

AAPA/AAOS PAs Guide to the  
Musculoskeletal Galaxy 2022

Lumbar Spine & Lower Extremity  
Physical Exam

# Lumbar Spine Examination

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# History

## Location

Localized, radiation, radicular symptoms, numbness, parasthesias

## Duration

Trauma, inciting event, falls, injuries, MVA, etc

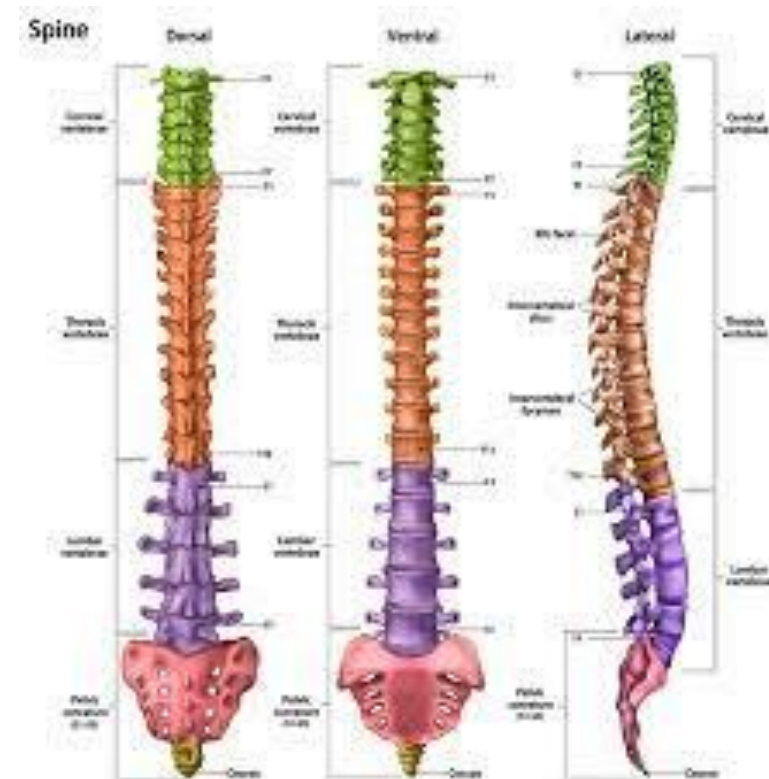
## Quality

Constant, intermittent, character

## Severity

Alleviating or aggravating factor

Prior episodes, history of back issues, CA, tumors, surgery, etc



# Red Flags

Pain that does not improve with laying down

Accompanying fever or chills

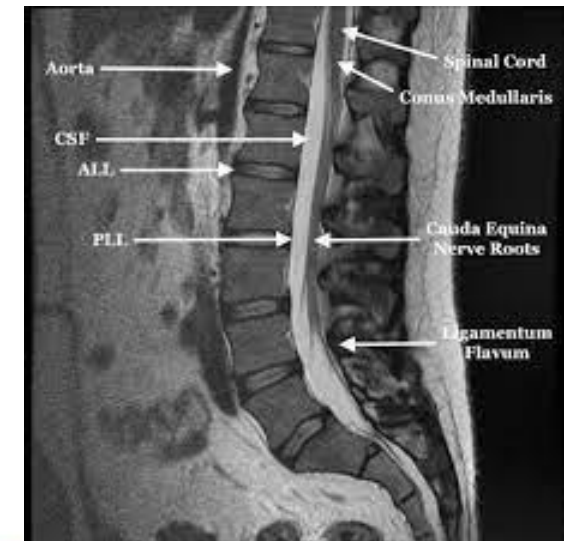
Known history of CA, especially prostate, breast and lung (These often metastasize to bone)

Osteoporosis

Neurological defects (saddle anesthesia)

Loss of bowel or bladder function

Focal weakness



# Inspection/Observation

## Standing Posture

- i. Asymmetry
  - 1. ASIS levels

## Spinal deformity

- 1. Hyperlordosis
- 2. Kyphosis
- 3. Scoliosis

## Muscle tone/bulk

- i. Atrophy
- ii. Abnormal skin folds

## Skin Changes

- i. Ecchymosis
- ii. Lacerations

## Gait analysis

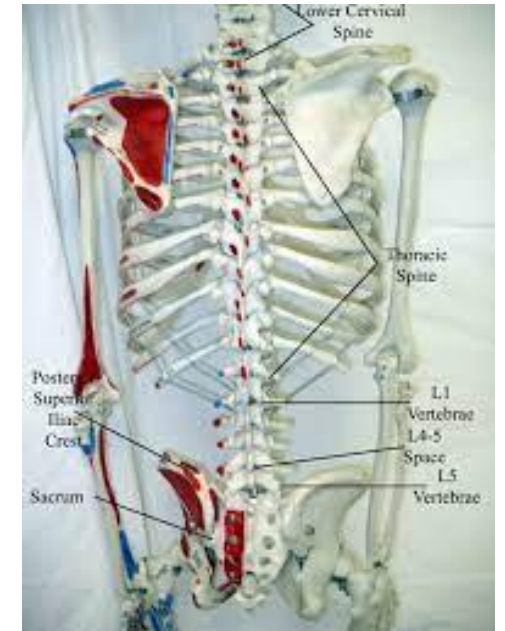
- i. Antalgia
- ii. Toe and heel walking

Observe the patient rise from a sit to stand, then walk toward and away from examiner.



