Neuramuscalar Reducation in the proprioception exercises after ACL reconstruction

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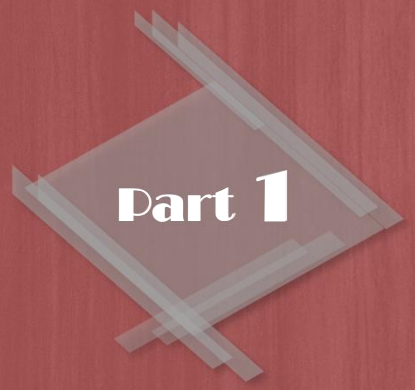
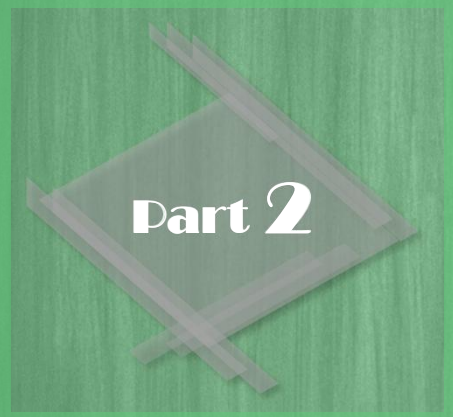
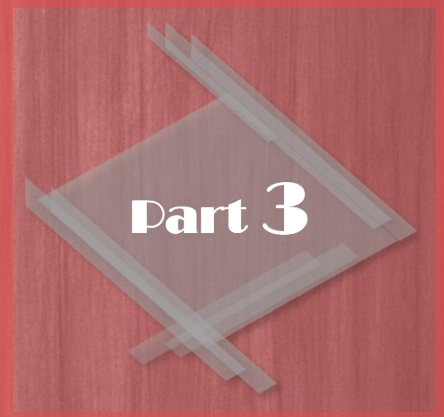
Contents



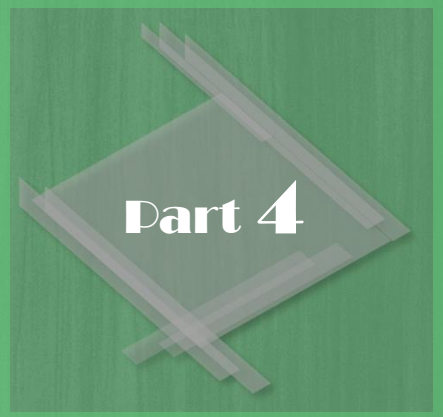
ACL Injury And Reconstruction



Proprioception And ACL



Neuromuscular Reeducation



Summary

Part 1

ACL Injury And Reconstruction

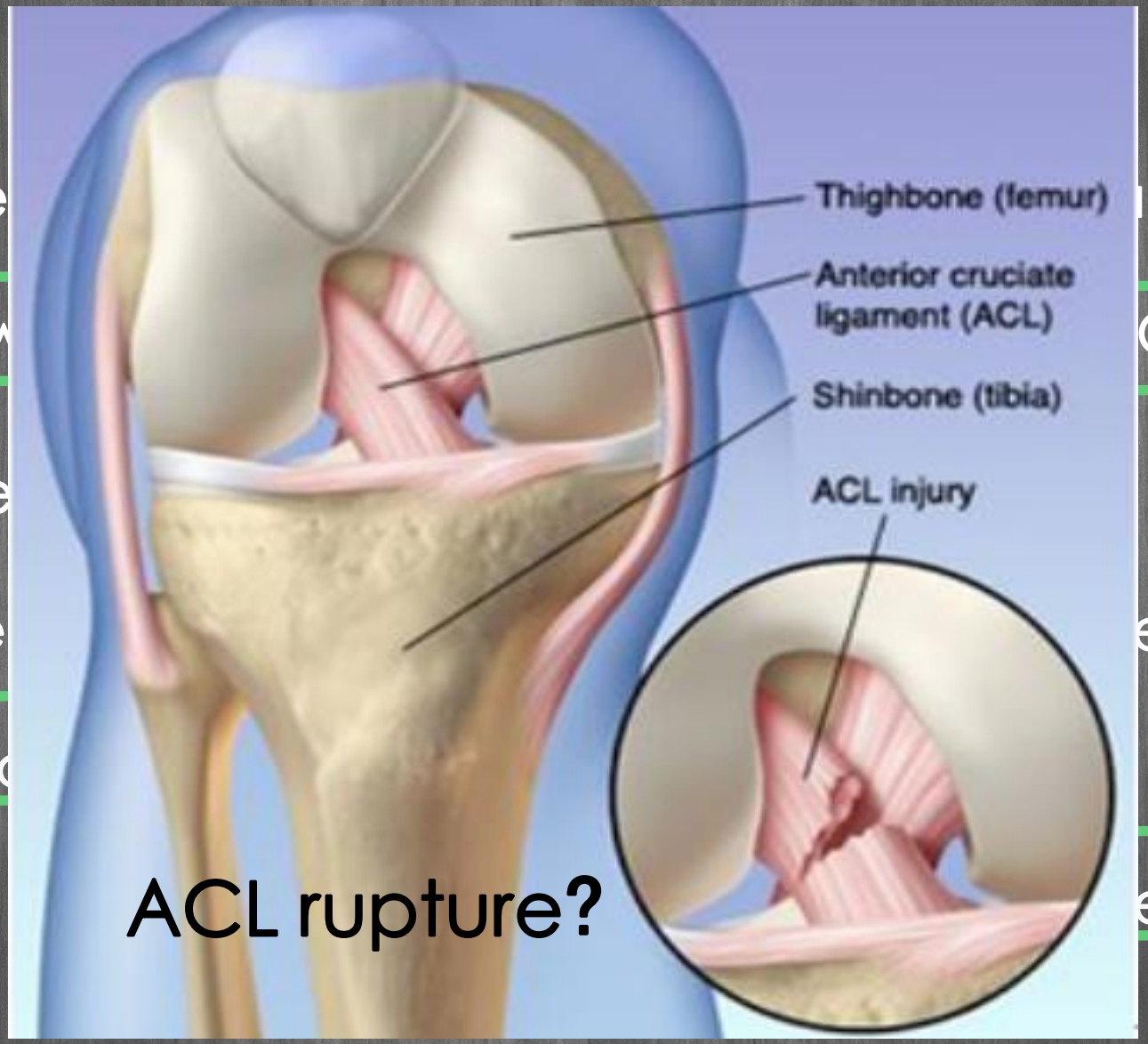
Case analysis

- Male,35Y
- Sprained the ll ,after the injury ,

  the joint is sw OM.
- Preoperative

  Swolle e knee

  Anteric
- MRI : Swollen e.



