The coordinated movement of the lumbo – pelvic – hip complex during rowing. How to prevent injury and improve the rowing technique.

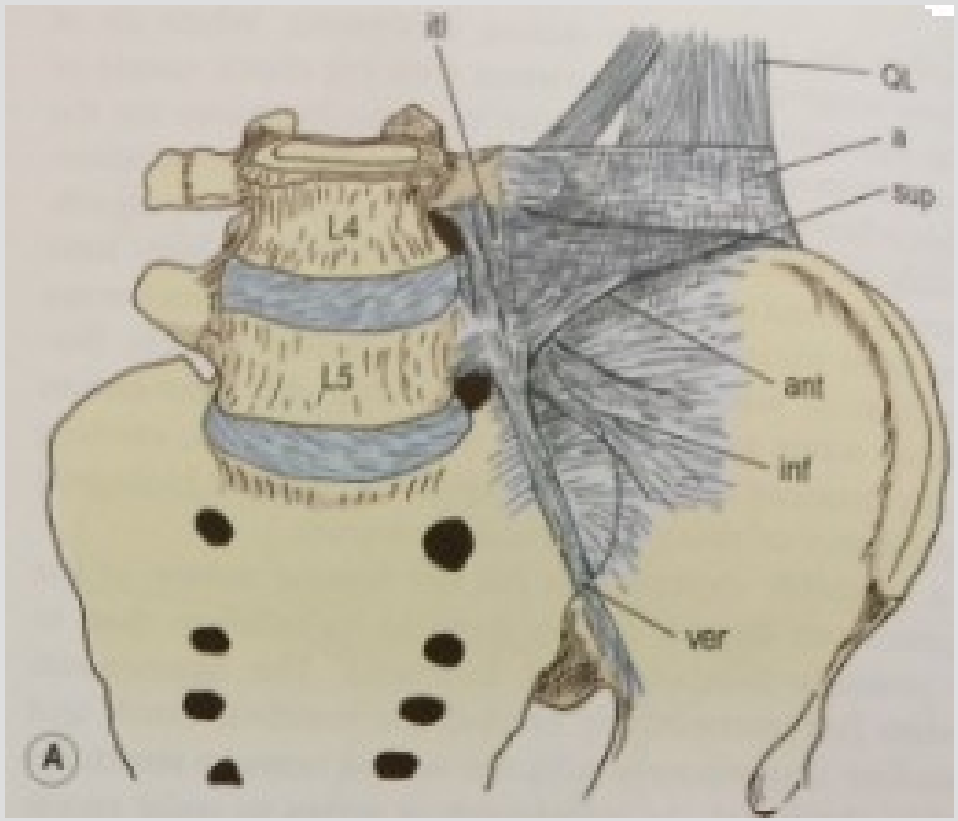
Carolina Martinelli
Osteopath D.O.

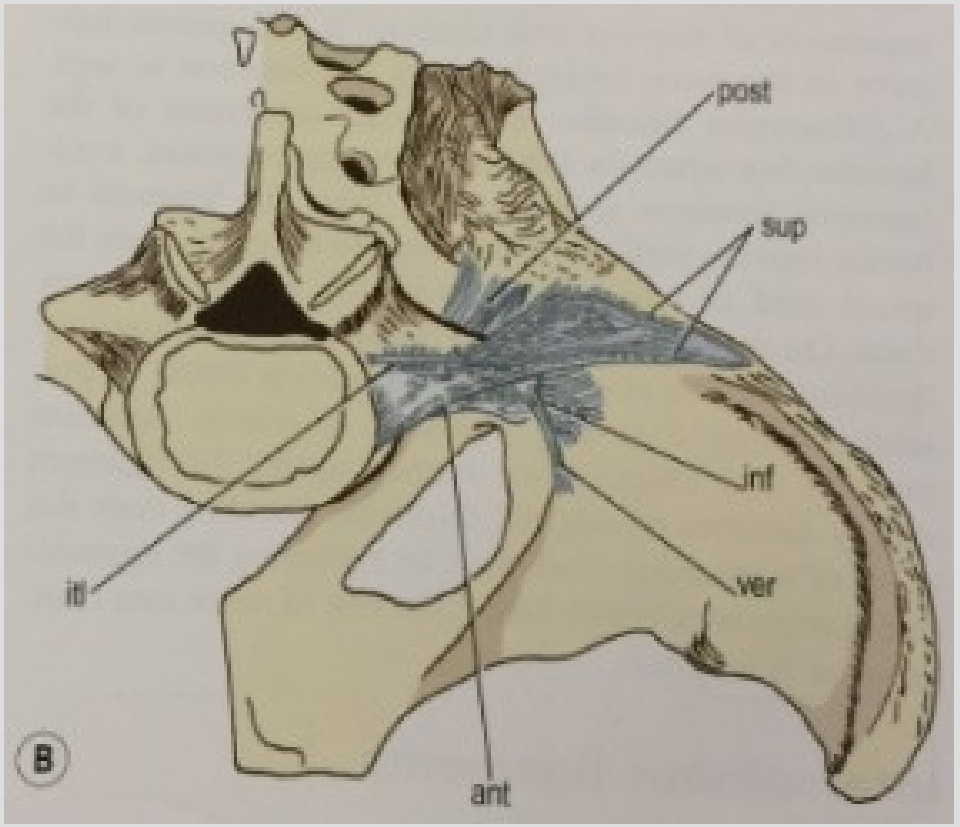
The lumbo – pelvic - hip complex: anatomy

- Why do we speak about lumbo – pelvic – hip complex?
- There are a lot of anatomic reasons to consider these structures as a complex:
- lumbo pelvic ligament that directly relay the vertebra L4 - L5 and ileus
- coxo – femural articulation
- muscles

The lumbo – pelvic - hip complex: anatomy

- Why do we speak about lumbo – pelvic – hip complex?





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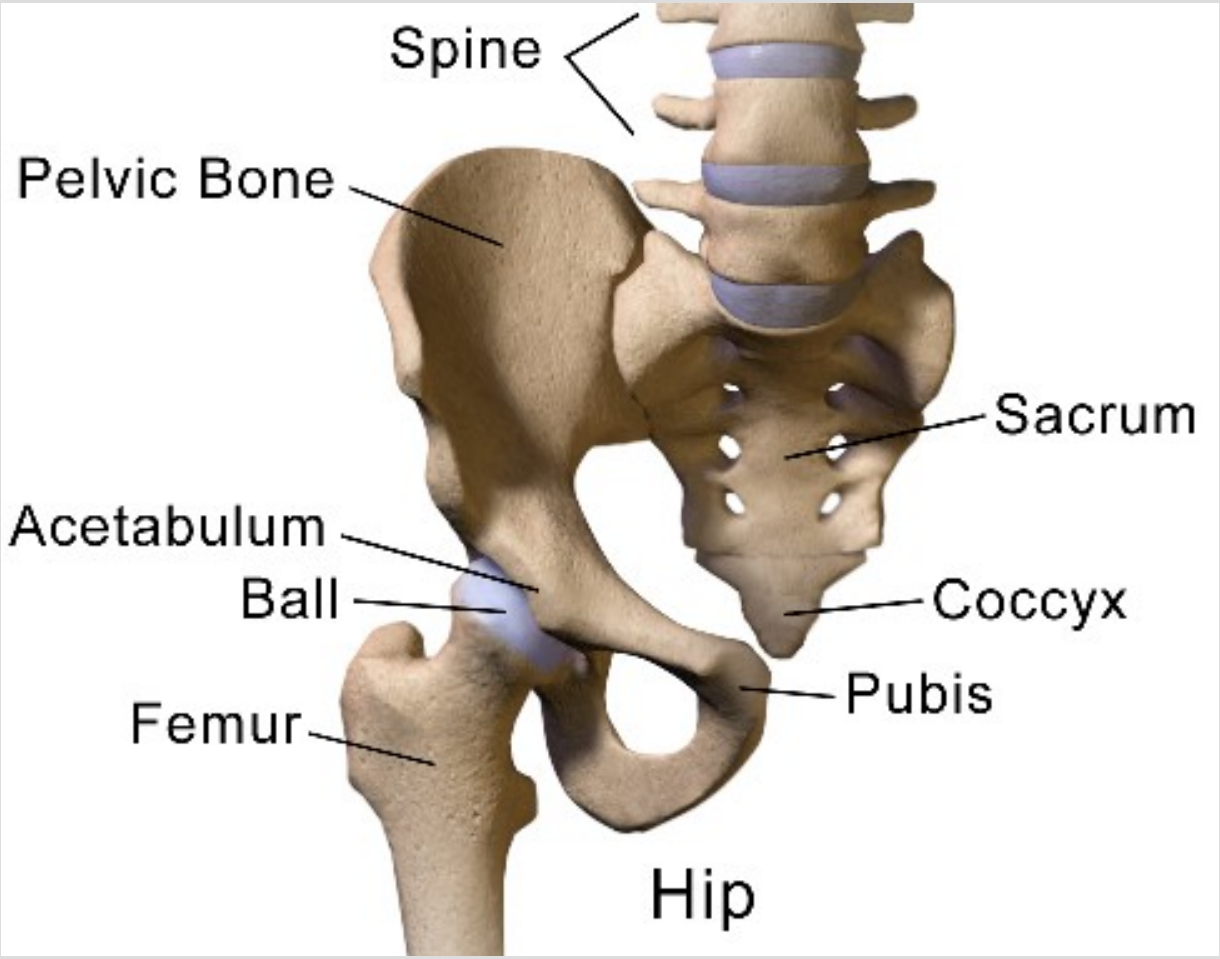

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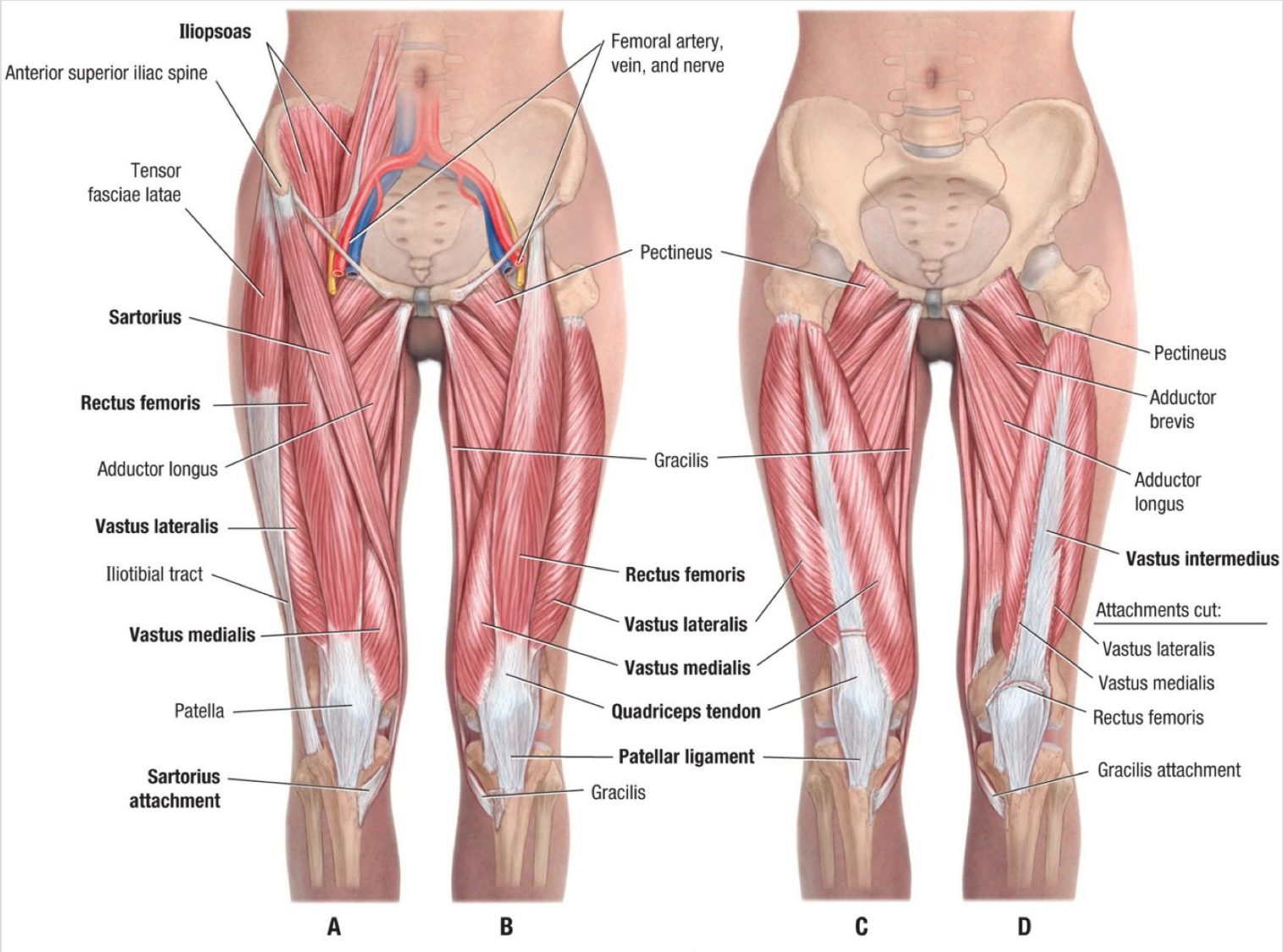

