

AAPA MSK Guide to the Galaxy 2023

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

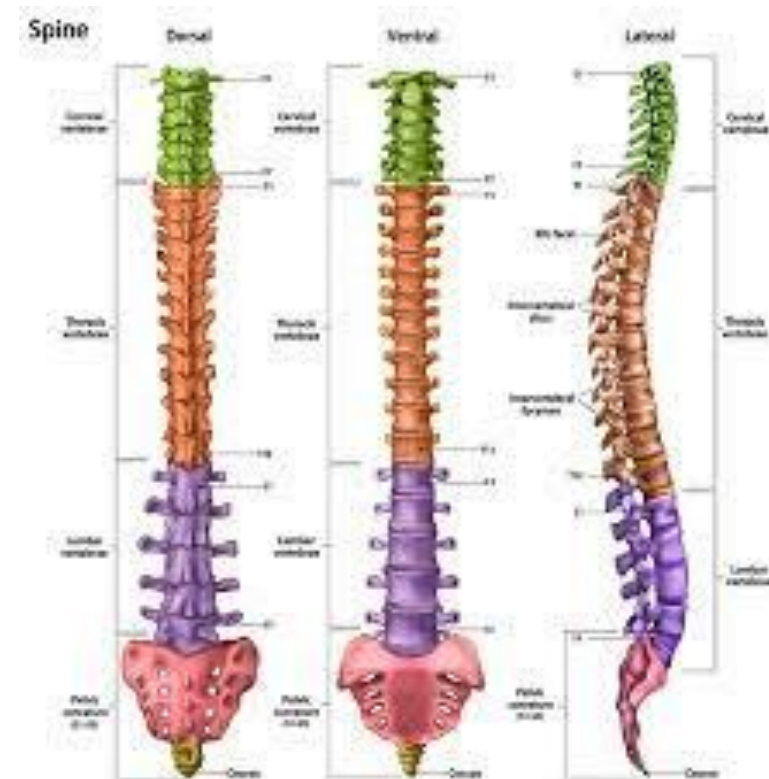
Quality

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

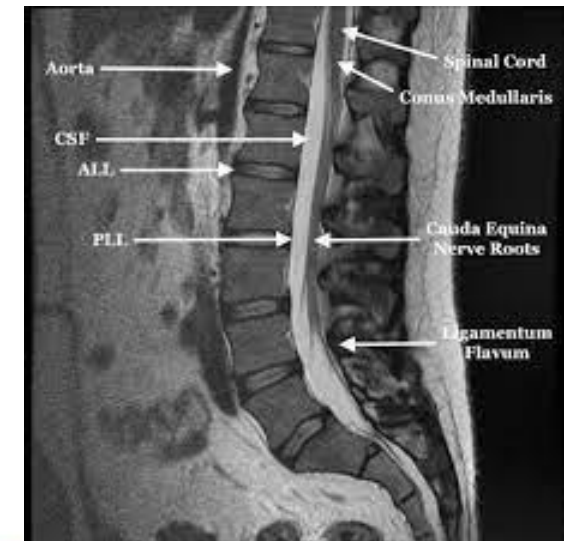
Known history of CA, especially prostate, breast and lung (These often metastasize to bone)

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

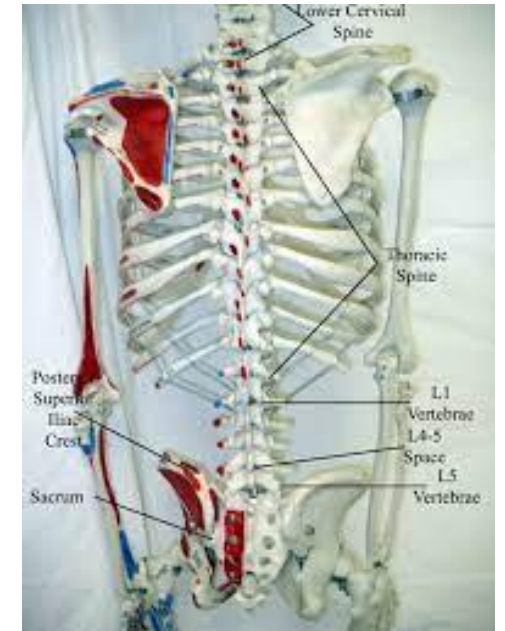
- i. Antalgia
- ii. Toe and heel walking

