RACHIDE:
LE PROBLEMATICHE SUL PIANO SAGITTALE
10 ottobre 2015

Funzione e disfunzione del Rachide:
Sindrome da Compenso Crociato (SCC)

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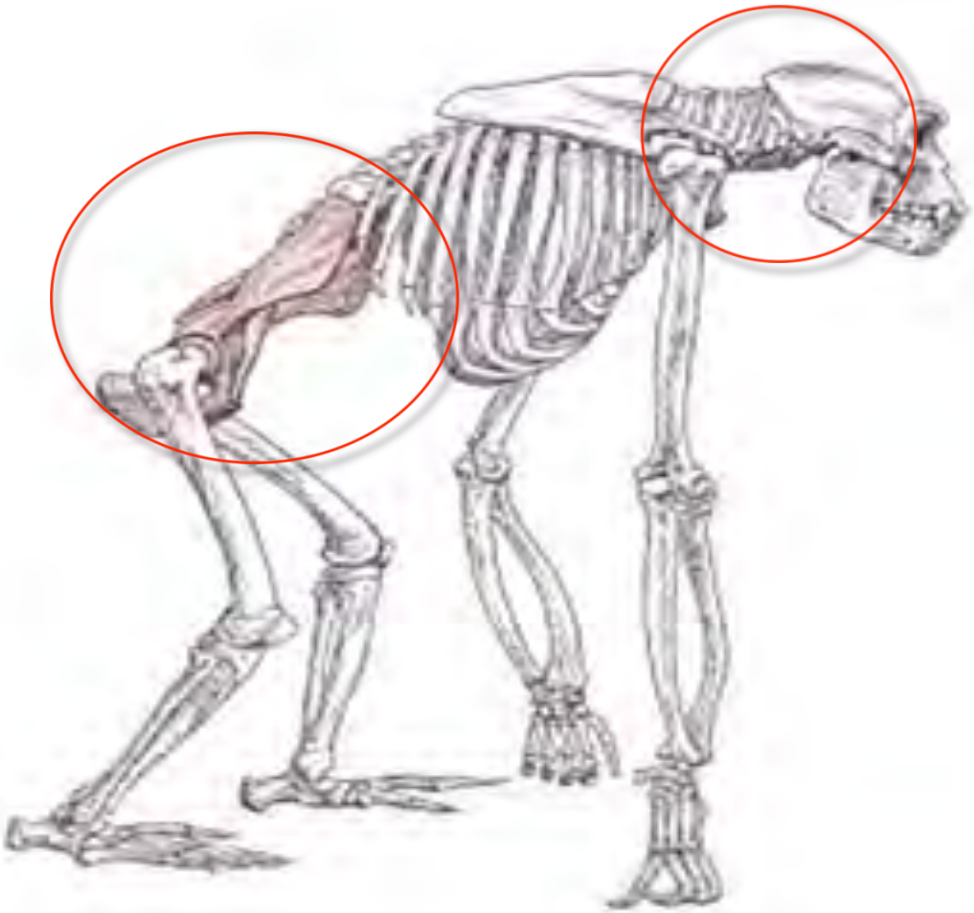
Perchè affrontare le problematiche del rachide dall'ottica del piano sagittale?

1) evoluzione filogenetica

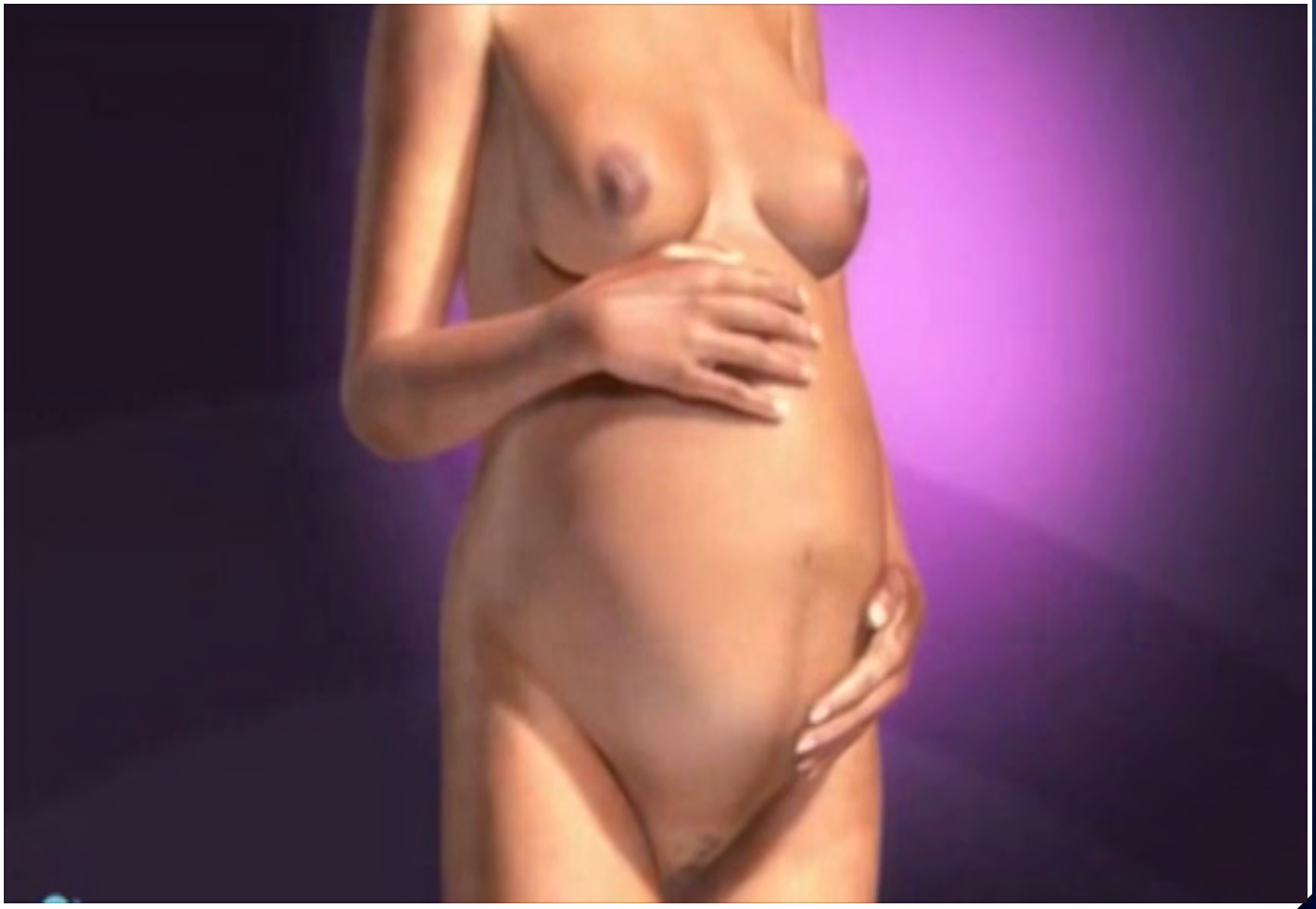
2) evoluzione ontogenetica

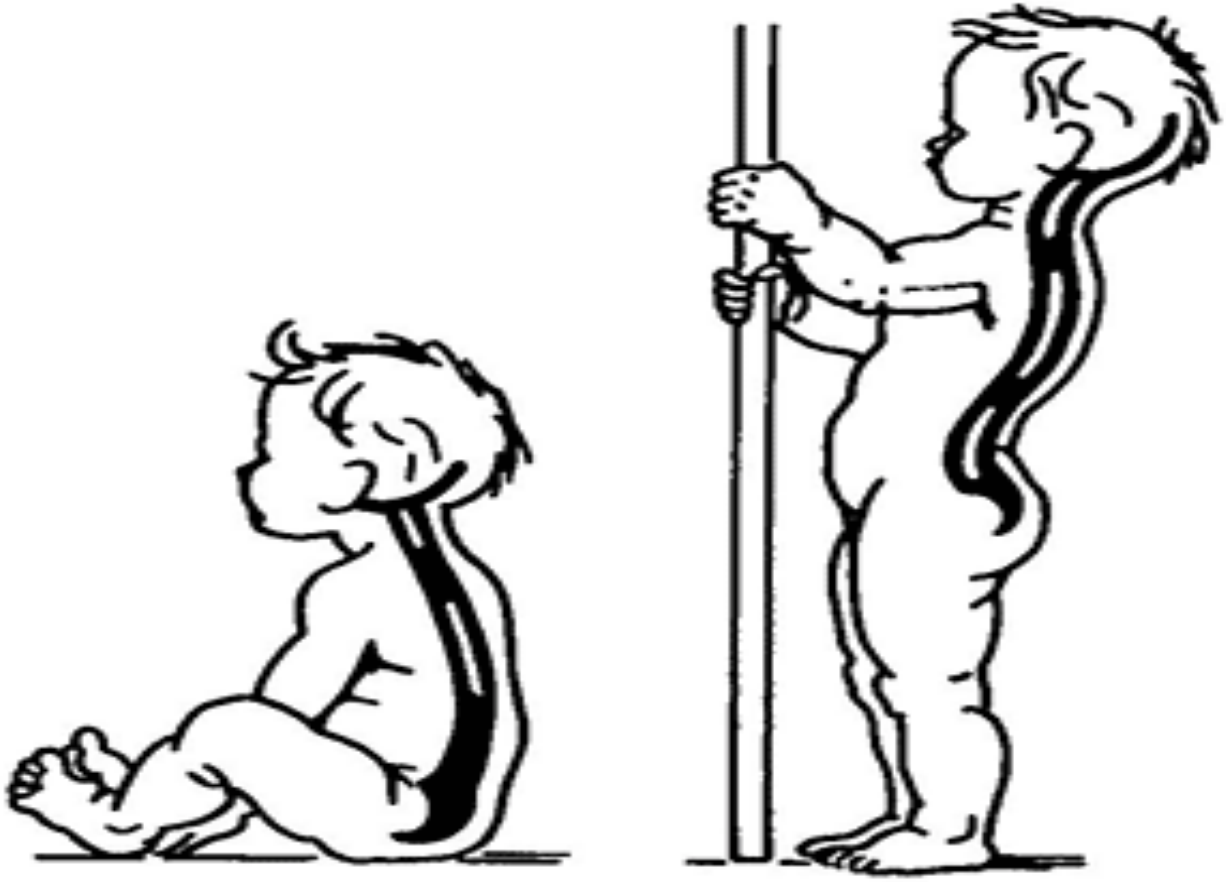
3) le recenti ricerche

Evoluzione Filogenetica



Evoluzione Ontogenetica

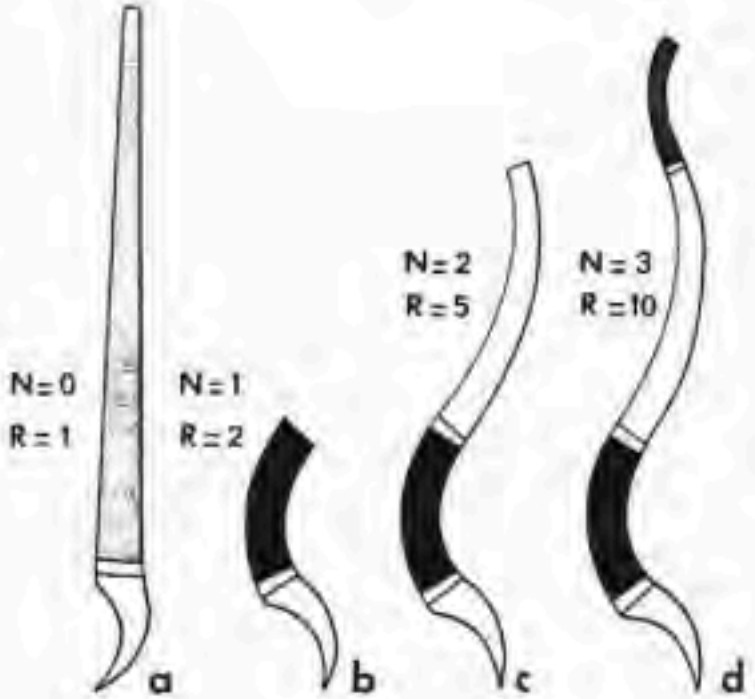




La presenza delle curve rachidee aumenta la resistenza del rachide alle sollecitazioni di compressione assiale