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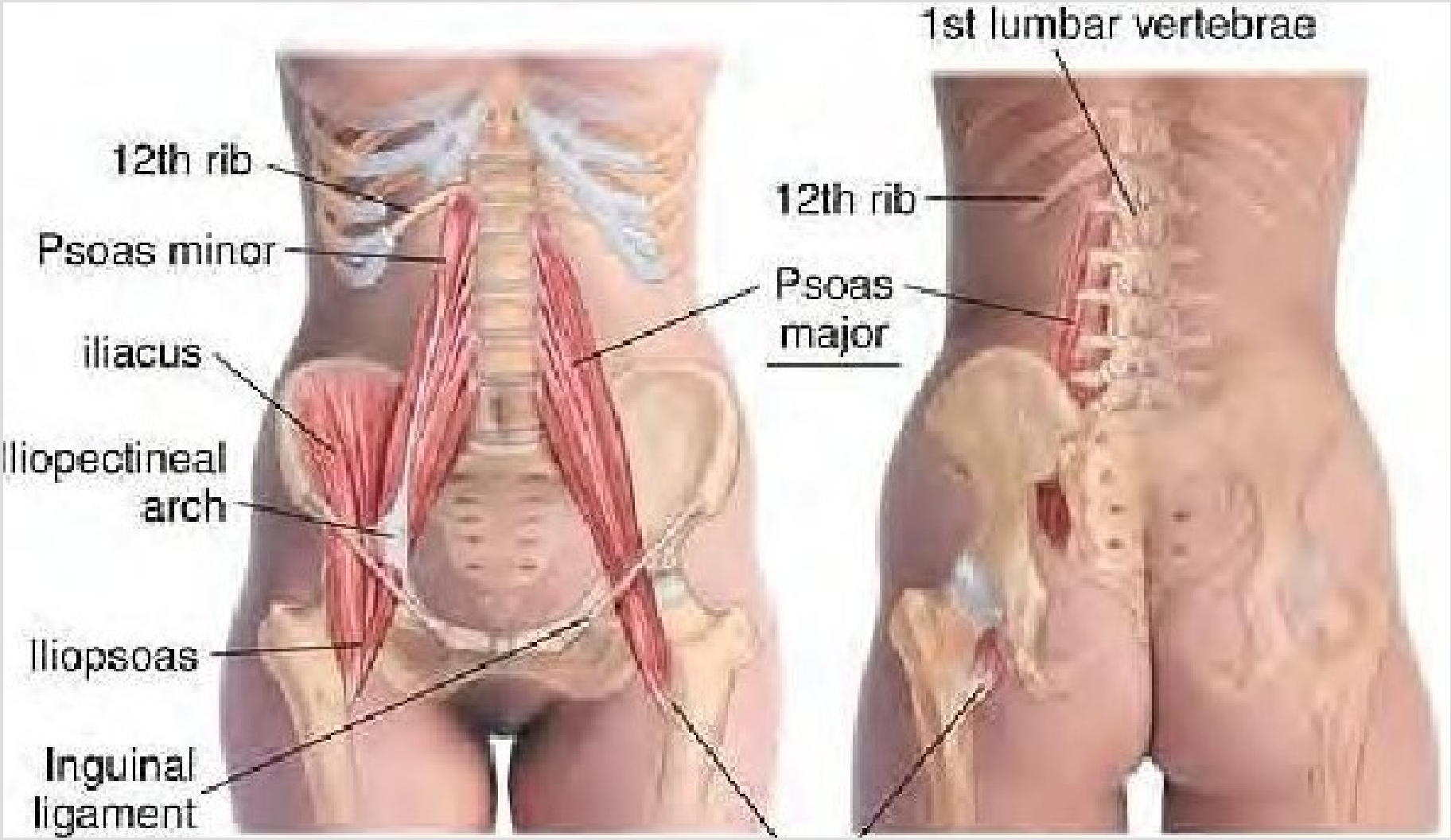

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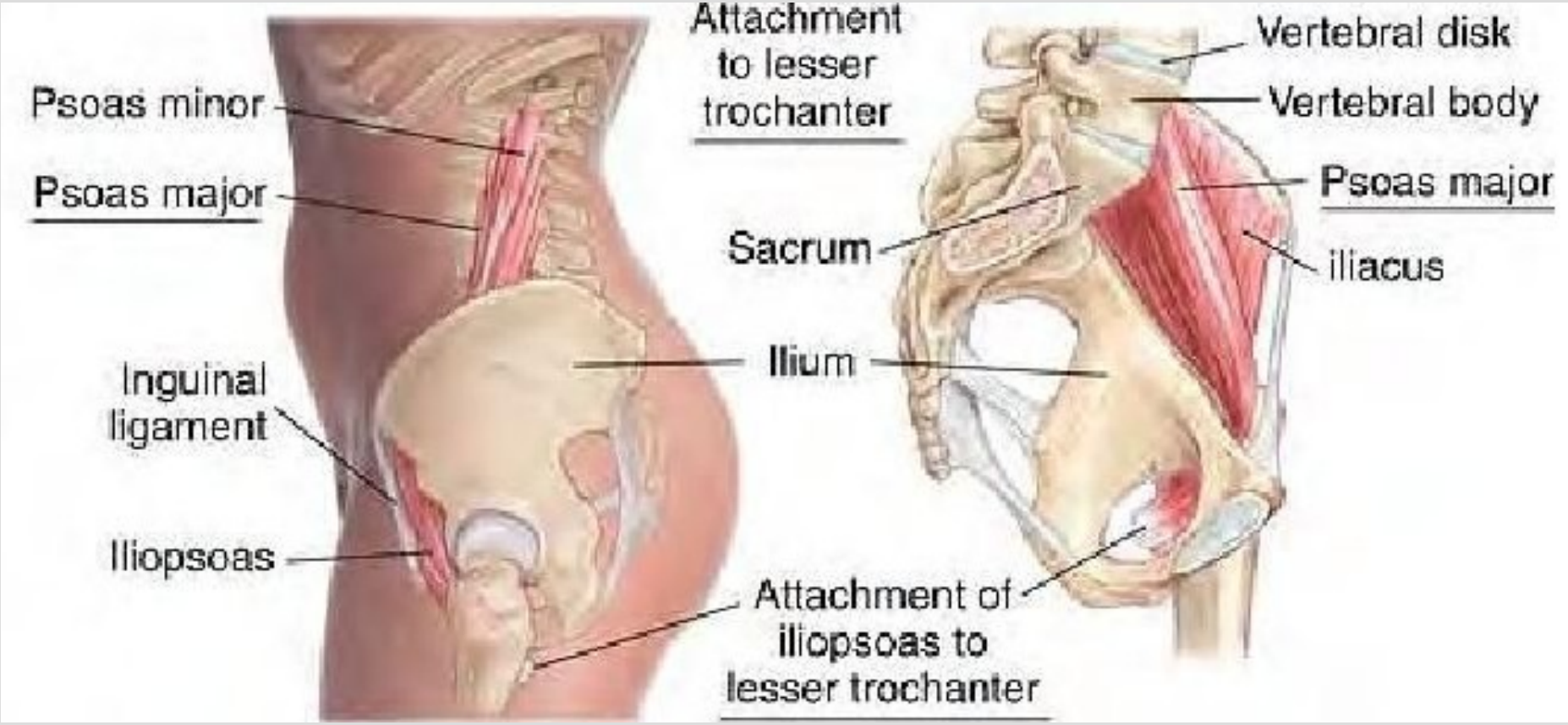
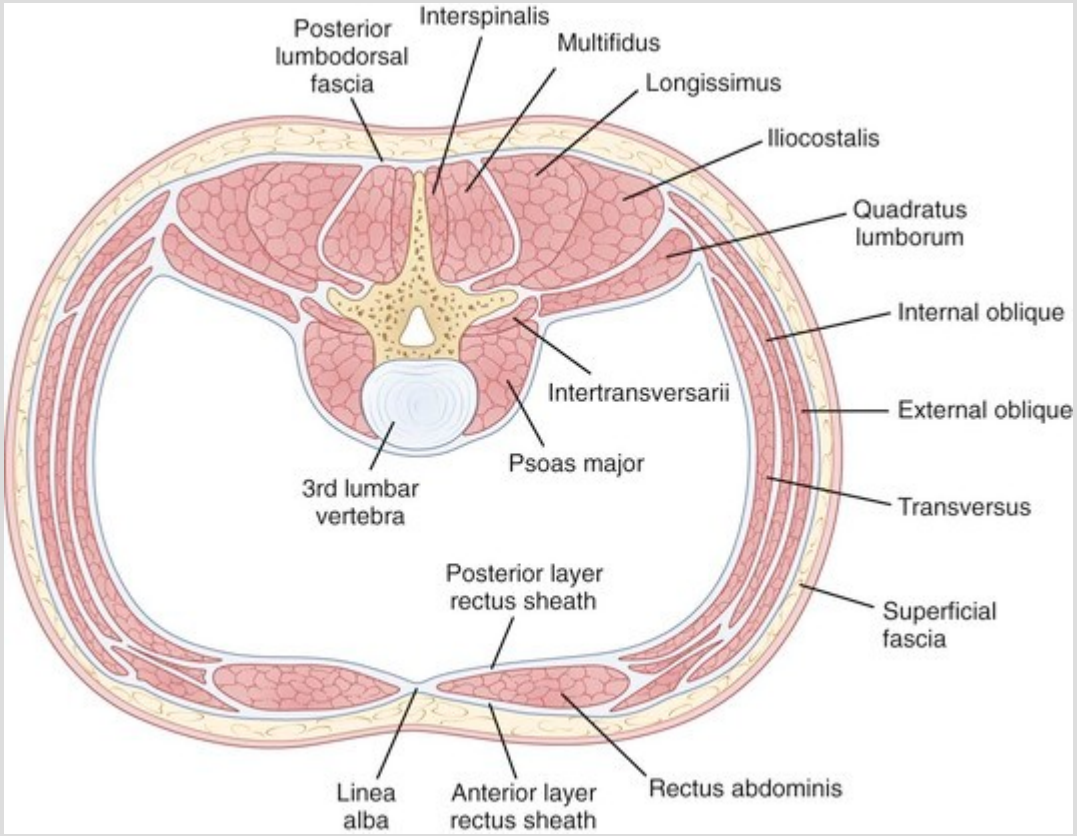


The lumbo – pelvic - hip complex: anatomy



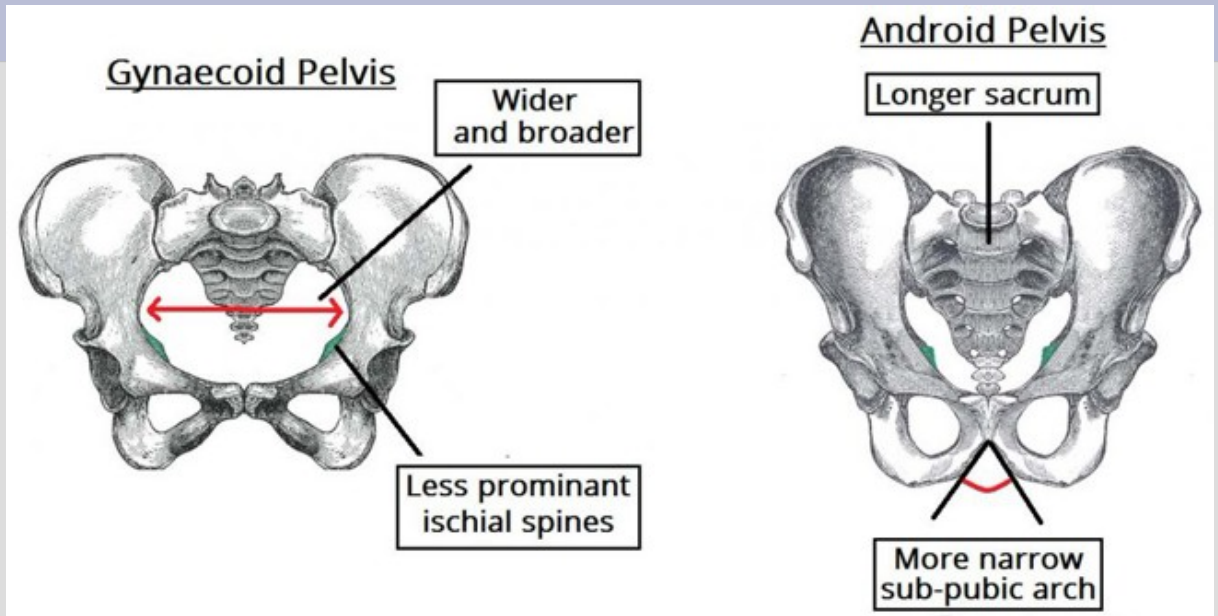
The lumbo – pelvic - hip complex: anatomy

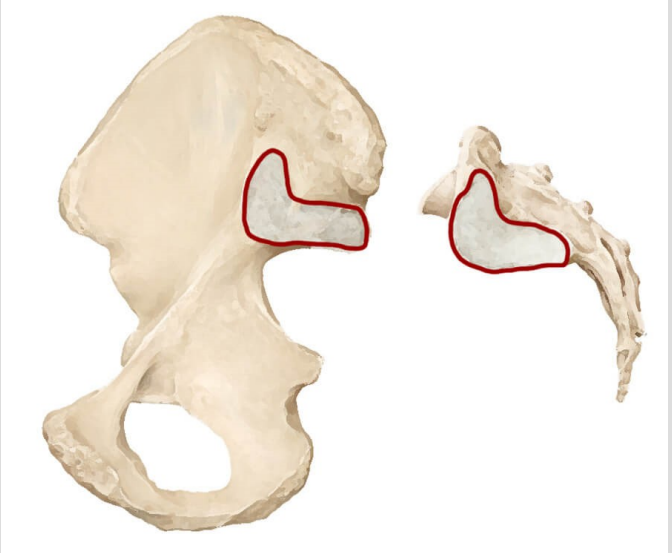
- Why do we speak about lumbo – pelvic – hip complex?