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



Palpation

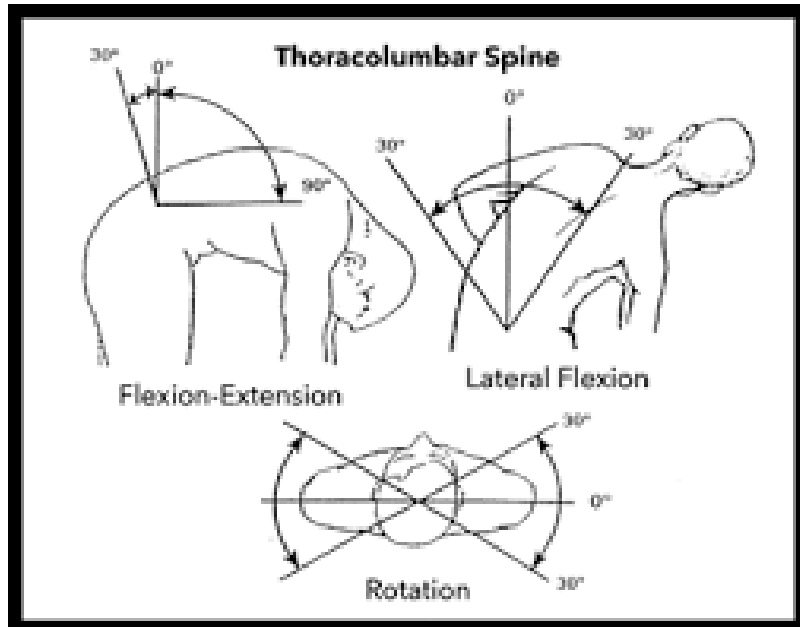
- a. Palpate for midline and paraspinal muscle tenderness
- b. Muscle spasms
- c. Step-deformity



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

A series of four photographs showing a person performing different lumbar spine movements. The first is sidebending, the second is flexion, the third is extension, and the fourth is rotation. Red lines and angles are drawn on each image to indicate the range of motion and landmarks.

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

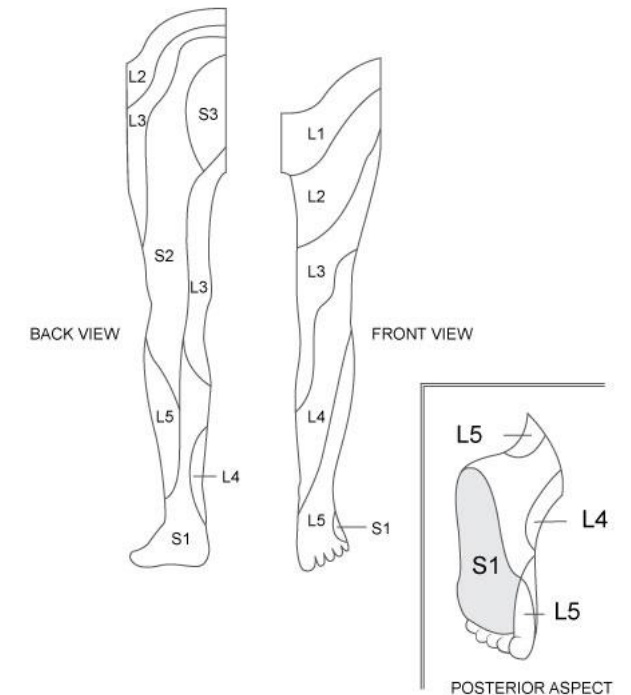
L3, L4 – knee extension

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

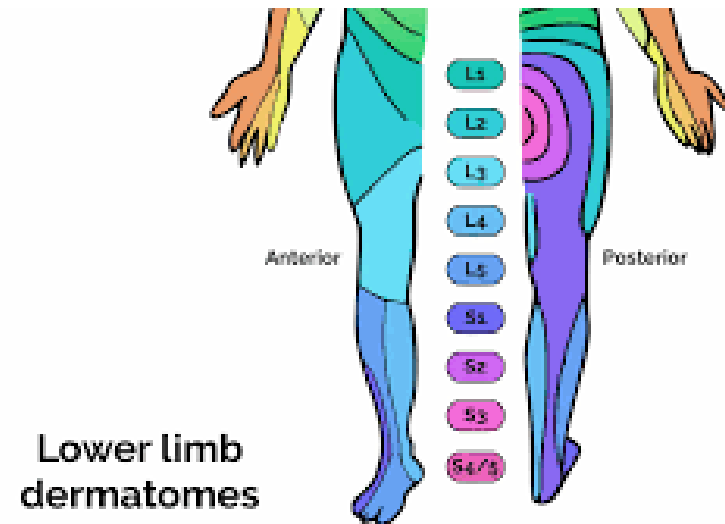
L4 – medial leg

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”

