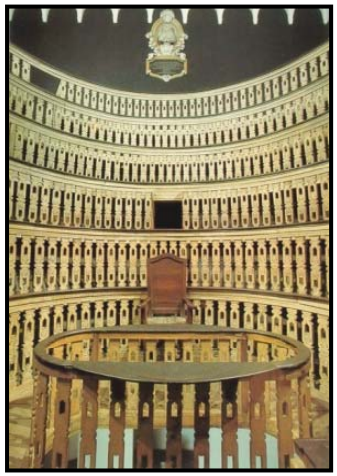
INTRODUCTION TO PHYSIOLOGY OF THE FASCIA



Antonio Stecco, M.D. - **May 2012**

Physical Medicine and Rehabilitation, University of Padova, Italy

DEFINITION OF FASCIA

Fascia was defined at the First Fascia Research Congress as:

"the soft-tissue component of the connective tissue system that permeates the human body, forming a whole-body continuous three-dimensional matrix of structural support.

It interpenetrates and surrounds all organs, muscles, bones and nerve fibers, creating a unique environment for body systems functioning."

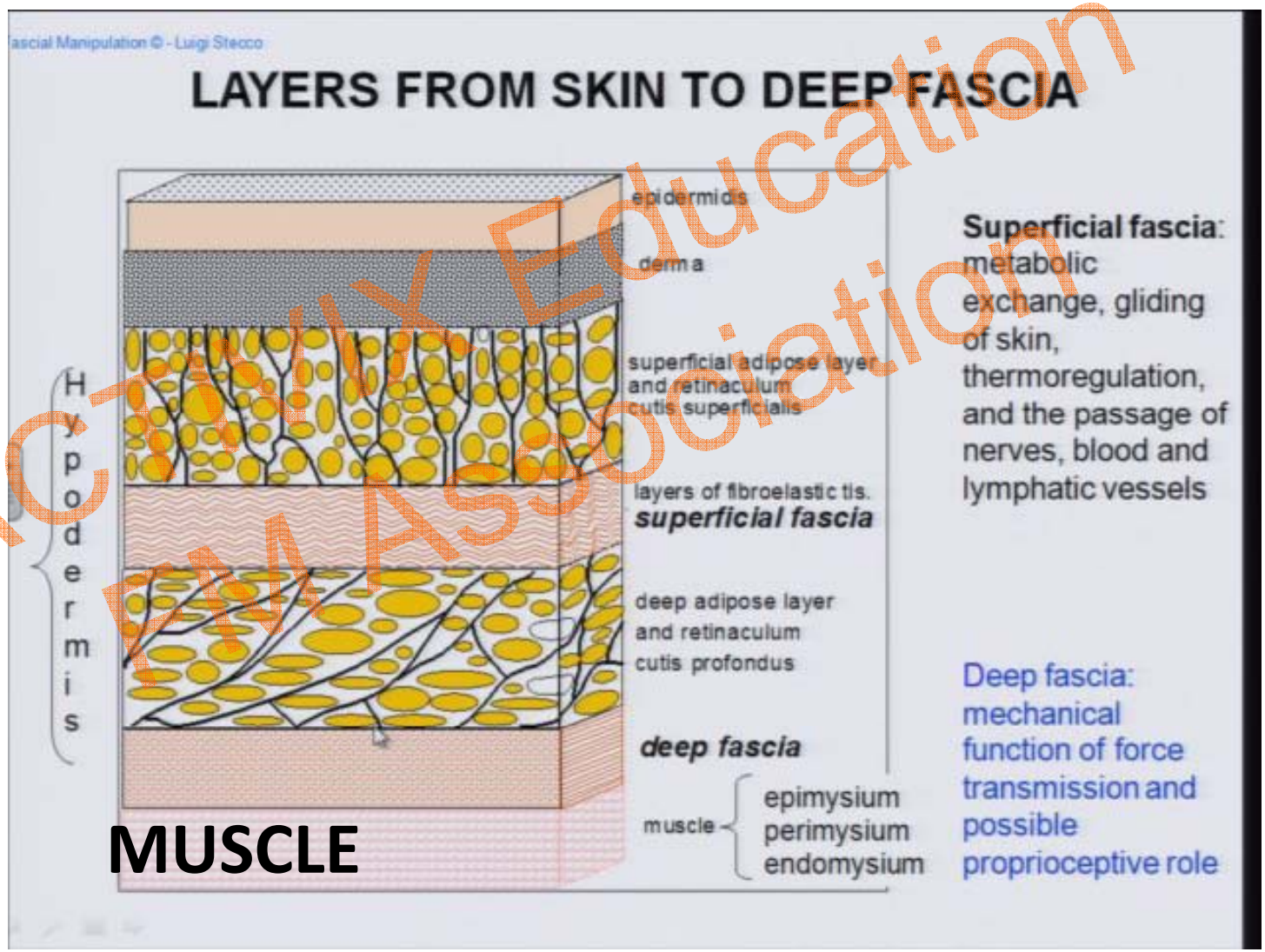
Ultrasound Evidence of Altered Lumbar Connective Tissue Structure in Human Subjects with Chronic Low Back Pain*

- This study is the first report of abnormal connective tissue structure in the back in a group of human subjects with chronic or recurrent LBP.
- The LBP group had ~25% greater perimuscular thickness and echogenicity compared with the No-LBP group
- Increased thickness and disorganization of connective tissue layers may be an important and so far neglected factor in human LBP pathophysiology.

* **Langevin HM, Stevens-Tuttle D, Fox JR. et al. *BMC Musculoskeletal Disorders 2009, 10:151***

Almost 100 “PubMed” Articles by Steccos

- Application of Fascial Manipulation technique in chronic shoulder pain--anatomical basis and clinical implications.
- Treating patellar tendinopathy with Fascial Manipulation.
- RMI study and clinical correlations of ankle retinacula damage and outcomes of ankle sprain.
- How much time is required to modify a fascial fibrosis?
- The expansions of the pectoral girdle muscles onto the brachial fascia: morphological aspects and spatial disposition.
- The ankle retinacula: morphological evidence of the proprioceptive role of the fascial system.
- The pectoral fascia: anatomical and histological study.
- Anatomical study of myofascial continuity in the anterior region of the upper limb.
- Histological study of the deep fasciae of the limbs.
- Historical review of carpal tunnel syndrome.
- Tendinous muscular insertions onto the deep fascia of the upper limb. First part: anatomical study.