  We can see on the figure that we are speaking about
- Sacrum
- Coccix
- Lumbar spine
- Hip

  so I think necessary a precisation about sacroiliac joint's anatomy

The lumbo – pelvic - hip complex: anatomy





Sacroiliac joint

the shape of the sacroiliac joint is determinant to movement.

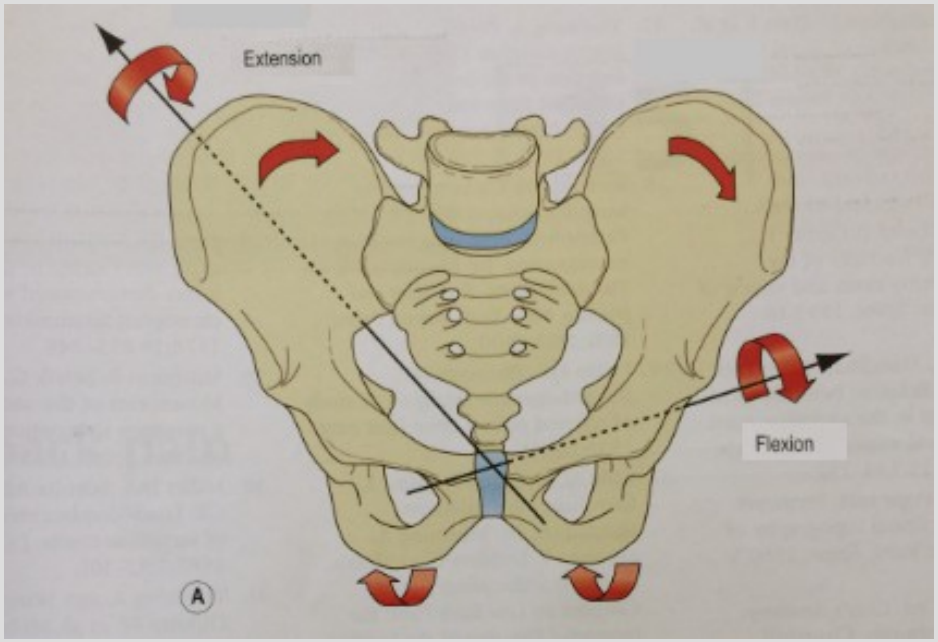
If the sacrum was fused with the rest of pelvis, the pelvis would be a solid ring of bone.

A fusion doesn't allow to the complex to adapte itself to large daily twisting force for example during walking.

The lumbo – pelvic - hip complex: elements of biomechanics

Why do we speak about lumbo – pelvic – hip complex?

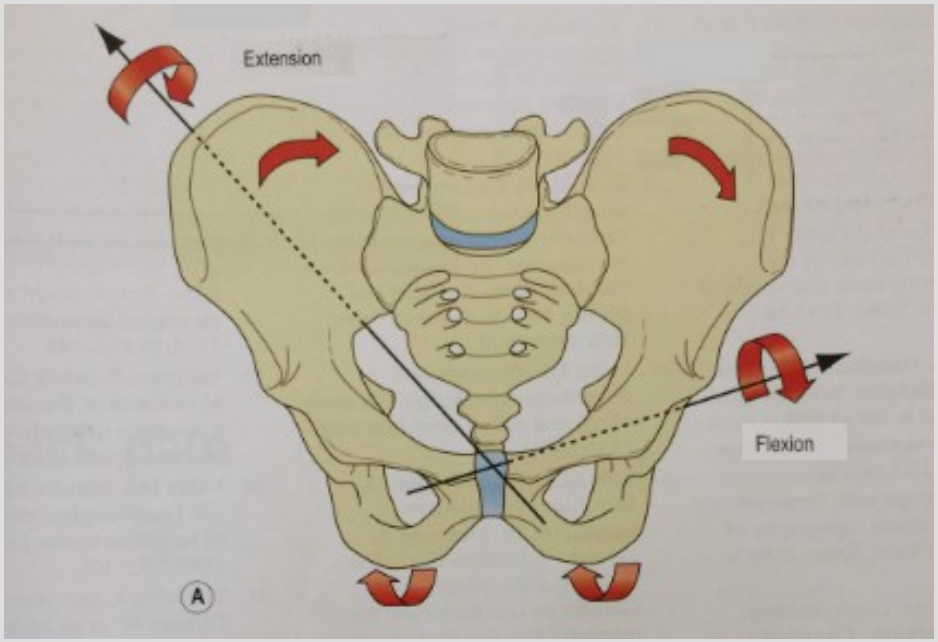
Thinking about the anatomy of this complex, it's clear that when I move a part there is a ripercussion on the other part of this complex.



The lumbo – pelvic - hip complex: elements of biomechanics

Why do we speak about lumbo – pelvic – hip complex?

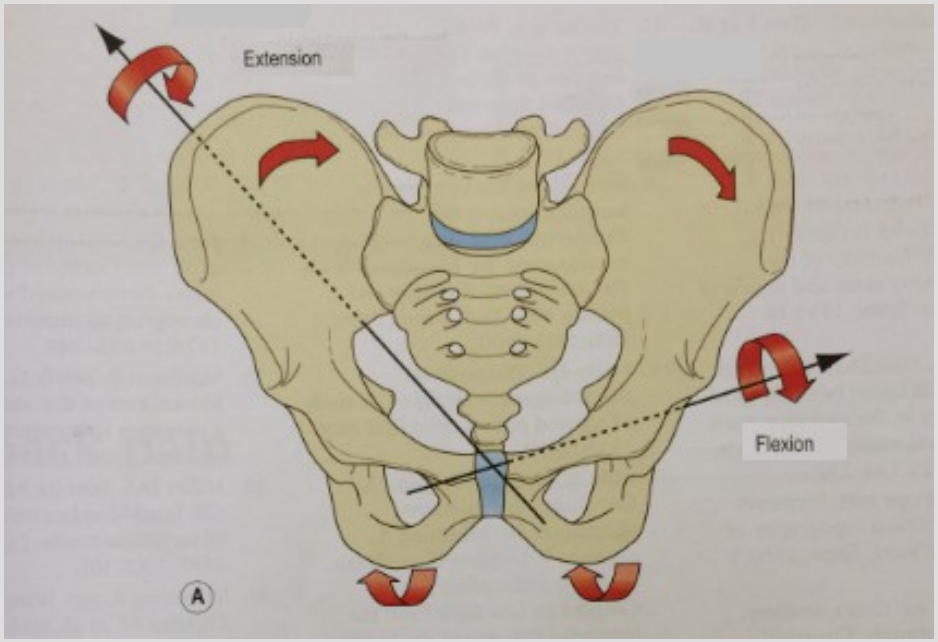
when the right lower limb is extended the pelvis on that side would tend to twist forwards.



The lumbo – pelvic - hip complex: elements of biomechanics

Why do we speak about lumbo – pelvic – hip complex?

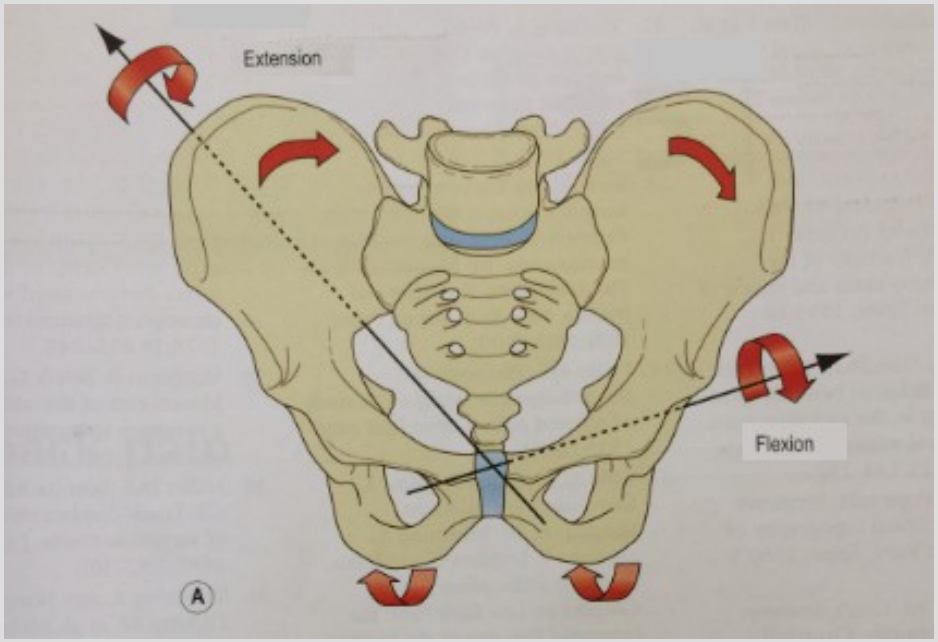
when the left lower limb is flexed, the left part of the pelvis would be twisted backwards.



The lumbo – pelvic - hip complex: elements of biomechanics

Why do we speak about lumbo – pelvic – hip complex?

Tension in the hamstrings would draw the ischium backwards, causing the left pelvis to rotate anticlockwise