# Palpation

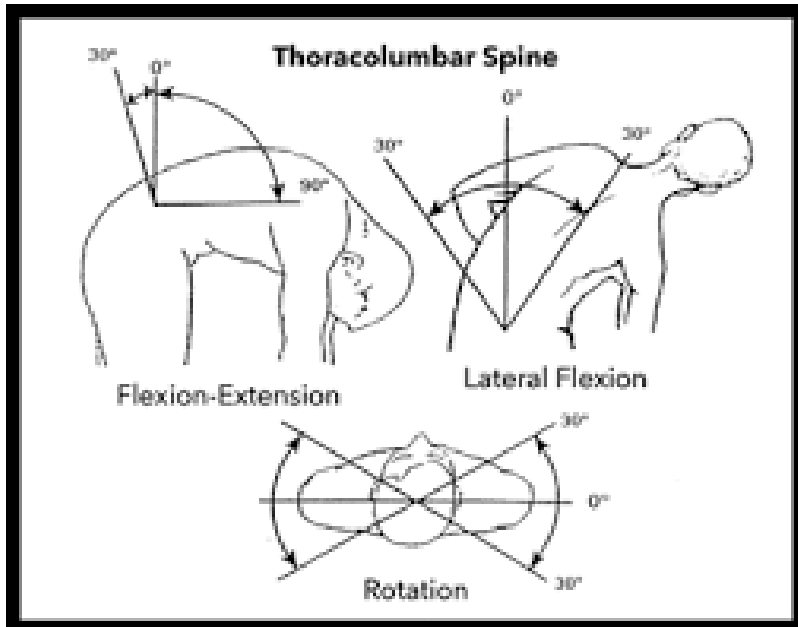
- a. Palpate for midline and paraspinal muscle tenderness
- b. Muscle spasms
- c. Step-deformity



# Range of Motion

Active

- a. Forward flexion 40-60°
- b. Extension: 20-35°
- c. Lateral flexion/side bending (left and right): 15-20°
- d. Rotation (left and right): 3-18°



### Lumbar Spine

Flexion:  °  
Landmarks: S1 → vertical, C7

Extension:  °  
Landmarks: S1 → vertical, C7

Sidebending:  °  
Landmarks: S1 → vertical, C7

Rotation:  °  
Landmarks: center of head → acromion, ASIS

Four photographs of a person demonstrating lumbar spine movements. The first shows sidebending to the left, the second shows flexion (bending forward), the third shows extension (bending backward), and the fourth shows rotation (twisting). Red lines and dots indicate the landmarks used for measurement.



# Motor Testing

## Scale for muscle power

0 = no muscle contraction visible

1 = muscle contraction is possible with gravity eliminated

2 = active joint movement is possible with gravity eliminated

3 = movement can overcome gravity but not resistance

4 = can overcome gravity and move against some resistance

5 = full and normal power against resistance

## Myotomes

L2, L3 – hip flexion

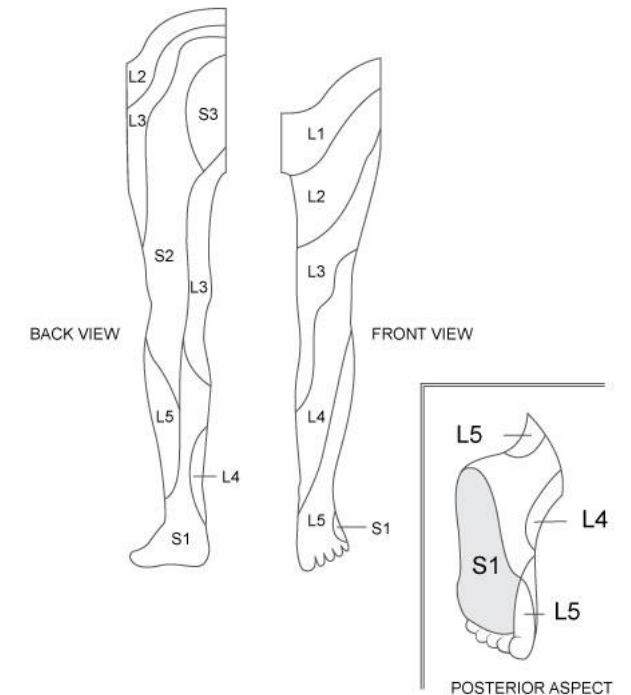
L3, L4 – knee extension

L4, L5 - ankle dorsiflexion

L5, S1 – great toe extension, ankle eversion

S1, S2 – ankle plantar flexion

DERMATOMES OF THE LEG





# Sensation

L1 – groin

L2 – upper thigh

L3 – knee

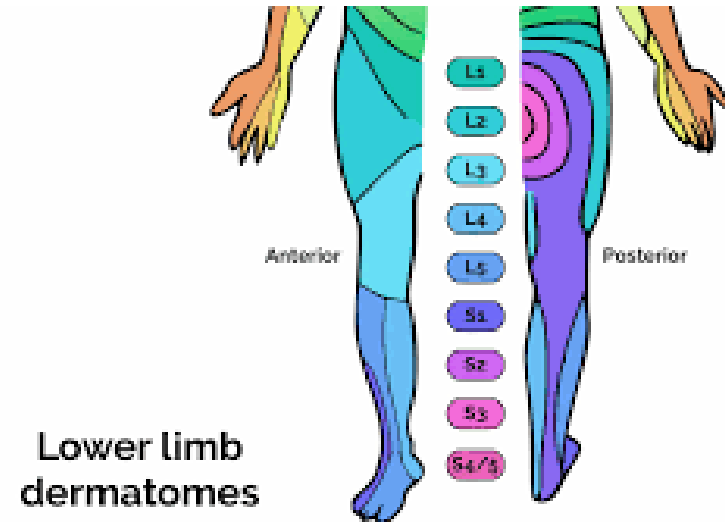
L4 – medial leg

L5 – lateral leg, medial side of  
the dorsum of the foot

S1 – lateral aspect of foot, heel and sole

S2 – posterior thigh

S3-S5 – concentric rings around  
anus (outermost is S3)



# Deep Tendon Reflexes (DTRs)

## Grading

- i. 0 = absent
- ii. 1+ = hypoactive
- iii. 2+ = normal
- iv. 3+ = hyperactive without clonus
- v. 4+ = hyperactive with clonus

## Locations

- i. Patellar – L3, L4
- ii. Achilles – S1, S2
- iii. Plantar – Babinski

1. With a sharp object - stroke lateral aspect of sole of each foot, come across the ball of the foot medially

2. Positive (Abnormal) = up-going
3. Negative (Normal) = down-going
- iv. Clonus – if reflexes are hyperactive (3+)
  1. Support knee in partly flexed position
  2. Quickly dorsiflex foot and observe for rhythmic clonic movements
    - a. Positive (abnormal)
    - b. A few beats of non-sustained transient clonus may be considered “normal”