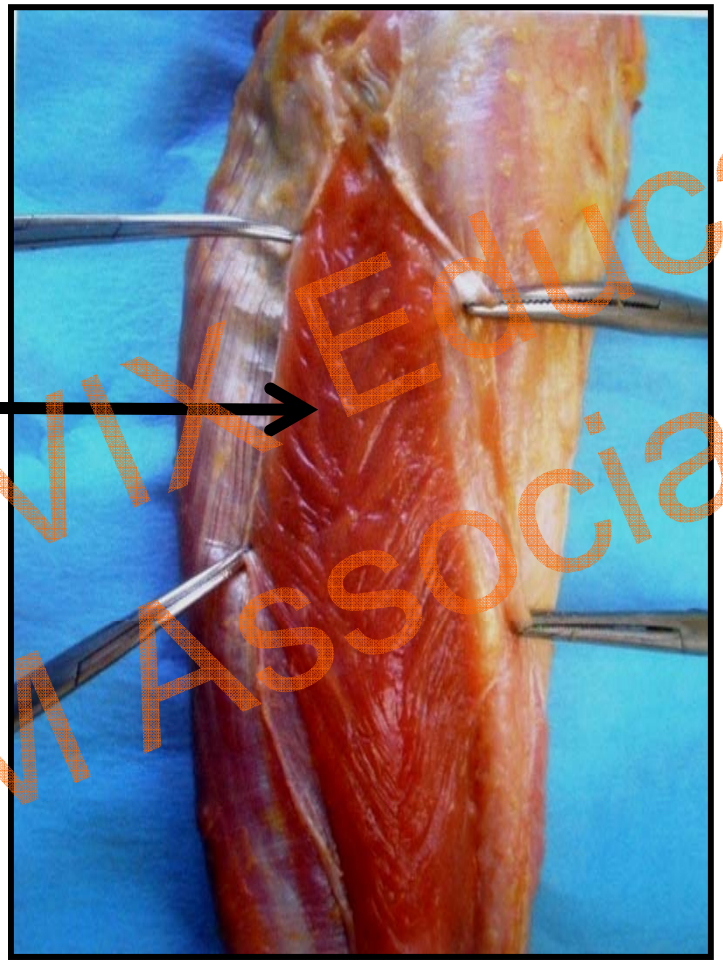


Fascia Covering the Arms & Legs

Anterior region of the arm | Anterior region of the forearm | Anterior region of the thigh | Posterior region of the leg

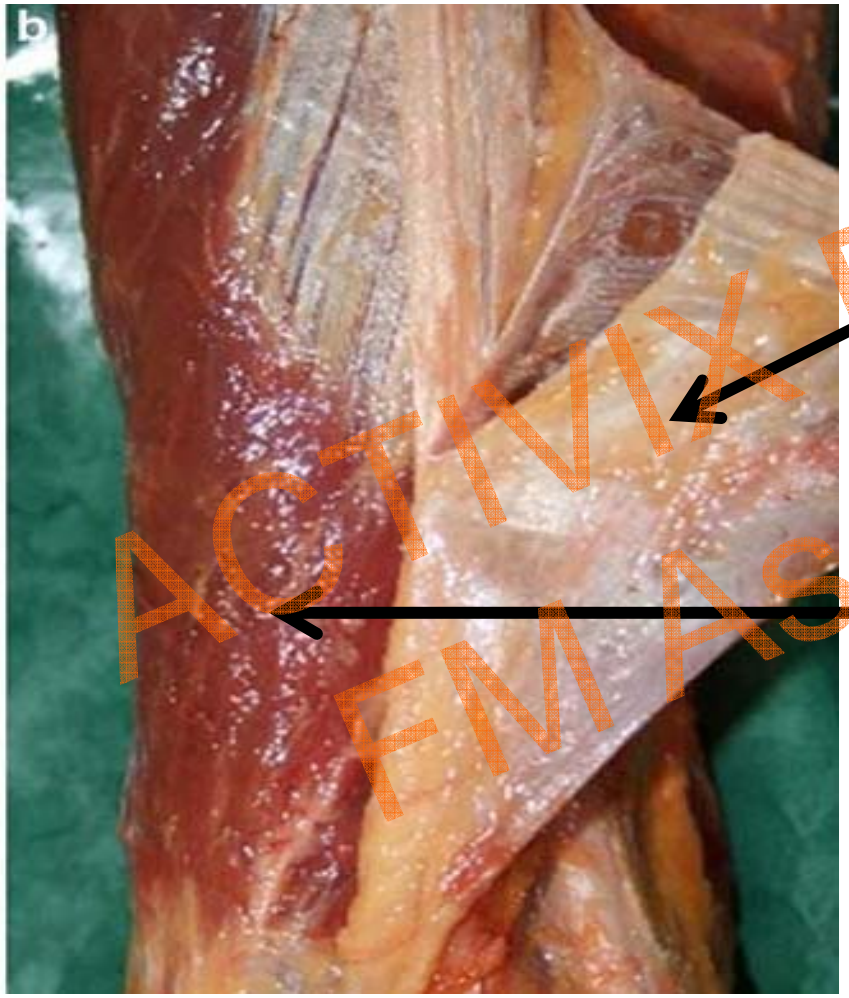
Insertion of Muscles into Deep Fascia

Deep Fascia



Insertion of the flexor carpi ulnaris at the antebrachial fascia

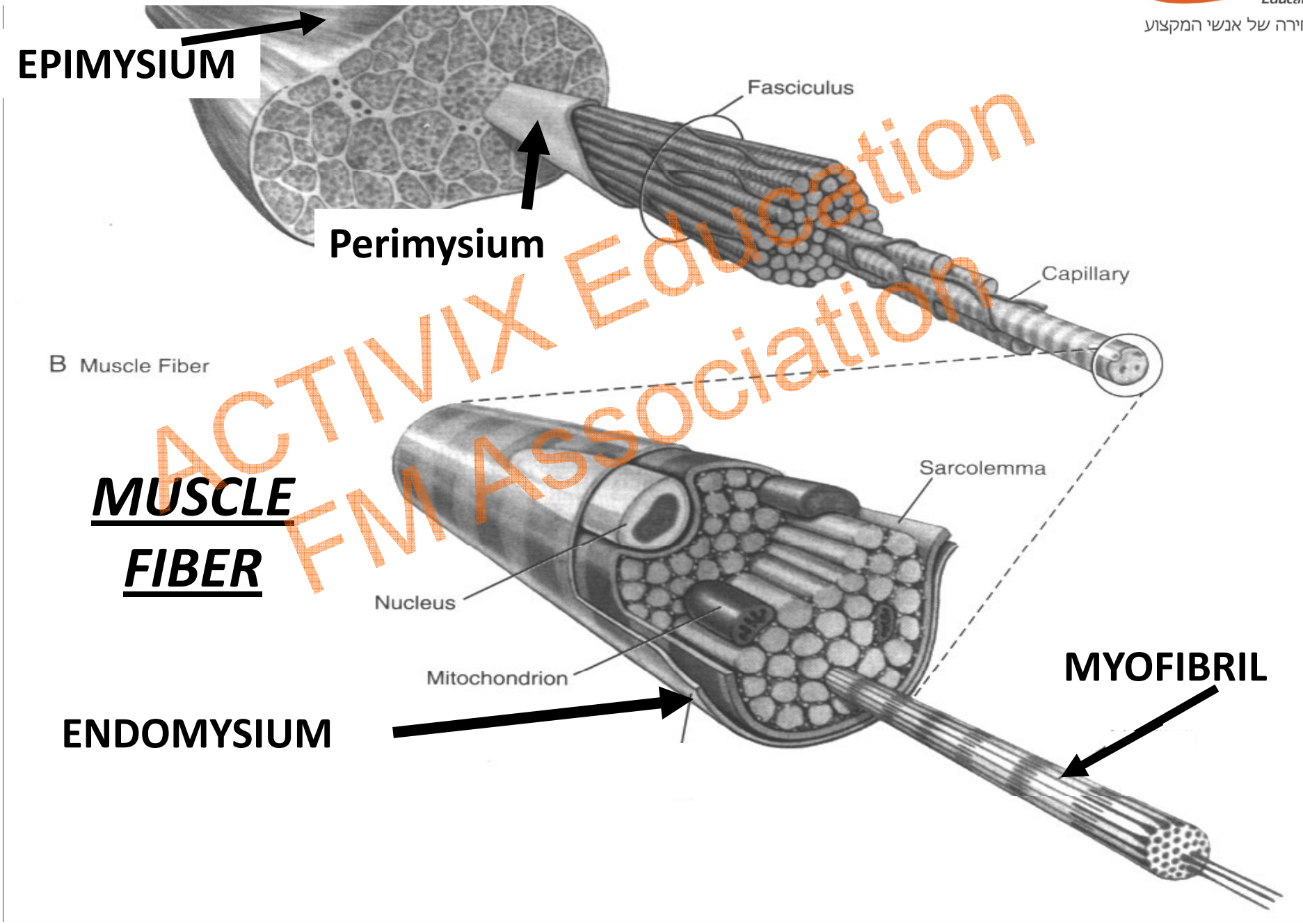
When muscles contract they stretch fascia. What happens if the facia is unable to stretch?