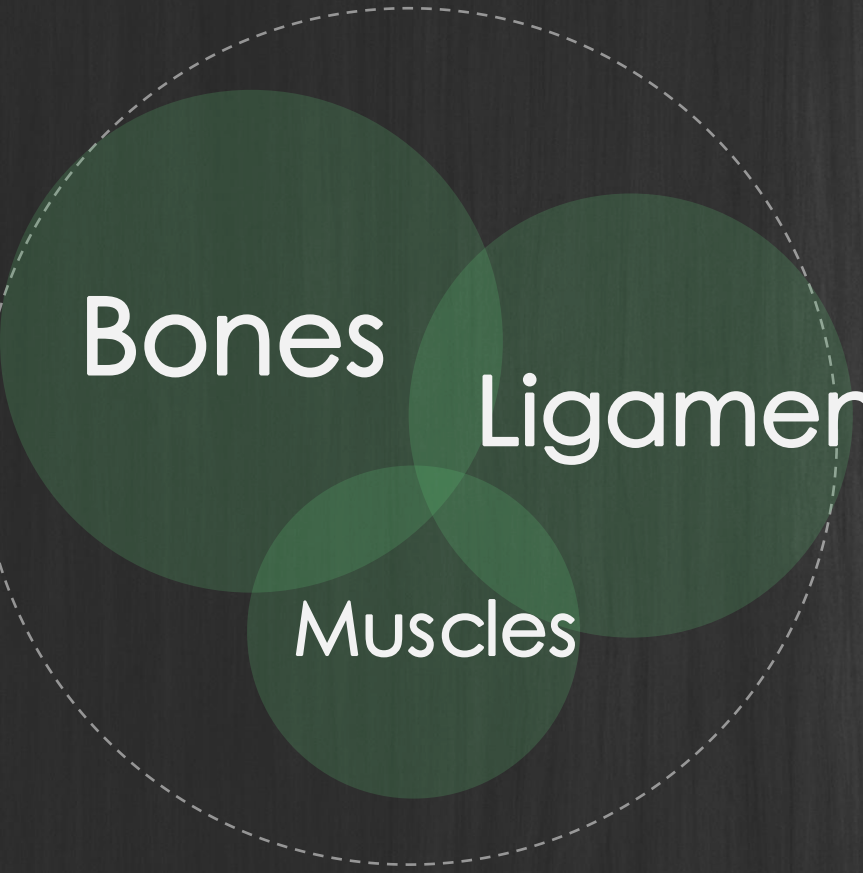
(Wei M,2011)

The knee joint

(www.google.com)

(www.56.com)

The anatomy of the knee joint



Bones Femur Tibia Fibula Patella

Ligaments MCL LCL ACL PCL Ect.

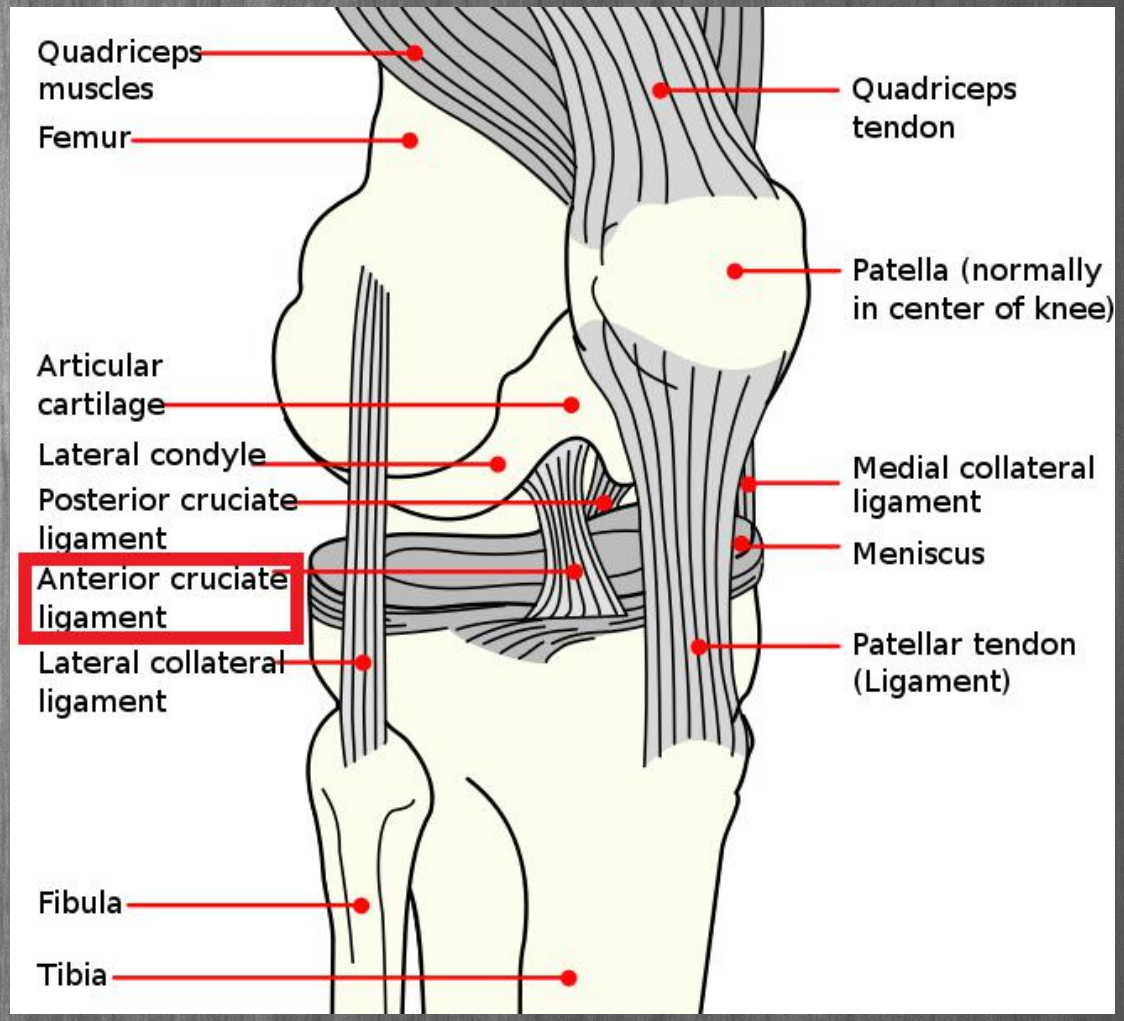
Muscles Quardriceps femoris
Biceps femoris
Semimembranosus muscle
Slender m.

(Hewett TE,2012)

The kinematic function of ACL

- Restrict the excessive forward of the tibia.
- Restrict the hyperextension.
- Restrict the rotation of the tibia.
- Restrict the movement in the coronal plane.