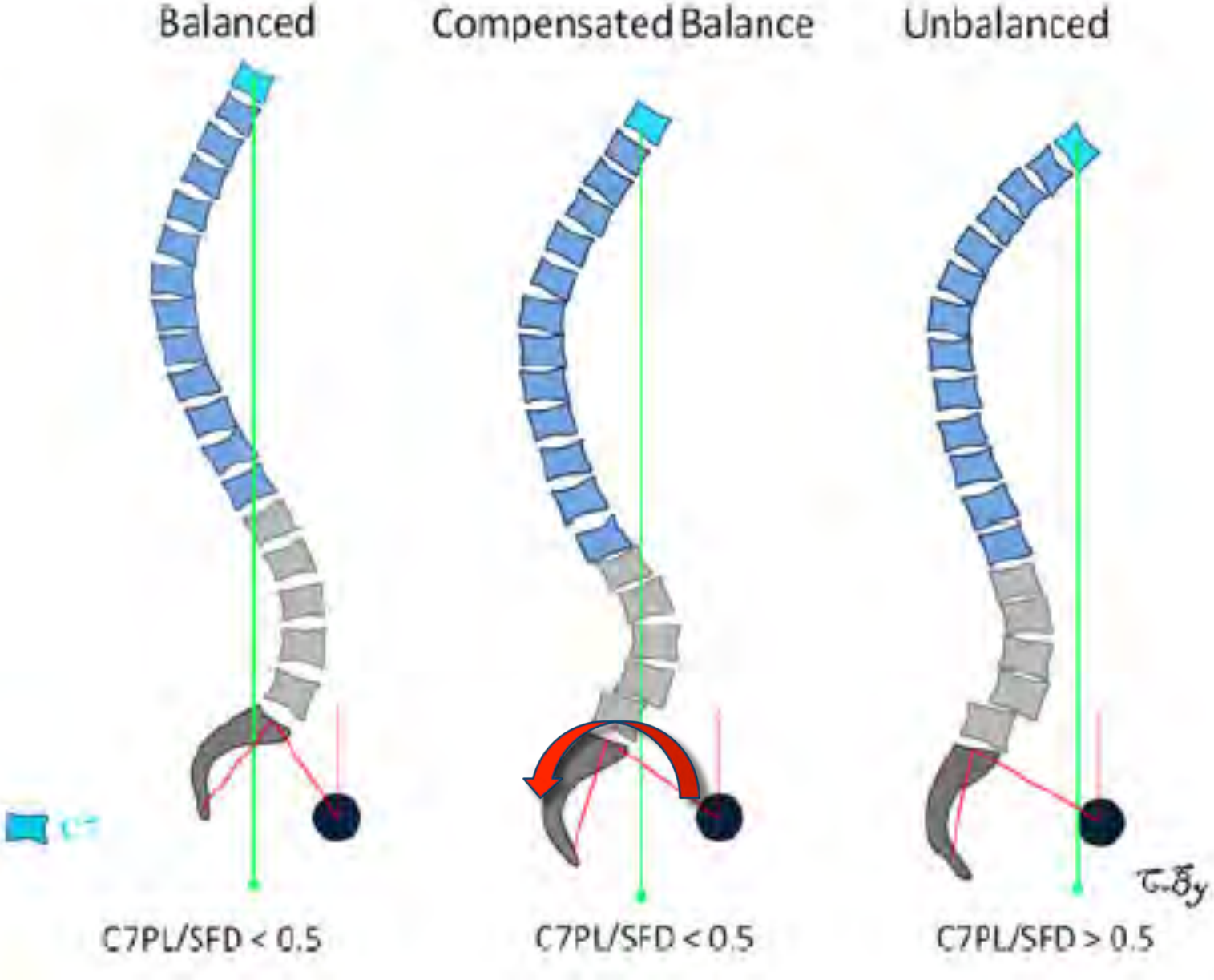
$R = N^2 + 1$

La resistenza della colonna vertebrale è 10 volte quella di una colonna rettilinea



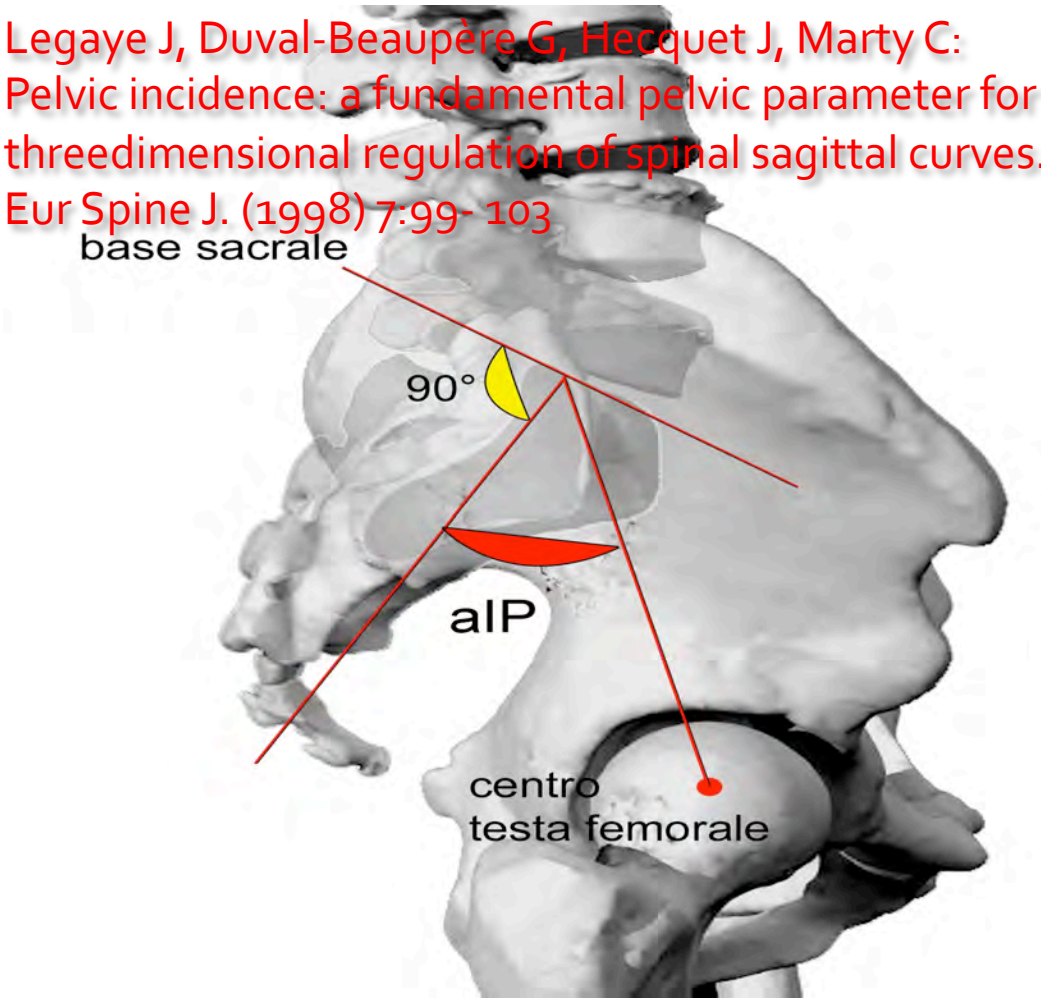
FLESSIBILITA' DEL RACHIDE

SPINE CENTER
RICERCA - FORMAZIONE - TRATTAMENTO della PATOLOGIA VERTEBRALE


Balanced
Compensated Balance
Unbalanced
C7PL/SFD < 0.5
C7PL/SFD < 0.5
C7PL/SFD > 0.5

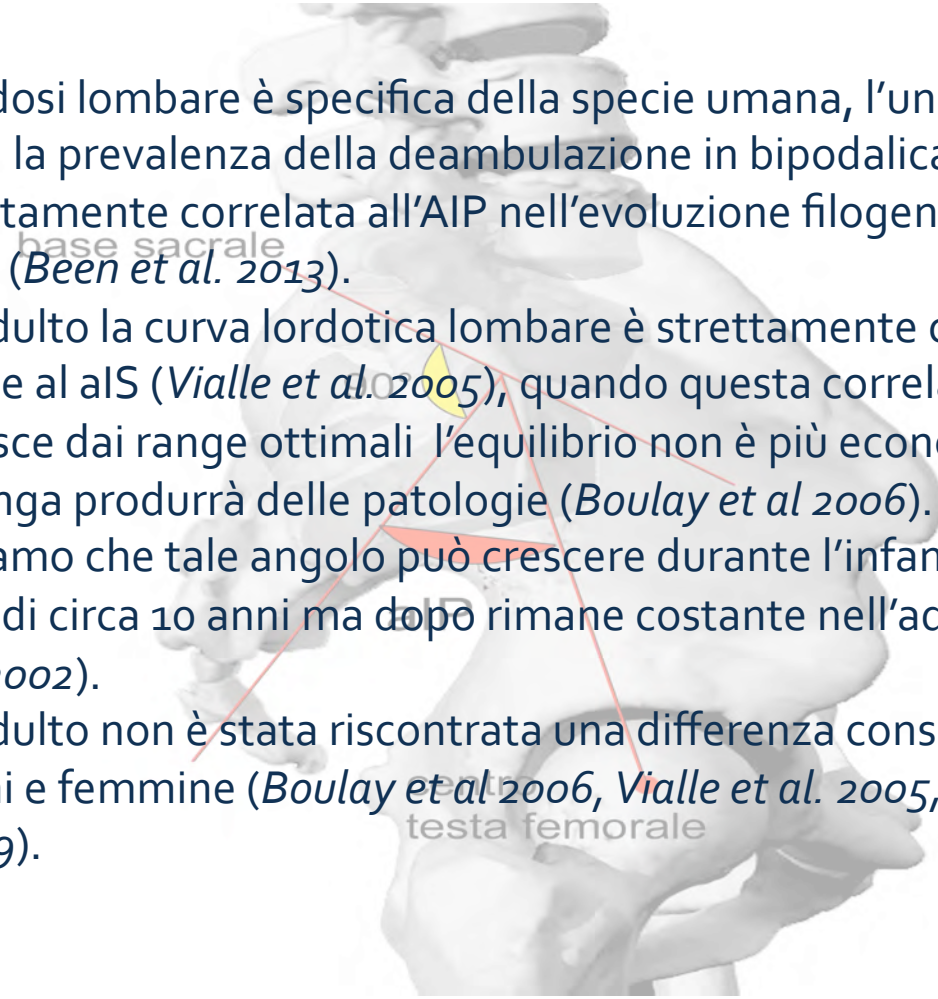
La spinta della ricerca

Legaye J, Duval-Beaupère G, Hecquet J, Marty C: Pelvic incidence: a fundamental pelvic parameter for threedimensional regulation of spinal sagittal curves. Eur Spine J. (1998) 7:99- 103



Angolo di Incidenza Pelvica

La lordosi lombare è specifica della specie umana, l'unica specie che ha la prevalenza della deambulazione in bipodalica, la lordosi è strettamente correlata all'AIP nell'evoluzione filogenetica della specie (*Been et al. 2013*).
Nell'adulto la curva lordotica lombare è strettamente correlata all'aIP e al aIS (*Vialle et al. 2005*), quando questa correlazione fuoriesce dai range ottimali l'equilibrio non è più economico e alla lunga produrrà delle patologie (*Boulay et al 2006*).
Sappiamo che tale angolo può crescere durante l'infanzia fino all'età di circa 10 anni ma dopo rimane costante nell'adulto (*Vaz et al. 2002*).
Nell'adulto non è stata riscontrata una differenza consistente tra maschi e femmine (*Boulay et al 2006*, *Vialle et al. 2005*, *Janssen et al 2009*).



