

# Review of the Office Musculoskeletal Exam

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# Session Objectives

- Review upper and lower extremity joint, nerve and muscle anatomy.
- Review upper and lower extremity physical exam tests.
- Understand how to integrate your anatomy knowledge with the history and/or physical exam to make a diagnosis.
- Recognize what physical exam findings would be associated with specific diagnosis.
- Try several “cases” to illustrate how to apply anatomy to a clinical situation.

# I'm having increasing leg pain and difficulty walking

- Our goal is to evaluate this concern, determine a differential diagnosis, the likely etiology, and a diagnostic and/or management plan.
- Our primary clinical tools are our history and physical exam.
- History and physical exam findings will help us to determine next steps in terms of diagnostics and/or management

# Symptoms

## - Clues from the history

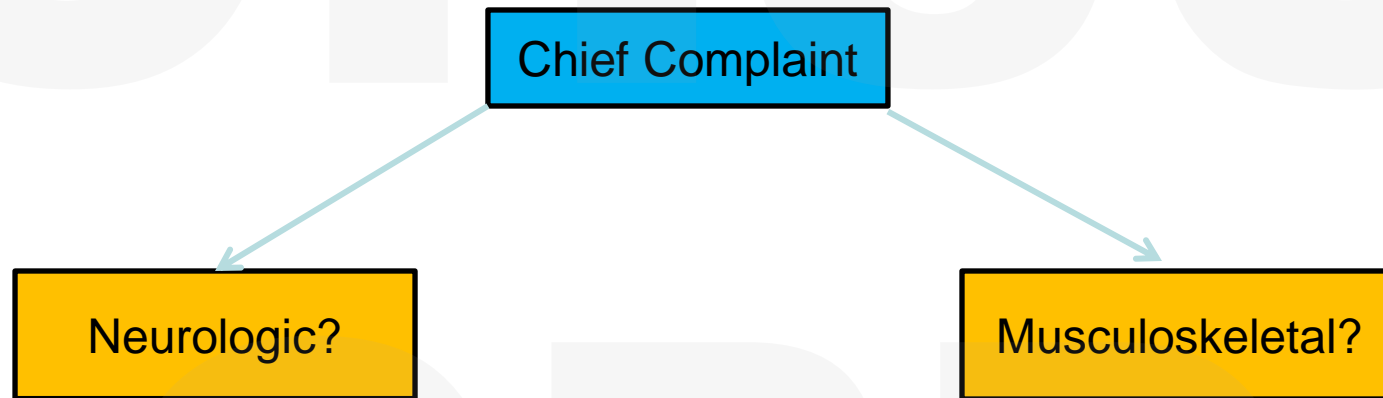
- Unsteadiness
- Pain (local vs. radiating or diffuse)
- Numbness
- Weakness or fatigue
- Stiffness
- Abnormal range of motion
- Rash
- Tripping or stumbling
- Impaired balance
- Atrophy
- Tingling or burning
- Catching, locking or sticking
- Twitching
- Swelling
- Redness
- Painful range of motion
- \*\*\*