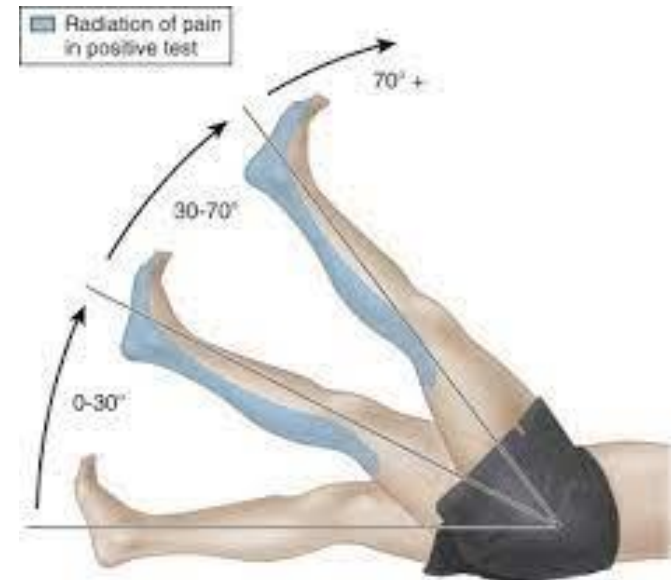
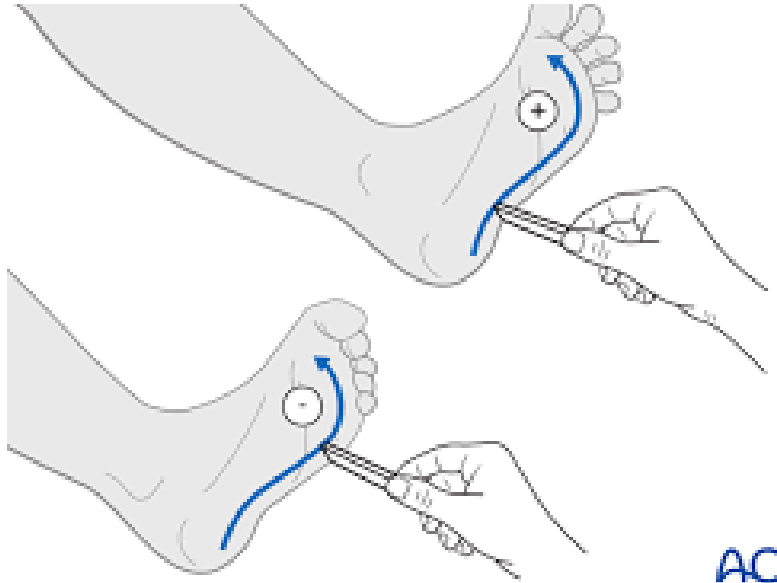


# Neural Tests

## Straight Leg Raise (SLR)

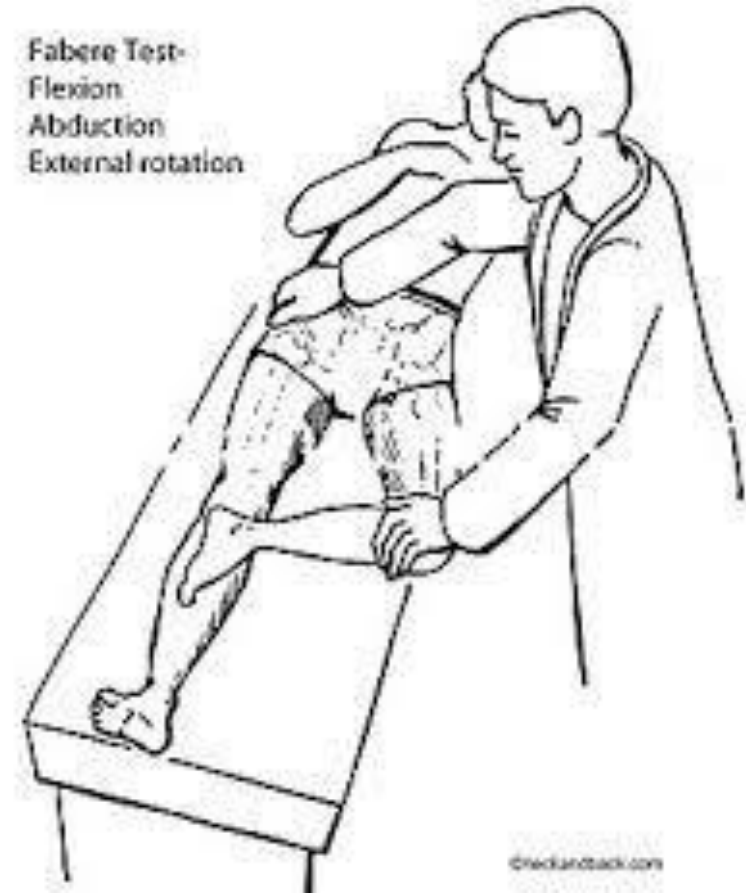
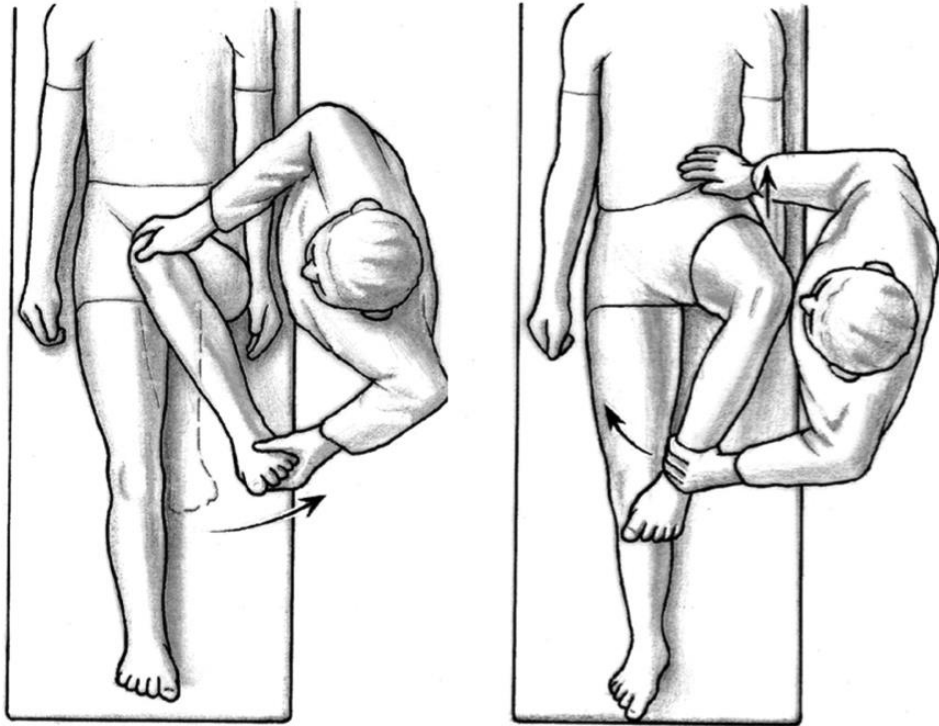
Supine or seated