IDEAL OR ECONOMIC

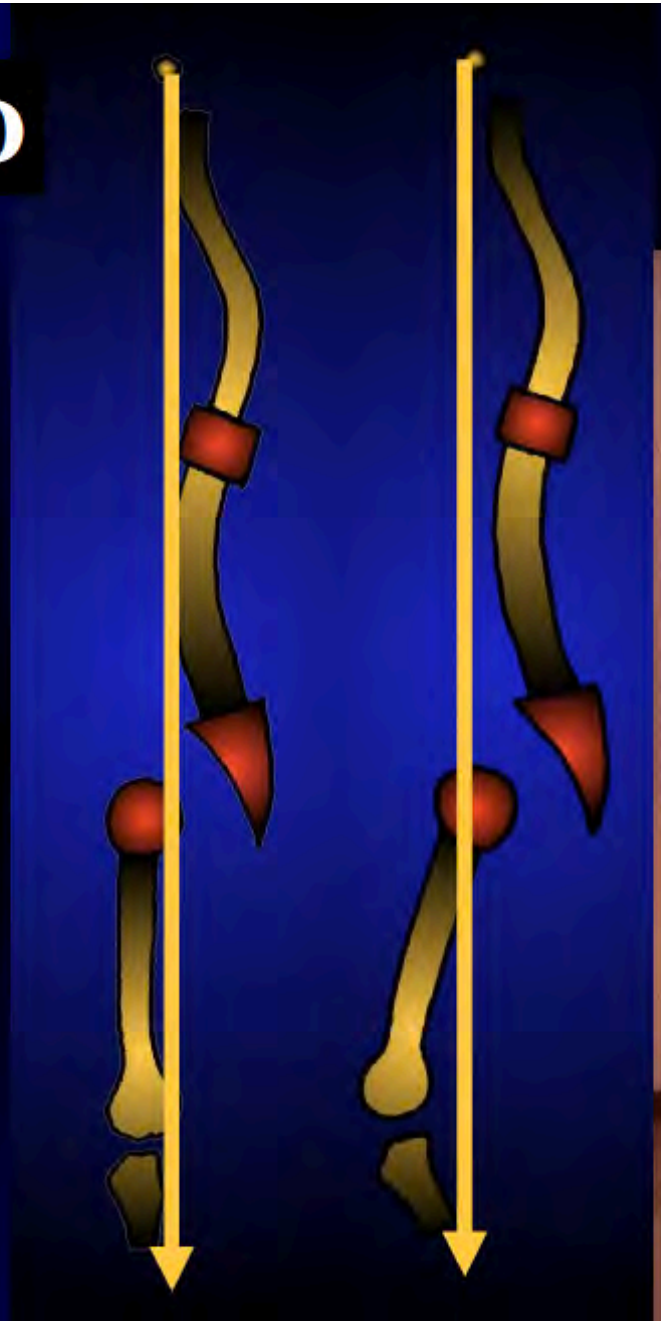
BALANCE

COMPENSATED BALANCE

by

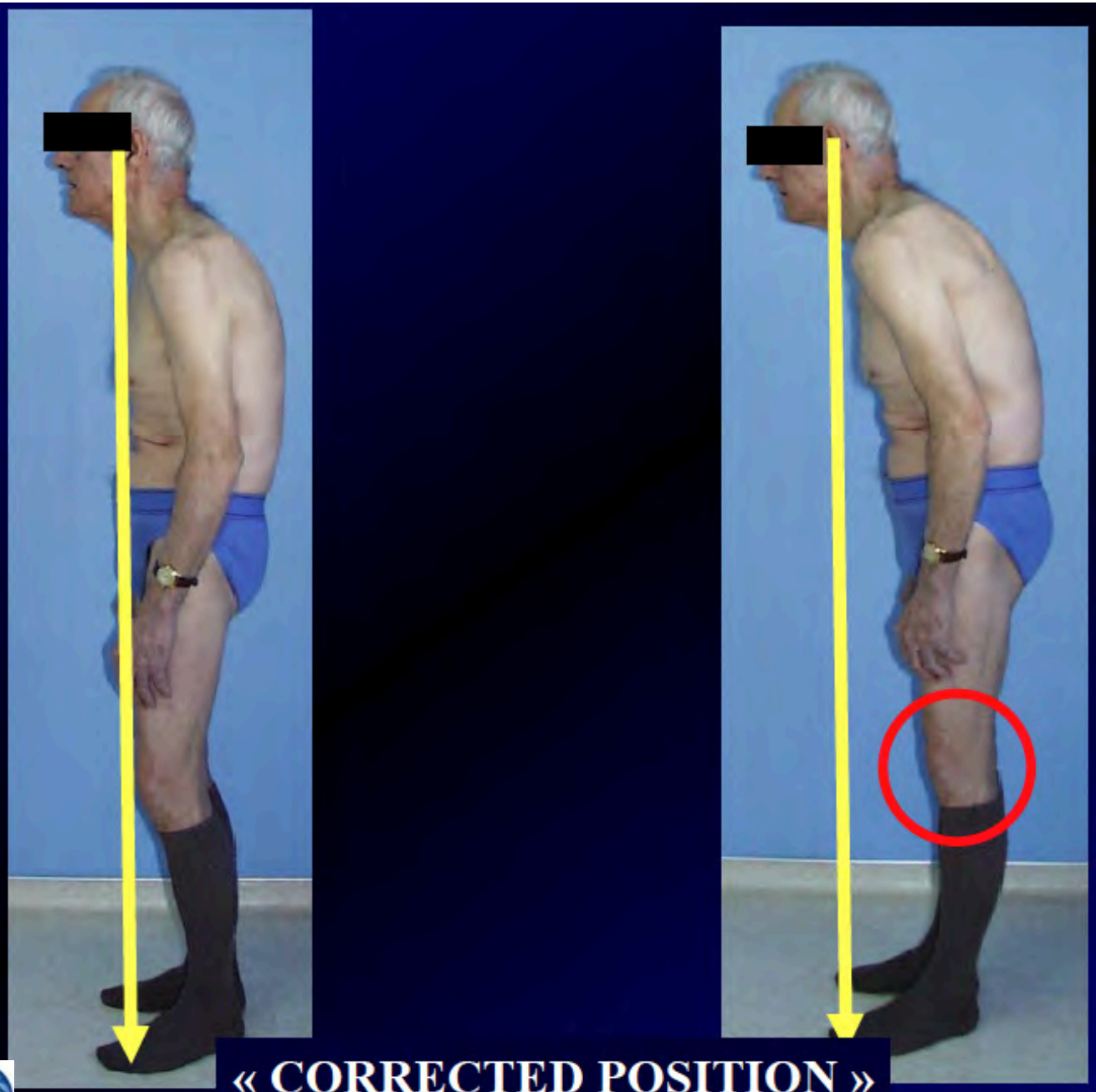
Pelvic Retroversion

+Knees Flexion



SPINE CENTER

ANTERIOR IMBALANCE

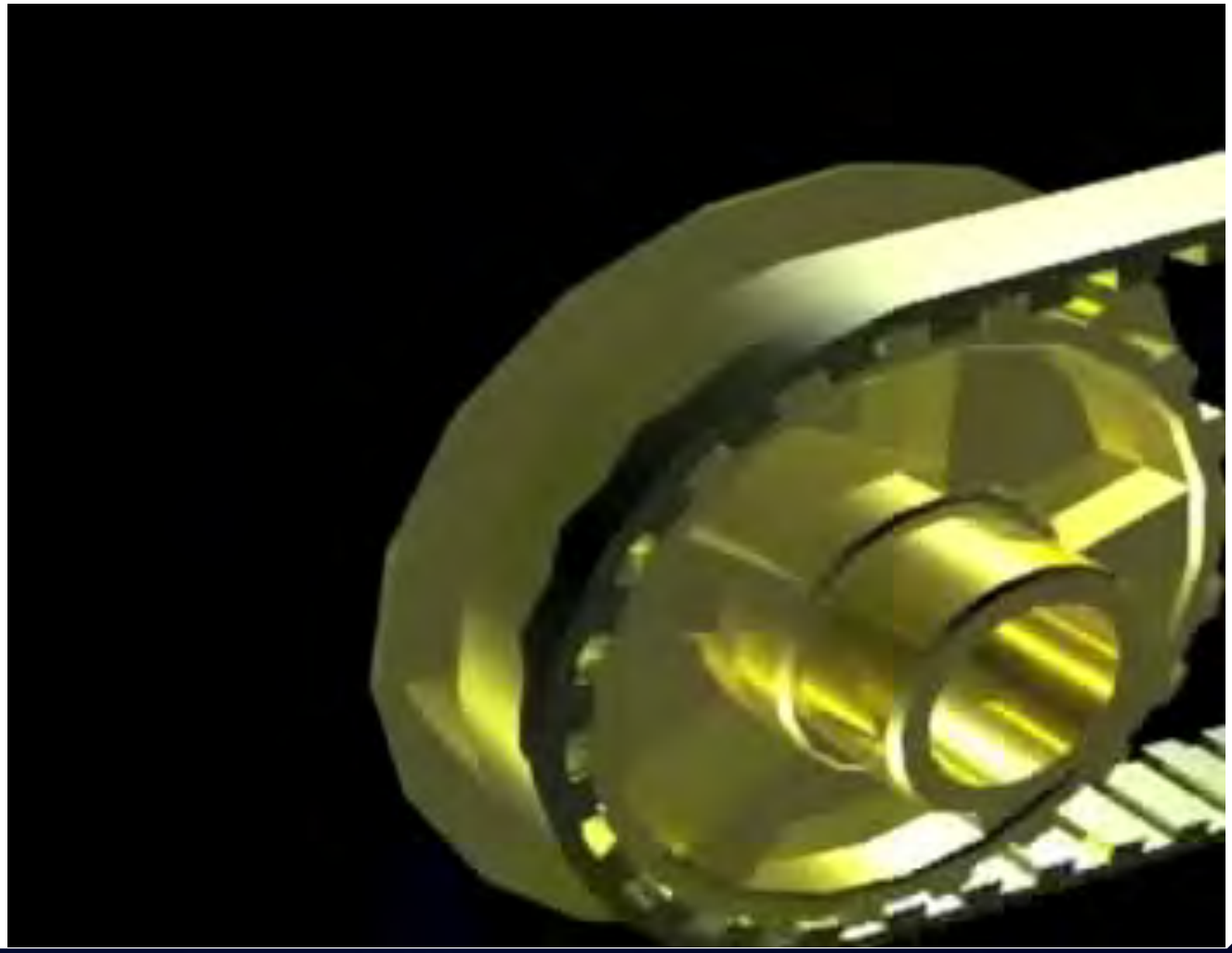


« CORRECTED POSITION »

CURVE DEL CORPO

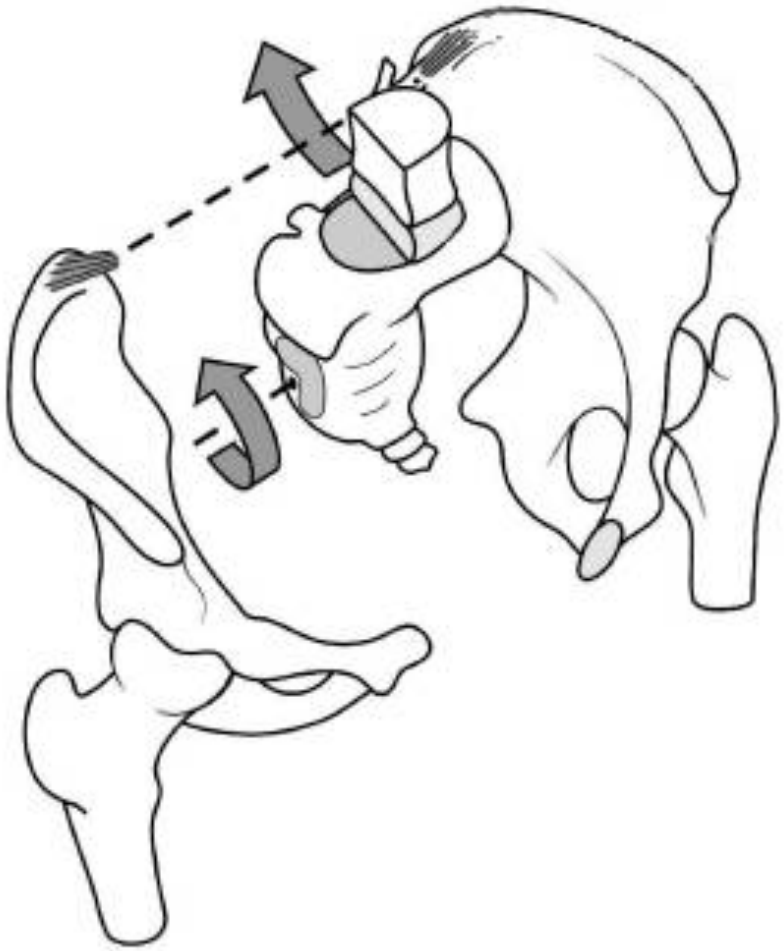
- Funzione e disfunzione del Rachide:
- Sindrome da Compenso Crociato (SCC

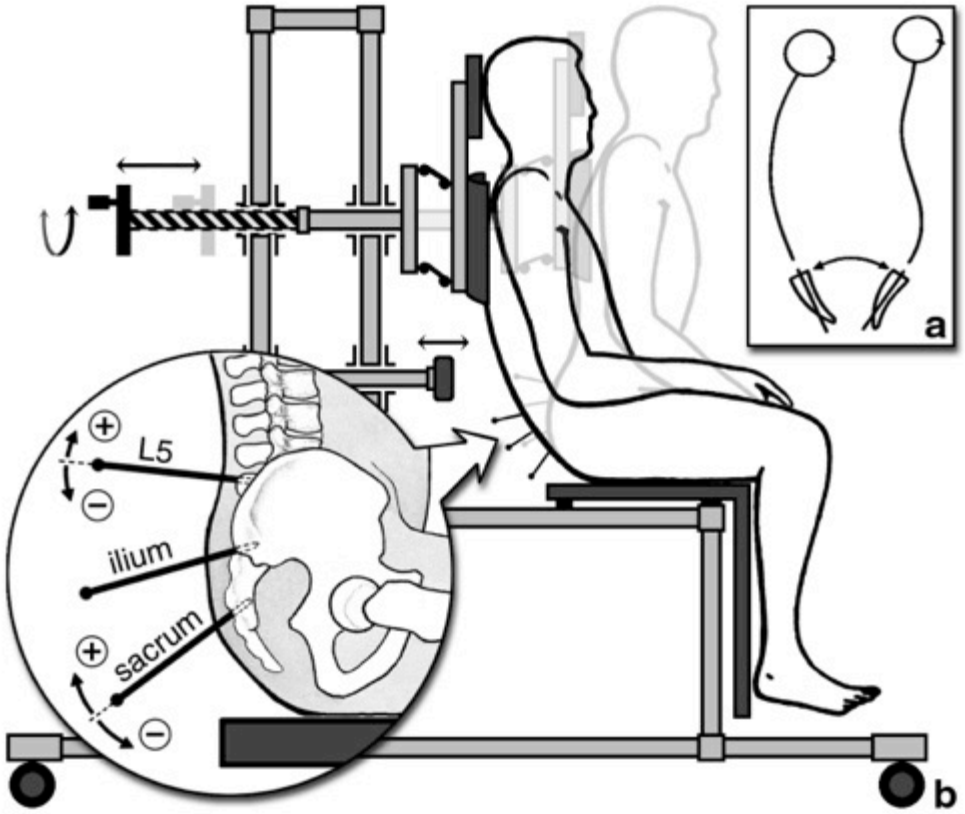
MECCANICA DEI MOVIMENTI ARTICOLARI

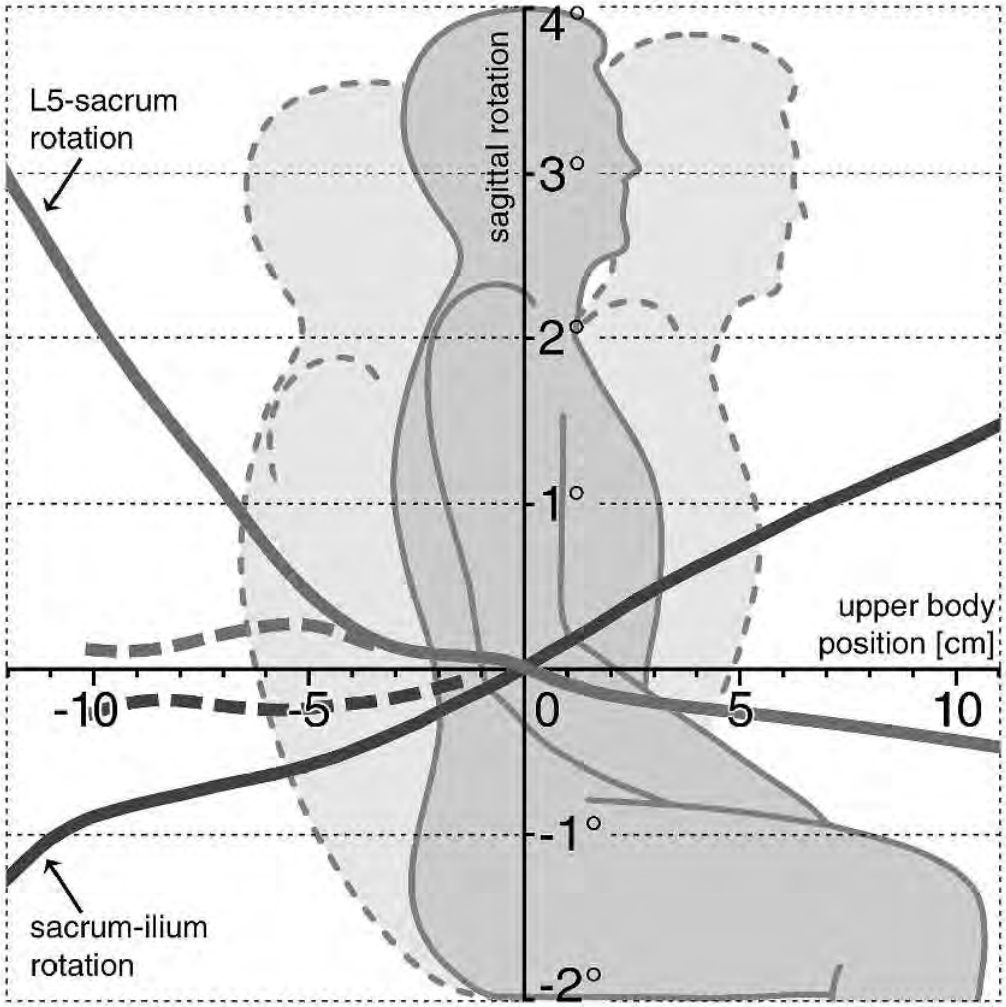


Tutti i segmenti partecipano nella stessa direzione al movimento eseguito

- Click clack movement puts strain on the iliolumbar ligaments
- L5 pivots on the iliolumbar ligaments
- Bottom of L5 moves dorsally
- Sacrum rotates backwards