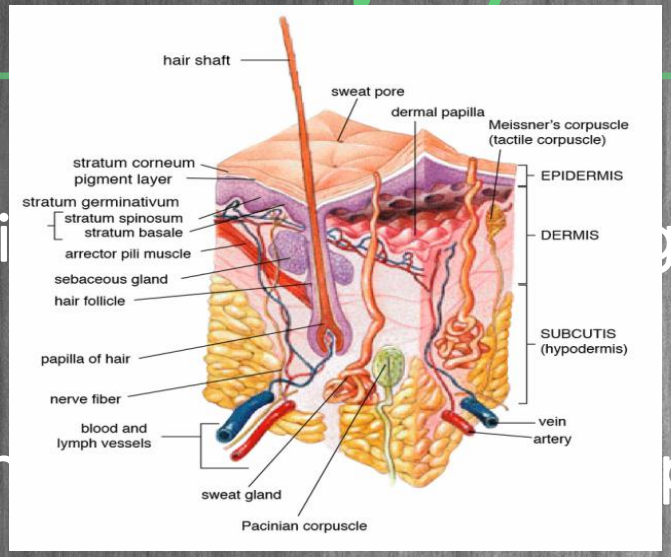
(Angoules, Mavrogenis,2011)

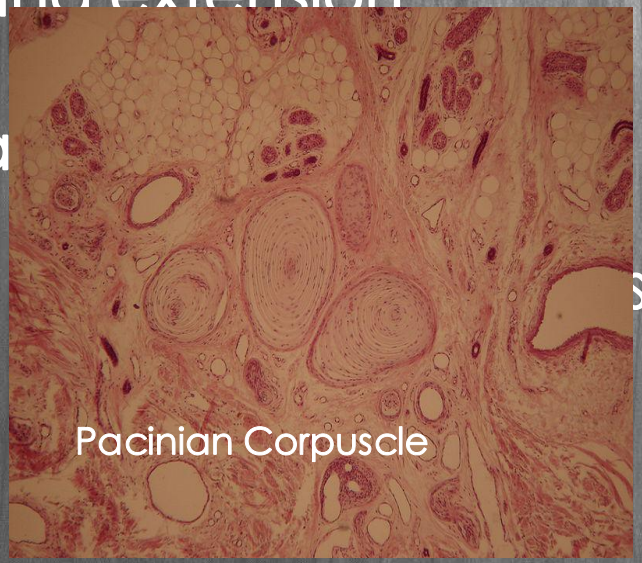


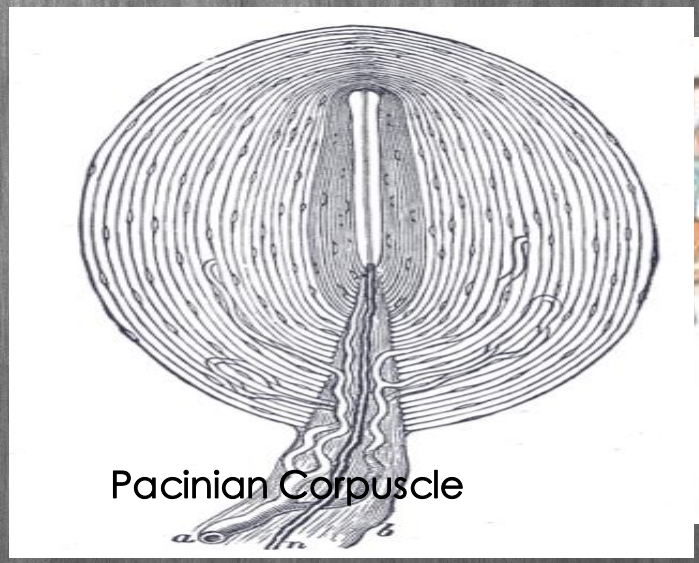
The injury mechanic of ACL torn

The excessi g th
positions:

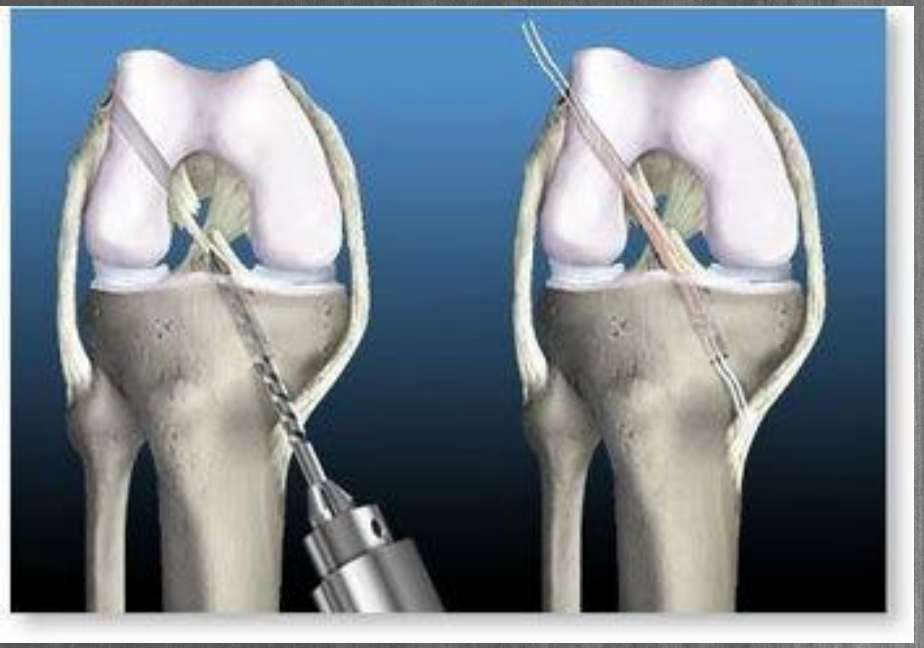
- Shift of th plo
- Flexion and extension
- Lateral a SW,



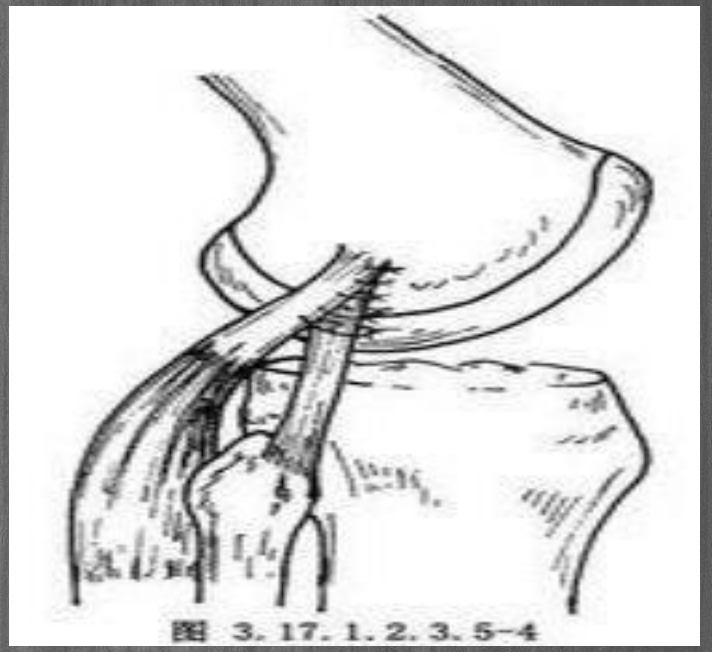




Surgical methods



Femur-Patella-Tibia



Autologous- Hamstring tendon transplant

The destroy of the proprioception receptors.