Knee extended, flex hip until pain  
Positive = radiating pain @ 30-70 degrees



# Hip Screening

Assess for fixed flexion deformity  
Hip IR/ER in 90 degrees hip flexion  
FABER test



# Vascular Assessment

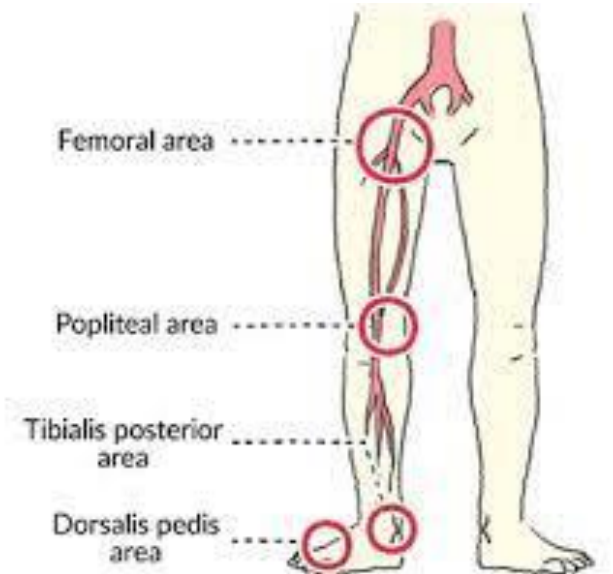
## Peripheral pulses

- i. Femoral
- ii. Popliteal
- iii. Dorsalis pedis
- iv. Posterior tibial



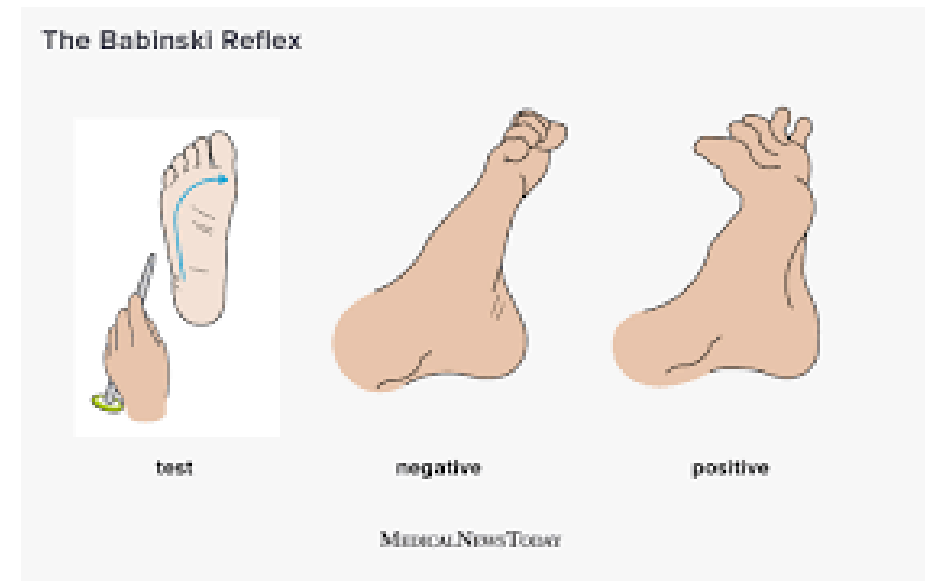
## Observation

- i. Edema
- ii. Discoloration – venous stasis
- iii. Hair changes
- iv. Varicosities



# Upper Motor Neuron Pathology

- a. Spasticity
- b. Clonus
- c. Increased DTRs



# Hip & Pelvis

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Steadman Hawkins Clinic Denver



# Hip & Pelvis: Inspection

Anterior: Pelvic height/symmetry

Lateral: L/S lordosis, Pelvic tilt

“Flat Back” ? L-spine spasm

“Sway Back” ? Listhesis,  
? Weak core, anterior hip  
contracture

Posterior: Scoliosis?



# Hip & Pelvis: Gait

Trendelenburg Gait:

Weak Gluteus Medius

“Pigeon Toed” vs “Duck Foot”



# Hip & Pelvis: Bony Palpation



ASIS(Anterior Superior Iliac  
Spine)

Iliac Crest

Greater Trochanter

PSIS(Posterior Superior Iliac  
Spine)