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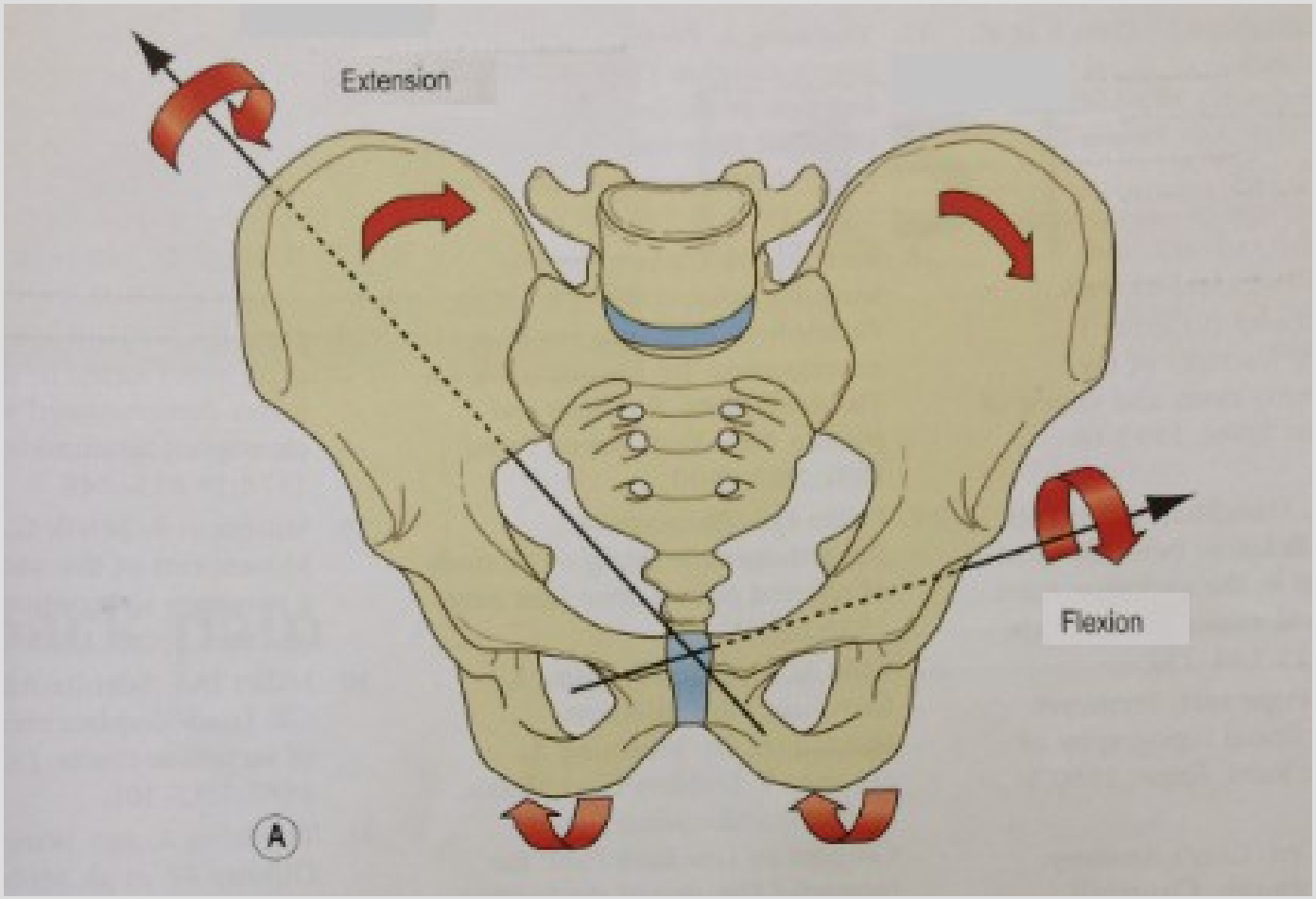
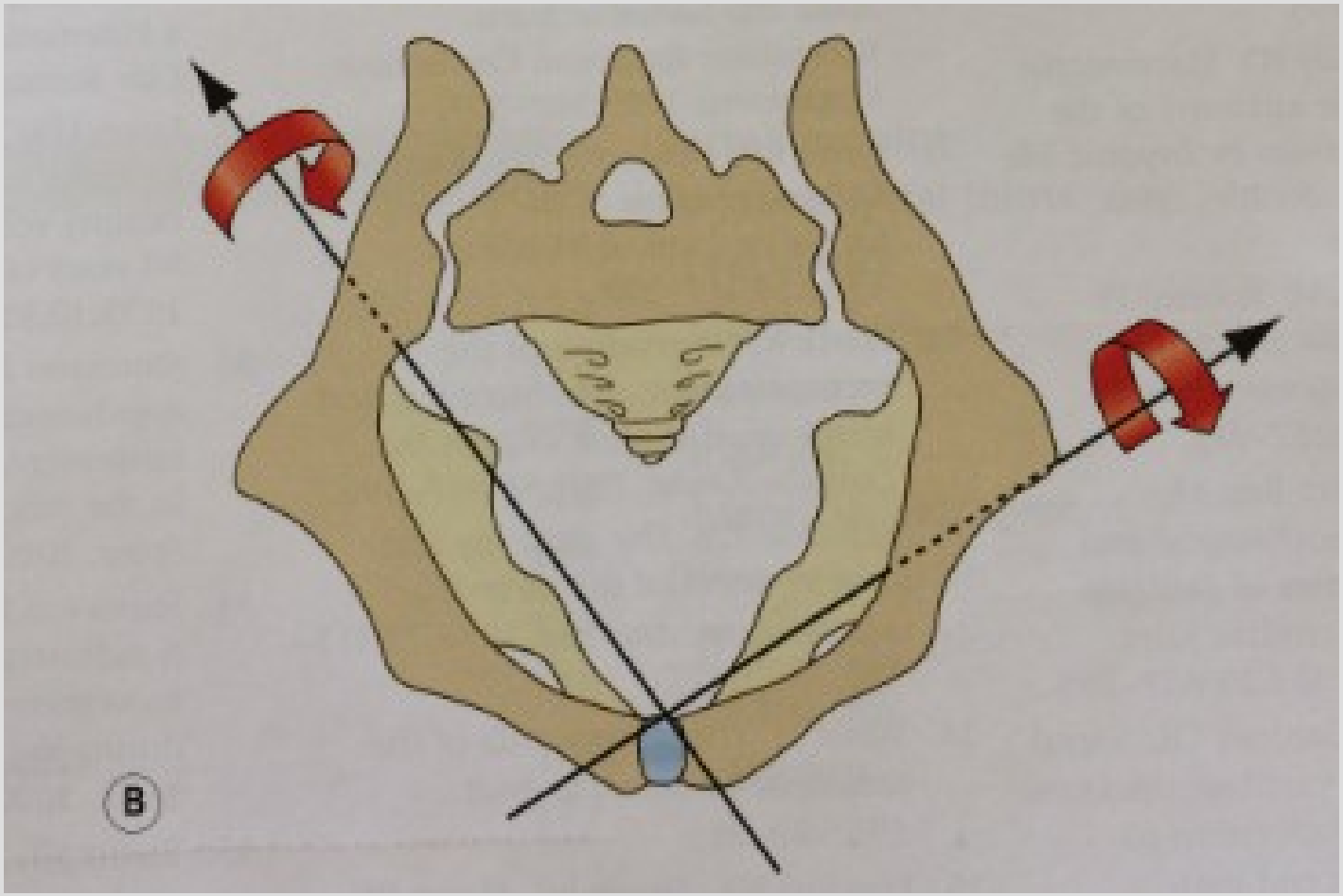


The lumbo – pelvic - hip complex: elements of biomechanics

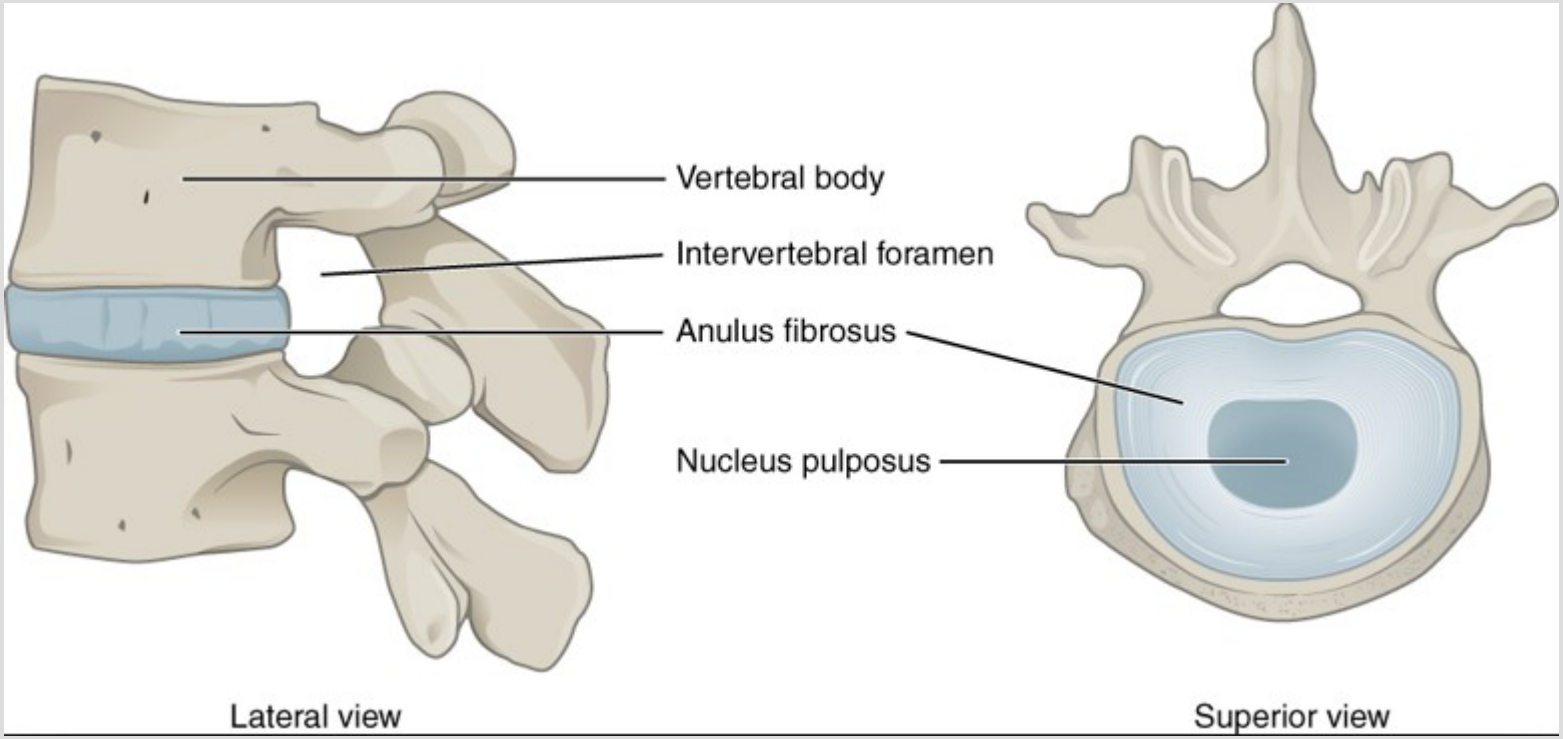
Why do we speak about lumbo – pelvic – hip complex?



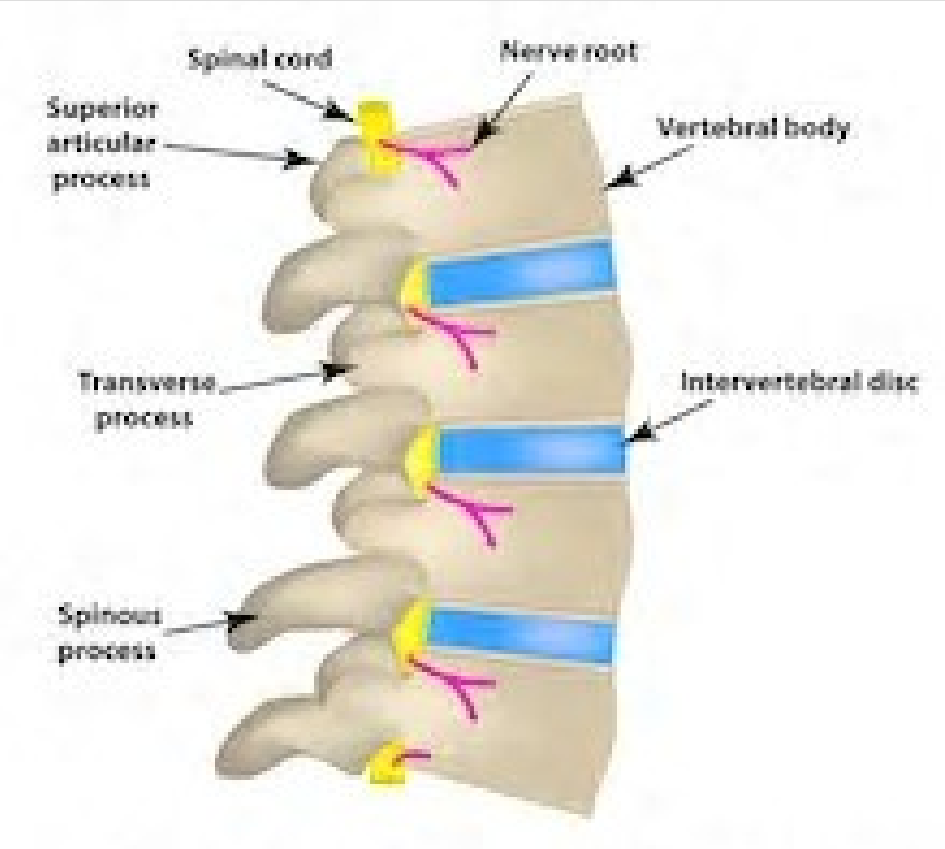
The lumbo – pelvic - hip complex: elements of biomechanics

Why do we speak about lumbo – pelvic – hip complex?

The last element we must consider in this complex is the intervertebral disc.