(Madhavan S,2011)

Case analysis

- Arthroscope surgery in the 23th Sep .: Taking the hamstring tendon and doing the ACL reconstruction.
- Postoperative assessment:

  AROM:14~87° ,PROM:5~90° , Muscle strength 3/3+,

  VAS :static:0/10 , Dynami:2/10,

  Arthredema slightly in the left knee

Problems?

Case analysis

- Rehabilitation Plan::

1Week:Knee CPM ,Ankle pump, Quardriceps femoris isometric contraction.

2-3Week:As the1st week but deepen,add patella manipulation.

4-6Week :Muscle strength exercises and Manipulation (AP+Longitude).

Squat slightly when against the wall, cycle ergometer.

29th Oct : Try to do weight bearing exercises

Case analysis

- Reassessment after 6 weeks:

  AROM:7~90° ,PROM:0~95° , Muscle strength 4-/4+

  VAS :static:0/10 , Dynami:0/10

- Difficulties during the gait cycle： Unbalance during weight bearing.

After the exercises as be planed ,
the unbalance in the gait still remain…

Why?

So...What we do are:

The assess of knee proprioception

1) Joint position sense test (JPS) of the knee;

2) Evaluation of unipodal postural control (PC);

3) Step up and down (SUD) test.

(Tássia Silveira Furlanetto,2016)

Joint position sense test (JPS) of the knee

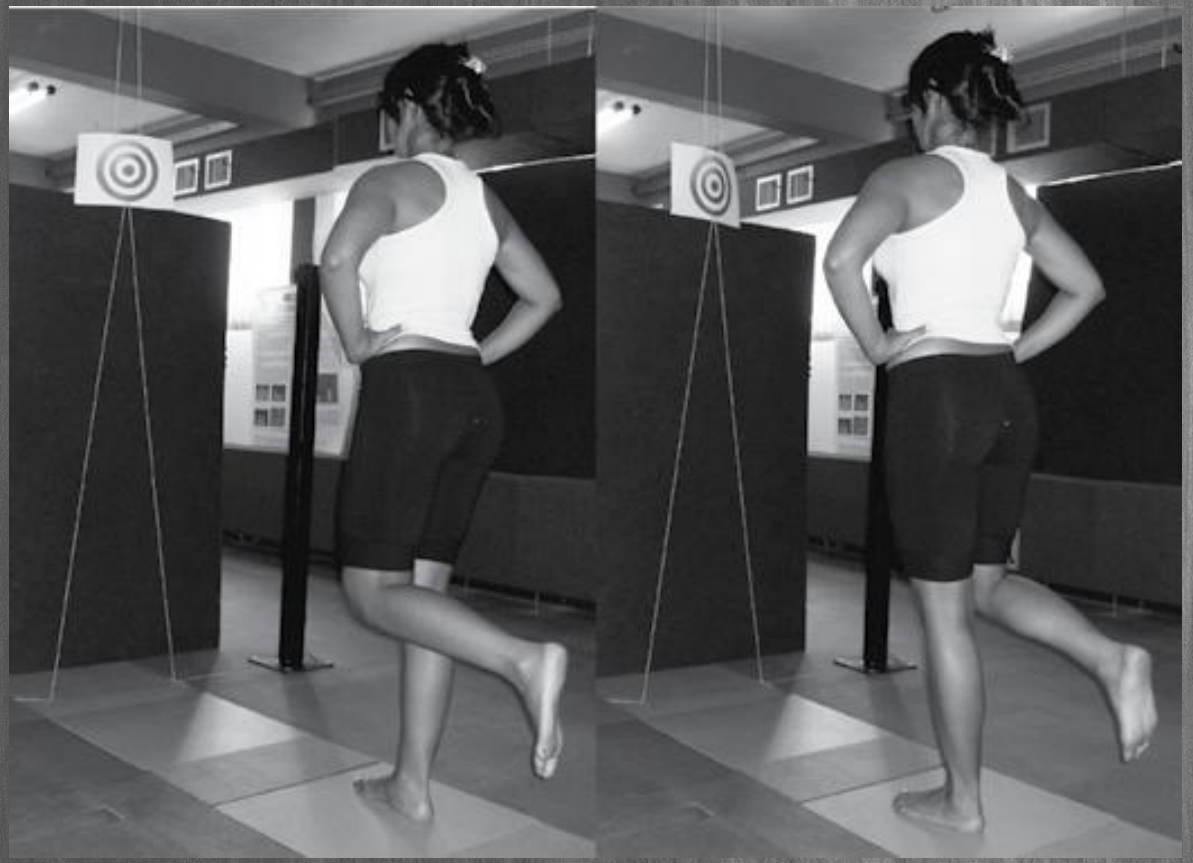
Three mark points:

- Greater trochanter of the femur
- Articular line of the knee
- Lateral malleolus

- Prone position , without visual contact with the LLs
- Flex the knee passively , measure the angle,
- Repeated the position immediately
- Performed at 90° and 40° knee flexion.

(Tássia Silveira Furlanetto,2016)

Evaluation of unipodal postural control (PC)

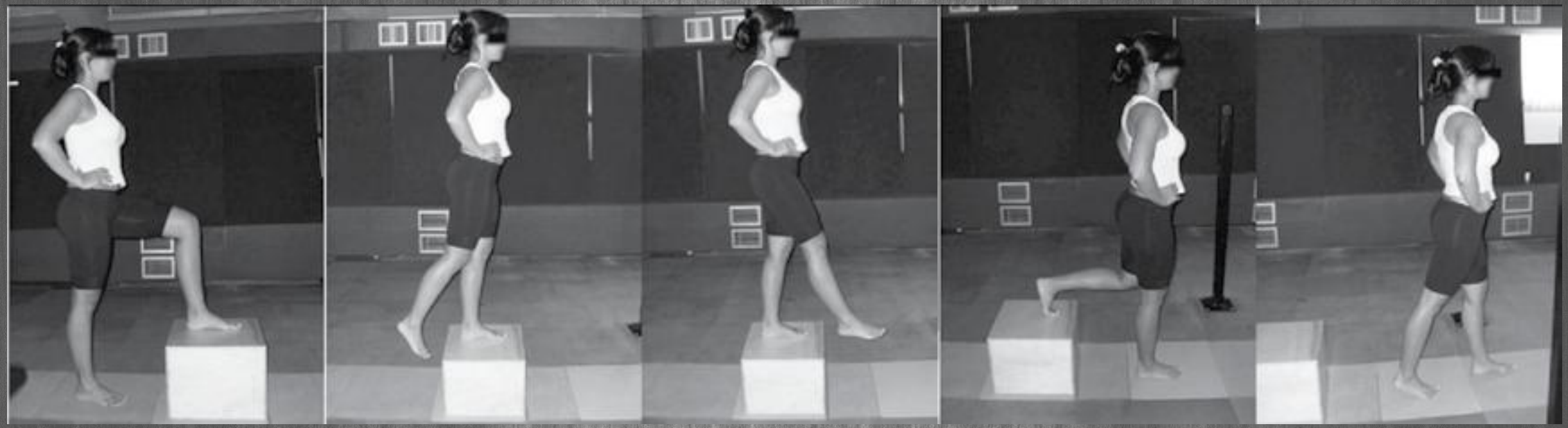


- Three records lasting for 30 sec each.
- Performed in the semi-static position
- Remain still in the indicated position with his/her hands on the anterosuperior iliac crests (ASIC)
- Gaze on a target, located 1m from the eye

.