Deep Fascia Over the Muscle

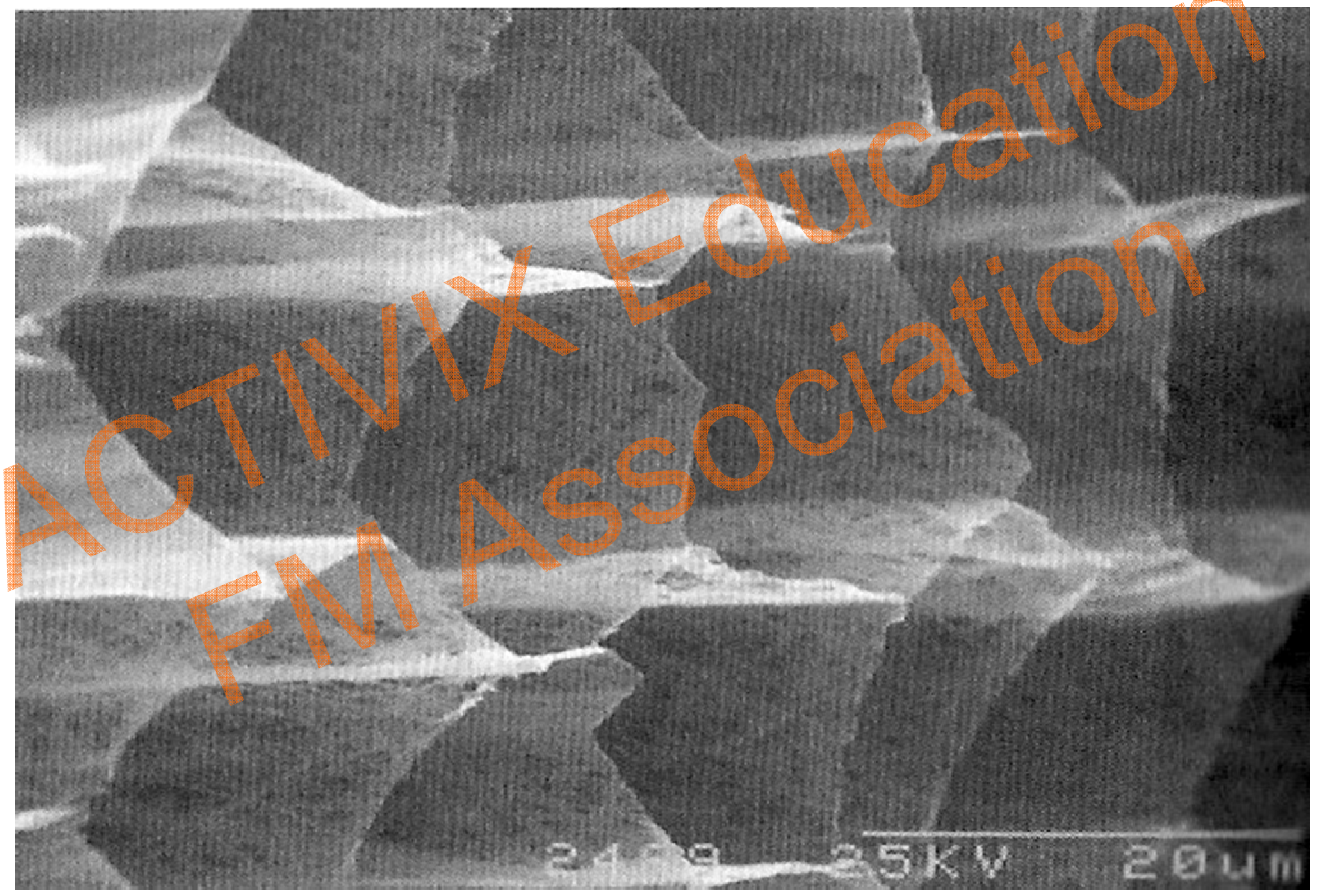
Epimysium (First Covering Over the Muscle)

MUSCLE BELLY



MUSCLE FIBER

Electron micrograph showing fine collagen fibers (endomysial sheets-fascia) separating adjacent muscle fibers



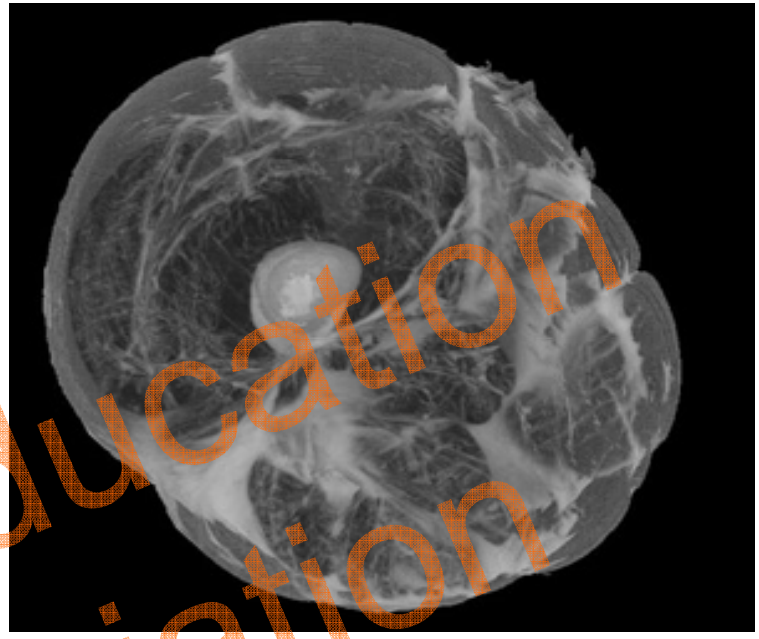
Purslow P, Trotter JA, 1994. The morphology and mechanical properties of endomysium in series-fibred muscles; variations with muscle length. J Muscle Res. Cell Motil 15, 299-304