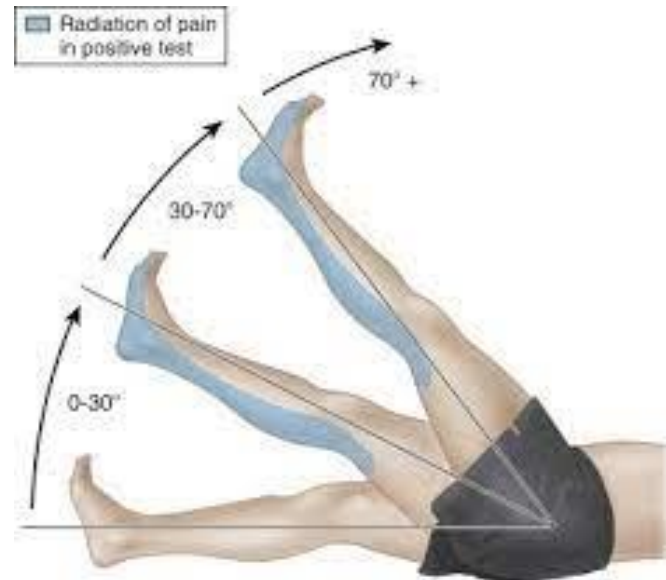
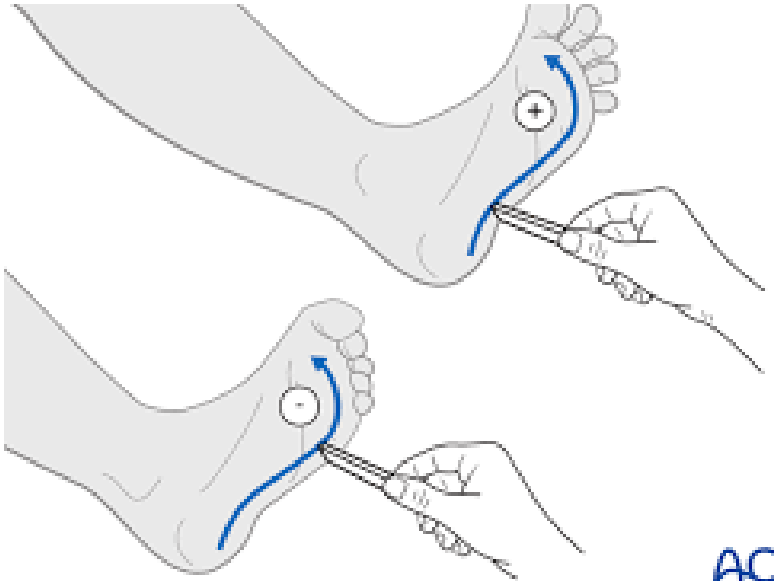


Neural Tests

Straight Leg Raise (SLR)

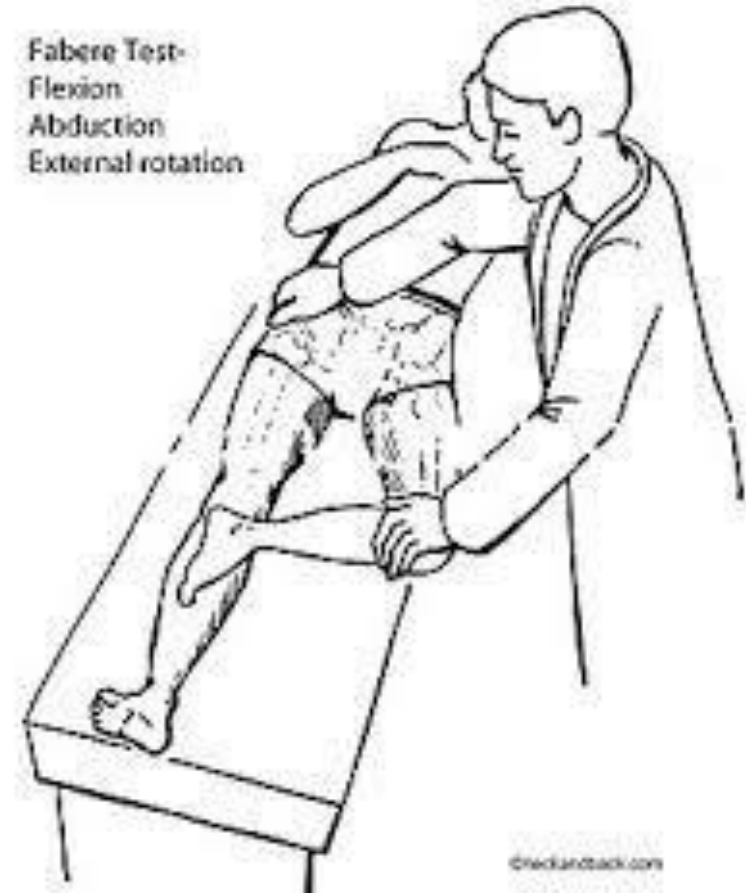
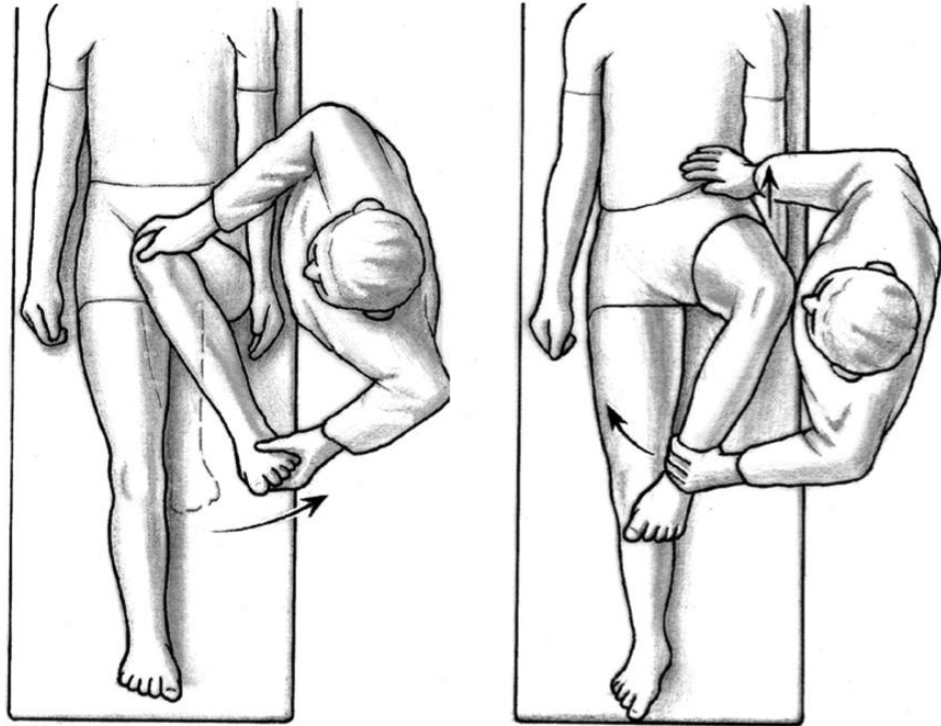
Supine or seated