(Tássia Silveira Furlanetto,2016)

Step up and down (SUD) test



- Step to a 30 cm high wooden box placed in P1
- Patient in static position, legs together and hands on ASIC
- Climbed the step (P1) with one of his/her LLs and descended it by stepping on P2
- Continuous single movement

(Tássia Silveira Furlanetto,2016)

Part 2
Proprioception And ACL

1 What is proprioception

The sixth sense

Proprioception

- Joint movement sense
- Joint position sense

"Proprioception is essential for well-adapted sensorimotor control."

Arockiaraj J, Korula R J, Oommen A T, et al. Proprioceptive changes in the contralateral knee joint following anterior cruciate injury.[J]. Bone & Joint Journal, 2013, 95-B(2):423–431.

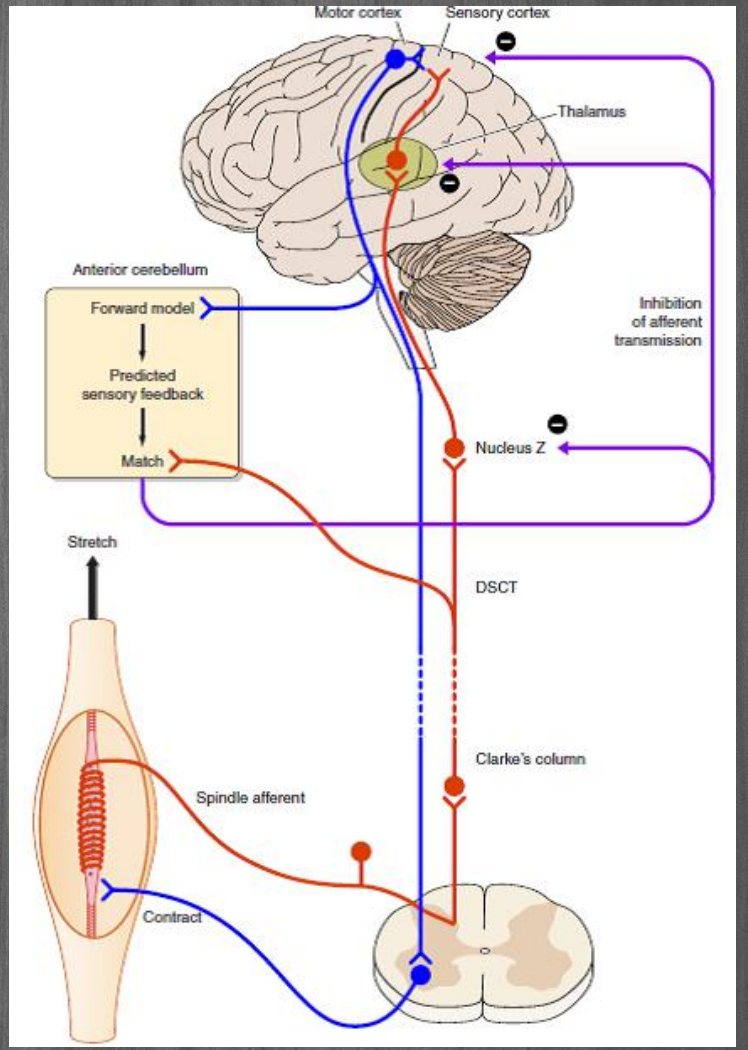
2 How Proprioception Works

Mechanoreceptors

Central Nervous System

Nervous pathways

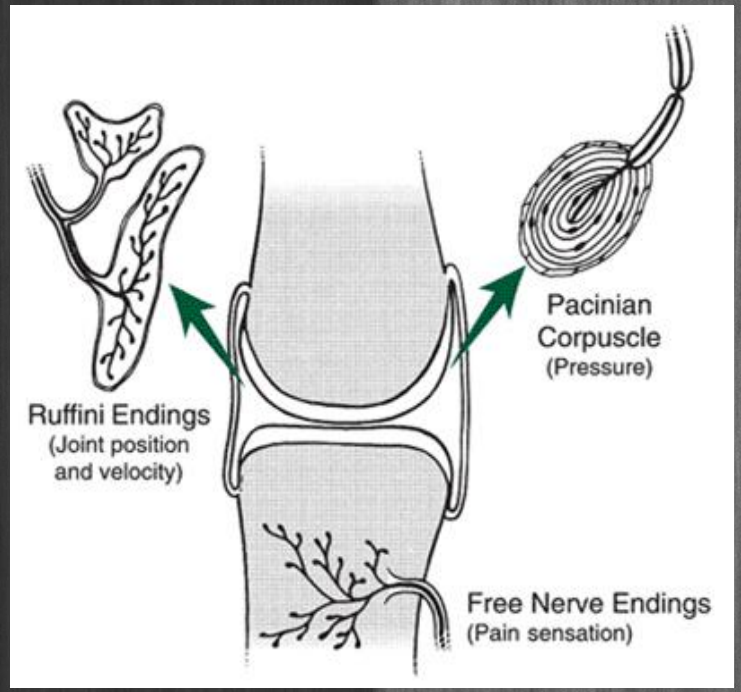
Muscle



Relph N, Herrington L, Tyson S. The effects of ACL injury on knee proprioception: a meta-analysis.[J]. Physiotherapy, 2014, 100(3):187-195.