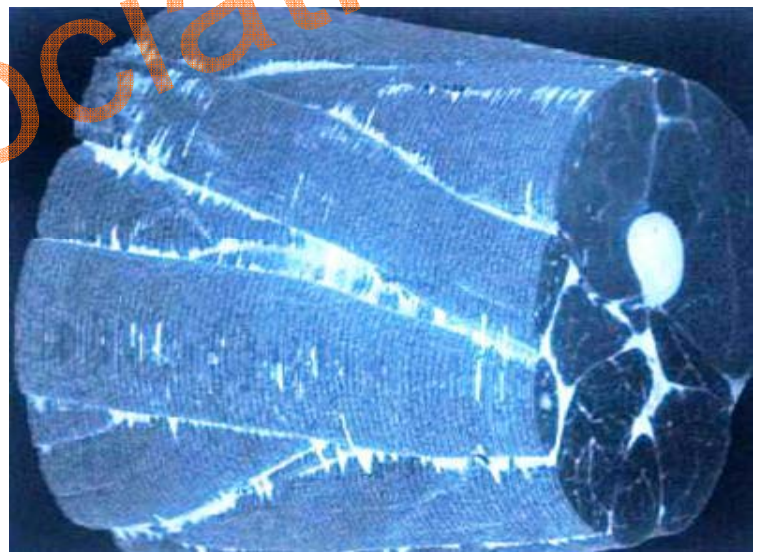
Muscle Force Requires Fascia

Patel and Lieber (1997) and Huijing (1999) have shown that:

- 70% of the transmission of muscle tension is directed (in series) through tendons

- **30% of muscle force is transmitted through the connective structures in parallel**





Muscle spindles are within the fascia

"The capsule of the muscle spindles is either attached to the perimysium, or to fascial septae, or fine connective tissue threads on in the intramuscular spaces ".

Baldissera

Stecco C. University of Padova

<u>FUNCTIONS</u>: If the fascia is restricted muscles cannot function normally.

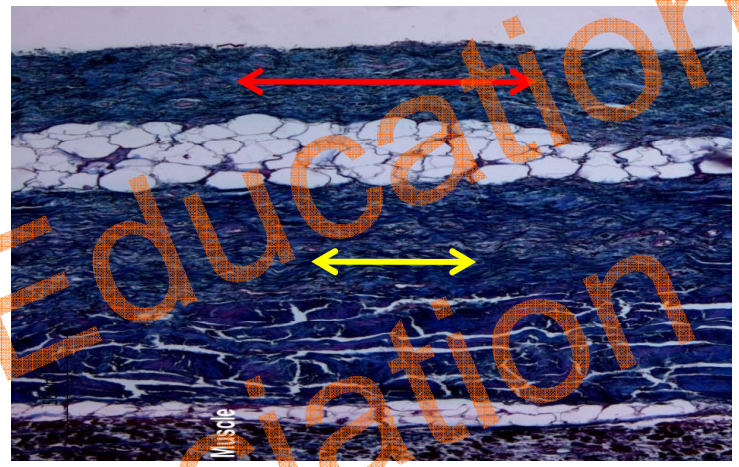
1. Controls and maintains muscle tone
2. Activates the dynamic stretch reflex mechanism that is responsible for 50% of normal muscle contraction stiffness during walking.
3. Maintains muscle contraction against the constant force of gravity
4. Controls fine motor movements.

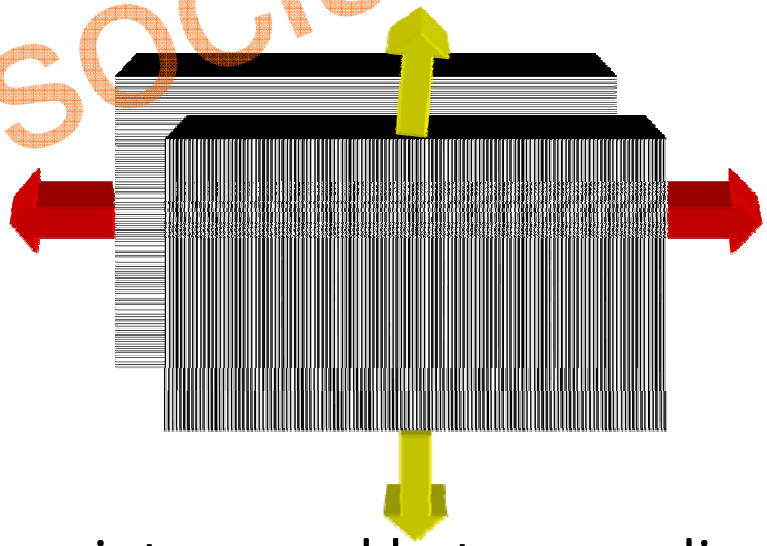
Recent e-mail exchange with **Siegfried Mense, MD** (world's leading expert on muscle pain & neurophysiology):

- **Question**: Can fascial adhesions have an adverse affect on spindle cells?
- **Answer:** "Structural disorders of the fascia can surely distort the information sent by the spindles to the CNS and thus can interfere with a proper coordinated movement".

- (Spindle cells are within the perimyceum and endomyceum)

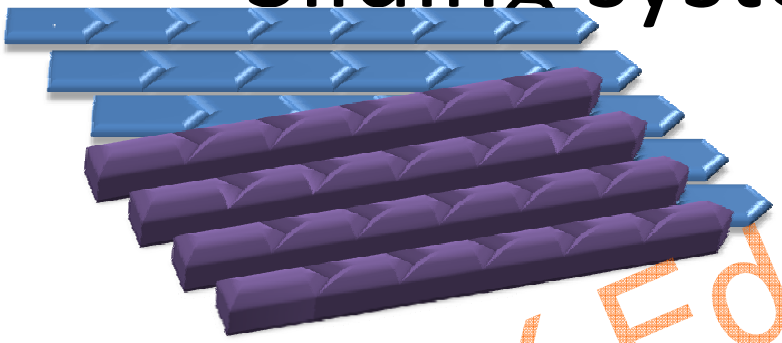
The multilayer structure of the deep fasciae of the limbs





The presence of loose connective tissue interposed between adjacent layers permits local sliding, and so from a mechanical point of view the single layers could be considered independently.

Sliding system



"A plane of potential movement exists in the form of the areolar tissue layer, and this appears to be lined with a lubricant, hyaluronic acid".