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

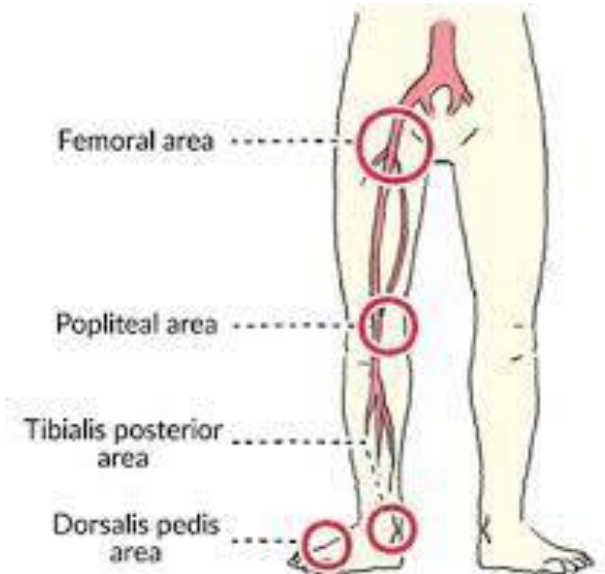
Peripheral pulses

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



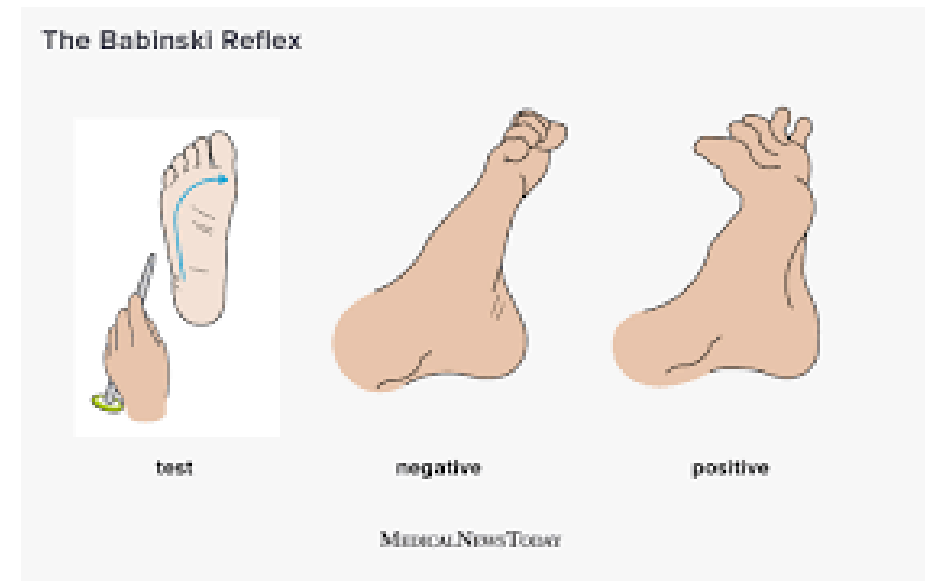
Observation

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



Upper Motor Neuron Pathology

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



Hip & Pelvis

Chuck Dowell, MS, PAC, ATC
Colorado Springs Orthopaedic Group



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