2 How Proprioception Works
——Mechanoreceptors in ACL

- Dynamic Receptors
  - Pacinian corpuscle
    帕西尼小体

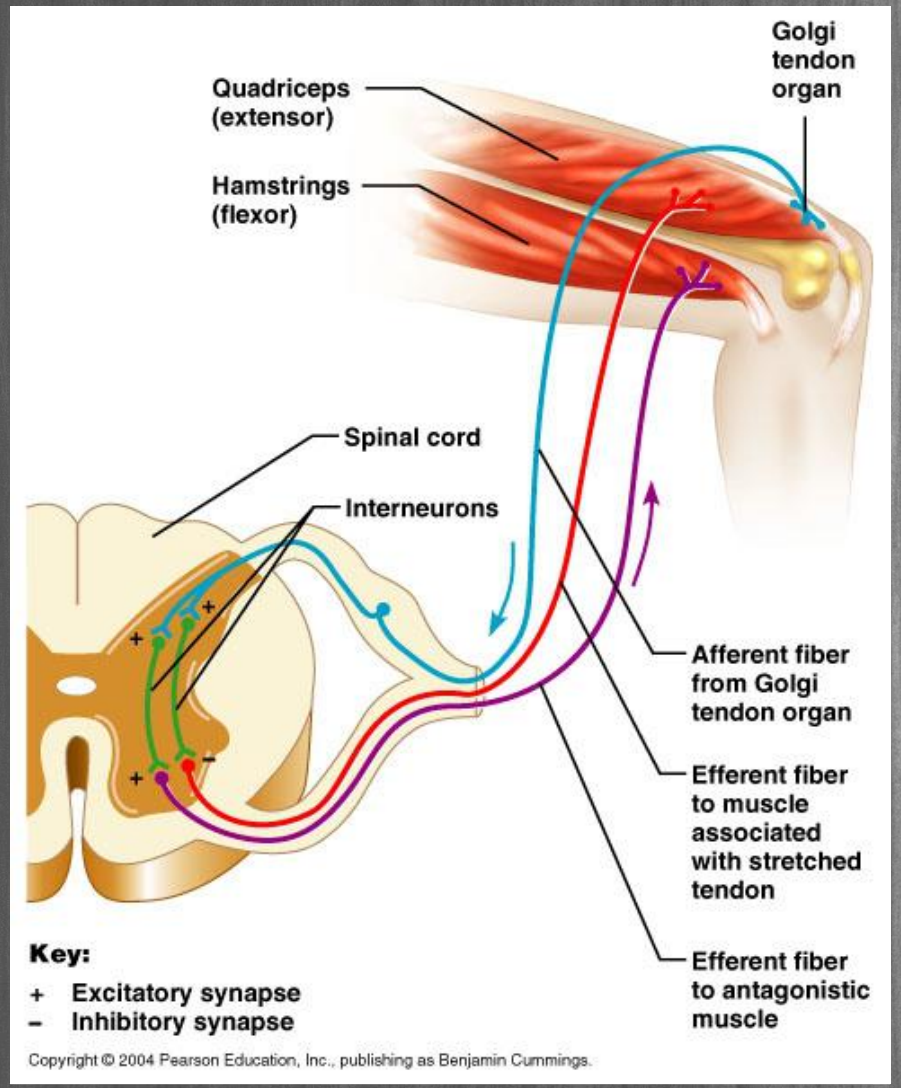


- Static Receptors
  - Ruffini corpuscle
    拉菲尼小体
  - Golgi tendon organ
    高尔基腱器

- **Joint movement sense**
- **Joint position sense**

Sanchez-Ramirez D C, Van d L M, Knol D L, et al. Association of postural control with muscle strength, proprioception, self-reported knee instability and activity limitations in patients with knee osteoarthritis.[J]. Journal of Rehabilitation Medicine Official Journal of the Uems European Board of Physical & Rehabilitation Medicine, 2013, 45(2):192-7.