SI Joint

Ischial Tuberosity

# Hip & Pelvis: Soft Tissue

Inguinal Ligament

Sartorius

Adductors

Rectus Femoris

Trochanteric Bursa

Gluteus Medius

Proximal Hamstrings



# Hip & Pelvis: ROM

Hip Flexion: 120-135

Hip Extension: 30

Hip Abduction: 20-40

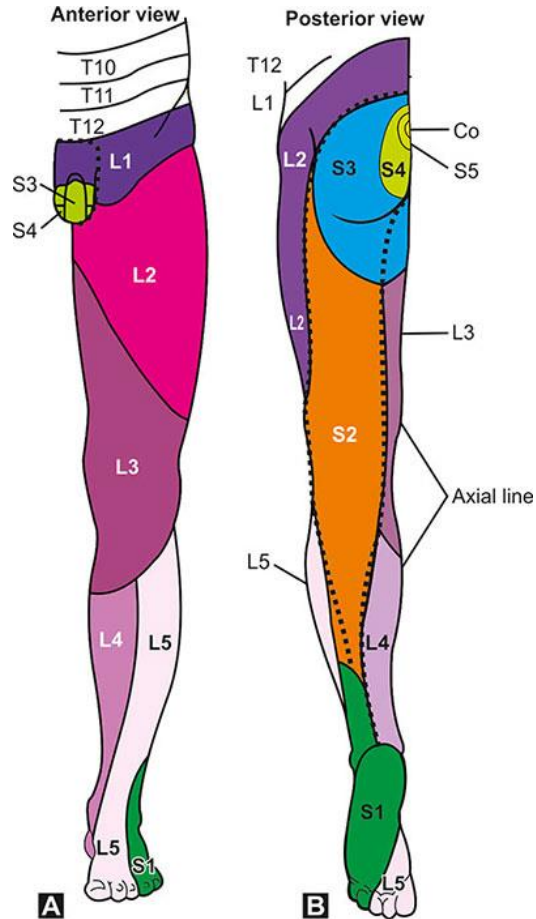
Hip Adduction: 30

Hip Internal Rotation: 30

Hip External Rotation: 45



# Hip & Pelvis: Neuro



Sensory: T 12 – L 2

Motor:

Gluteal Nerves

Femoral Nerve

Obturator Nerve

# Hip & Pelvis: Think Zones

## Anterior:

### Intra-Articular

Arthritis

Labral Tear

Femoral Acetabular Impingement

### Extra-Articular

Snapping Hip

Rectus Femoris Injury

Groin Strain

Groin Pain

Loss of Motion

Injury

Decrease Strength

Palpable Snapping

Tenderness

Echymosis

Edema

Radiating to Medial Thigh/Knee



# Hip & Pelvis: Think Zones

Lateral:

Trochanteric bursitis/IT Band  
Syndrome

Gluteus Medius Tear

Tender to Palpation (TTP)

Trendelenburg Gait

Weakness with Resisted Abduction

Pain/Positive Ober's test

# Hip & Pelvis: Think Zones

## Posterior:

SI Dysfunction

Lumbar Etiology

Sciatica

Proximal Hamstring Injury

TTP

Limited ROM

Radiculopathy

Injury

Echymosis

Edema

# Hip & Pelvis: Special Test

Supine Hip Extension test



FABER Test: Forced Abduction/External Rotation



# Hip & Pelvis: Special Test

FADIR Test: Forced Adduction/Internal Rotation



# Knee Examination

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Physician Assistant, Department of Orthopaedics,  
University of Colorado



# Knee Anatomy

Bony Anatomy: Tibia, Femur, Patella

# Knee Anatomy

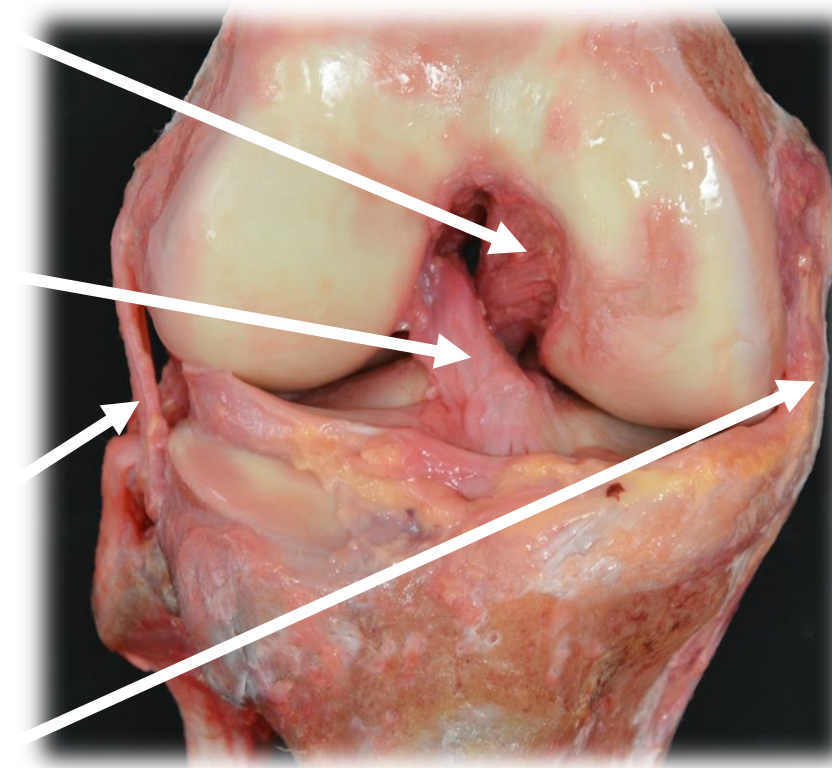
## Static Stabilizers

Posterior Cruciate Ligament  
(PCL)

Anterior Cruciate Ligament  
(ACL)

Lateral Cruciate Ligament  
(LCL)

Medial Cruciate Ligament  
(MCL)