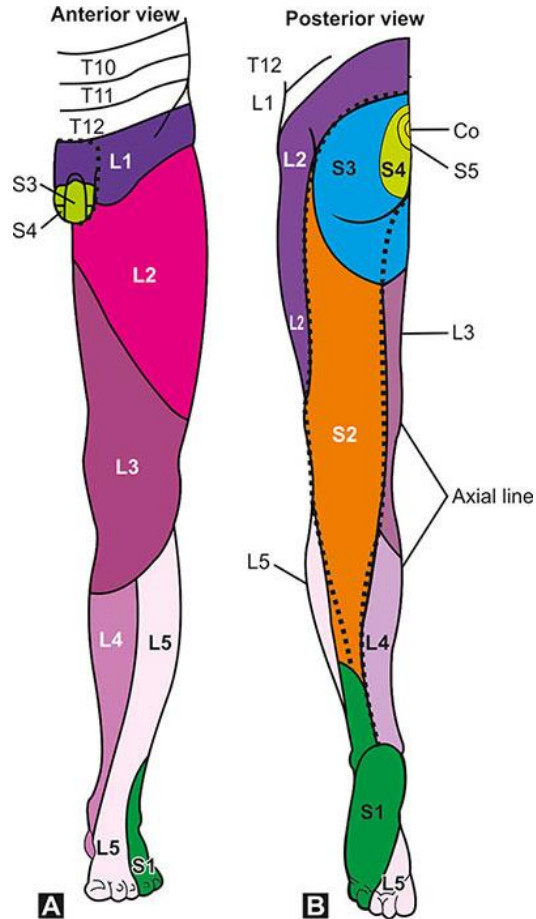
Hip Adduction: 30

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 Acaetabular 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

Russell R. Smith, ATC, PAC
UT Southwestern
Medical Center

Knee Anatomy

Bony Anatomy: Tibia, Femur, Patella

Knee Anatomy

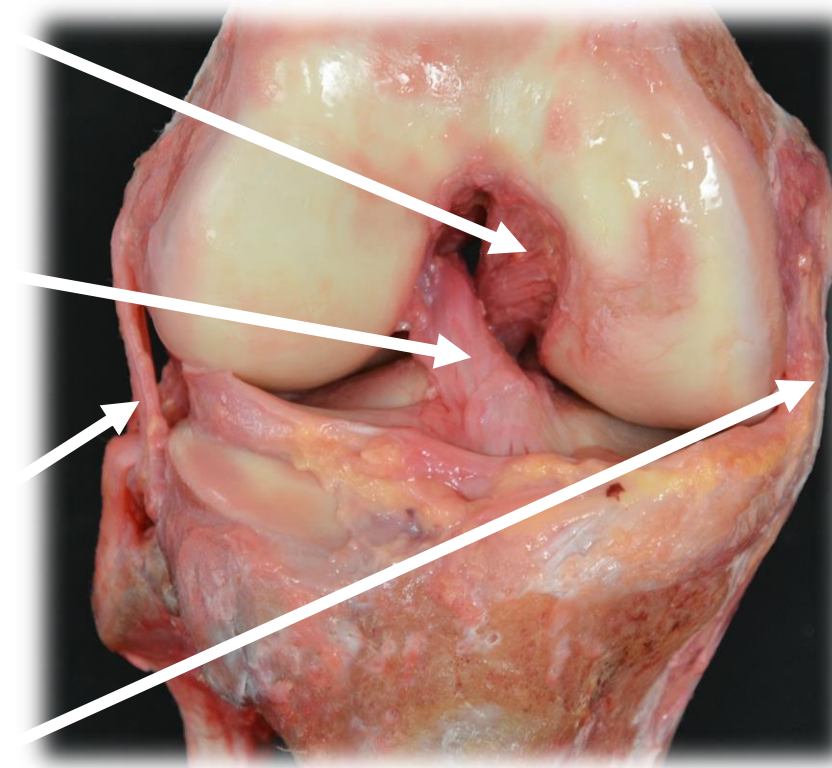
Static Stabilizers

Posterior Cruciate Ligament
(PCL)

Anterior Cruciate Ligament
(ACL)

Lateral Cruciate Ligament
(LCL)

Medial Cruciate Ligament
(MCL)