3 ACL-hamstring reflex



Mechanoreceptors in ACL active

Afferent Nerve

CNS

Efferent Nerve

Hamstrings contract

Dynamic Stability

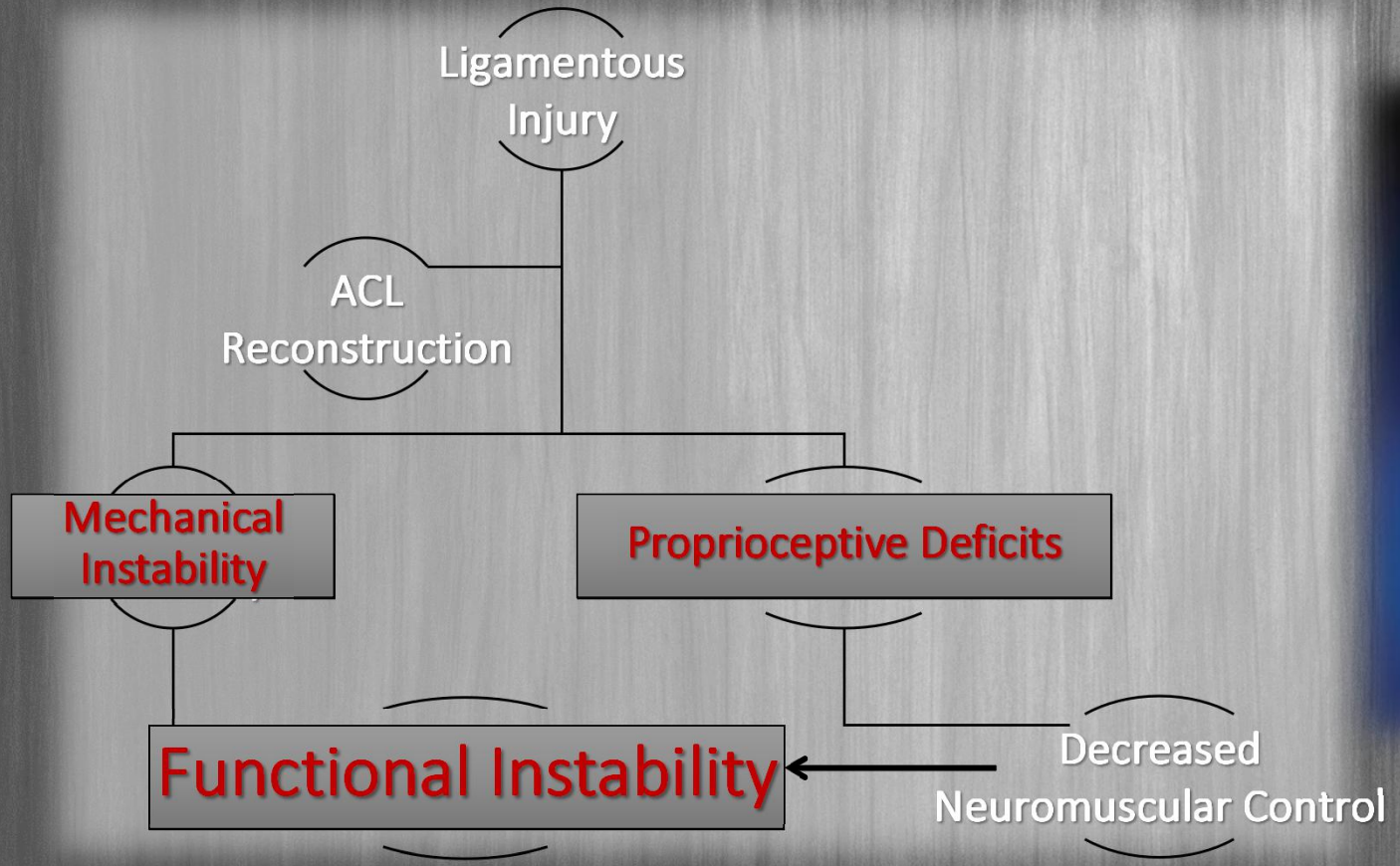
Protect

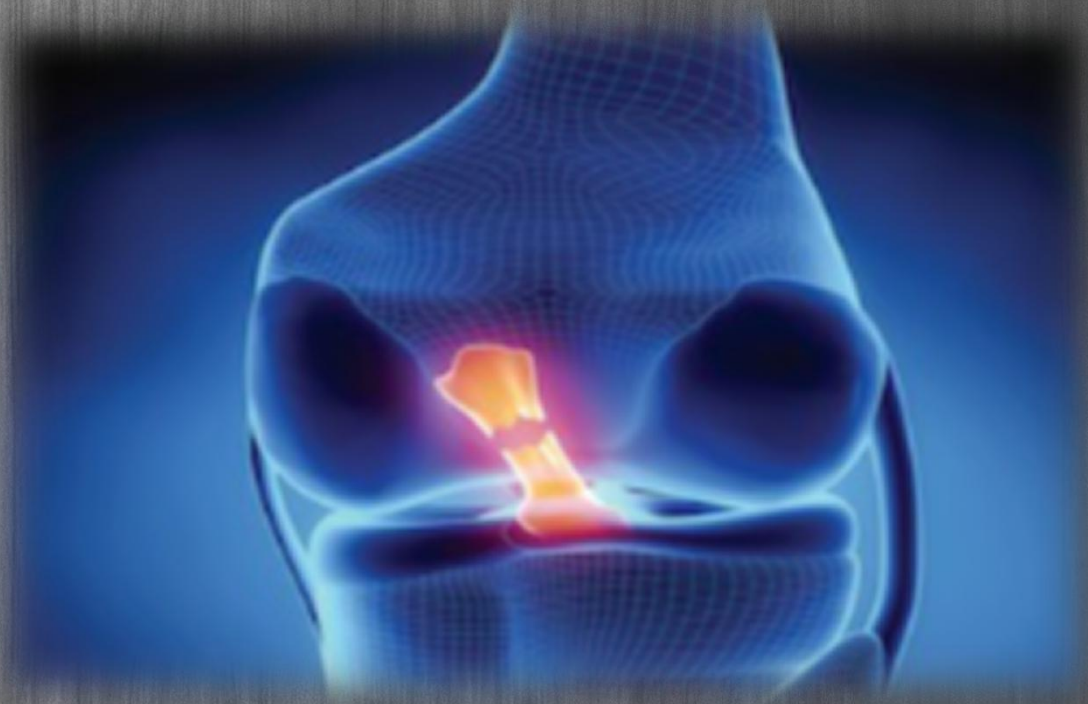
KNEE

- Stretching and electrical stimulus
- Hyperextension and rotation

Relph N, Herrington L, Tyson S. The effects of ACL injury on knee proprioception: a meta-analysis.[J]. Physiotherapy, 2014, 100(3):187-195.

4 The effects of ACL injury on knee proprioception





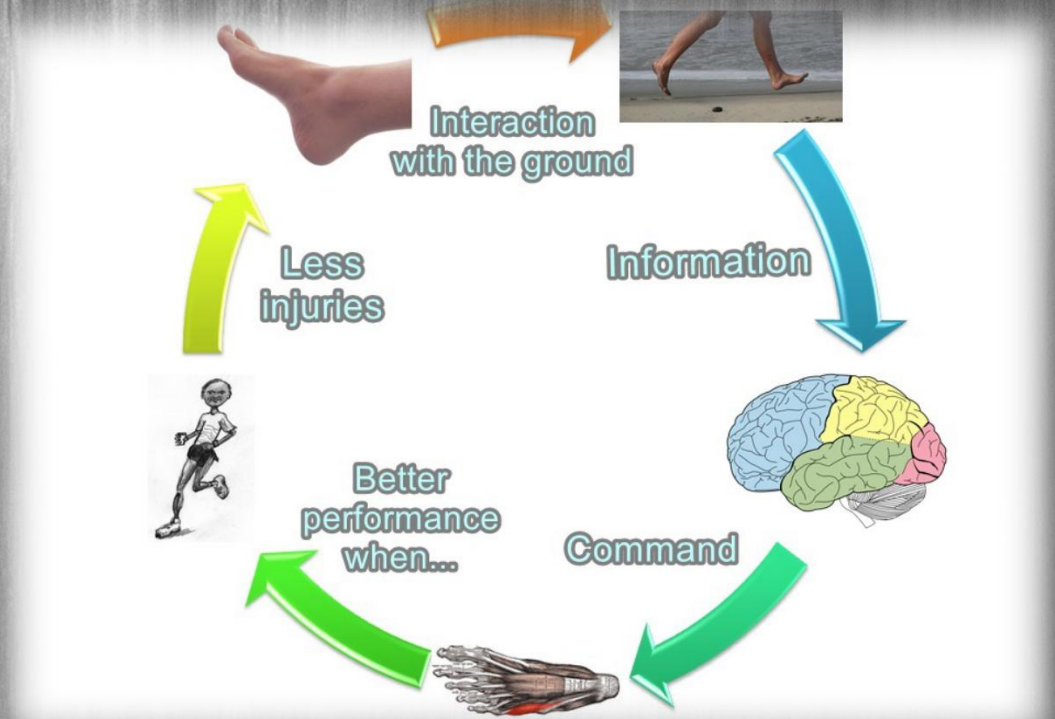
Furlanetto, T. S., Pinho, A. S. D., Bernardes, E. D. S., & Zaro, M. A. (2016). Proprioception, body balance and functionality in individuals with acl reconstruction. Acta Ortopédica Brasileira, 24(2), 67-72.

"Proprioception is very important when rehabbing an injury. Regarding the risk of reinjury, several studies found that it wasn't necessarily due to a lack of strength, but to a lack of proprioception."

——Sue Falsone,

Vice president of performance physical therapy and team sports at Athletes' Performance