# Knee Anatomy

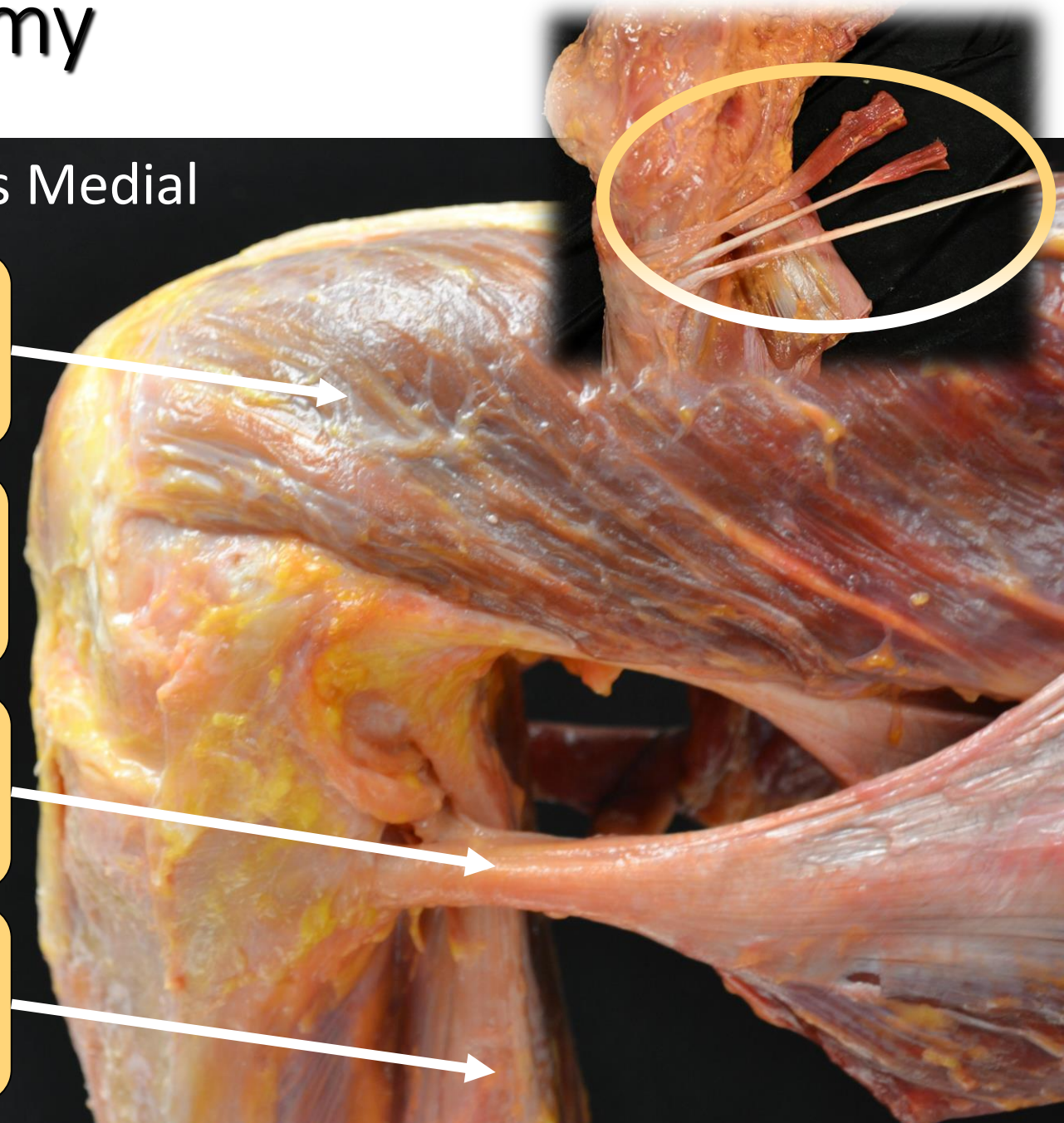
## Dynamic Stabilizers Medial

Vastus Medialis

Pes Tendons

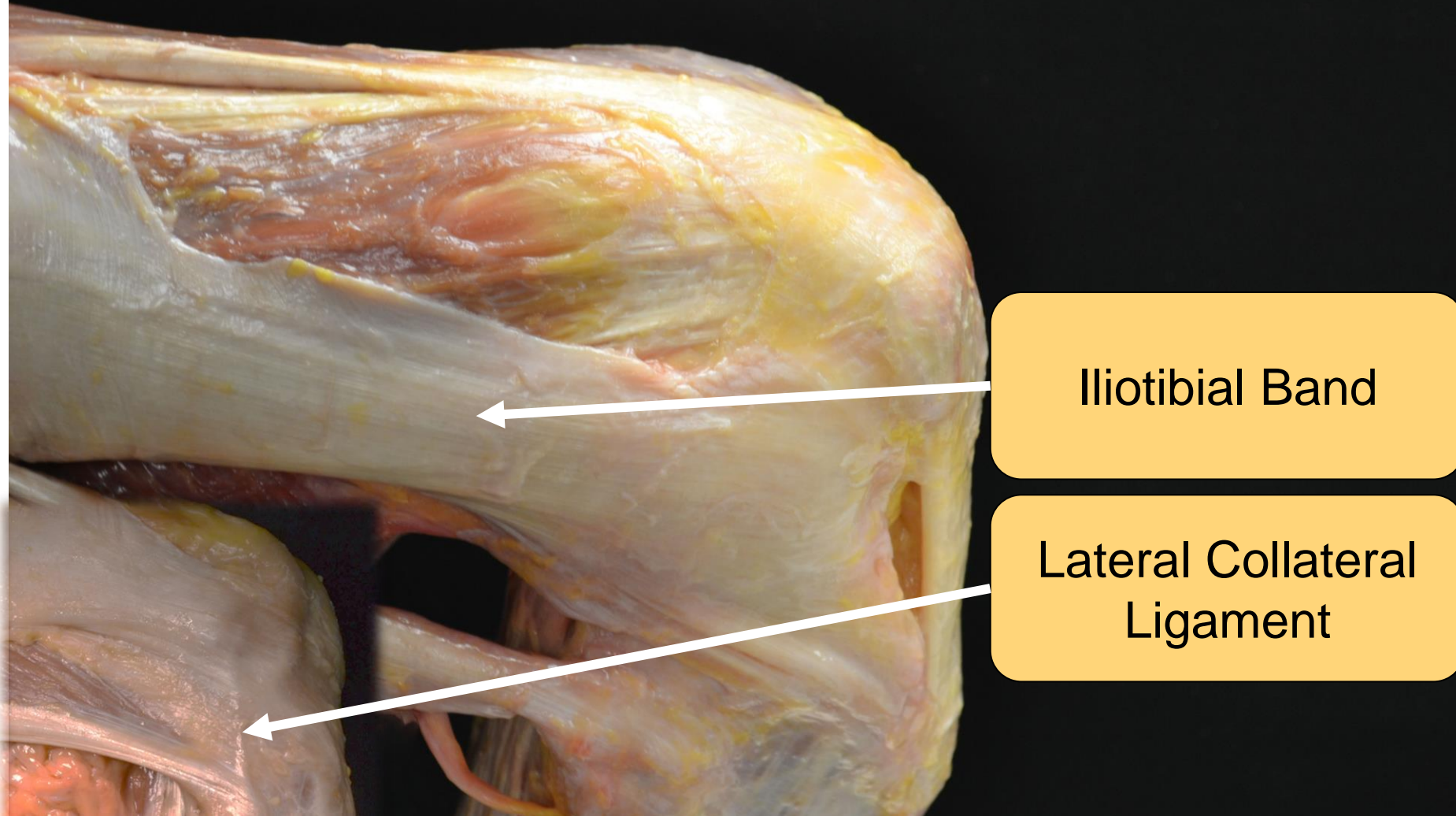
Semimembranosus

Medial  
Gastrocnemius



# Knee Anatomy

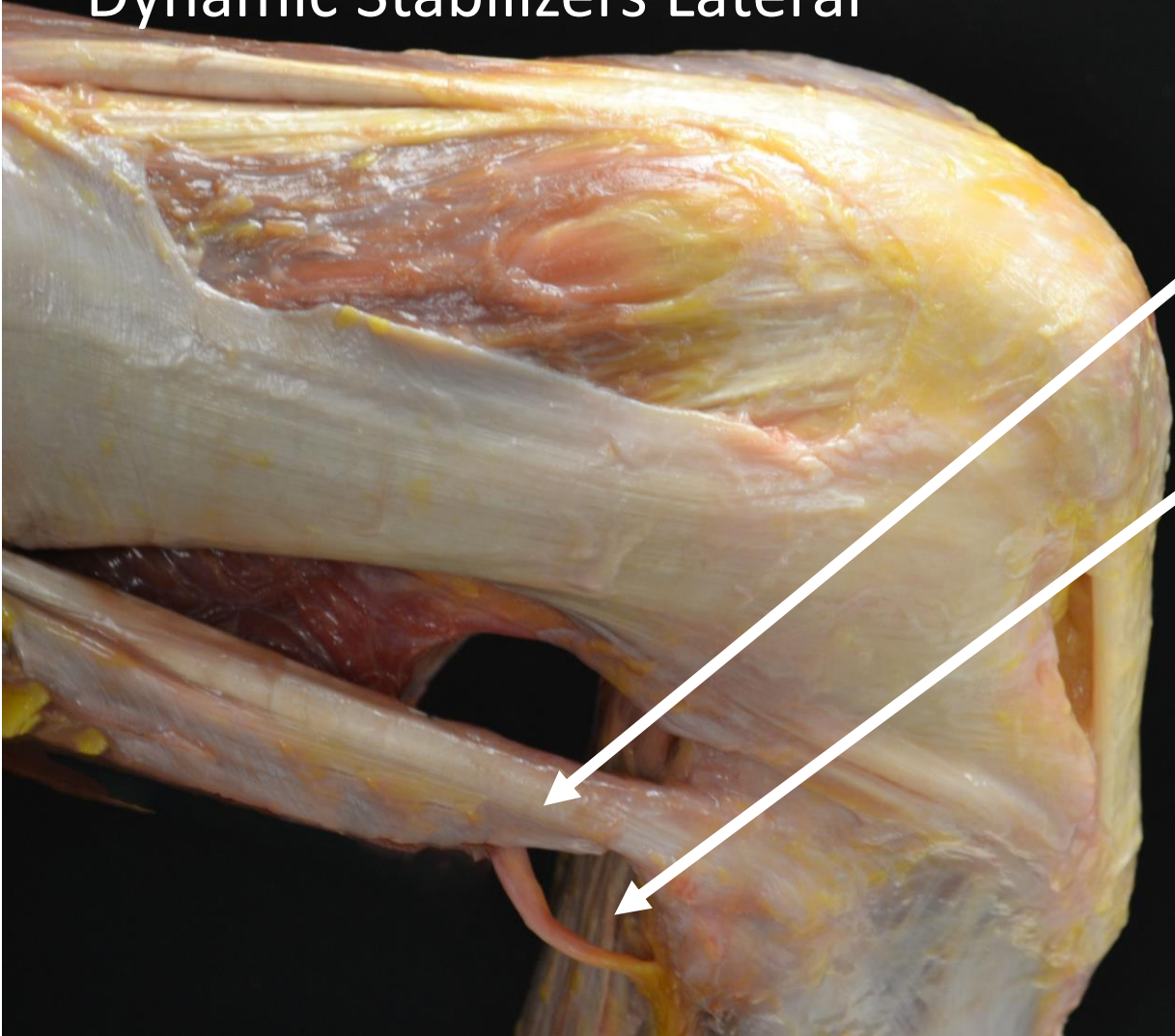
## Static Stabilizers Lateral





# Knee Anatomy

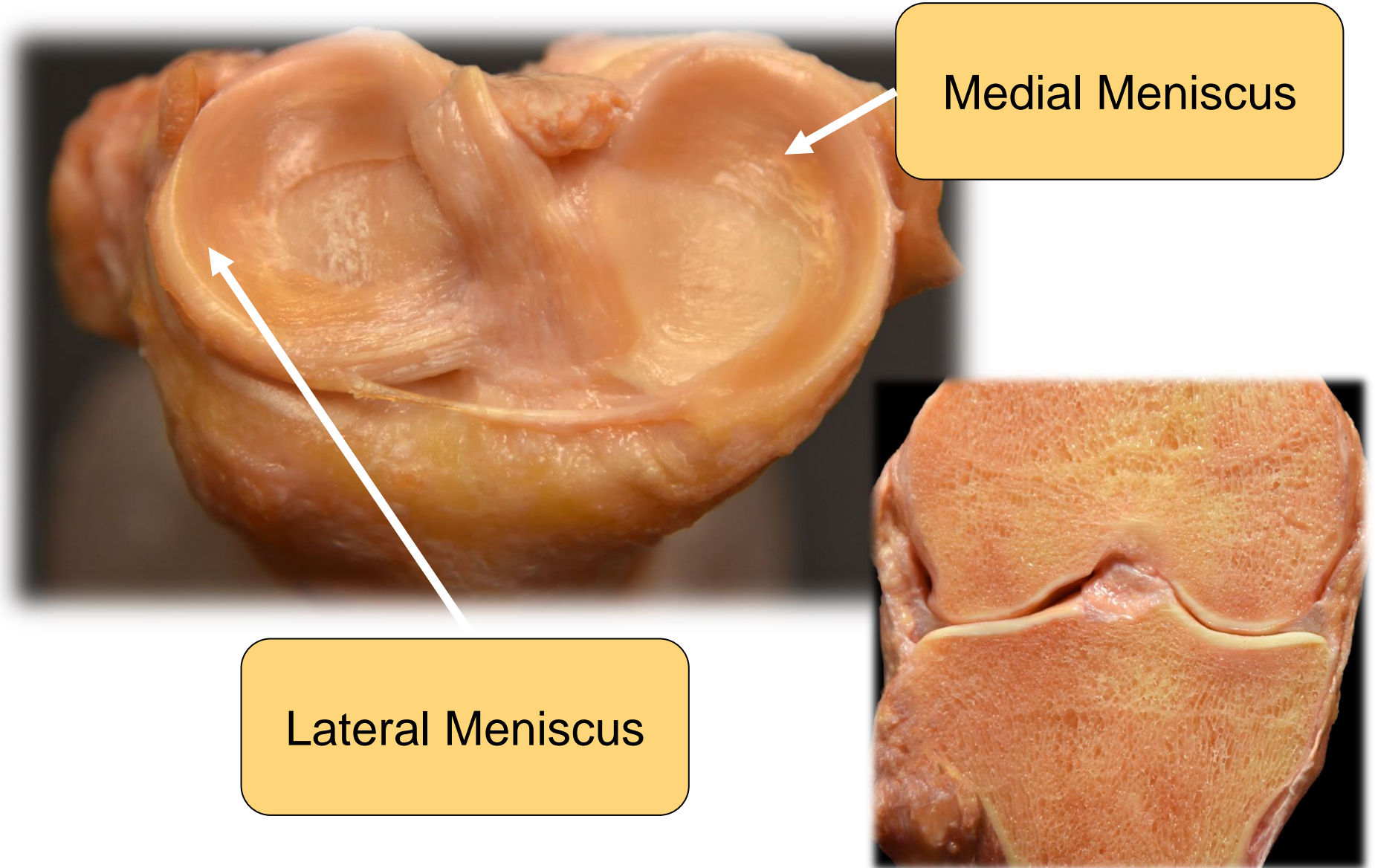
## Dynamic Stabilizers Lateral



Biceps Femoris

Lateral  
Gastrocnemius

# Knee Anatomy



# Palpable Landmarks



- Quadriceps
- Patella
- Patellar
- Tibial Tubercle
- Joint Lines
- Iliotibial Band
- Biceps Femoris
- Semimembranosus
- Pes Anserine

# Knee Physical Examination:

- History! History! History!
- Inspection:
  - Deformity - Soft tissue and Bone
  - Ecchymosis
  - Swelling/Effusion
  - Edema
- Palpation:
  - Go through palpable Landmarks
- Range of Motion

# Knee Physical Examination:

- Neurovascular
  - Motor
    - Knee Extension: Femoral Nerve(L2-4)
    - Knee Flexion: Tibial(L4-S3) and Peroneal(L4-S3)
    - Foot Plantarflexion: Tibial Nerve(S1)
    - Foot Dorsiflexion: Deep Peroneal Nerve(L4)
    - Hallux Dorsiflexion: Superficial Peroneal Nerve(L5)