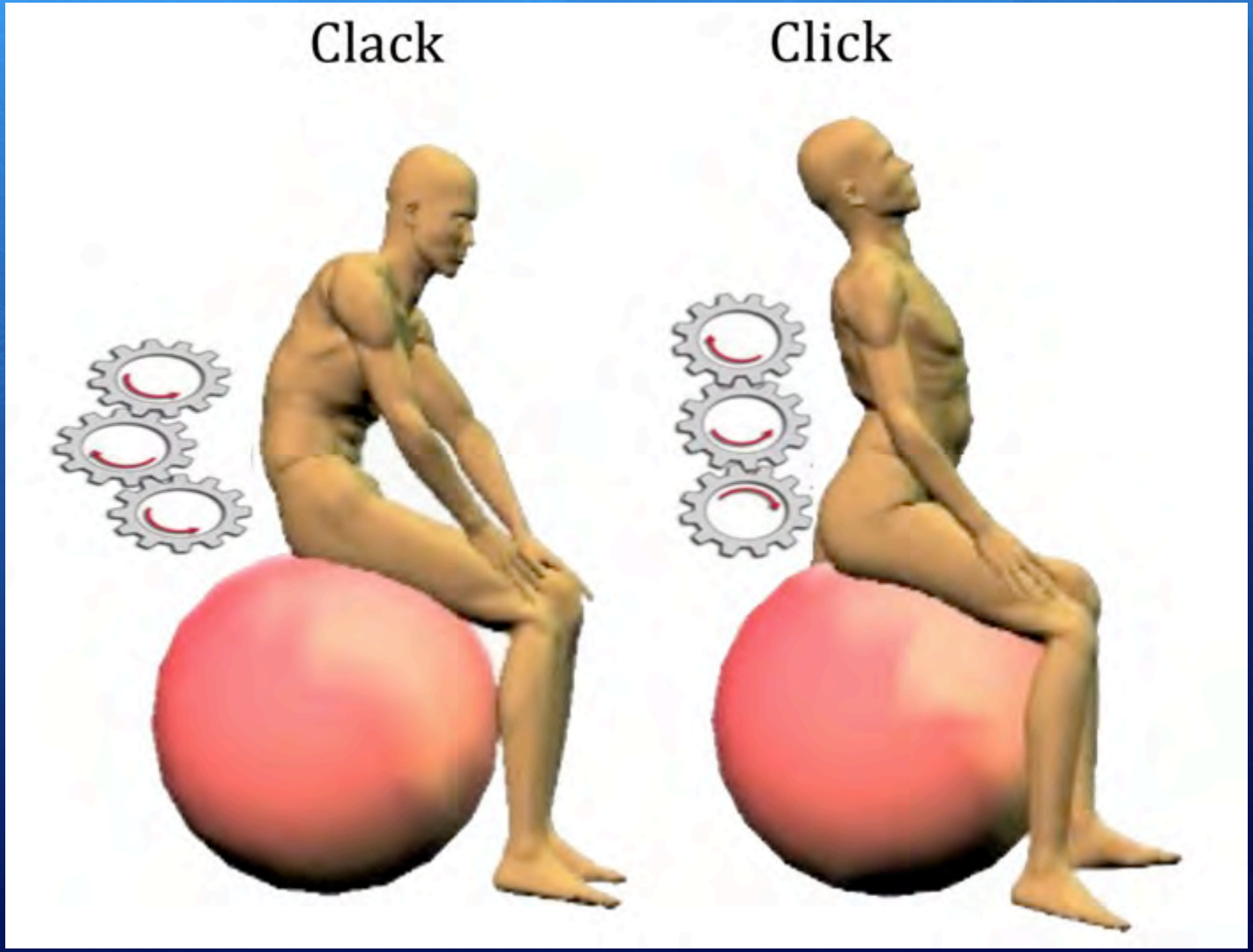



L5
ilium
sacrum
a
b

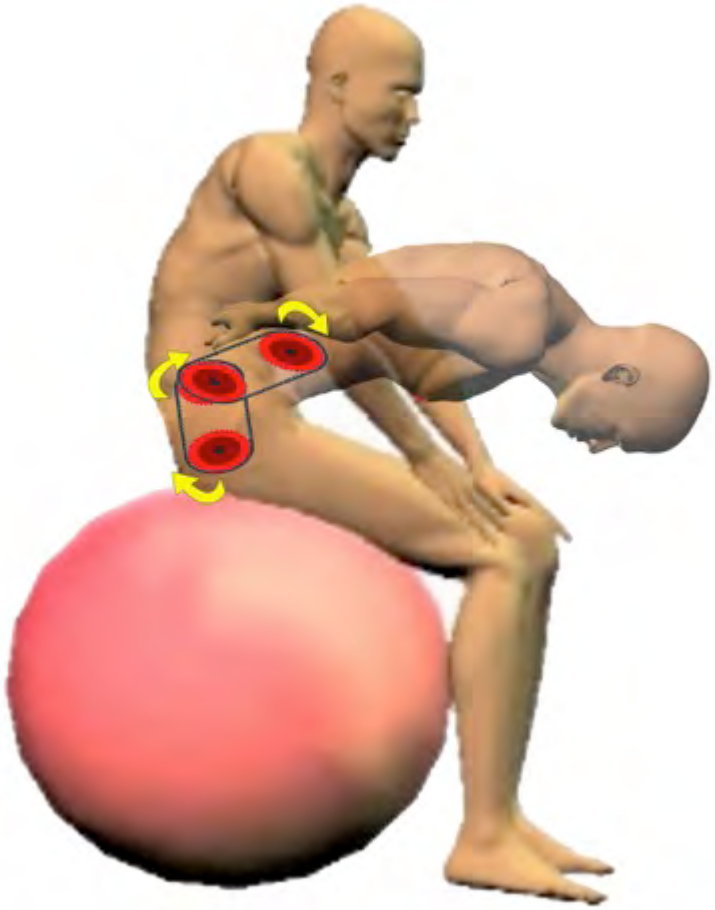

L5-sacrum
rotation
sagittal rotation
4°
3°
2°
1°
-1°
-2°
upper body
position [cm]
-10
-5
0
5
10
sacrum-ilium
rotation