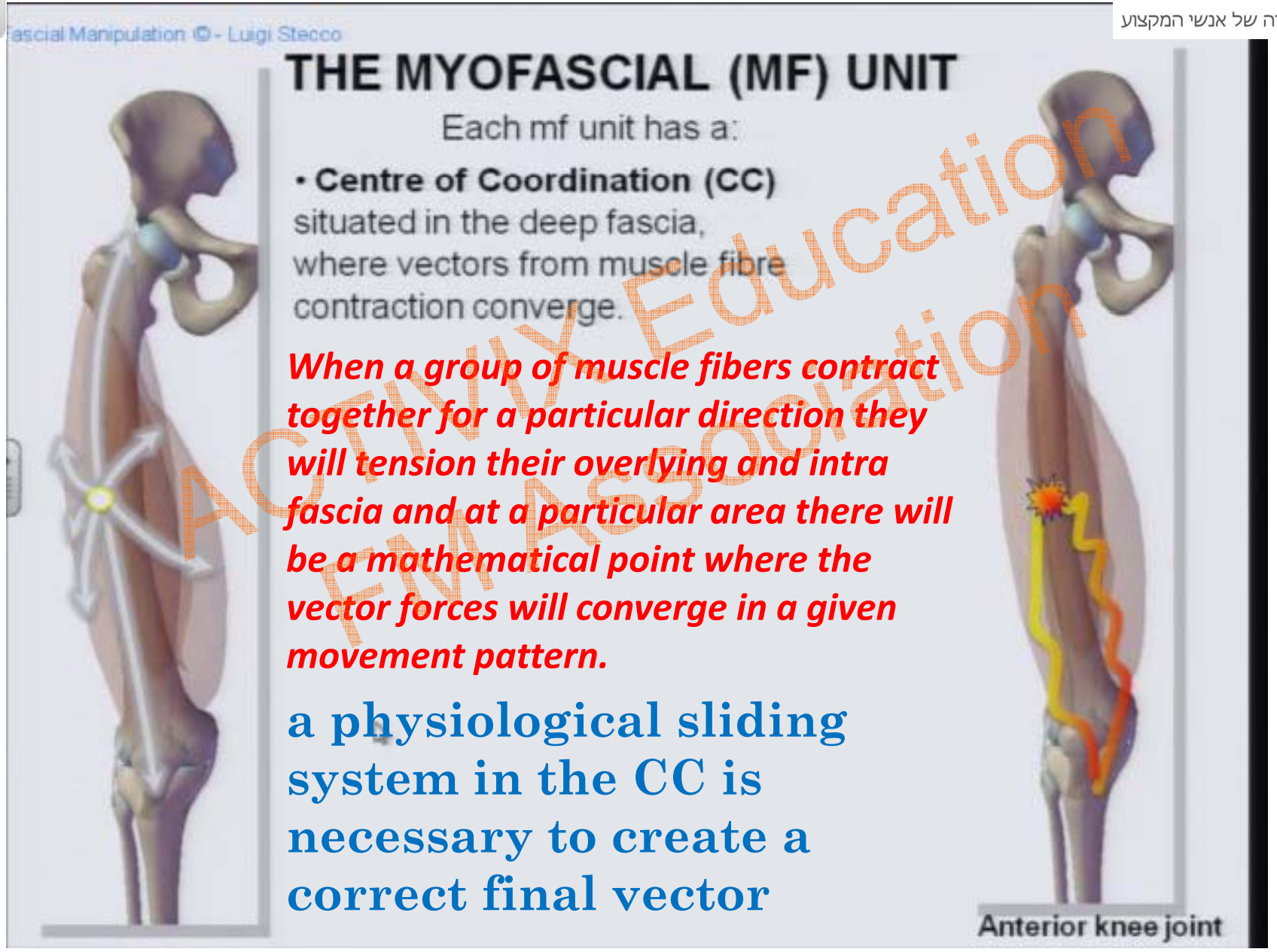
D. McCOMBE, et al; THE HISTOCHEMICAL STRUCTURE OF THE DEEP FASCIA AND ITS STRUCTURAL RESPONSE TO SURGERY; THE JOURNAL OF HAND SURGERY VOL. 26B No. 2 APRIL 2001

It is Necessary to Restore Fascial Function

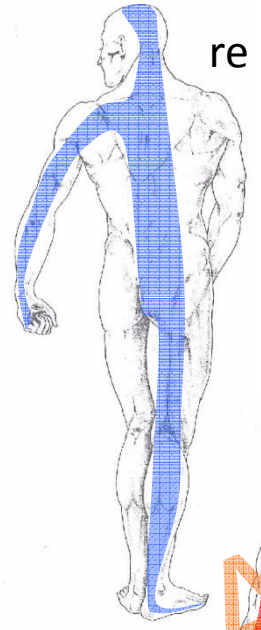
Overuse syndrome, trauma or surgery could alter the capacity of the different endofascial collagen layers to glide one on the other

Damage of proprioception

Precise evaluation & treatment of the deep fascia provides a guide for clinicians to restore normal fascial glide to the myofascial system.