# Knee Physical Examination:

- Special Tests:
  - Patellar Apprehension
  - J Sign
  - Lachman, Anterior Drawer, Pivot Shift test
  - Posterior Drawer, Reverse Pivot, Posterior Sag
  - Valgus and Varus Stress



# Common Pathology:

- ACL tear
- MCL tear
- Meniscus Tear
- Patellar Dislocation
- Patellar and Quadriceps Tendon Rupture
- Osgood Schlatter
- Patella Fracture
- Tibial Plateau Fracture

# Foot & Ankle

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# Foot & Ankle: Inspection

Pes Planus

Pes Cavus

Bunions

Edema

Deformity



# Foot & Ankle: Gait



Pronation  
Supination  
Drop Foot

# Foot & Ankle: Bony Palpation

Lateral Malleolus

Medial Malleolus

Calcaneus

Base of 5<sup>th</sup> Metatarsal

Metatarsal Shafts

Navicular

Sesamoids



# Foot & Ankle: Soft Tissue



Achilles

Lateral Ligaments

Medial Ligaments

Syndesmosis

Anterior/Posterior Tibial Tendons

Extensors Tendons

Flexors Tendons

# Foot & Ankle: ROM

Dorsi Flexion: 25

Plantar Flexion: 50

Inversion: 5-10

Eversion: 5

Forefoot Adduction: 20

Forefoot Abduction: 10



# Foot & Ankle: Neuro



Nerve Roots: L4 – S1