CLICK-CLACK

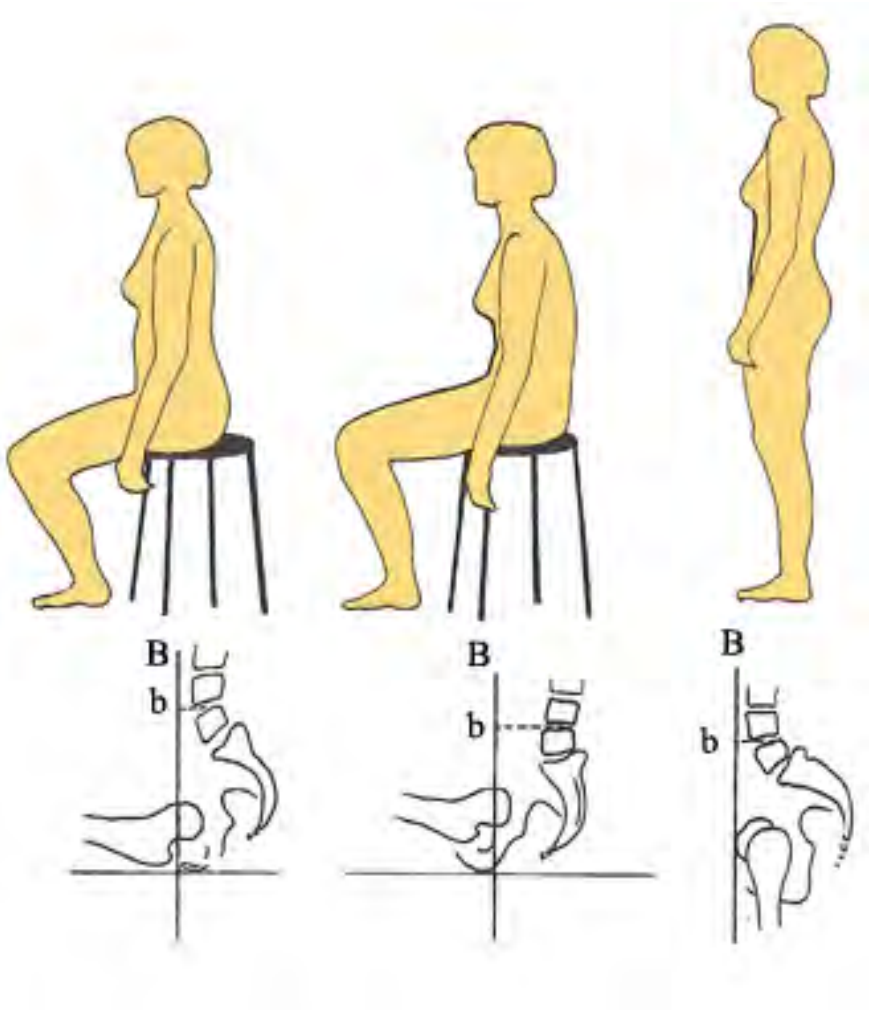
CLICK-CLACK

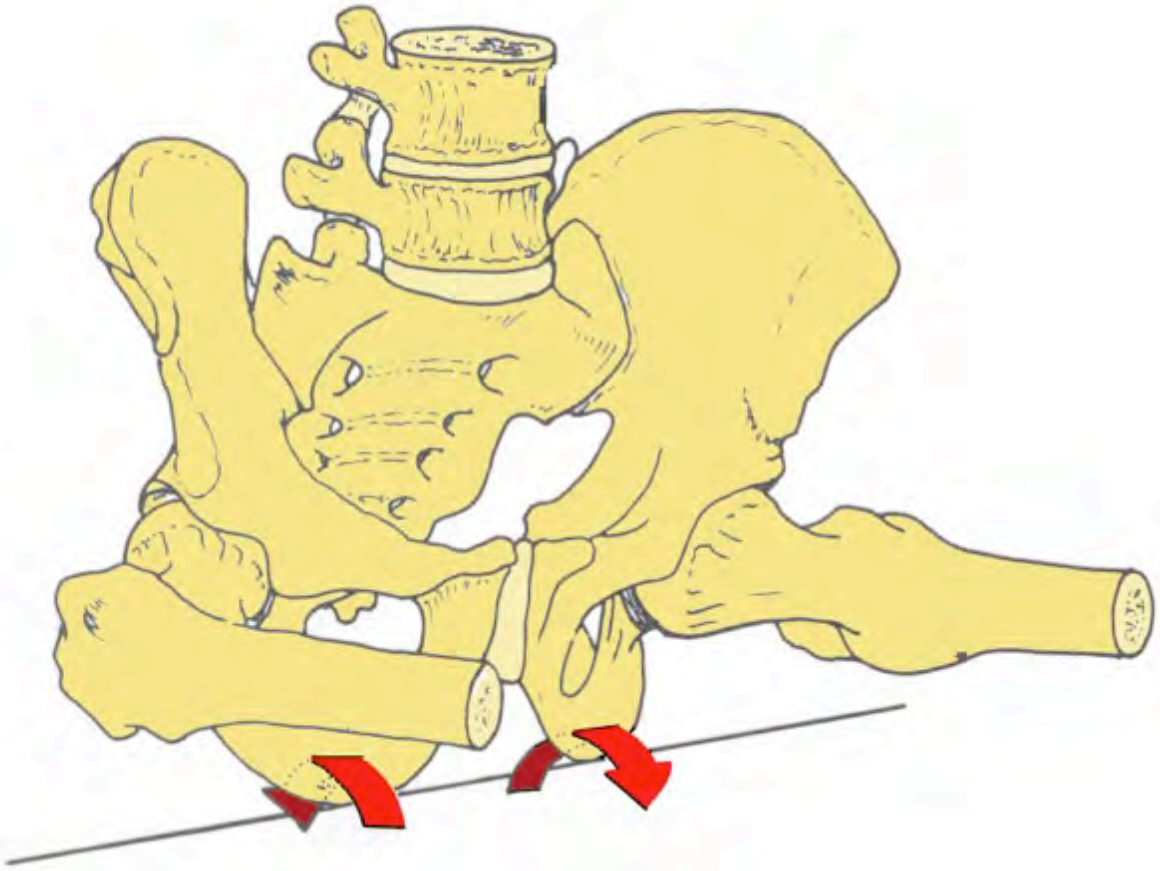


MOVIMENTO A CINGHIA

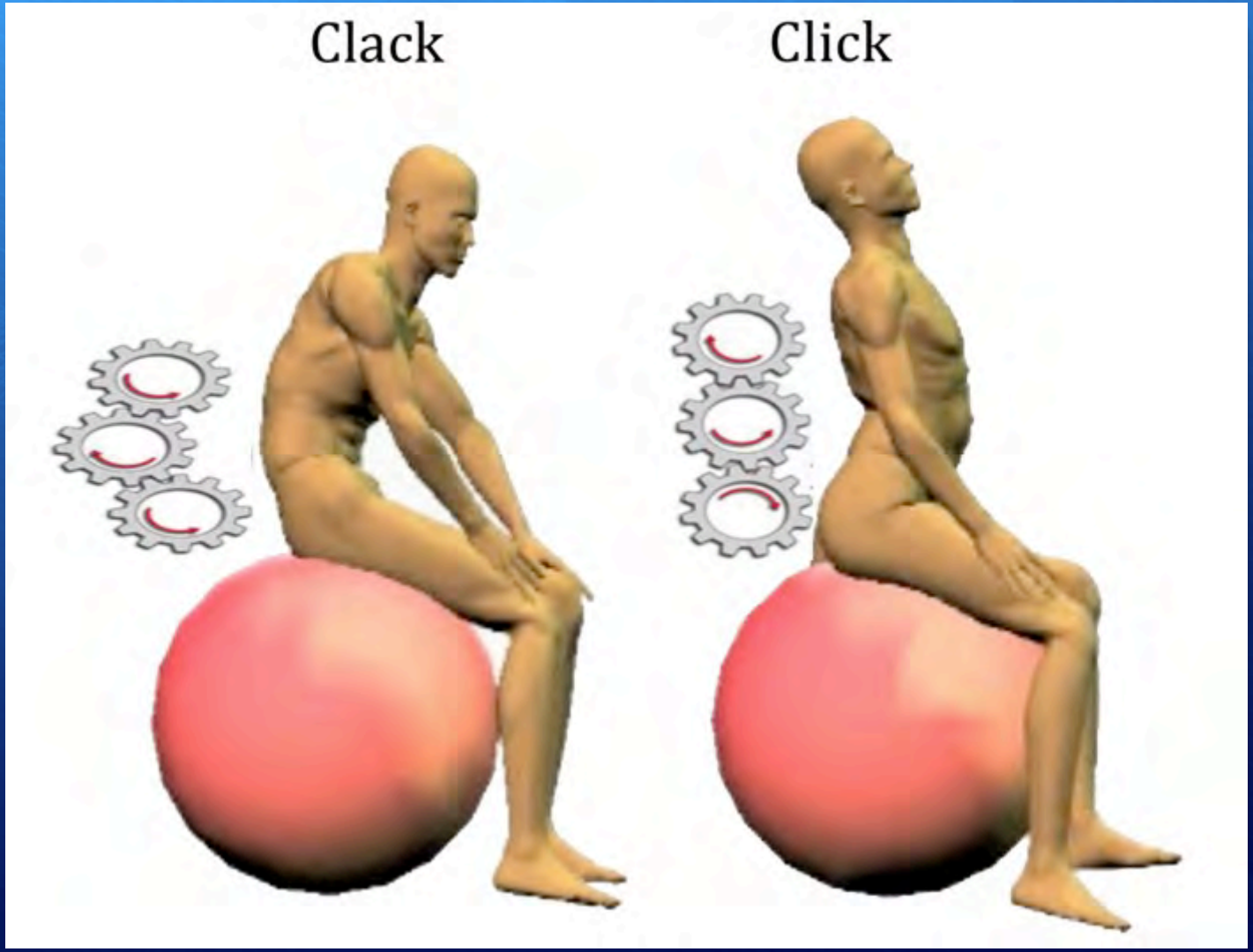


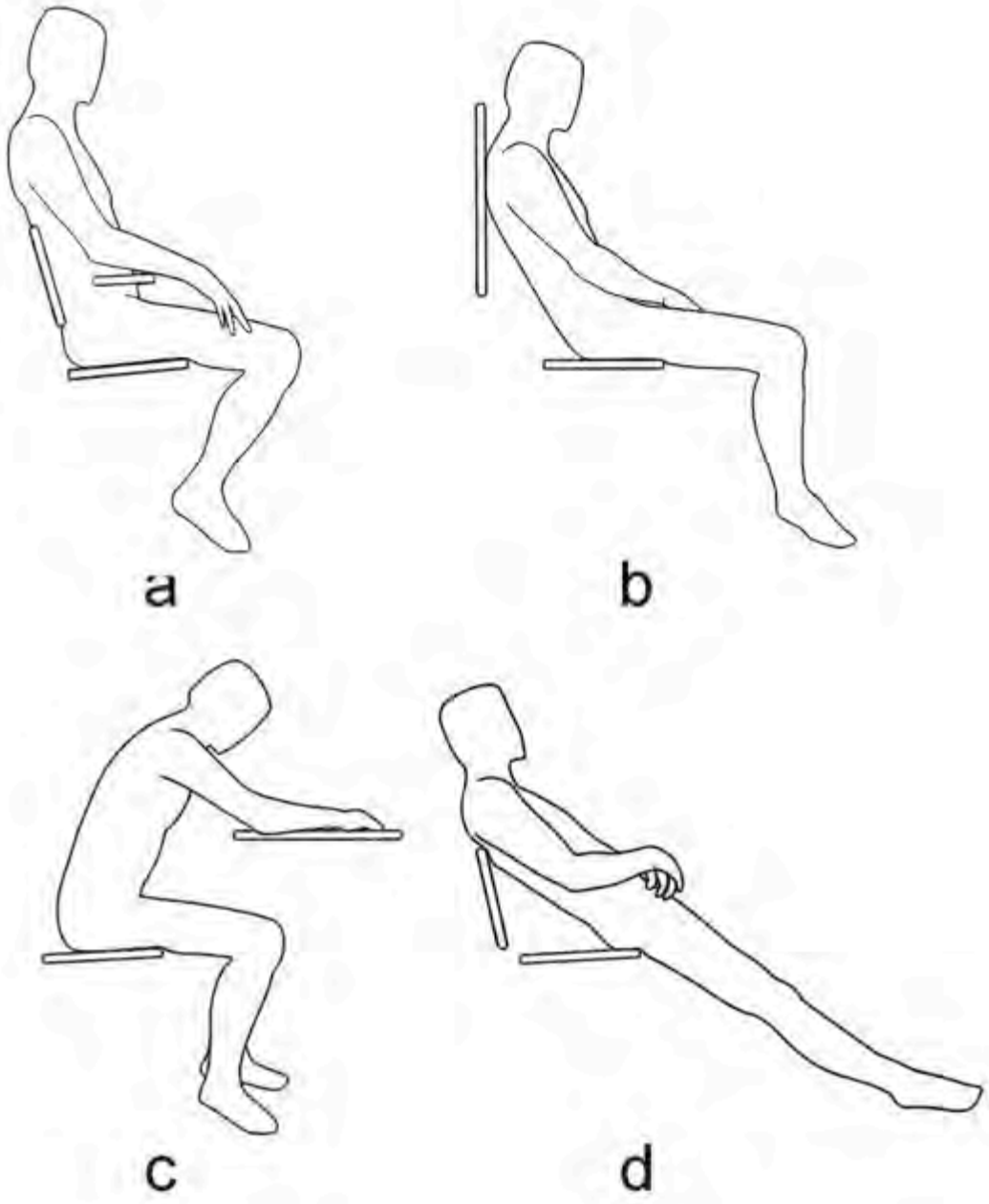
POSTURA SEDUTA





CLICK-CLACK




a
b
c
d

STRUTTURE LEGAMENTOSE

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Clin Biomech (Bristol, Avon). 2002 Jun;17(5):353-60.

Examination of the flexion relaxation phenomenon in erector spinae muscles during short duration slumped sitting.

Callaghan JP, Dunk NM.

Department of Human Biology and Nutritional Sciences, College of Biological Science, University of Guelph, Ont., Canada N1G 2W1. jcallagh@uoguelph.ca

Abstract

OBJECTIVE: The purpose of this study was to examine the myoelectric activity of the erector spinae muscles of the back in order to determine if the flexion relaxation phenomenon occurs in seated forward flexion or slumped postures.

BACKGROUND: The flexion relaxation phenomenon during standing forward flexion is well documented. However, flexion relaxation in seated forward flexion has not been studied. It is possible that flexion relaxation could be linked with low back pain that some individuals experience during seated work.

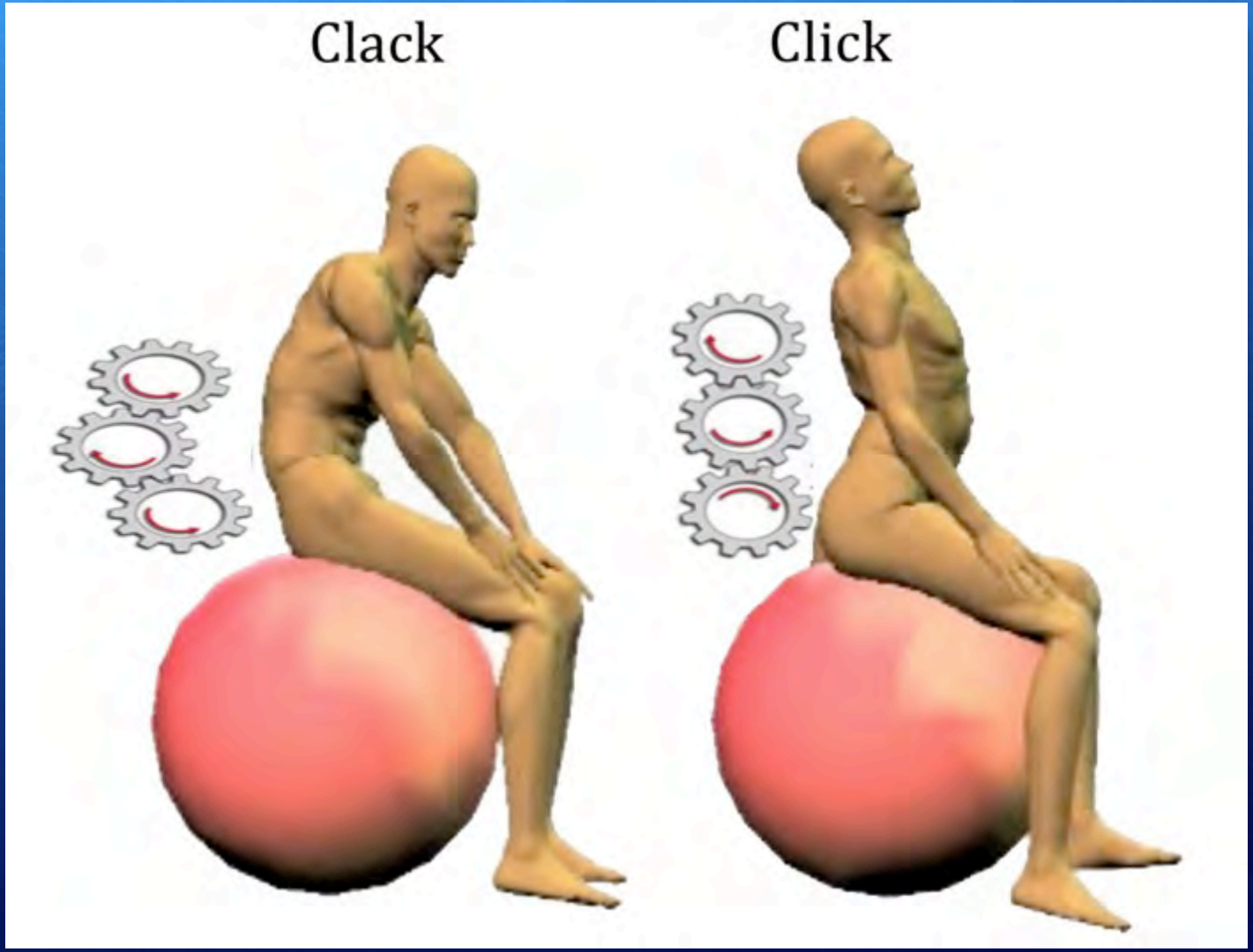
METHODS: Twenty-two healthy subjects (11 males, 11 females) participated in the study. Surface electromyography was used to measure the level of muscle activity at the thoracic and lumbar levels of the erector spinae muscles. An electromagnetic tracking device measured the three-dimensional movement of the lumbar spine. Five trials each of standing and seated forward flexion were performed.

RESULTS: A slumped sitting posture yielded flexion relaxation of the thoracic erector spinae muscles, whereas the lumbar erector spinae muscle group remained at relatively constant activation levels regardless of seated posture. Thoracic erector spinae silence occurred at a smaller angle of lumbar flexion during sitting than the flexion relaxation angle observed during standing flexion relaxation.

CONCLUSIONS: Since the myoelectric activity of the lumbar erector spinae did not increase, it is likely that the passive tissues of the vertebral column were loaded to support the moment at L4/L5. Ligaments contain a large number of free nerve endings which act as pain receptors and therefore could be a potential source of low back pain during seated work.