The lumbo – pelvic - hip complex: elements of biomechanics



Function of the intervertebral disc:

- to allow movement between vertebral bodies

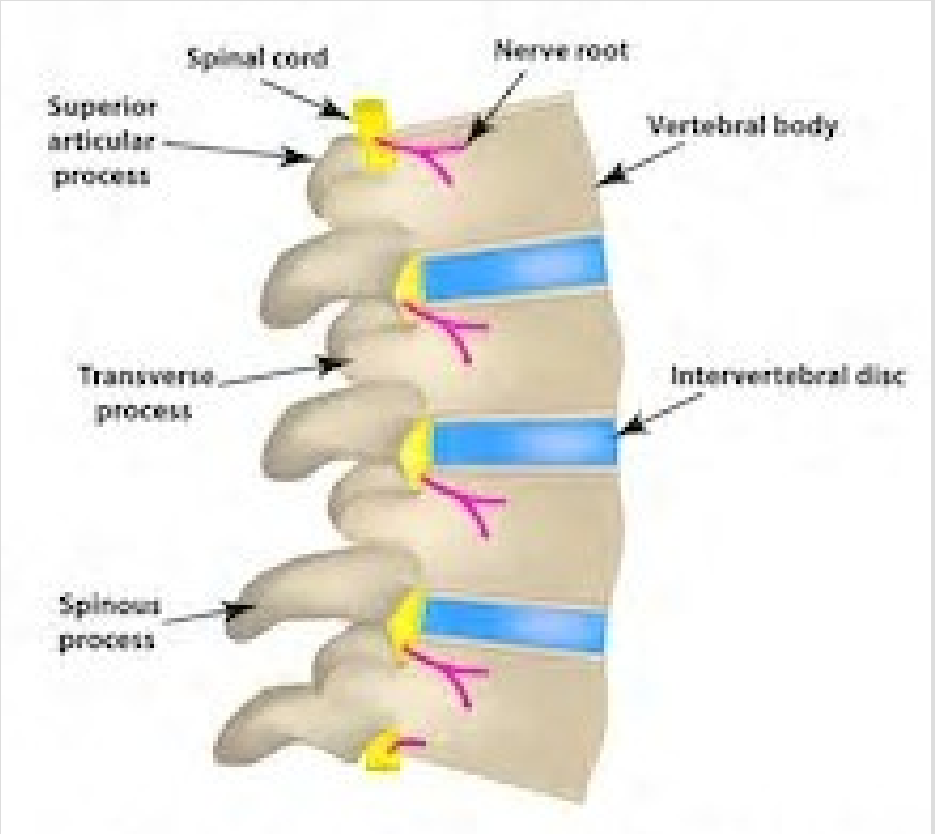
- to transmit loads from one vertebral body to the next

- to absorb and store energy

The lumbo – pelvic - hip complex: elements of biomechanics

Why do we speak about lumbo – pelvic – hip complex?

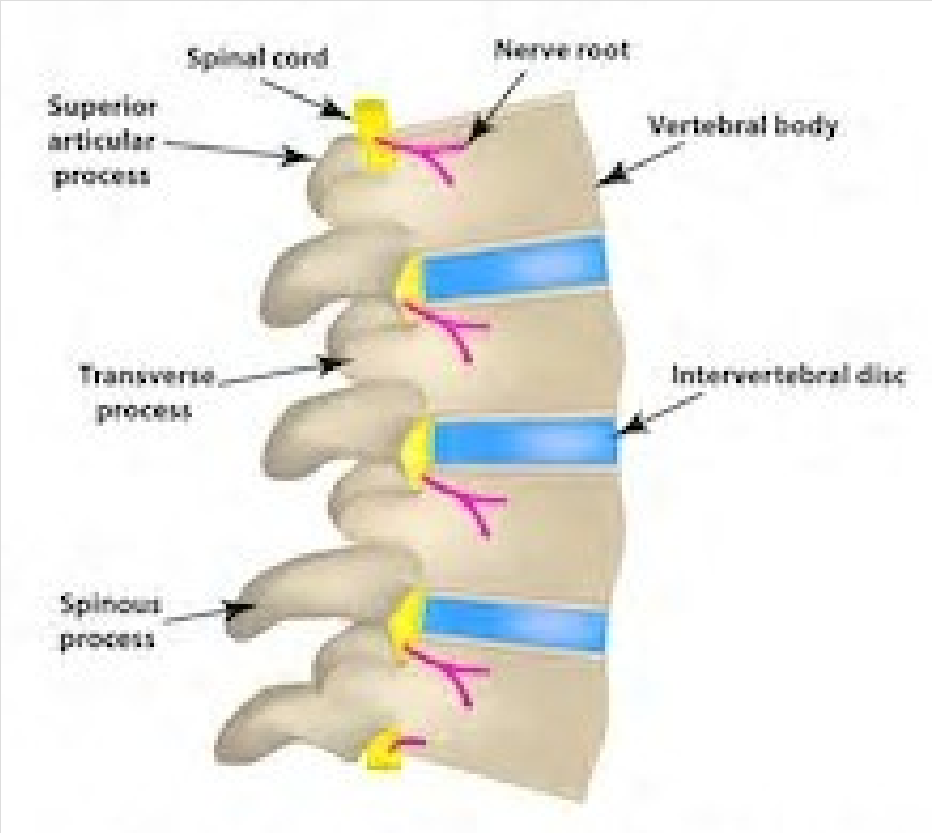
The resilience of intervertebral disc enables it to act as a shock absorber.



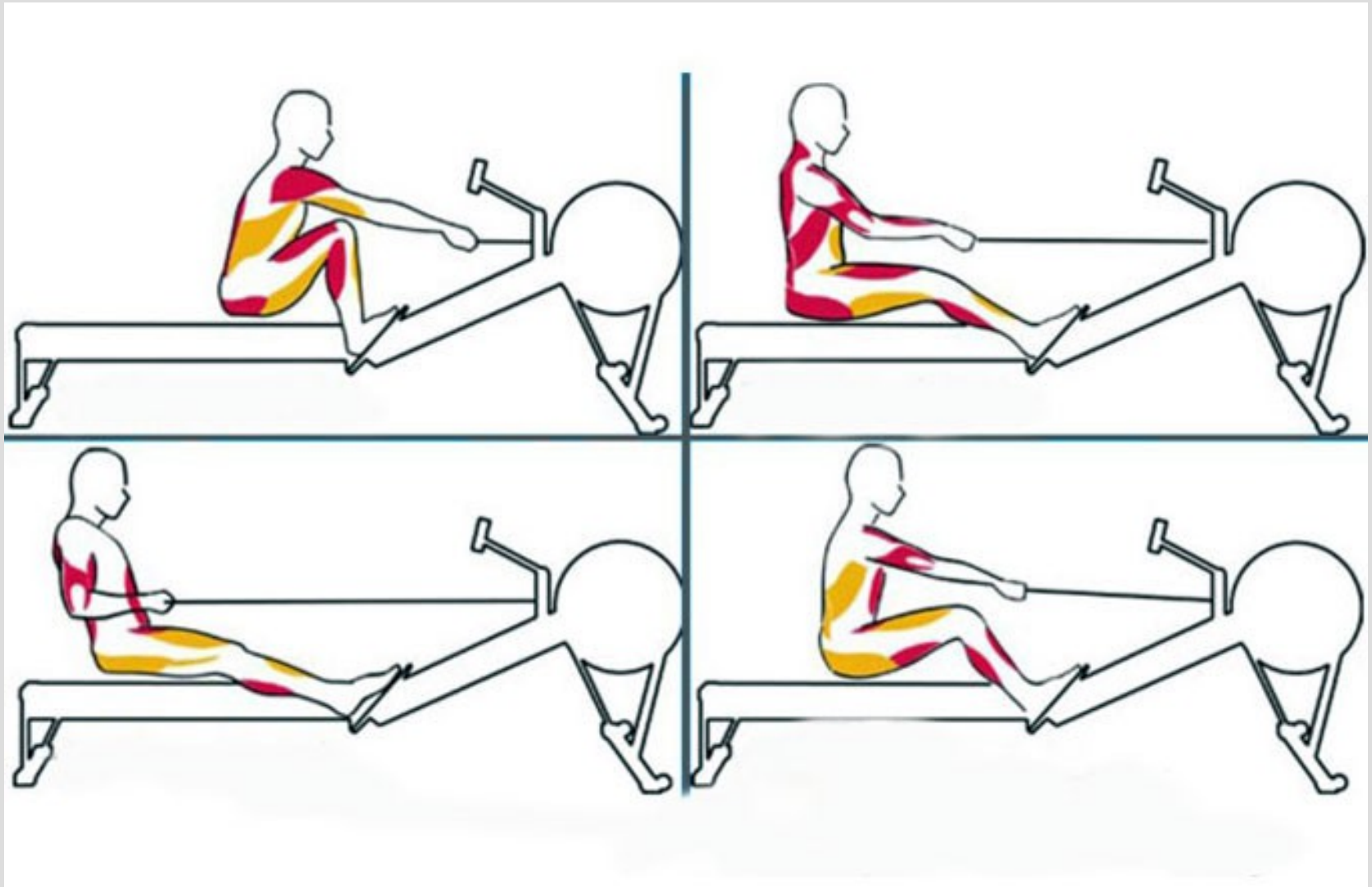
The lumbo – pelvic - hip complex: elements of biomechanics

Why do we speak about lumbo – pelvic – hip complex?

Any change in proteoglycan and water contenent of the nucleus will inevitably alter the mechanical properties of the disc



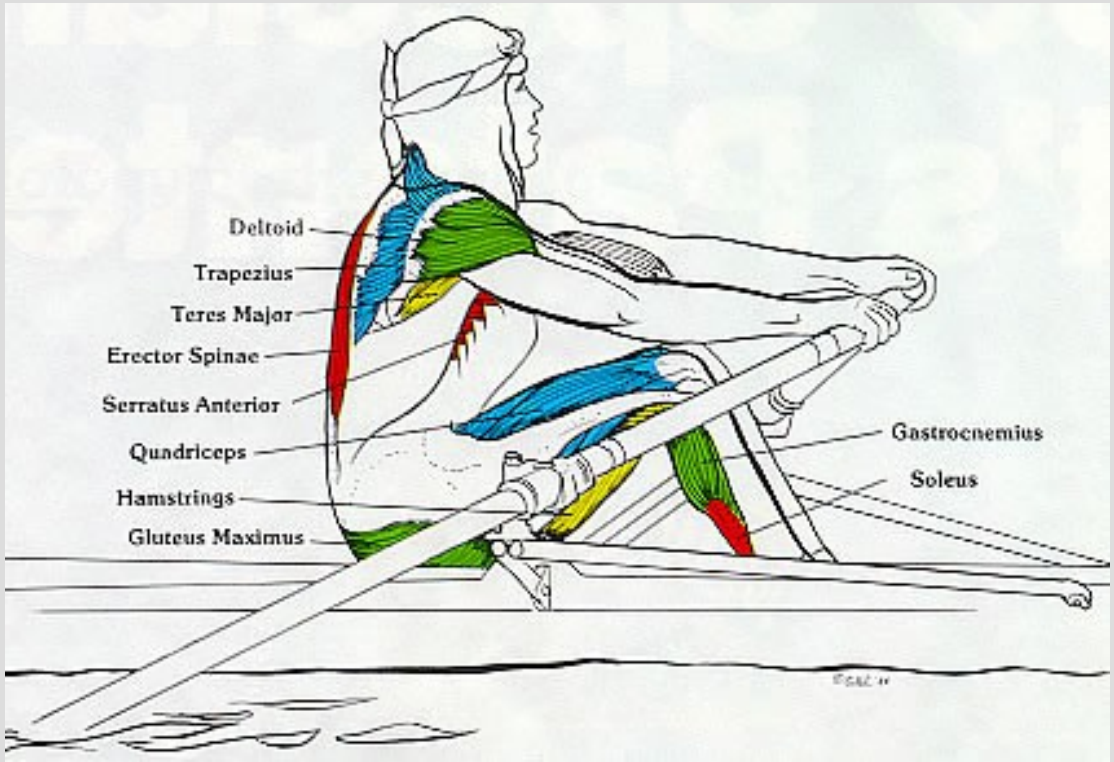
The lumbo – pelvic - hip complex: the biomechanics of rowing



The lumbo – pelvic - hip complex: the biomechanics of rowing

- As you know in rowing you need a great mobility of this complex to have a good movement
- How I can you preserve it?

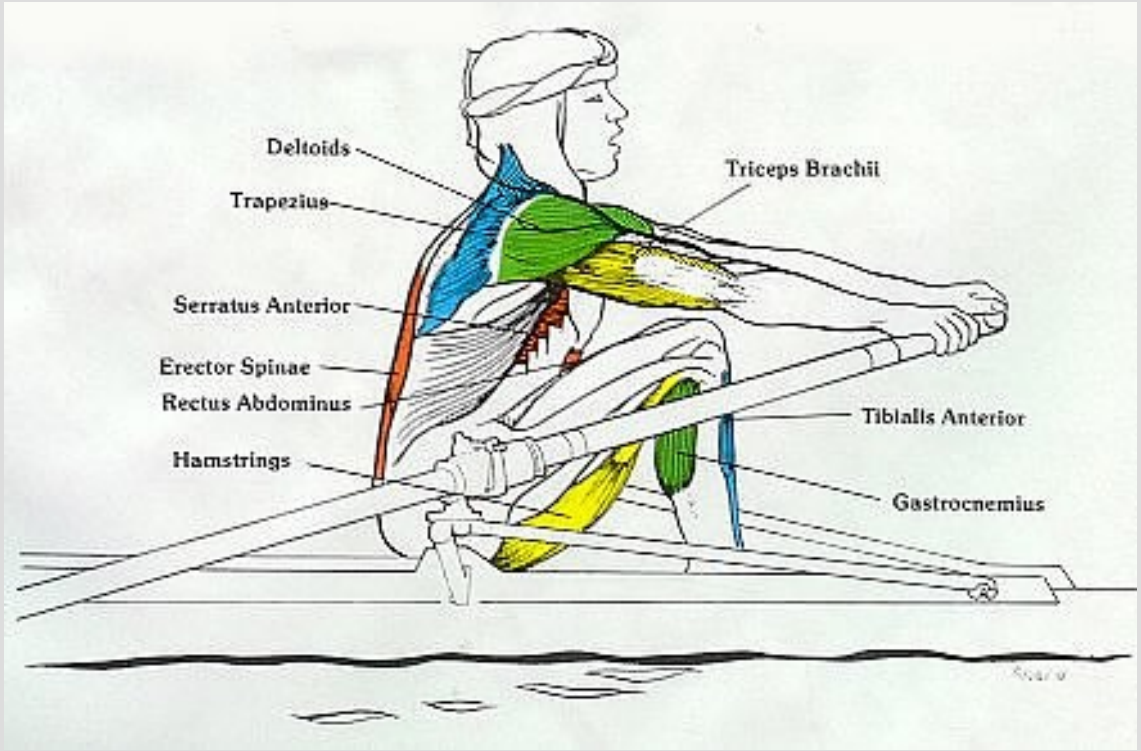
Muscolar tensions influence lumbo – pelvic – hip complex



The lumbo – pelvic - hip complex: the biomechanics of rowing

To maintain free the movement of lumbo – pelvic – hip complex it's necessary that all muscles with origin or insertion near this complex are free to contract and release.