Motor:

Dorsiflex: L4-5

Plantarflex: L5-S1

Sensory:

Medial: L4

Dorsum: L5

Lateral/Posterior: S1

Achilles' Reflex: S1



# Foot & Ankle: Vascular



Dorsal Pedal Artery

Posterior Tibial Artery

# Foot & Ankle: Special Tests

**Anterior Drawer**



**Dorsi-Flexion/Eversion Test**



# Foot & Ankle: Special Tests

**Thompson's Test**



**Homan's sign**



# Foot & Ankle: Most Common (MC)/Don't Miss (DM)

MC: Lateral Ankle Sprain

Tender laterally

Soft tissue edema

Anterior drawer pain/laxity

Inversion Injury

Get x-rays

DM: Syndesmosis Injury

Tender Medially and Syndesmosis

Soft tissue edema

+ Dorsi-flexion/Eversion Test

Tenderness at Proximal fibula

Get weight bearing x-rays if possible

# Foot & Ankle: Most Common (MC)/Don't Miss (DM)

DM: Lisfranc Injury

Pain in mid foot dorsal/medial

Pain with weight bearing

Pain with resisted dorsi/plantar flexion

Soft tissue edema

Forceful dorsi/plantar flexion injury

Drop something on foot

MC: Achille's Rupture

Pain at Achilles'

Palpable defect

Felt a pop

Weakness/Absent plantar flexion

Jumping

Forced dorsi-flexion