Visto che l'attività mioelettrica dell'erettore spinale non incrementa è possibile che il tessuto passivo della colonna vertebrale era caricato per supportare il momento a L4-L5

CLICK-CLACK



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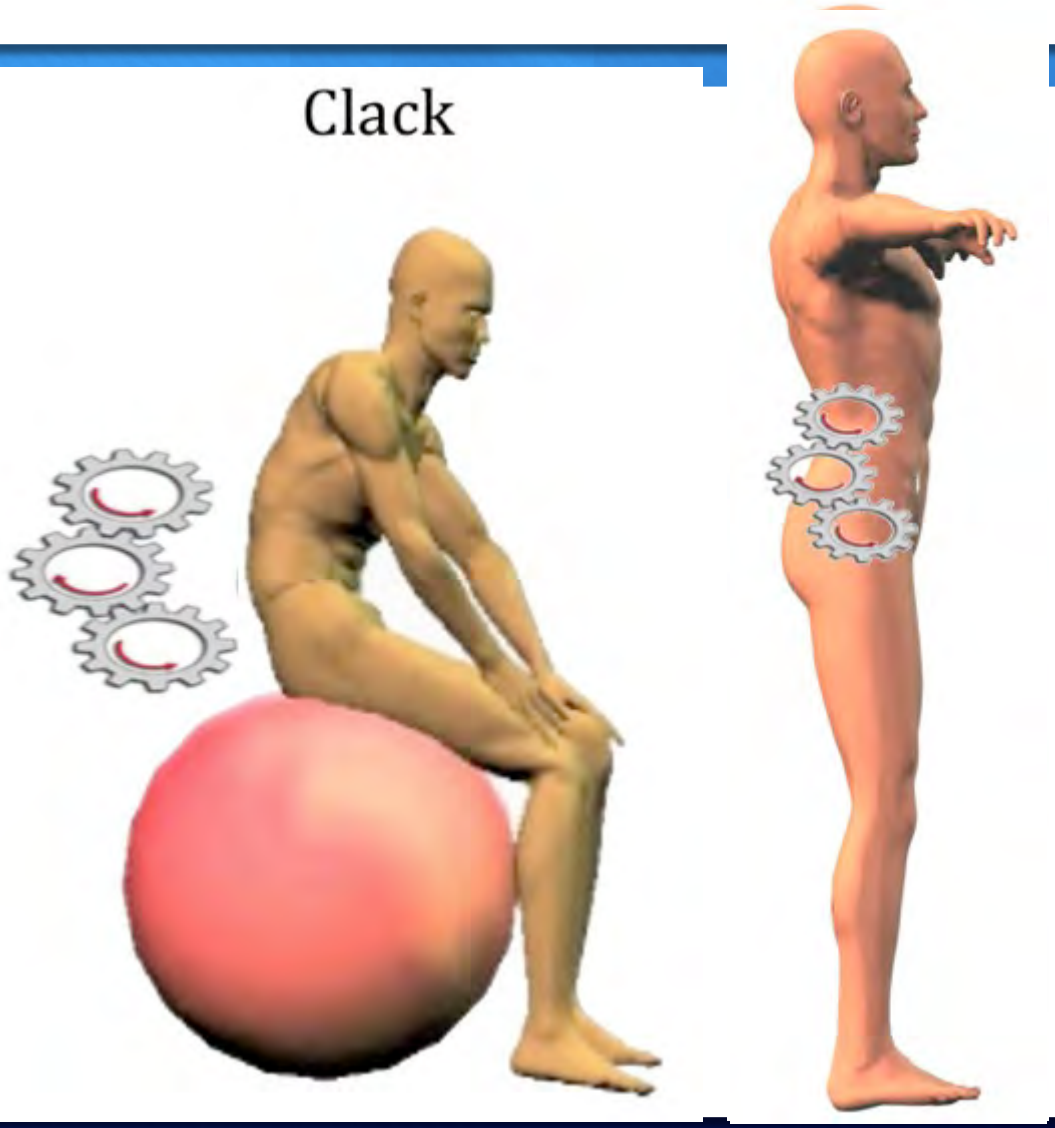
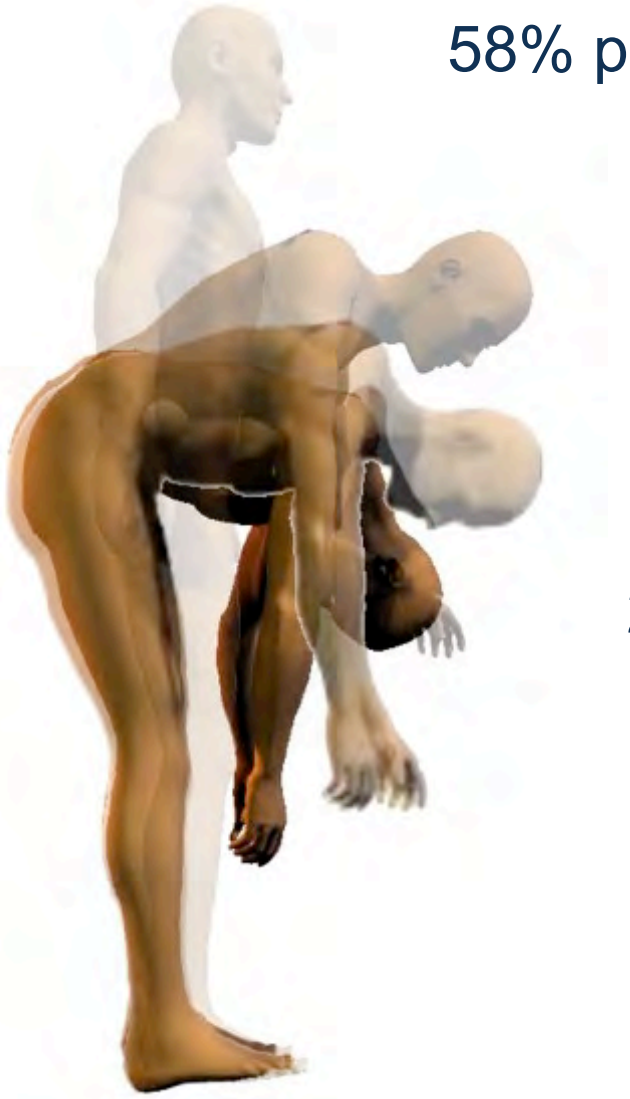


RITMO LOMBO-PELVICO (HIP-PELVIS-LUMBAR RHYTM)

RITMO LOMBO-PELVICO (HIP-PELVIS-LUMBAR)

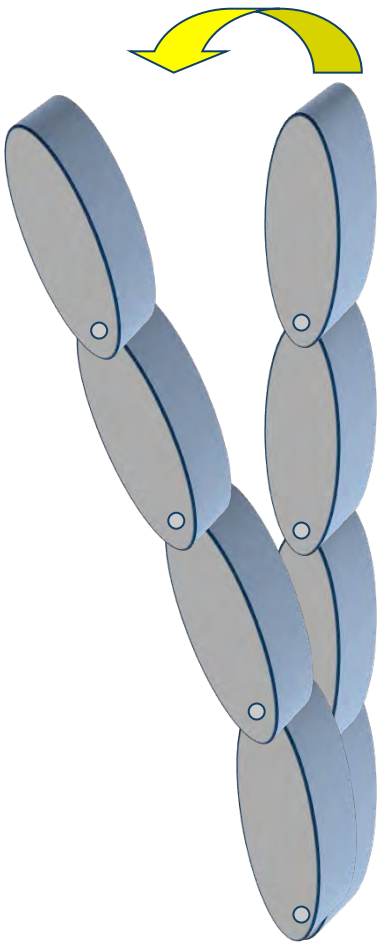


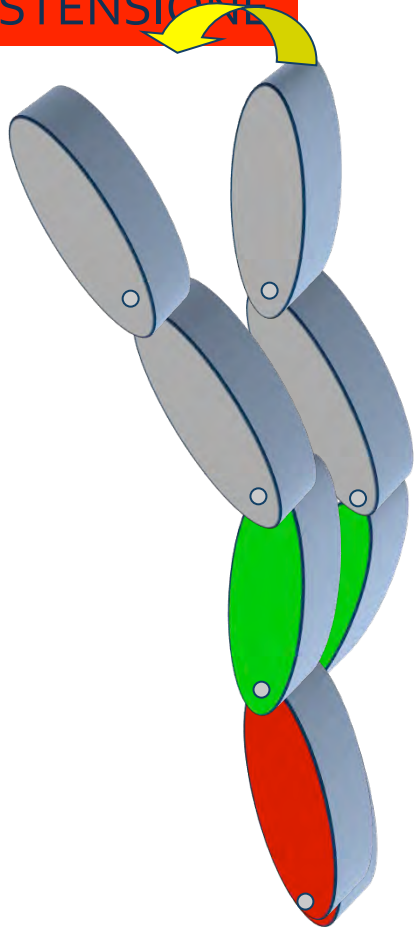
58% priorità lombare

22% misto

24% priorità anca

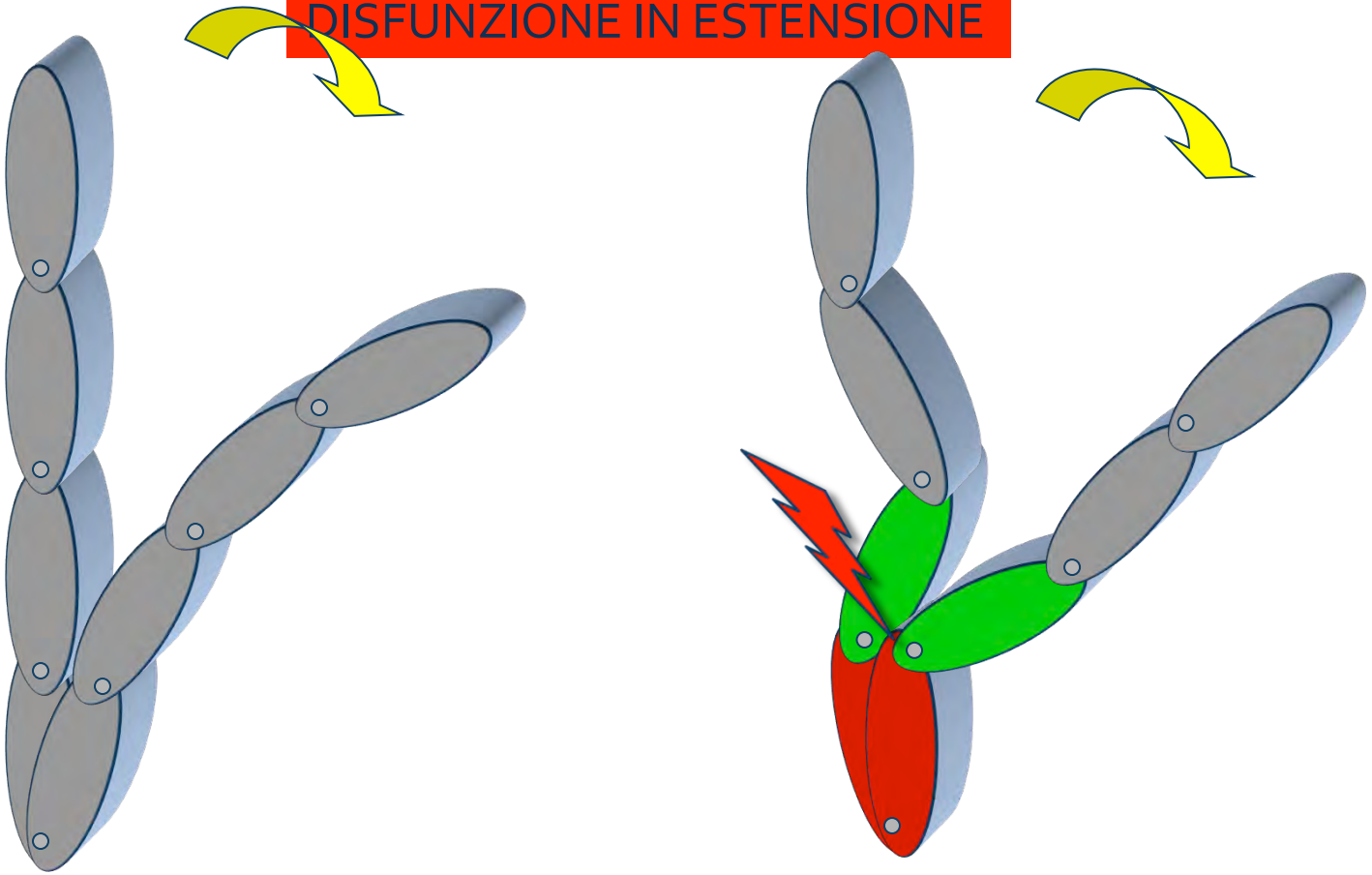
DISFUNZIONE IN ESTENSIONE





ESTENSIONE

DISFUNZIONE IN ESTENSIONE



FLESSIONE

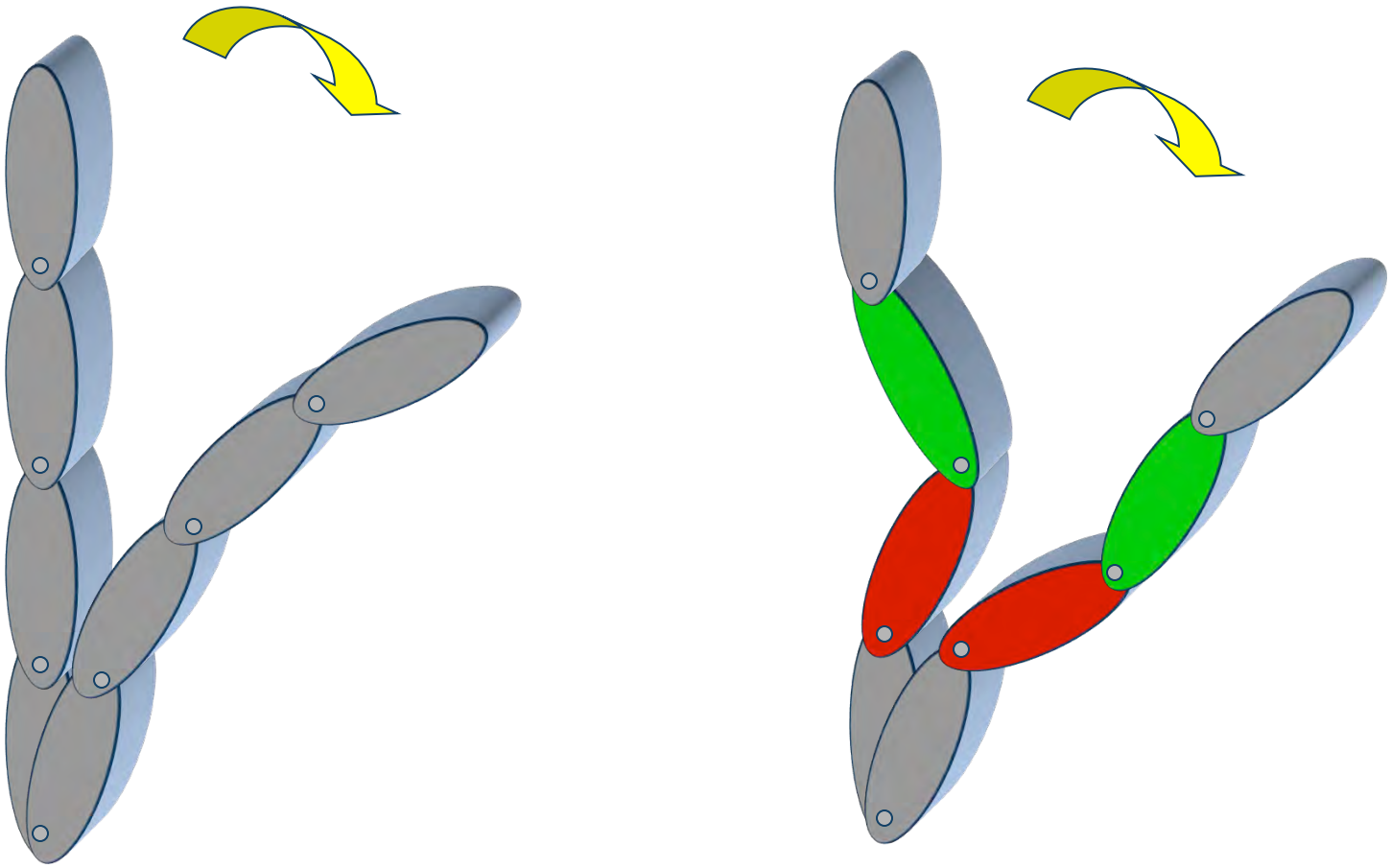
Eziopatogenesi della disfunzione articolare e sintomatologia