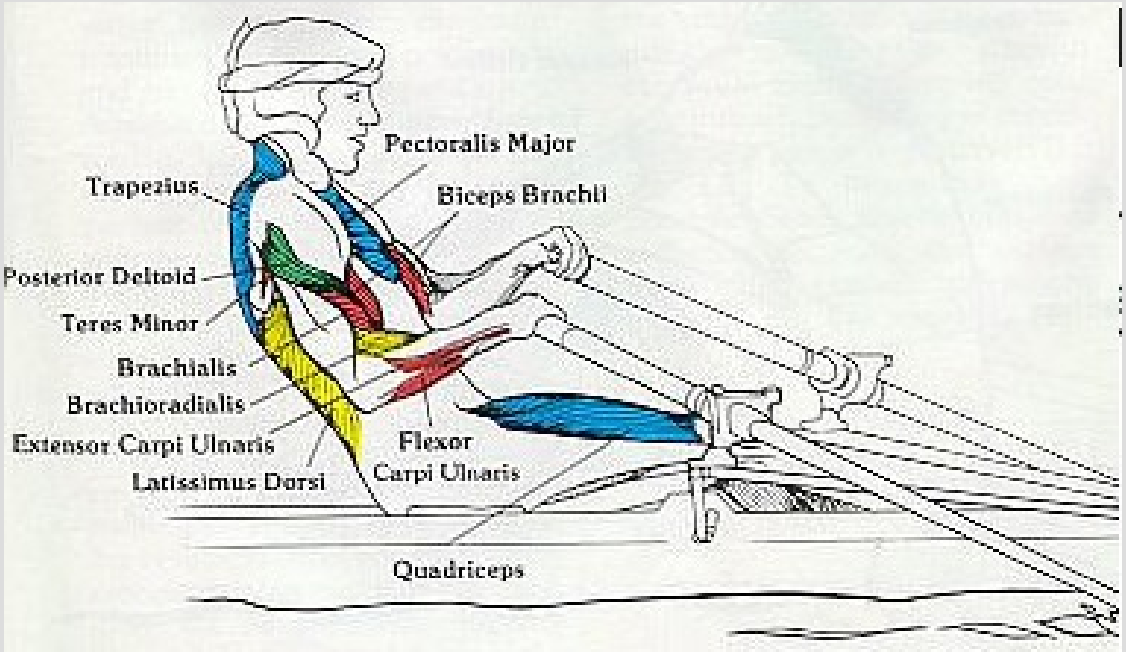
- A great tension in hamstrings can affect the possibility of pelvic complex to rotate anterior



The lumbo – pelvic - hip complex: the biomechanics of rowing

To maintain free the movement of lumbo – pelvic – hip complex it's necessary that all muscles with origin or insertion near this complex are free to contract and release.

similarly a great tension in quadriceps can affect the possibility of the complex to rotate posteriorly.



The lumbo – pelvic - hip complex: the biomechanics of rowing

What does it mean in rowing techique?

- If the pelvic complex diminuite the possibility to rotate anterior, the rower has a bit limitation at the catch
- If the pelvic complex diminuite the possibility to rotate posterior, the rower has a bit limitation at the final phase

The lumbo – pelvic - hip complex: the biomechanics of rowing

What does it mean in rowing technique?
The lumbo – pelvic – hip complex correct rotation protect the rower to back pain
Why?
Beacause it allows to these structures to move correctly so they can support the load required at the catch

The lumbo – pelvic - hip complex: the biomechanics of rowing

What does it mean in rowing technique?

At the catch, when the oar becomes a fixing point to move the boat , the forces applied on vertebra L3 are about 660 N as 6 times the weight of the rower

The lumbo – pelvic - hip complex: the biomechanics of rowing

What does it mean in rowing technique?

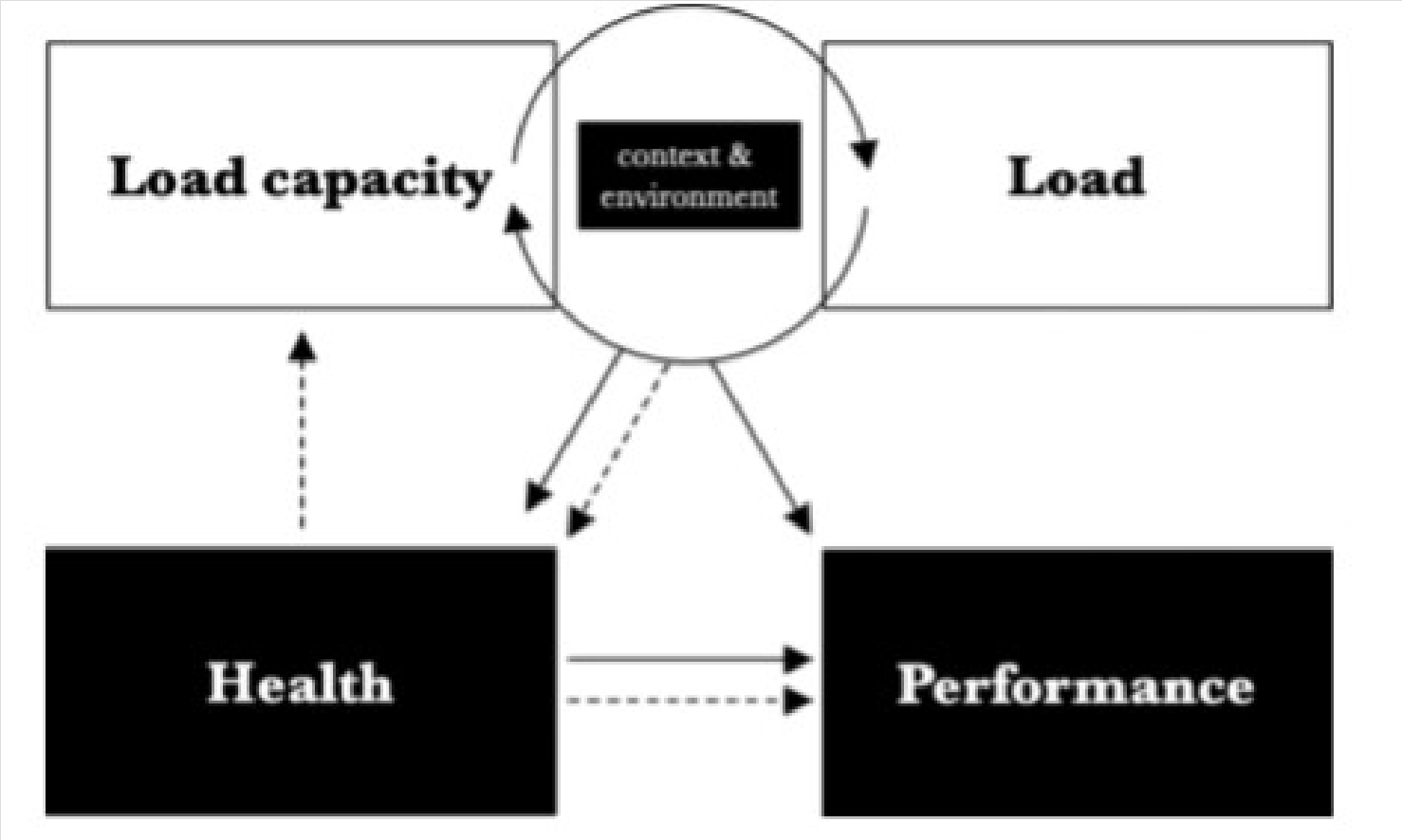
- Every minimal change in biomechanics can affect rowing technique and decrease the performance of your rower

The lumbo – pelvic - hip complex: how to prevent injury?

The science says:

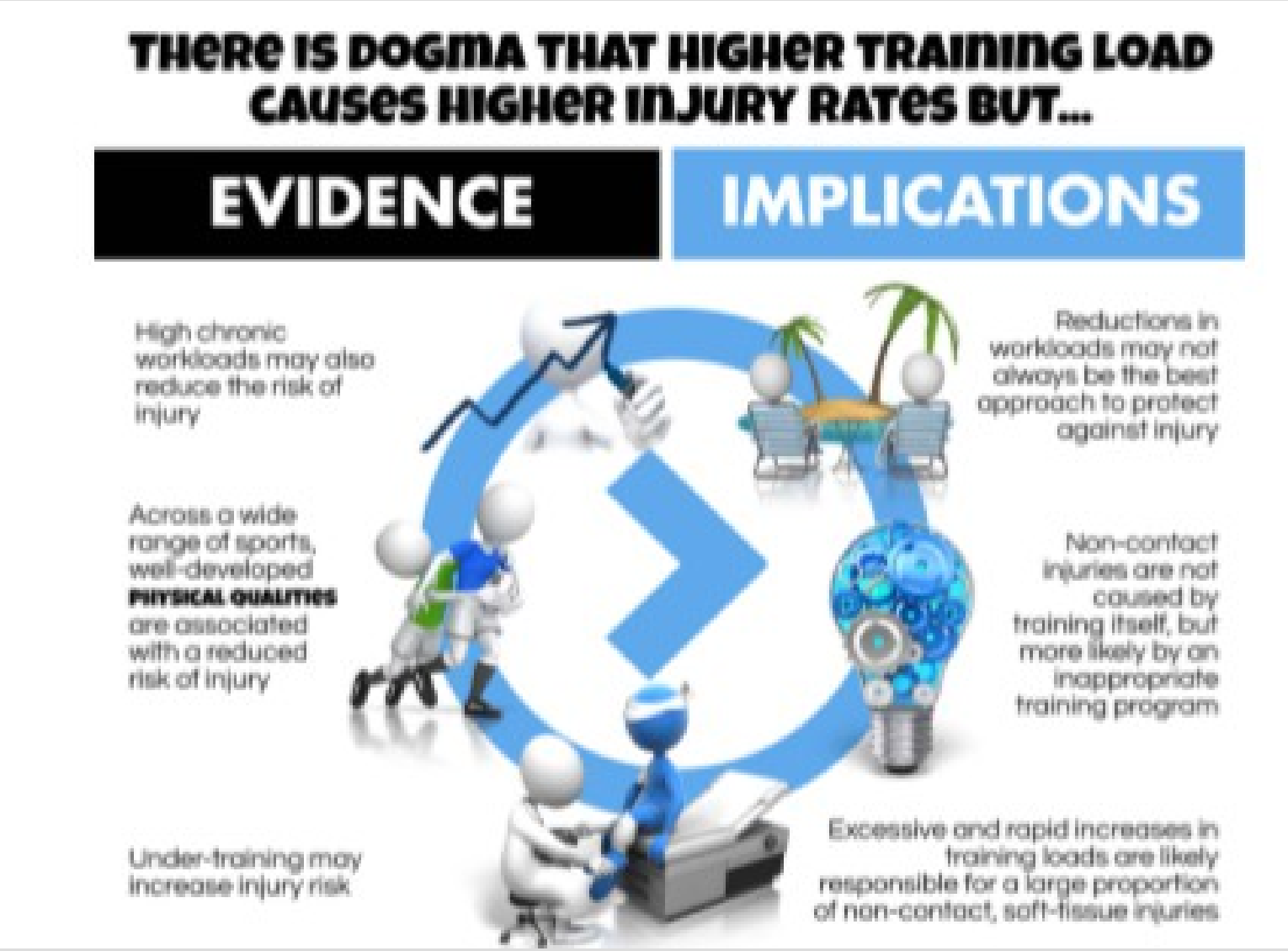
- The modifiable factors of load and load capacity, and the outcomes of performance and health are interlinked. Any change in one component of the model affects others.
- There is a paradox in training – injury prevention
- The workload – injury aetiology model
- Being active might be a good thing to reduce pain, including LBP, as long as the rate of increase in activity is managed appropriately and other relevant factors (eg, sleep, mood, relationships) are also addressed.