Myofascial Sequences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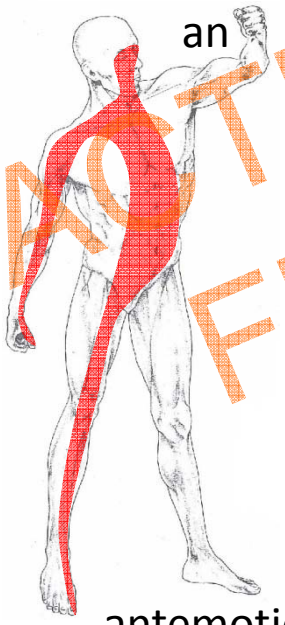
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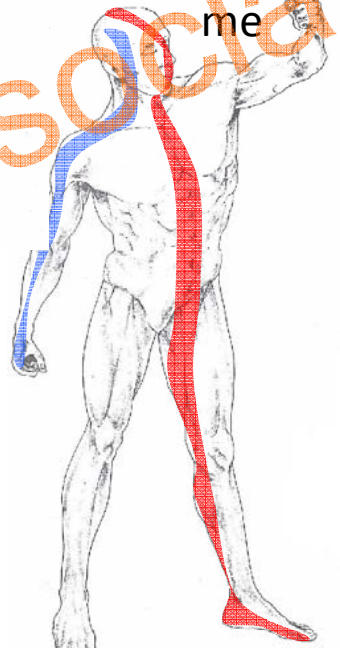
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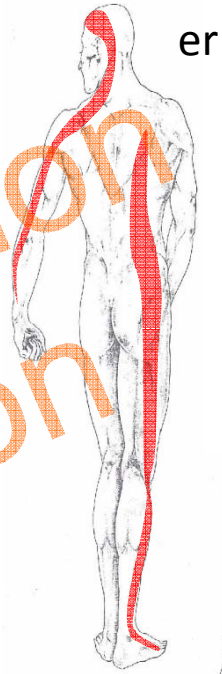
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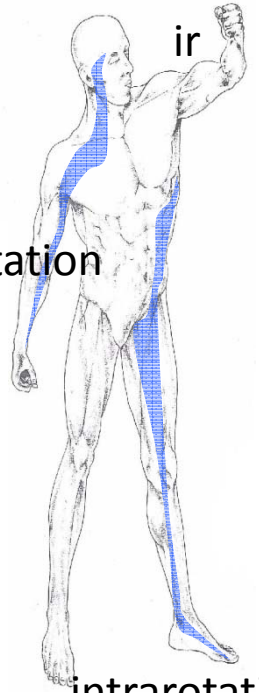
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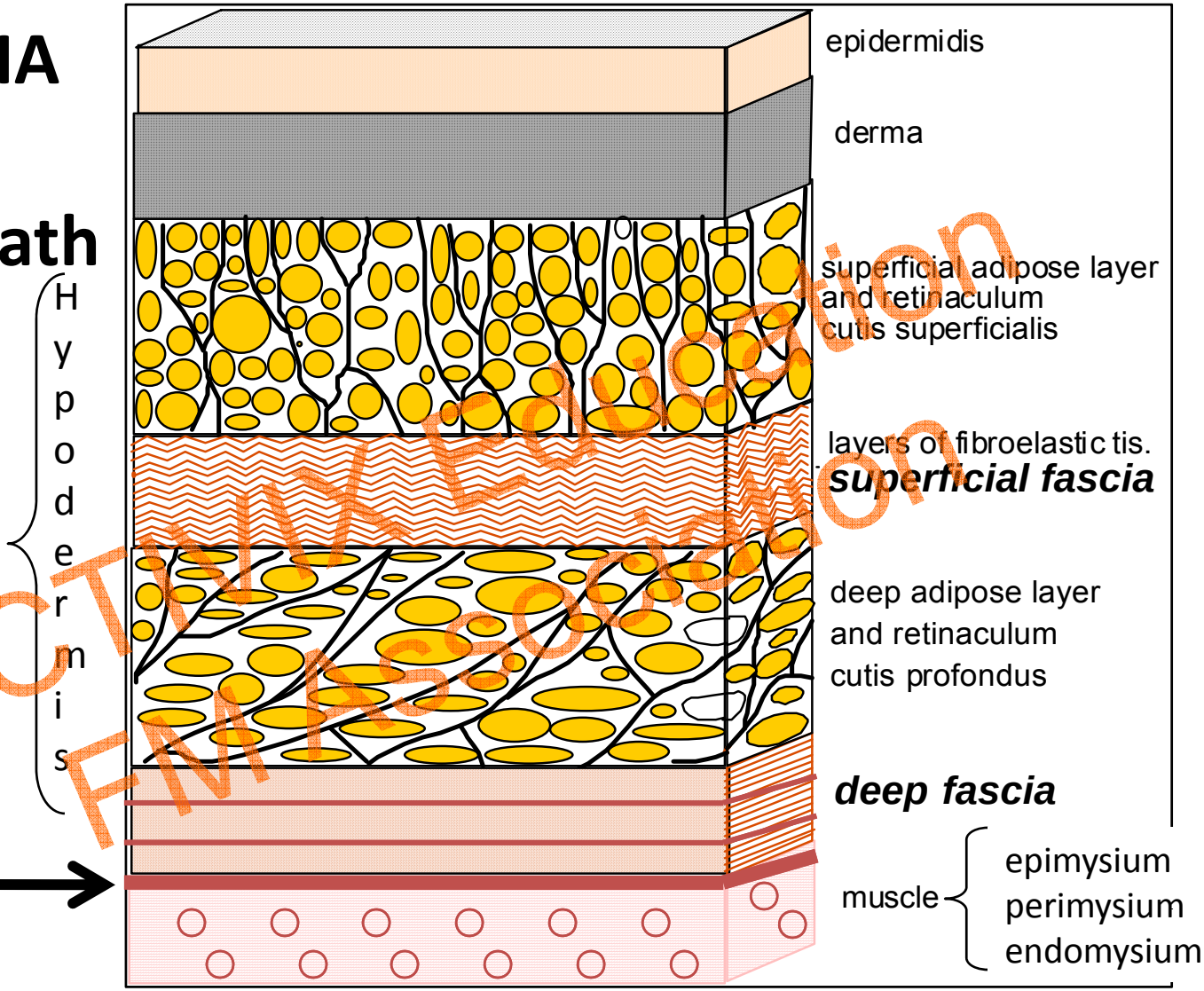
*Relationship of Acupuncture Points & Meridians to Connective Tissue Planes**

- Acupuncture meridians tend to be preferentially located along fascial planes between muscles, or between a muscle and bone or tendon.
- Found a greater connective tissue response at acupuncture points than control points.
- ***The greater the amount of connective tissue at a particular acupuncture point the more powerful the mechanical signaling and down stream effects.***

