutanée
  - Modification en cas d'inflammation
- Contribution possible à la lombalgie
- Perspective de recherche



Merci pour votre attention!

Questions