The lumbo – pelvic - hip complex: how to prevent injury?



The lumbo – pelvic - hip complex: how to prevent injury?

The paradox in injury prevention



The lumbo – pelvic - hip complex: how to prevent injury?

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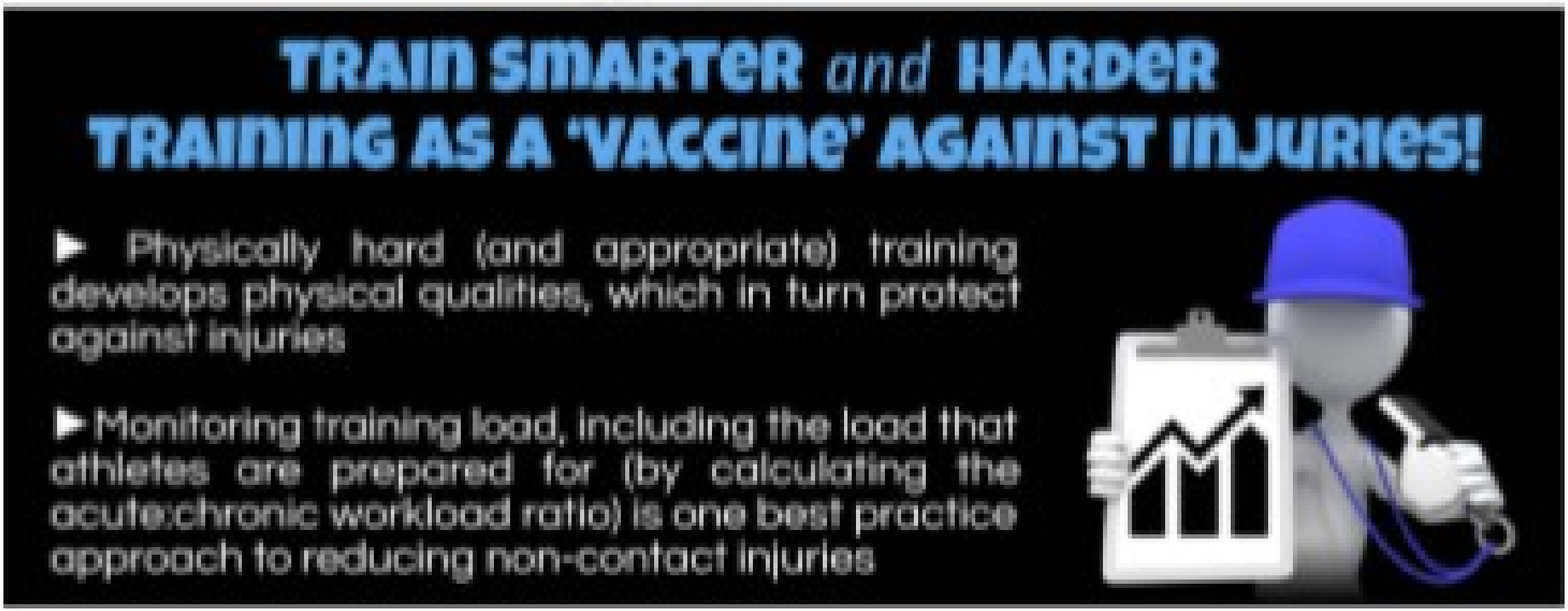
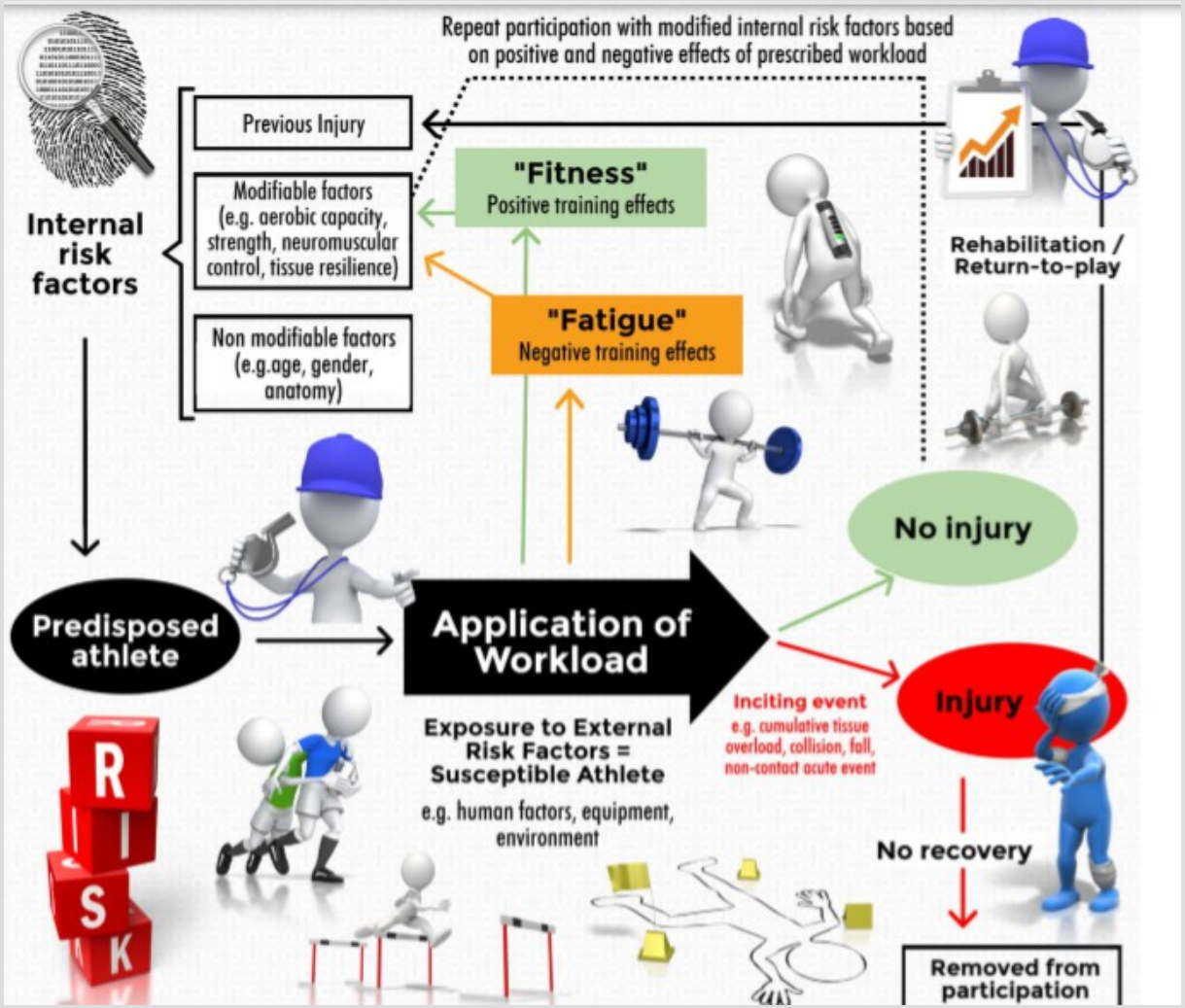
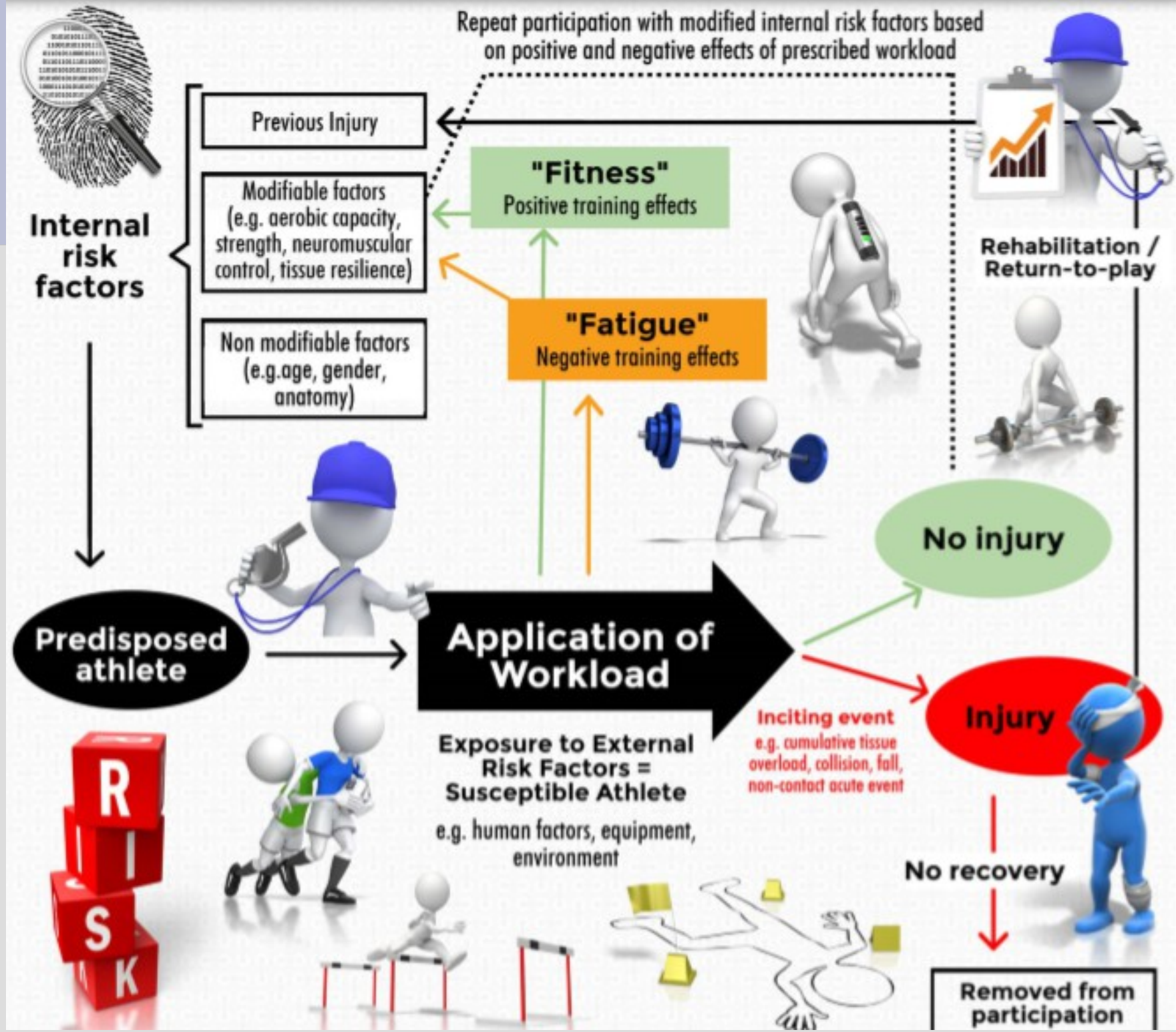


The lumbo – pelvic - hip complex: how to prevent injury?

The workload – injury aetiology model




Repeat participation with modified internal risk factors based on positive and negative effects of prescribed workload
Internal risk factors
Previous Injury
Modifiable factors (e.g. aerobic capacity, strength, neuromuscular control, tissue resilience)
Non modifiable factors (e.g.age, gender, anatomy)
"Fitness" Positive training effects
"Fatigue" Negative training effects
Rehabilitation / Return-to-play
No injury
Predisposed athlete
Application of Workload
Exposure to External Risk Factors = Susceptible Athlete
e.g. human factors, equipment, environment
Inciting event
e.g. cumulative tissue overload, collision, fall, non-contact acute event
Injury
No recovery
Removed from participation
RISK

The lumbo – pelvic - hip complex: how to prevent injury?

- When an athlete has a Low Back Pain is important to maintain some form of activity
- Advocating complete rest and/or using bracing in such a situation could increase the risk of an athlete becoming a ‘chronic rehabber’ at risk of poor performance and recurrent pain/injury.
- Many markers commonly used to monitor training responses (eg, sleep, energy, mood, soreness) offer useful insights into the sensitivity of the athlete’s nervous system and provide opportunities to optimise their health.

The lumbo – pelvic - hip complex: how to prevent injury?

Low back pain

Fear and Avoidance

Blame their dangerous sport

Blame their vulnerable body

Excessive avoidance of load while in pain

Systemic factors not considered

Reduced fitness
Reduced performance
Vulnerability to further pain / injury

Resilience

Sport is not that dangerous

They are sore, but not vulnerable

Maintain load as much as possible

Consider systemic factors

Maintain fitness
Maintain performance
Resilient to further pain / injury

How responses to managing low back pain in athletes can influence outcomes

The lumbo – pelvic - hip complex: how to prevent injury?