* **Langevin H, Yandow JA. Anat Record 2002, 269:257-269**

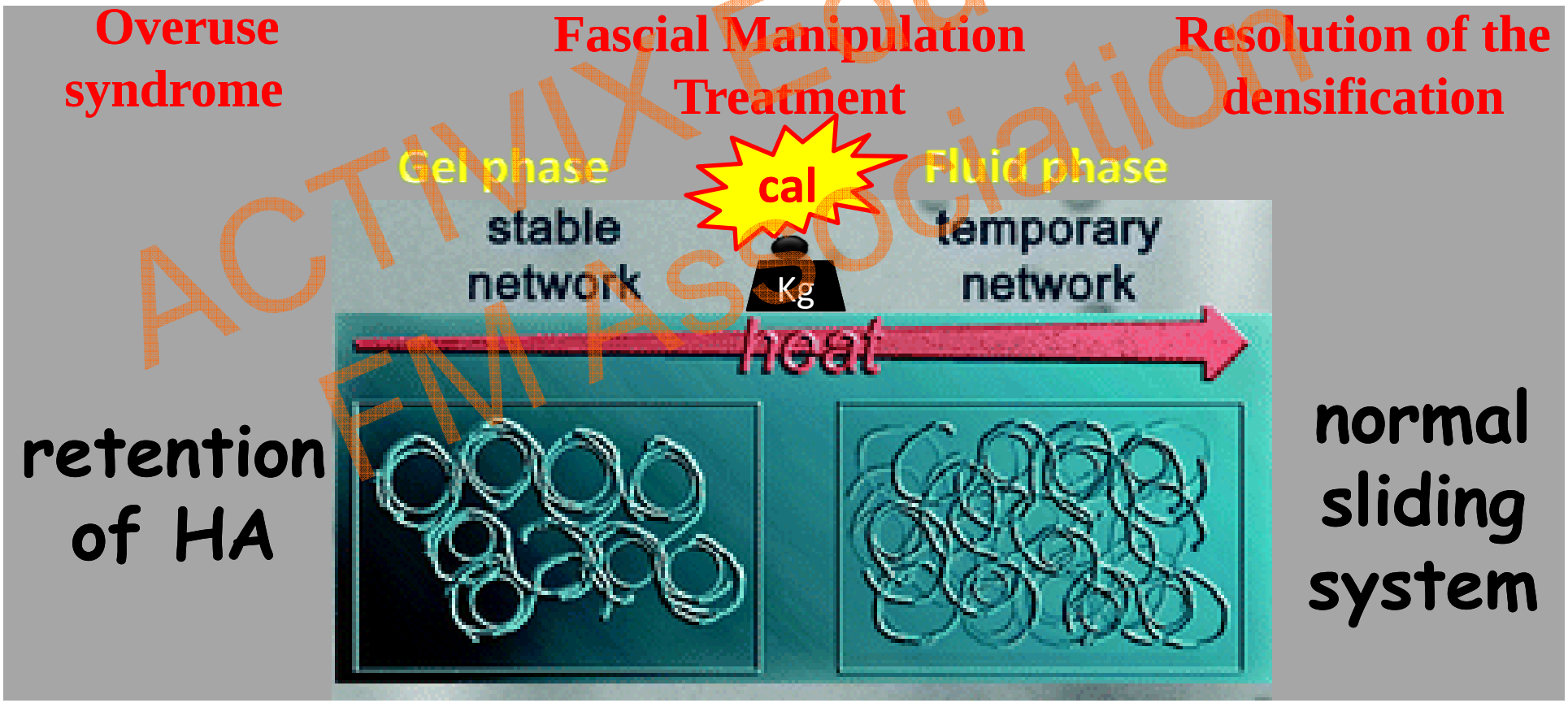
Why fascia loses its ability to glide

Most of the HA is located directly beneath the deep fascia



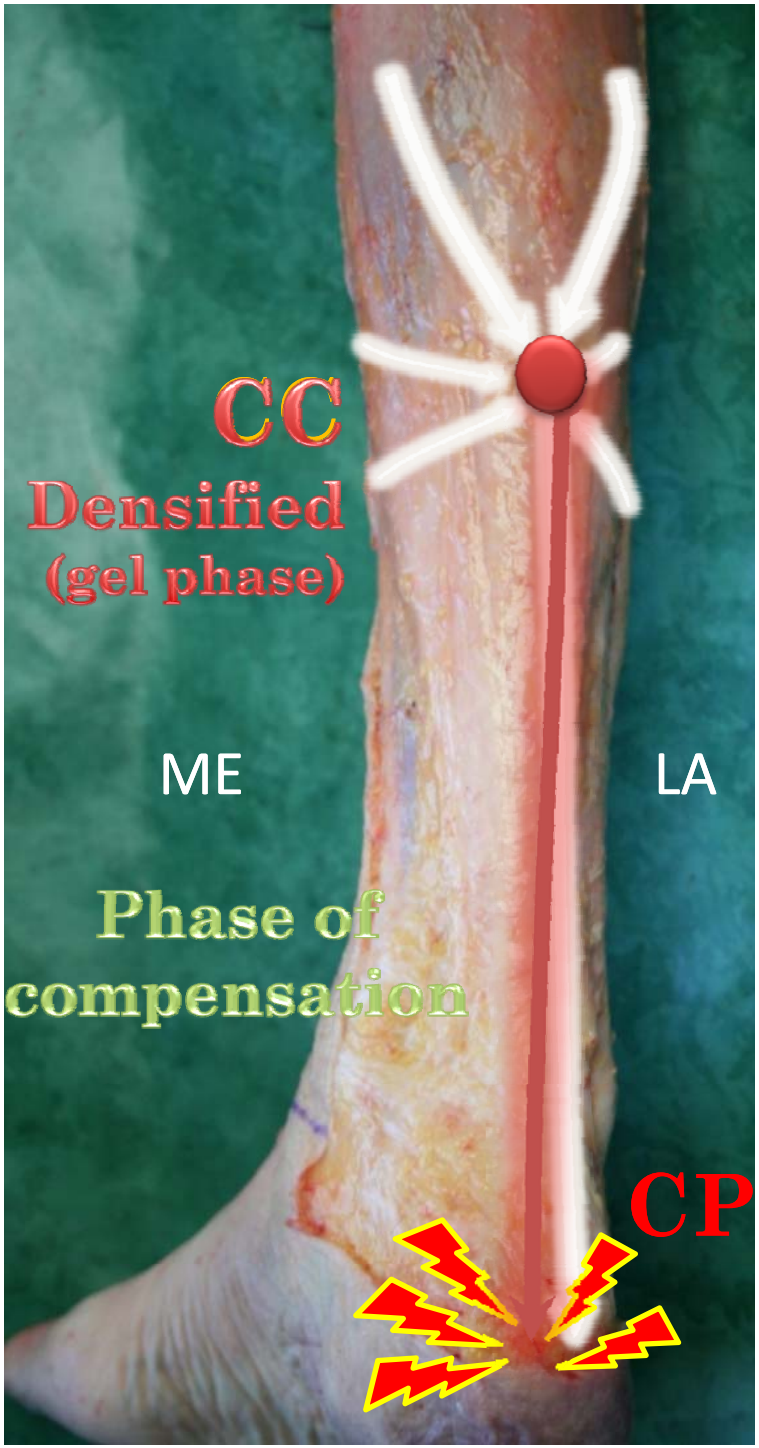
Densification: gel-like phase

"DSC pointed out the existence of a gel-like to fluid-like transition, while it excluded any involvement of strong intermolecular interactions".



Dysfunction:

- Increase of the viscosity of HA in the Centre of Coordination
- Decrease of the sliding system in the CC
- Decrease activation of muscle spindles
- Improper recruitment of muscle fibres
- The resulting vector becomes faulty
- Mechanical incoordination in the articulation
- Phase of compensation
- Symptoms in the Center of Perception



INDICATIONS

Pain or lack of mobility that manifests due to the fascial system being out of balance.