SCC

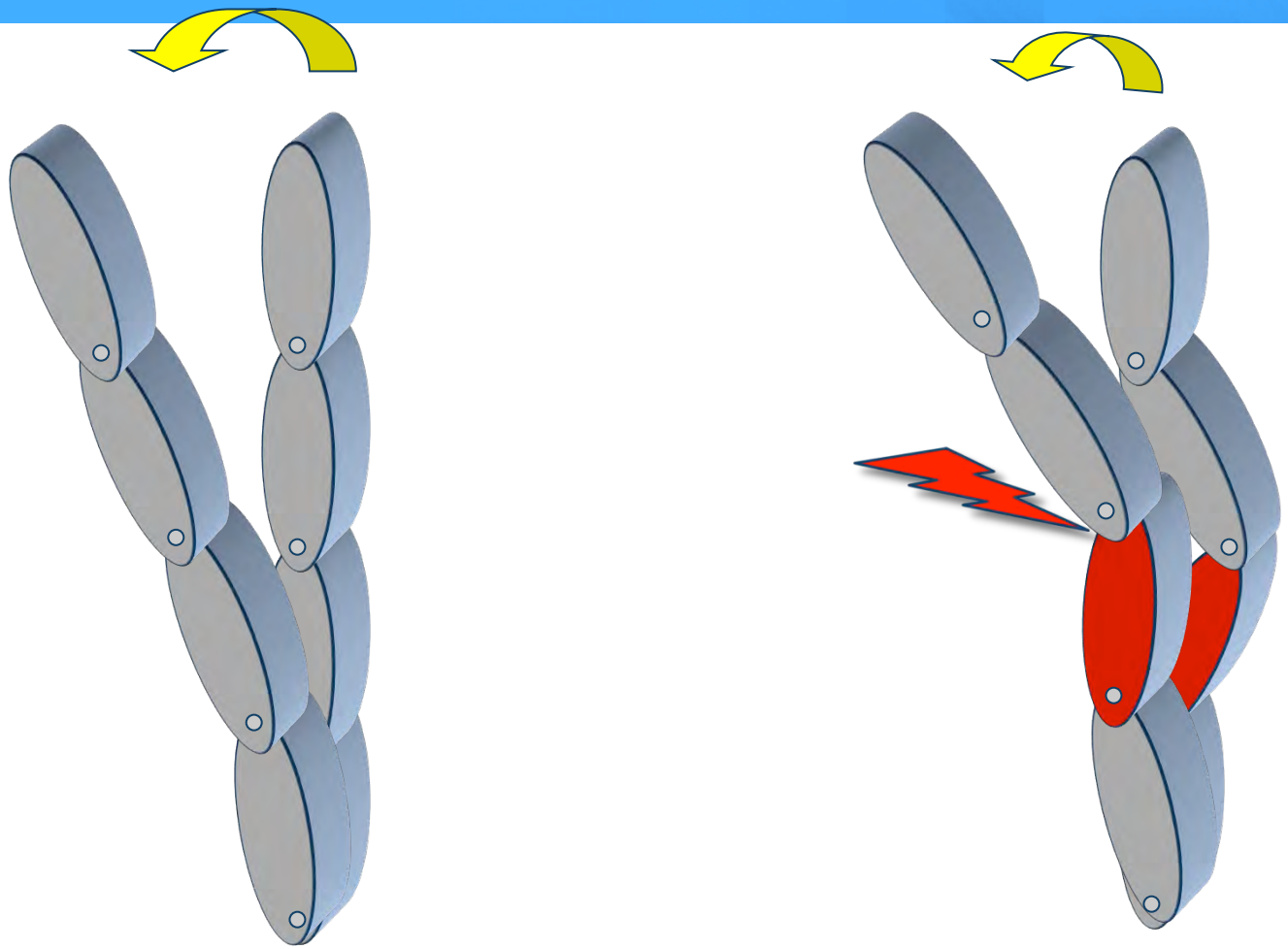
Sindrome- insieme di sintomi

Compenso – reazione del corpo

Crociato – dalla parte opposta



FLESSIONE



ESTENSIONE

FLEXION RELAXATION PHENOMENON

The flexion-relaxation phenomenon (FRP) is defined by a reduction in or silence of myoelectric activity of the lumbar erector spinae muscle observed during full trunk flexion Farfan 1975

Clin Biomech (Bristol, Avon). 1992 Feb;7(1):43-6. doi: 10.1016/0268-0033(92)90007-Q.

Creep response of the lumbar spine to prolonged full flexion.

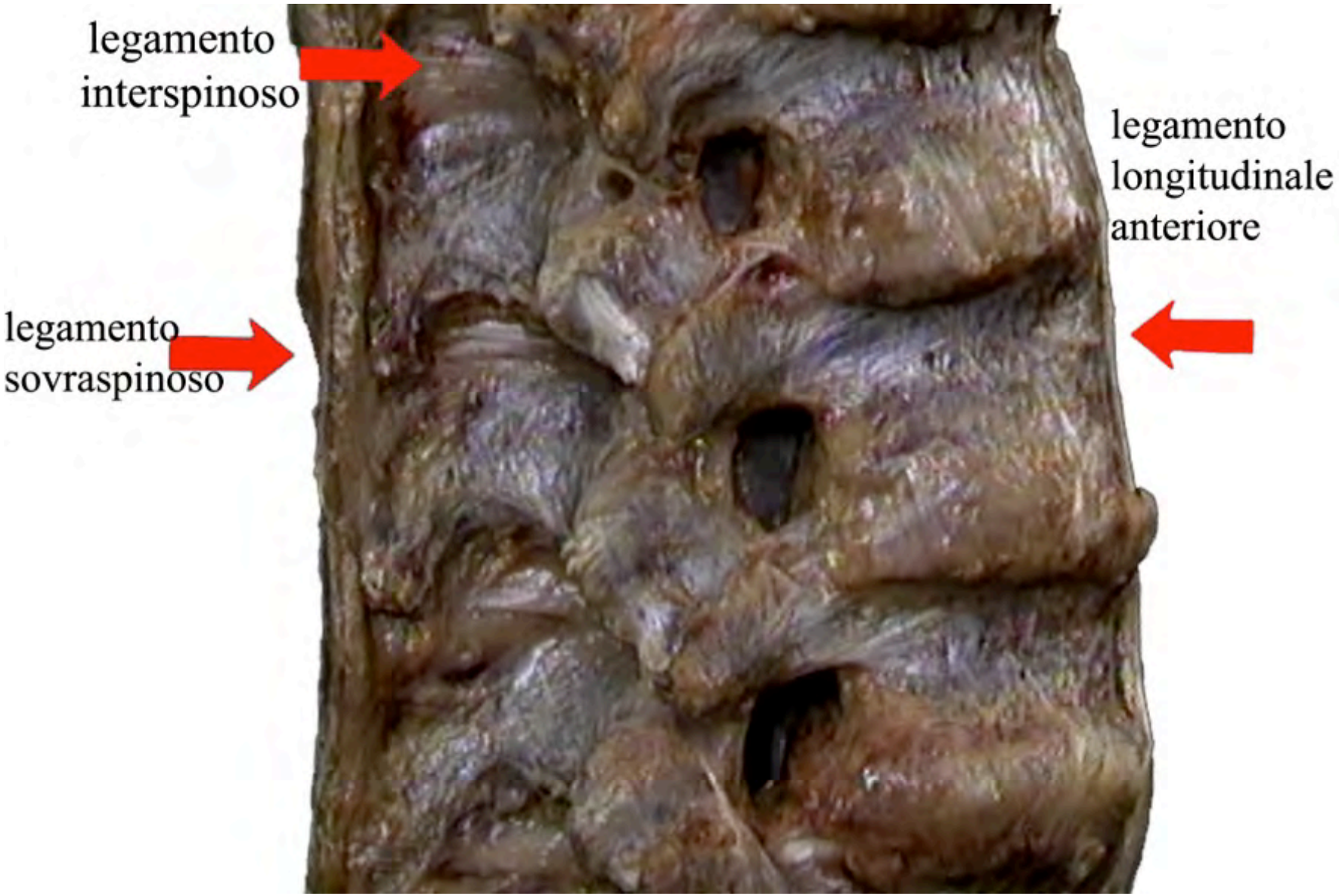
McGill SM[1], Brown S.

⊕ **Author information**

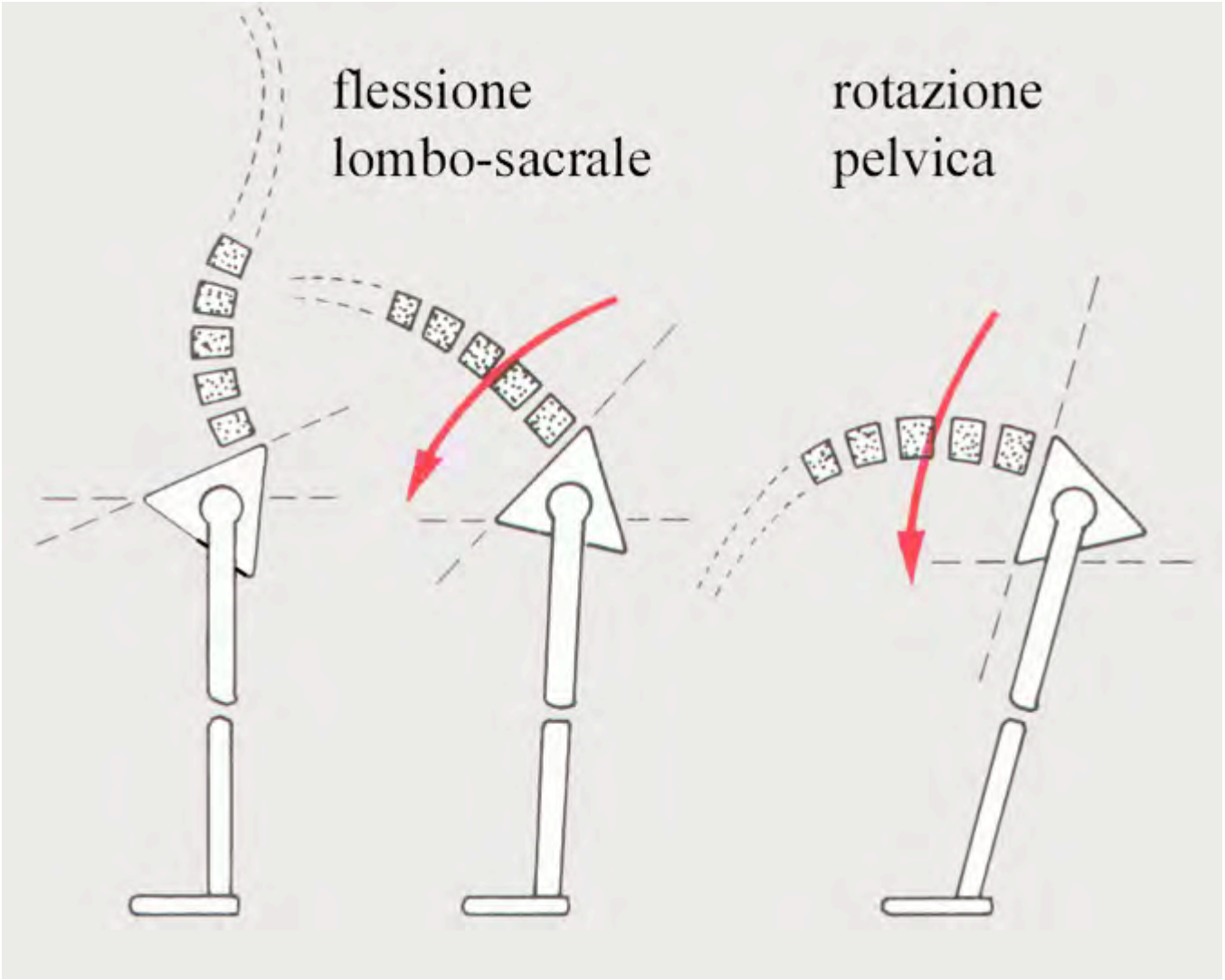
Abstract

The time course of full lumbar flexion under a prolonged flexion moment, lasting 20 min, was documented in 27 male and 20 female subjects. Peak flexion increased by 5.5° over the 20 min. The flexion-creep data was fitted with a first-order step input response having a time constant of 9.4 min. Maximum flexion was also documented over the recovery phase, lasting 30 min, indicating that subjects regained approximately 50% of their resting joint stiffness within 2 min of resuming relaxed lordosis, although full recovery took longer than the flexion-creep, indicating the presence of viscoelastic hysteresis. For this reason it may be prudent to advise those who experience prolonged full flexion postures (as might a seated warehouse shipper/receiver, gardener, or construction worker) to stand and walk for a few minutes prior to performing demanding manual exertions. Indeed, temporary joint flexion laxity, following a bout of full flexion, may increase the risk of hyperflexion injury to certain tissues.