Knee Anatomy

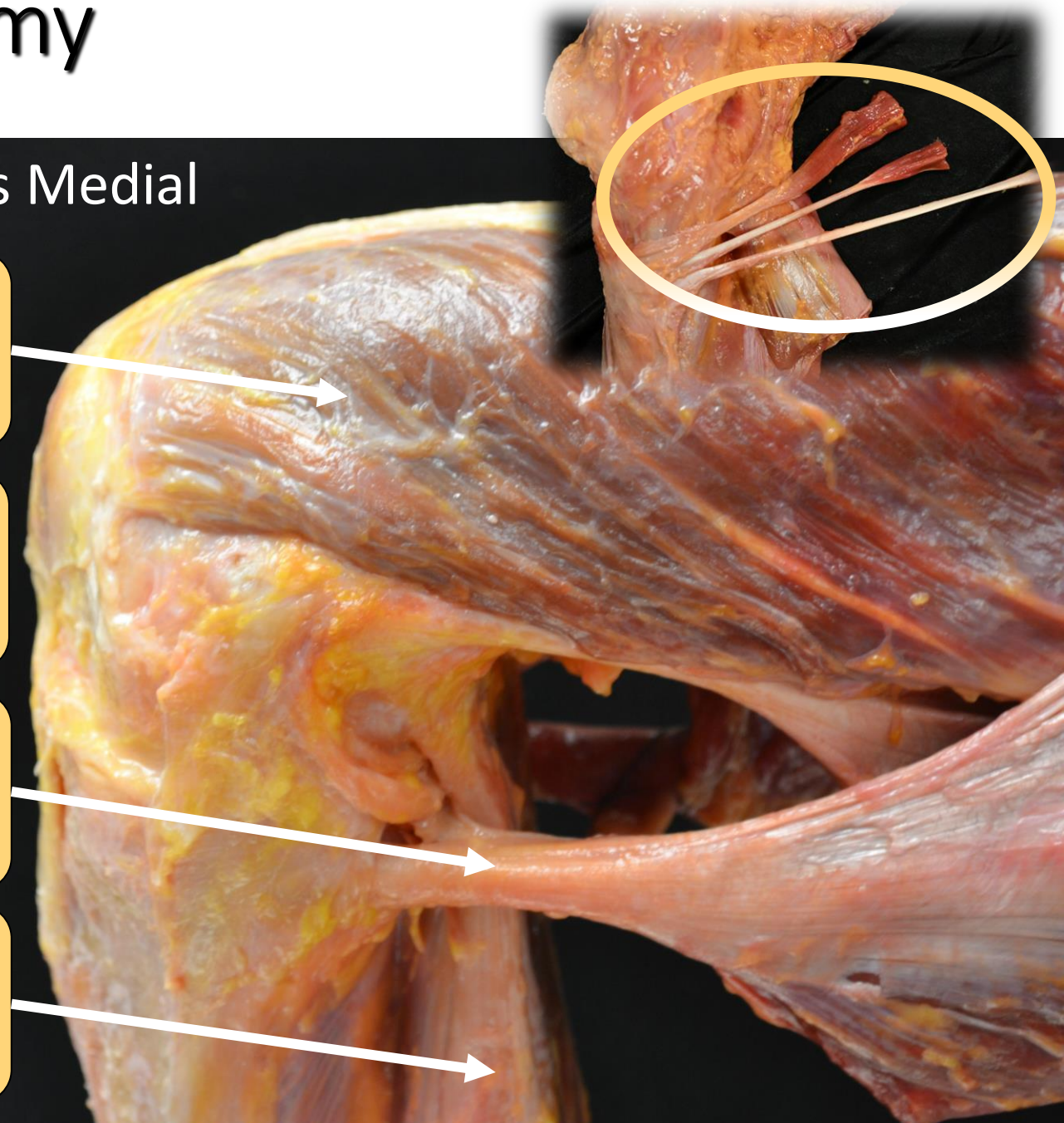
Dynamic Stabilizers Medial

Vastus Medialis

Pes Tendons

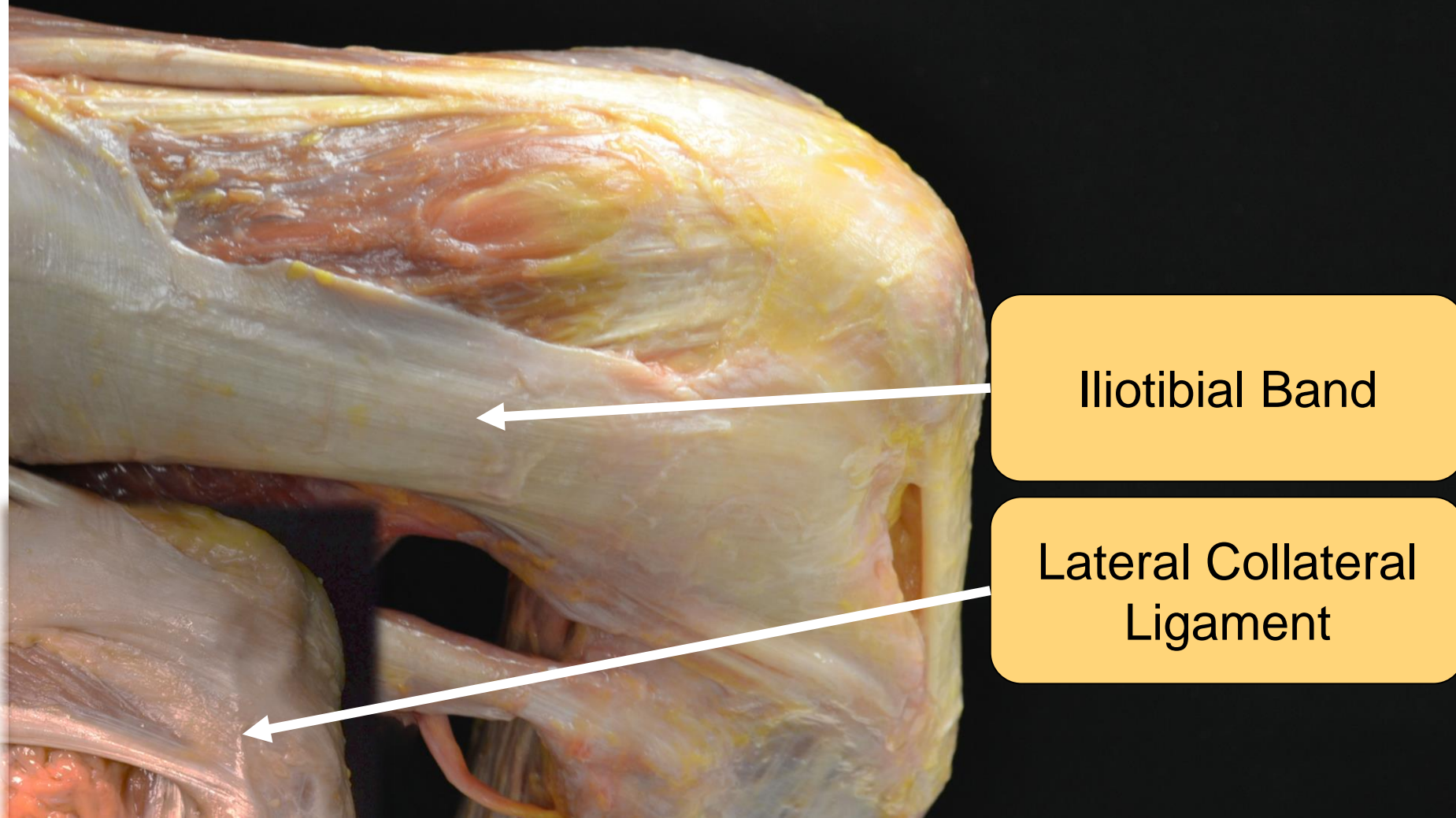
Semimembranosus

Medial
Gastrocnemius