✓Flexibility
✓Strength
✓Muscle balance
? ?
Proprioception★

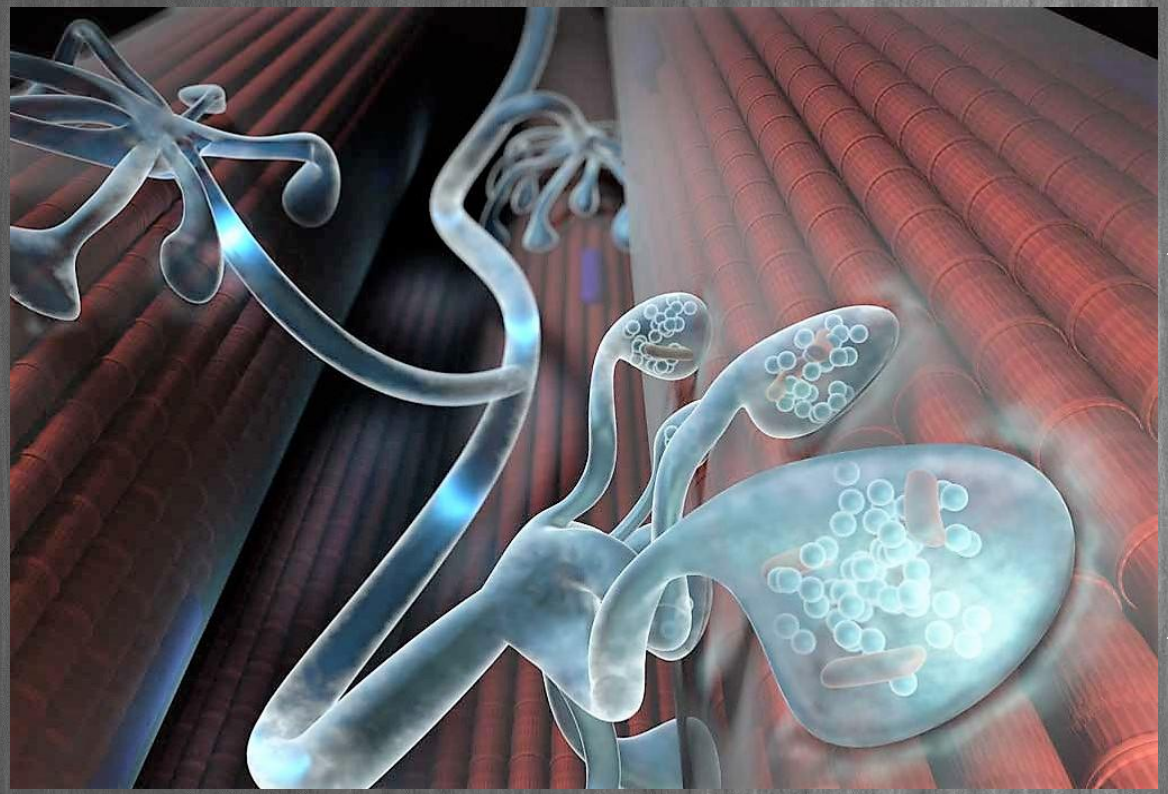


Part 3

NMR

Neuromuscular Reeducation

.What is NMR?



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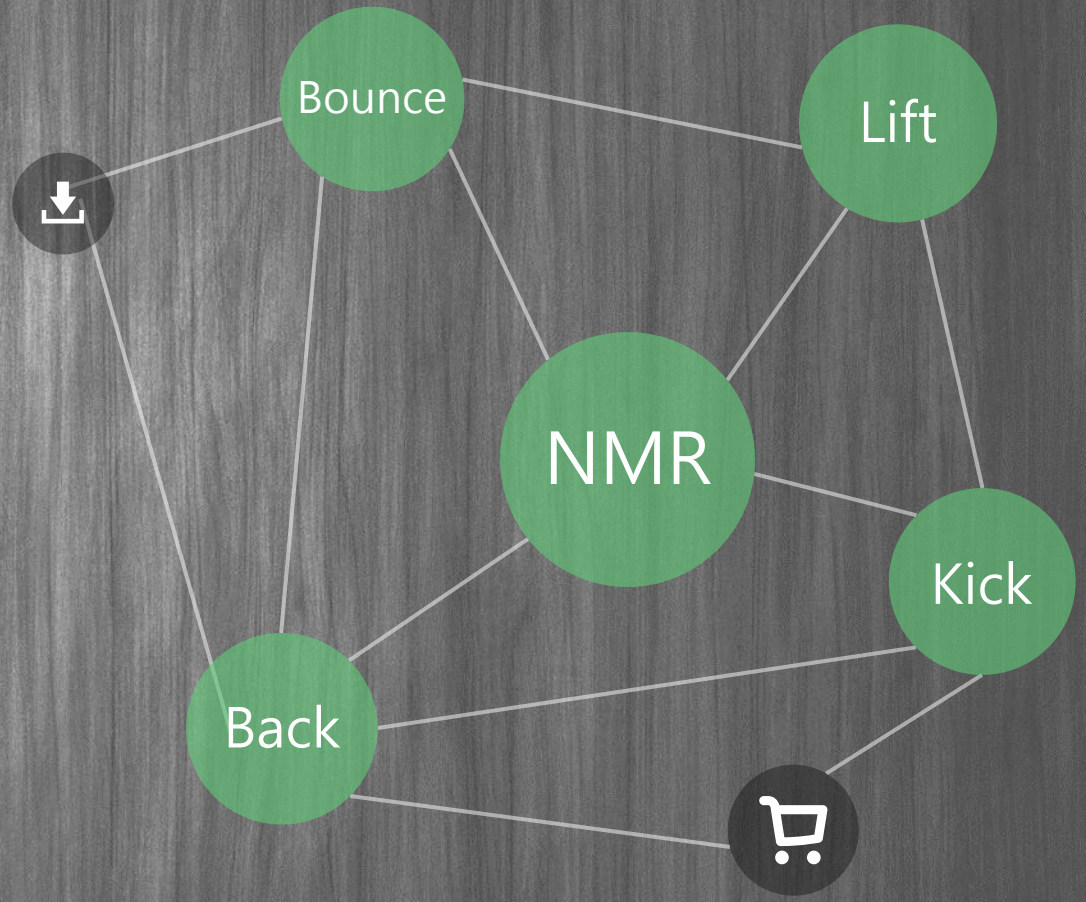
Neuromuscular Reeducation

- ✓ A general term that refers to techniques that attempt to retrain the neuromuscular system to function properly.
- ✓ Improve balance , coordination, posture, kinesthetic sense and proprioception

J Orthron Sports Phvs Ther.2016 Nov 4:1-26. [Epub ahead of print]
Assessment of Relationships Between Joint Motion Quality and Postural Control in Patients With Chronic Ankle Joint Instability.

Step1 Seated Leg Lift



J Orthon Sports Phvs Ther.2016 Nov;46(11):965-975. Epub 2016 Sep 29.
Management of a Patient With Acute Acetabular Labral Tear and Femoral Acetabular Impingement With Intra-articular Steroid Injection and a Neuromotor Training Program.

Step2
Unilateral Leg Balance

Level A

[redacted]

Level C

[redacted]

Level B

[redacted]

Step3
superman

A

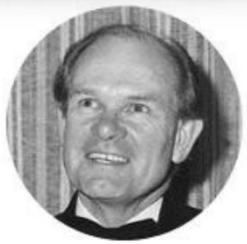
B

C

J Bodvw Mov Ther.2016 Jan;20(1):10-8. doi: 10.1016/j.jbmt.2015.01.007. Epub 2015 Jan 31.
Training for improved neuro-muscular control of balance in middle aged females.

Exercise Is Medicine


Bobath


Geoffrey Maitland


Freddy Kaltenborn


Brian Mulligan


Vaclav Vojta


Who's next?

技在手，
能在身，
思在脑，
做康复的匠人。

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Quantitative Improvements in Hop Test Scores After a 6-Week Neuromuscular Training Program.

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Reductions in co-contraction following neuromuscular re-education in people with knee osteoarthritis.

Osteoarthritis Cartilage. 2016 Nov 9. pii: S1063-4584(16)30365-X. doi: 10.1016/j.joca.2016.10.022. [Epub ahead of print]
The effect of instruction in analgesic use compared with neuromuscular exercise on knee-joint load in patients with knee osteoarthritis: a randomized, single-blind, controlled trial.

J Bodyw Mov Ther. 2016 Jan;20(1):10-8. doi: 10.1016/j.jbmt.2015.01.007. Epub 2015 Jan 31.
Training for improved neuro-muscular control of balance in middle aged females.

Respir Physiol Neurobiol. 2011 Dec 15;179(2-3):219-26. doi: 10.1016/j.resp.2011.08.009. Epub 2011 Aug 22.
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Thanks For Your Attention