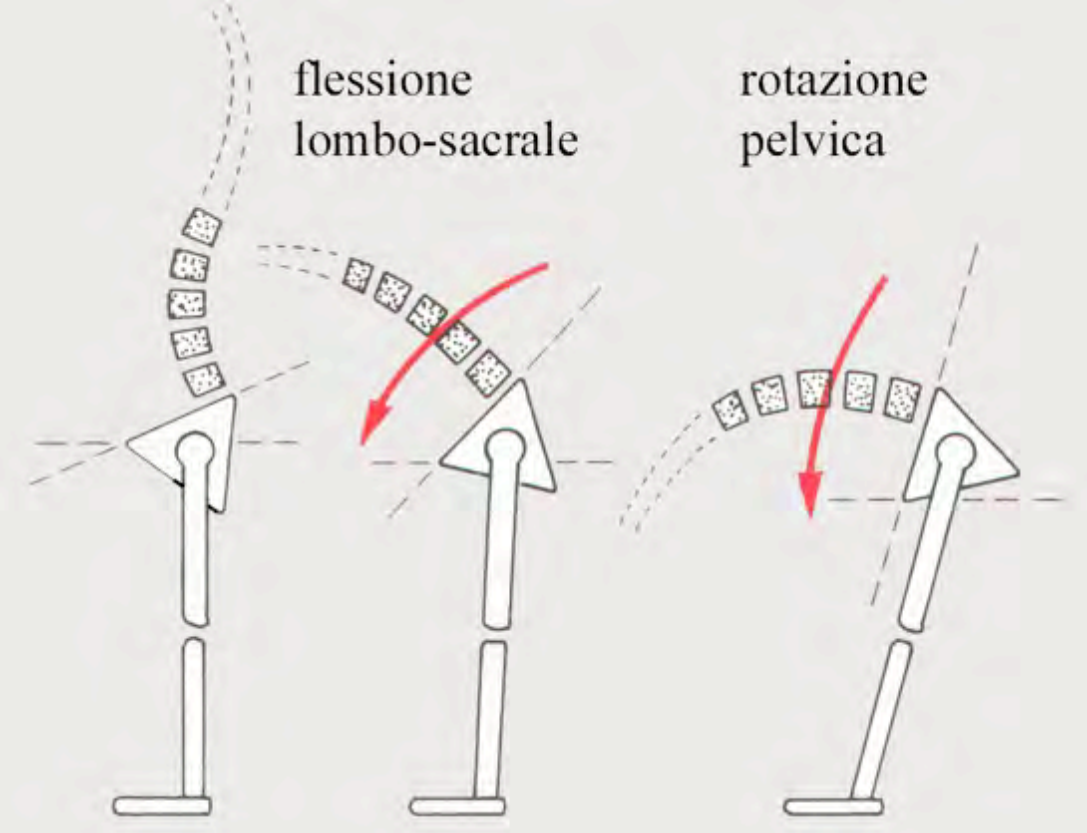
20 min di stretching in massima flessione del tronco incrementano di 5,5° circa dovuta allo sfibramento (creep properties) dei tessuti molli.
Il 50% recupera la stiffnes dopo 2 minuti, per il recupero totale ne servono almeno 30 min.


legamento
interspinoso
legamento
longitudinale
anteriore
legamento
sovraspinoso

RITMO LOMBO-PELVICO



RITMO LOMBO-PELVICO



Norton et al: Viodeographic analysis of subjects with and whitout low back pain during forward bending. Phys Ther 76: 529, 1996

La colonna lombare non deve completare più del 50% del suo movimento prima che inizi il movimento a livello del bacino

Esola et al: Analysis of lumbare spine and hip motion during forward bending in subjects with and whitout a history of low back pain. Spine 21: 71, 1996

I soggetti lombalgici muovono maggiormente, rispetto ai soggetti sani, il rachide lombare nei primi 30-60° di flessione del tronco

I maschi utilizzano anticipatamente la colonna lombare rispetto alle donne che utilizzano più facilmente l'anca
Thomas et al 1998

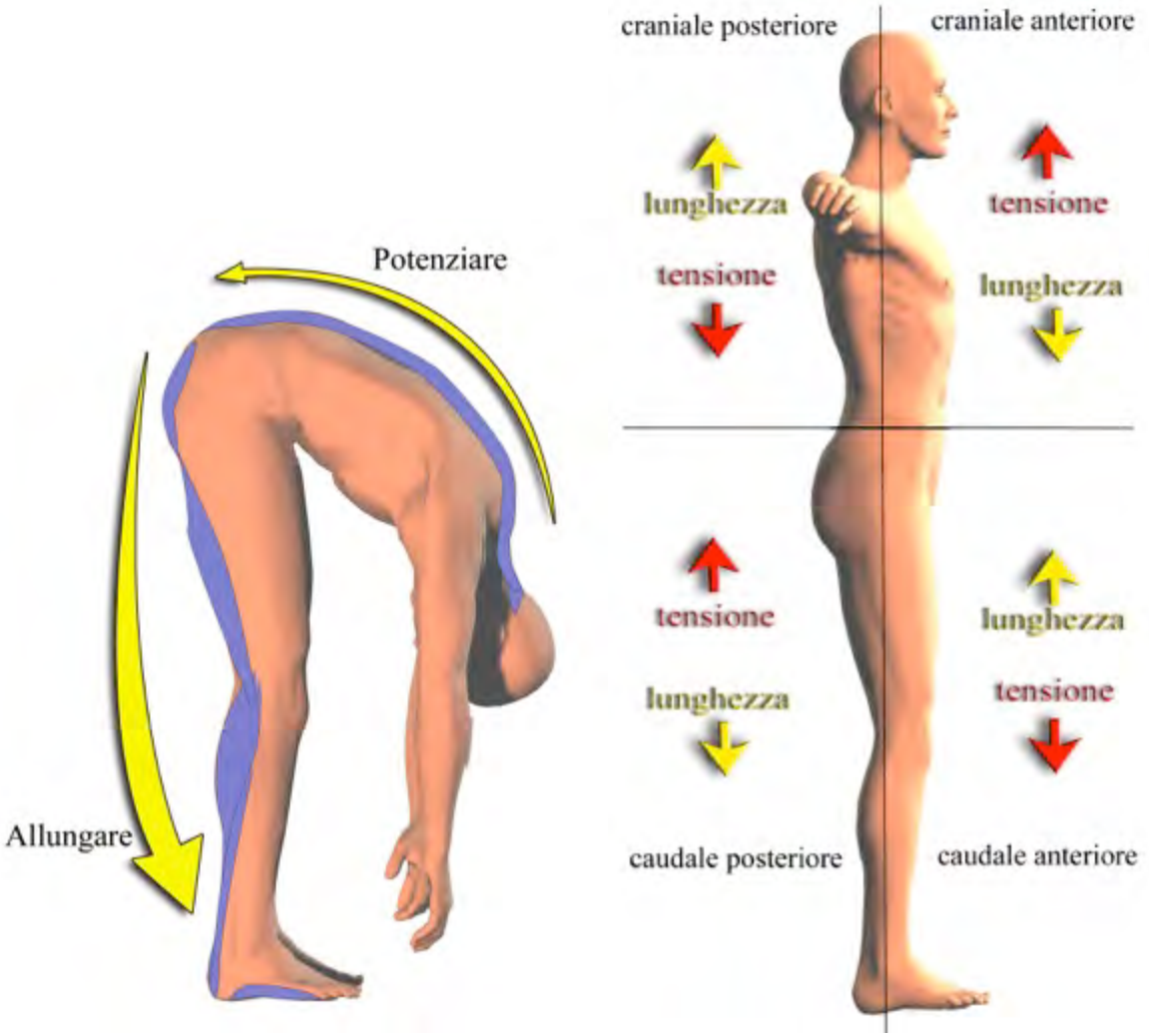
E' importante il massimo ROM ma più importante è la flessione vertebrale a fine corsa.

Woolsey e Norton . Phys Ther 2001 –
Max ROM di Flessione lombare 56.6°

Soggetto normo allineato
-in ortostasi la colonna lombare è in estensione di circa 20-30°
- in massima flessione e flessa di circa 30°

Soggetto con rettilizzazione del rachide lombare
-in ortostasi la colonna lombare è in estensione di circa 0°
- in massima flessione e flessa di circa 50-60°
White e Panjabi , 1978

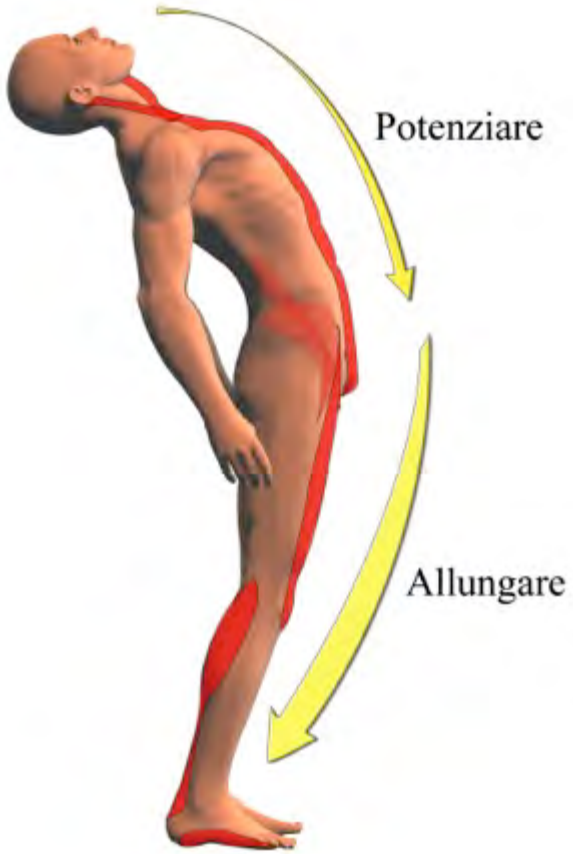
ROM colonna vertebrale lombare
L1 12°
Incremento di 1° circa per segmento
L5 S1 20°

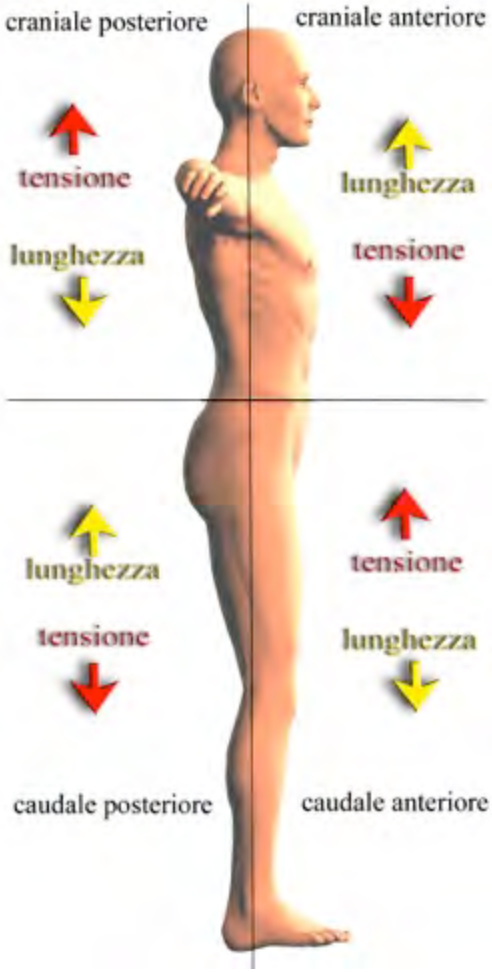


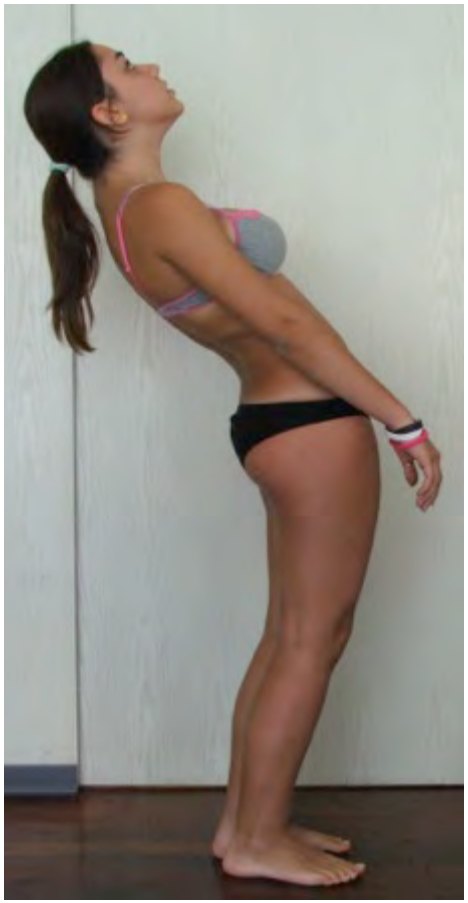
SINDROME FLESSORIA

O'Sullivan 2000, Saharman 2002

a) paziente sofferente di sindrome flessoria ; b) catena statico-dinamica posteriore con retrazione della componente caudale posteriore e debolezza della componente craniale posteriore







SINDROME ESTENSORIA

O'Sullivan 2000, Saharman 2002

a) paziente sofferente di sindrome estensoria; b) catena statico-dinamica anteriore con retrazione della componente caudale anteriore e debolezza della componente craniale anteriore