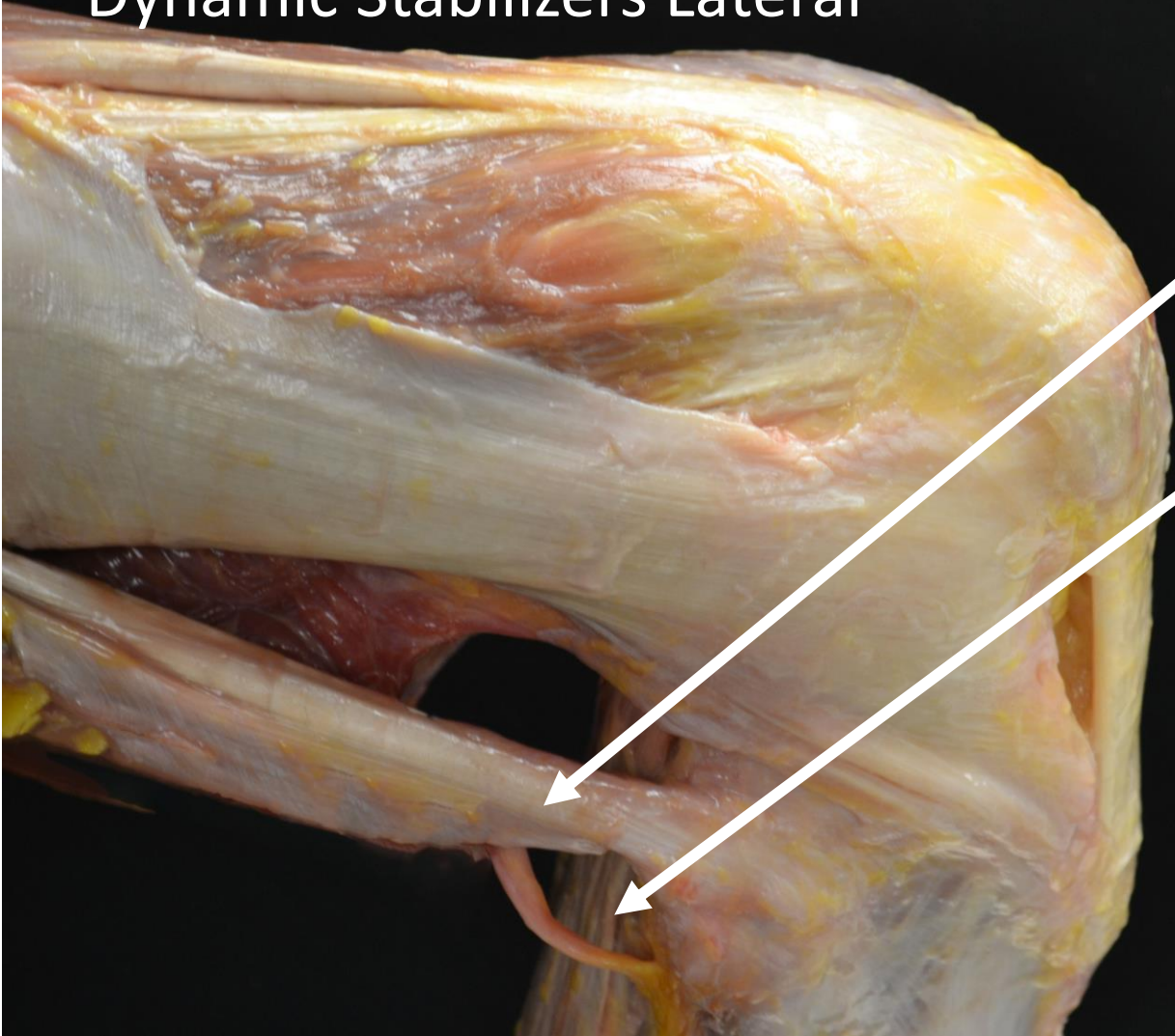
Knee Anatomy

Static Stabilizers Lateral



Knee Anatomy

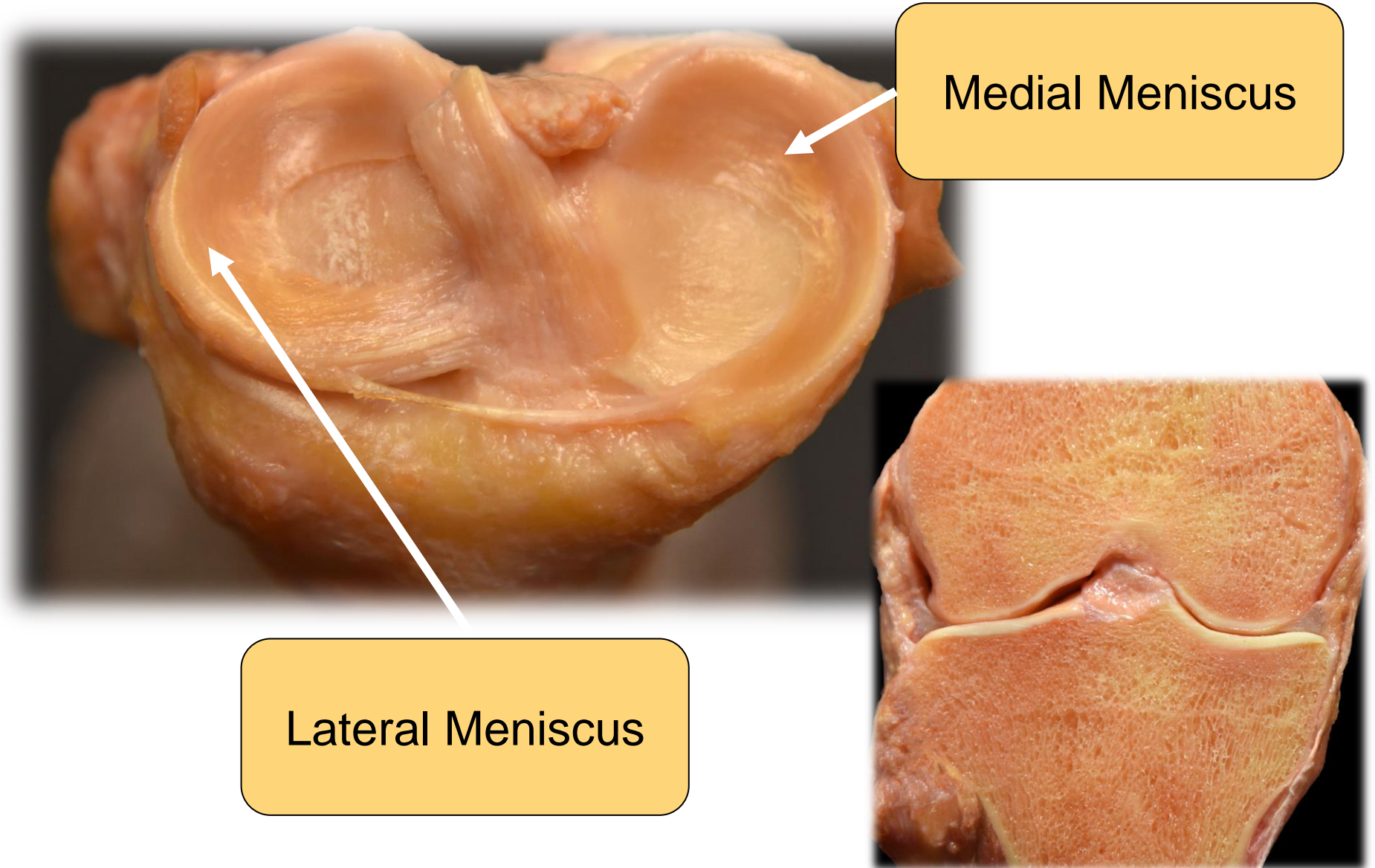
Dynamic Stabilizers Lateral



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

Russell Wilson, MS, PA-C, ATC

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 5th 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