There are a lot of simple strategies to prevent injuries:

- To preserve the range of motion of each articulation (stretching)
- To preserve the muscolar lenght
- To observe the incidence of injury in each athlete
- To use medical staff also to prevent and not only to care
- To use a correct reasoning to increase the load
- To avoid the total rest

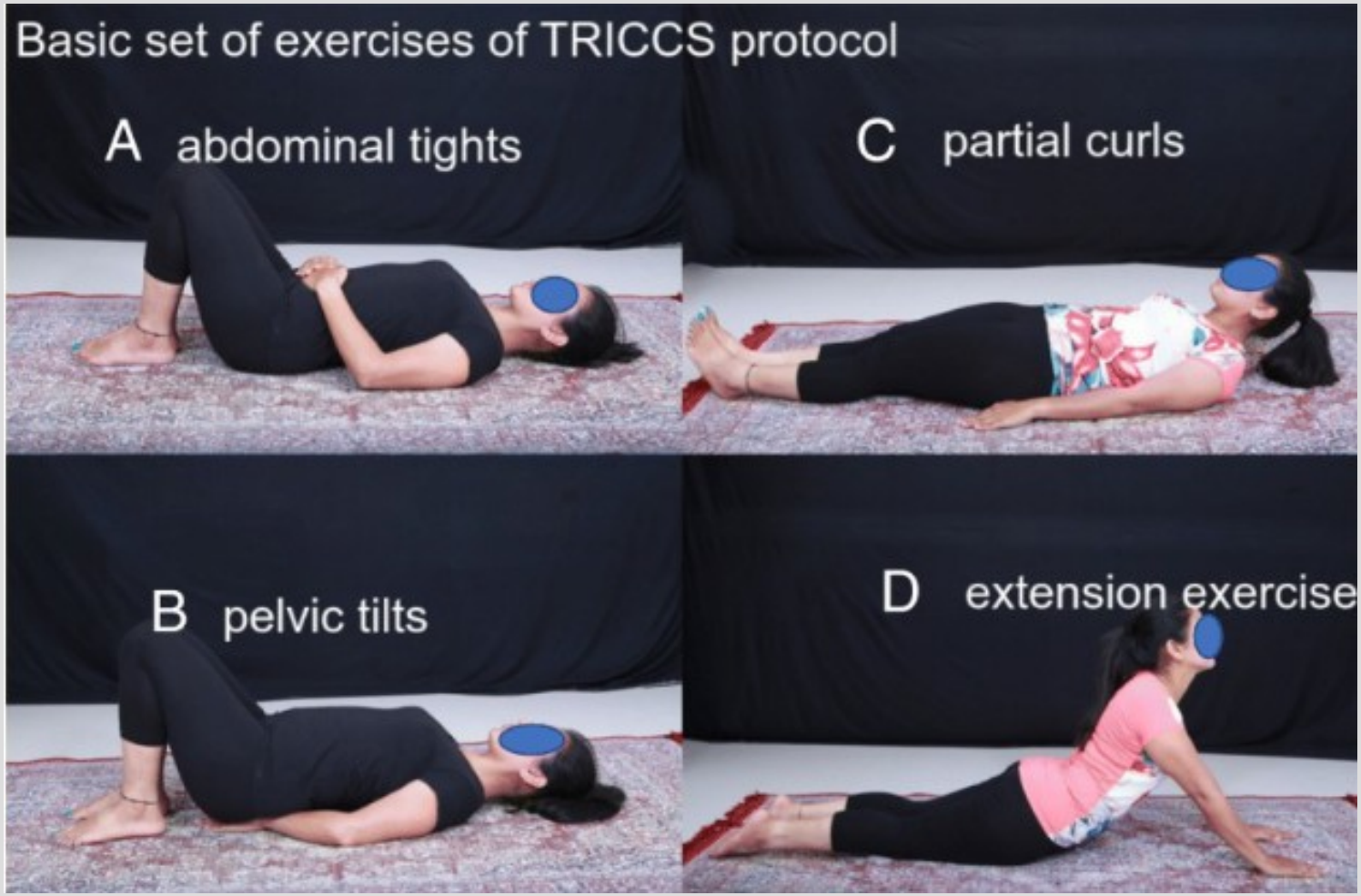
The lumbo – pelvic - hip complex: how to prevent injury?

The World Health Organisation suggests:

Category	Intervention	Low Back Pain Duration	
		Acute < 4 Weeks	Subacute or Chronic > 4 Weeks
Self-care	Advice to remain active	X	X
	Books, handout	X	X
	Application of superficial heat	X	
Non-pharmacologic therapy	Spinal manipulation		X
	Clinician-guided exercise		X
	Acupuncture		X
	CBT and/or mindfulness-based stress reduction		X
	Exercise which may include Pilates, tai chi, and/or yoga		X
Pharmacologic therapy	NSAIDs	X	X
	Non-benzodiazepine skeletal muscle relaxants	X	
	Antidepressants (duloxetine)		X
Other therapies	Intensive interdisciplinary rehabilitation		X

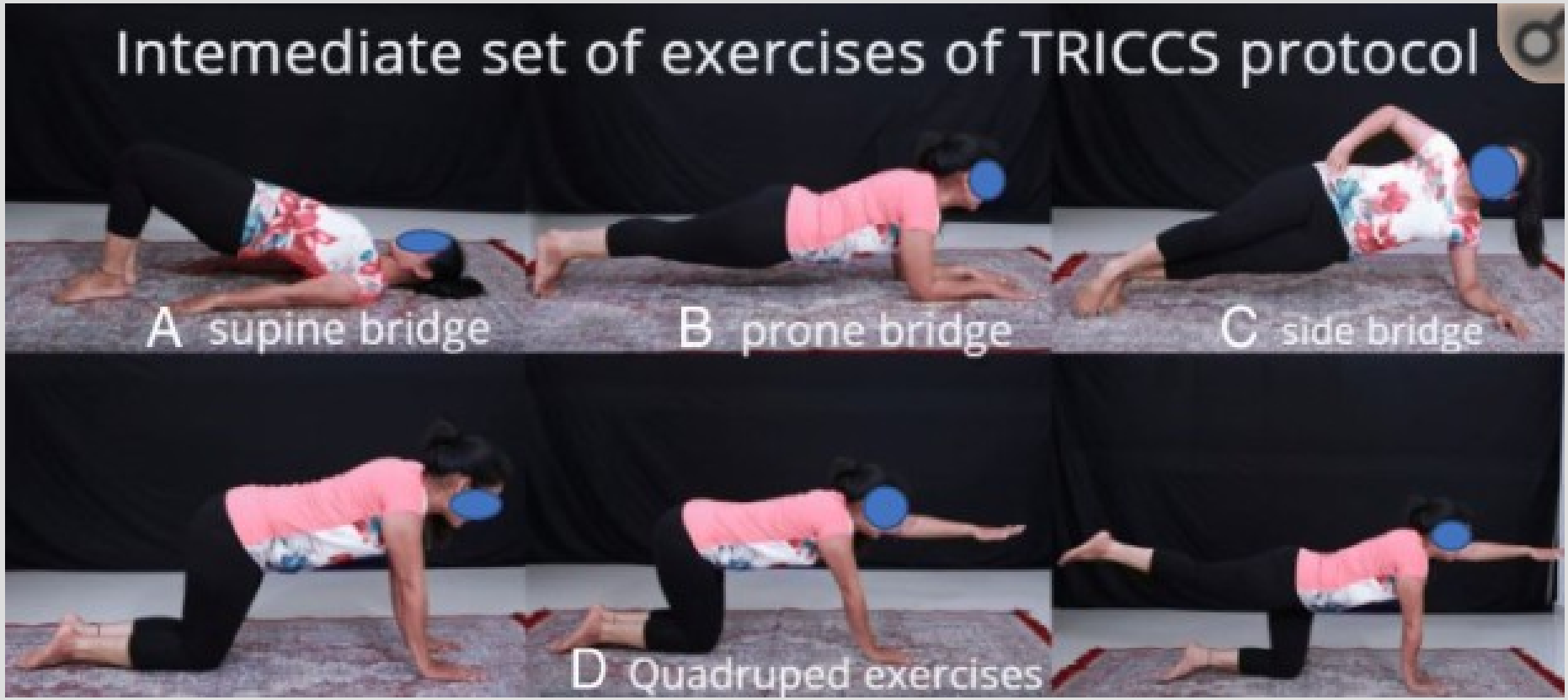
The lumbo – pelvic - hip complex: how to prevent injury?

Trivandrum Community-based Core Stabilisation protocol of treatment (TRICCS):



The lumbo – pelvic - hip complex: how to prevent injury?

Trivandrum Community-based Core Stabilisation protocol of treatment (TRICCS):



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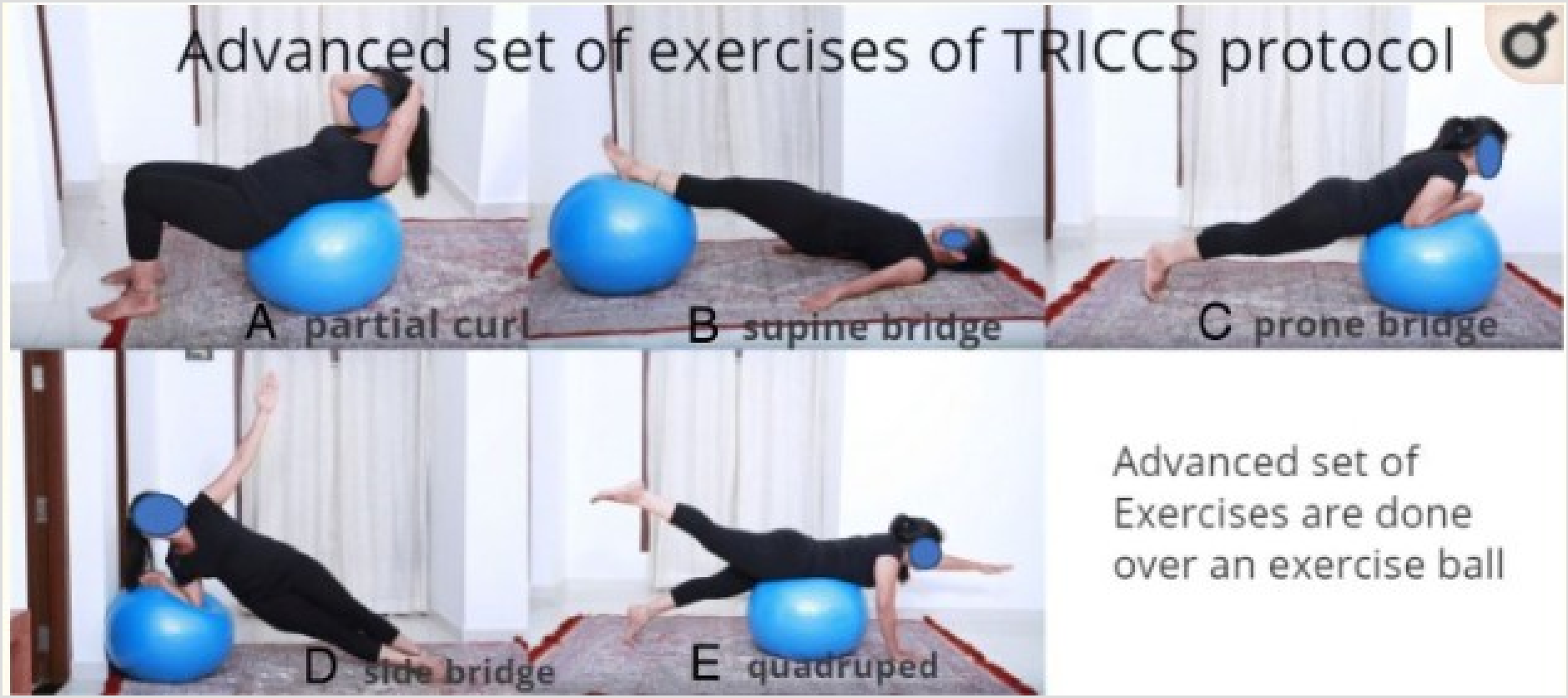
Trivandrum Community-based Core Stabilisation protocol of treatment (TRICCS):



The lumbo – pelvic - hip complex: how to prevent injury?

The lumbo – pelvic - hip complex: how to prevent injury?

Stretching:

The lumbo – pelvic - hip complex: how to prevent injury?

Stretching:

The lumbo – pelvic - hip complex: how to improve the rowing technique?

In my unpretentious opinion you can try:

- To improve proprioception regard itself and the crew
- To improve self – confidence
- To improve the sensibility of the boat
- To improve the compliance with the rest of the crew in term of “verbal communication” and “bodies communication”

The coordinated movement of the lumbo – pelvic – hip complex during rowing. How to prevent injury and improve the rowing technique.

FALEMINDERIT ΣΑΣ ΕΥΧΑΡΙΣΤΟΥΜΕ KIITOS

MULŢUMESC СПАСИБО TERIMA KASIH

AČIŪ DĚKUJI நன்றி MERCI KÖSZÖNJÜK

RAHMAT **THANK YOU** TAK

СПАСИБІ MAZVITA ENKOSI დიდი მადლობა

ありがとうございました BEDANKT DANKE

HVALA DANKIE ХВАЛА TEŞEKKÜRLER תודה

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