TMJ dysfunctions,
cephalalgia,
tinnitus, vertigo
acute torcicollis,
whiplash

Intercostal neuralgia,
post thoracic surgery

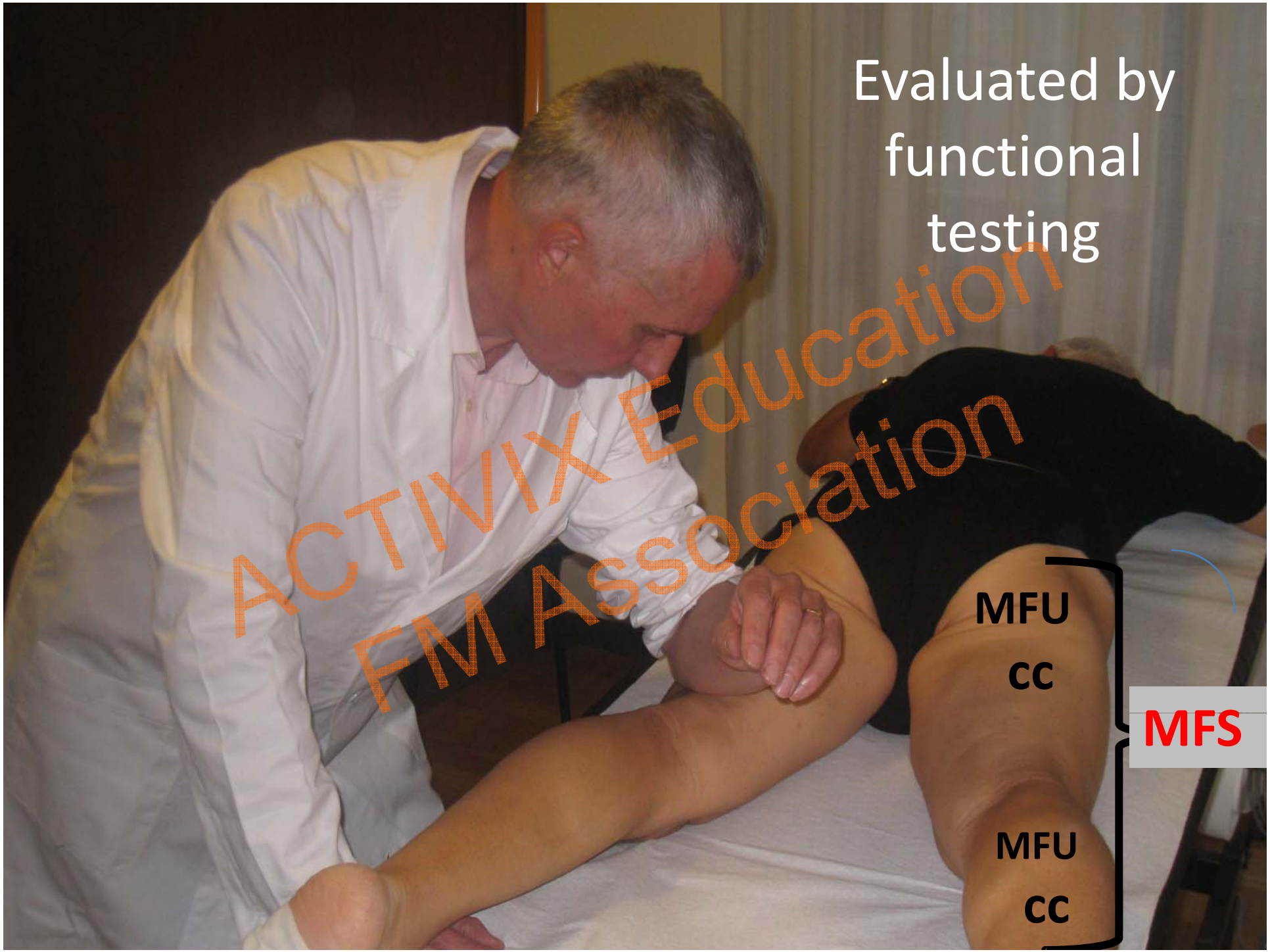
Lumbar discopathy,
sciatic, lumbar facet pain,
SI, piriformis syndrome,
coccidynia

AC impingement,
rotator cuff
tendinitis

epicondylitis,

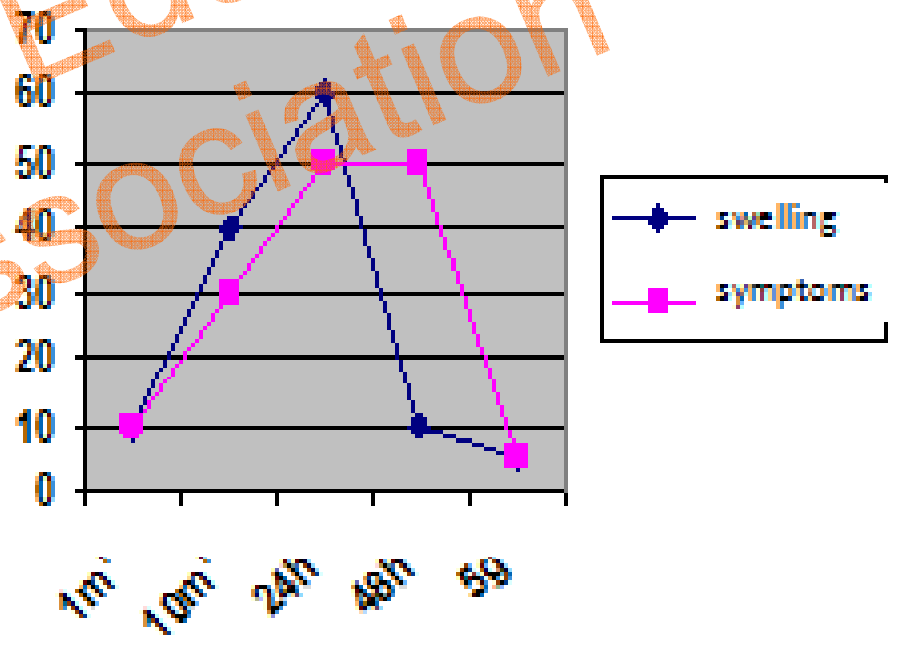
Carpal tunnel,
De Quervain,
Trigger finger,

Hip arthritis
Patellar femoral
misalignment
Chronic ankle sprain
Post fracture stiffness
Plantar fasciitis
.....


Evaluated by functional testing
ACTIVIX Education
FM Association
MFU
CC
MFS
MFU
CC

Reaction after treatment

- Local swelling, rubor
  - Appears after 10m'
  - Increases over 24h
  - Decreases over 48h
- Symptoms
  - Can worsen after 10 mins
  - Compensations may ensue for 48h
  - Improvement over 5 days



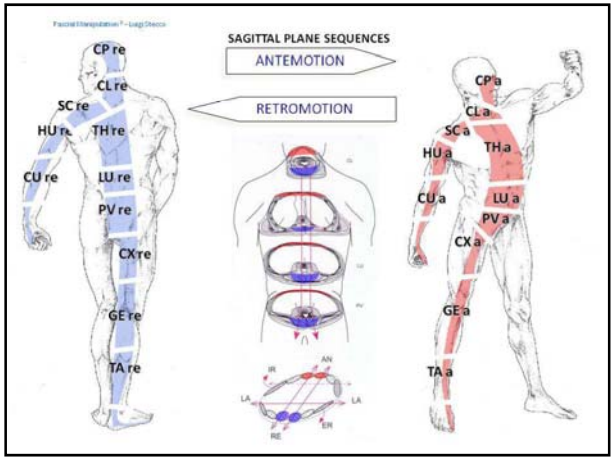
מחזור יולי 2014 יוצא לדרך – בחיפה!!

מאות בוגרי הקורסים הקודמים לא מפסיקים להלל - ואנו שמחים להזמינכם ל:

קורס קליני בסיסי בתרפיית: Fascial Manipulation© Technique

בהנחיית: Stefano Casadei, PT

הרשמה בטל':
072-2501440



6 ימים (במתכונת הבינ"ל): ד' עד ג' - 2-8.7.2012

הקורס ייערך בחיפה (מיקום סופי בקרוב)

מספר המקומות מוגבל – כל הקודם זוכה!