# Signs

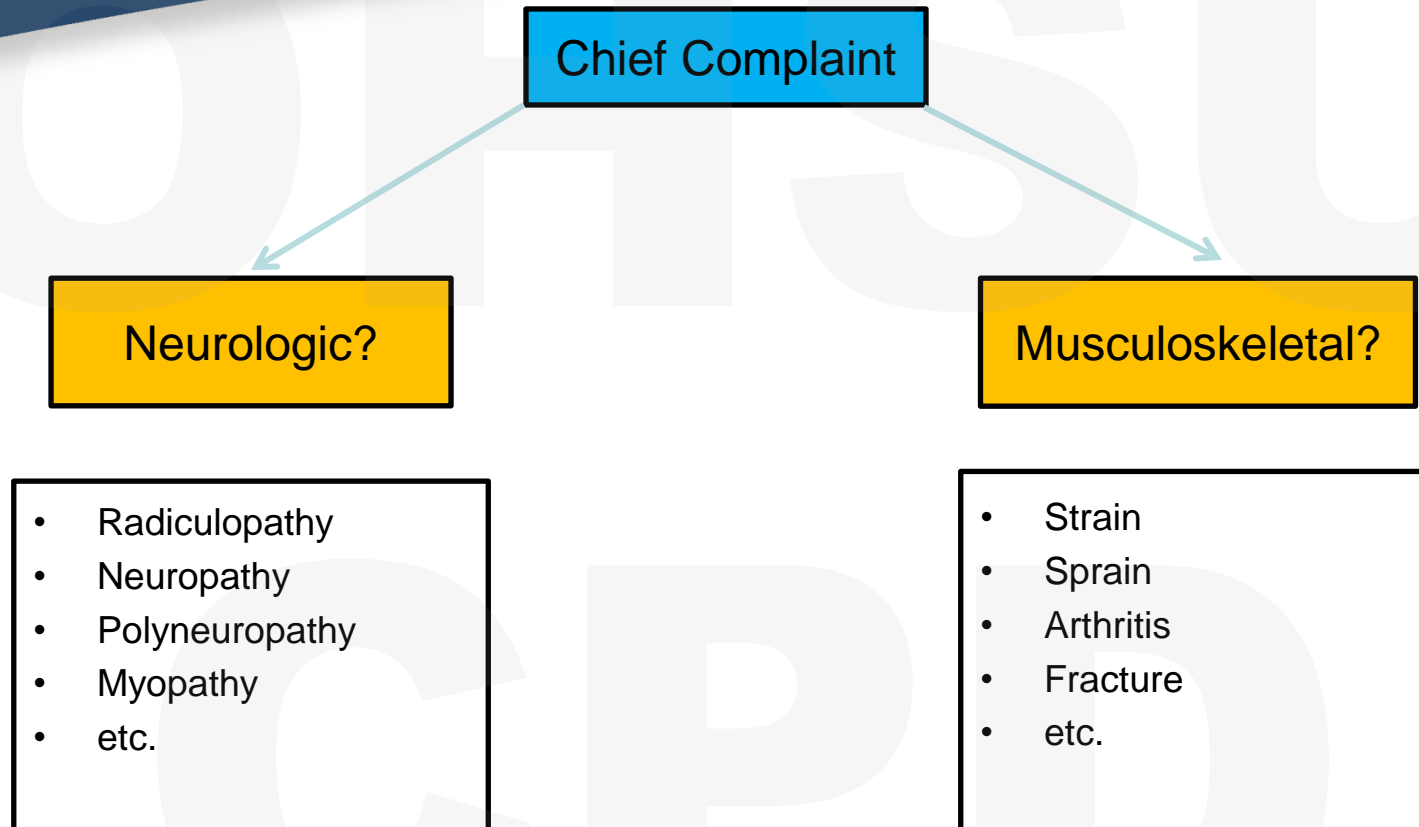
## - Clues from the physical exam

- Numbness
- Decreased reflexes
- Spasticity
- Tenderness to palpation
- Swelling
- Erythema or rash
- Skin ulceration
- Weakness
- Flaccid tone
- Painful/painless passive range of motion
- Incoordination
- Limp
- Altered gait
- Hyperreflexia
- Decreased range of motion
- Painful/painless active range of motion
- Atrophy
- Deformity
- \*\*\*

# Using the history and physical exam to make a Dx



# Using the history and physical exam to make a Dx



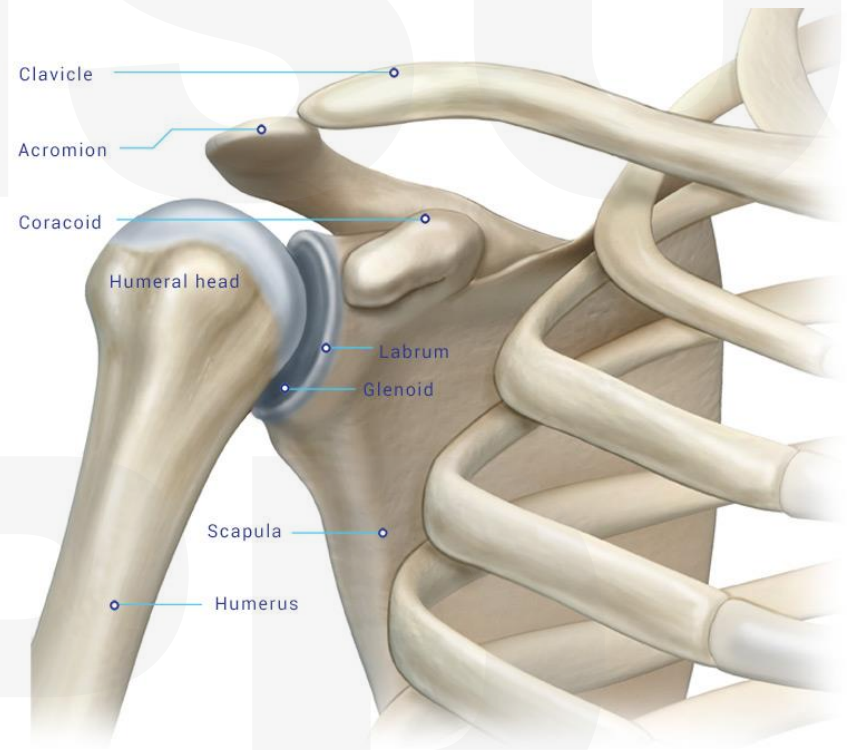
# Musculoskeletal Anatomy

- Common Joints
  - Shoulder
  - Hip
  - Knee
- Routine Exam
  - Inspection
  - ROM (active/passive)
  - Palpation
  - Joint-specific maneuvers



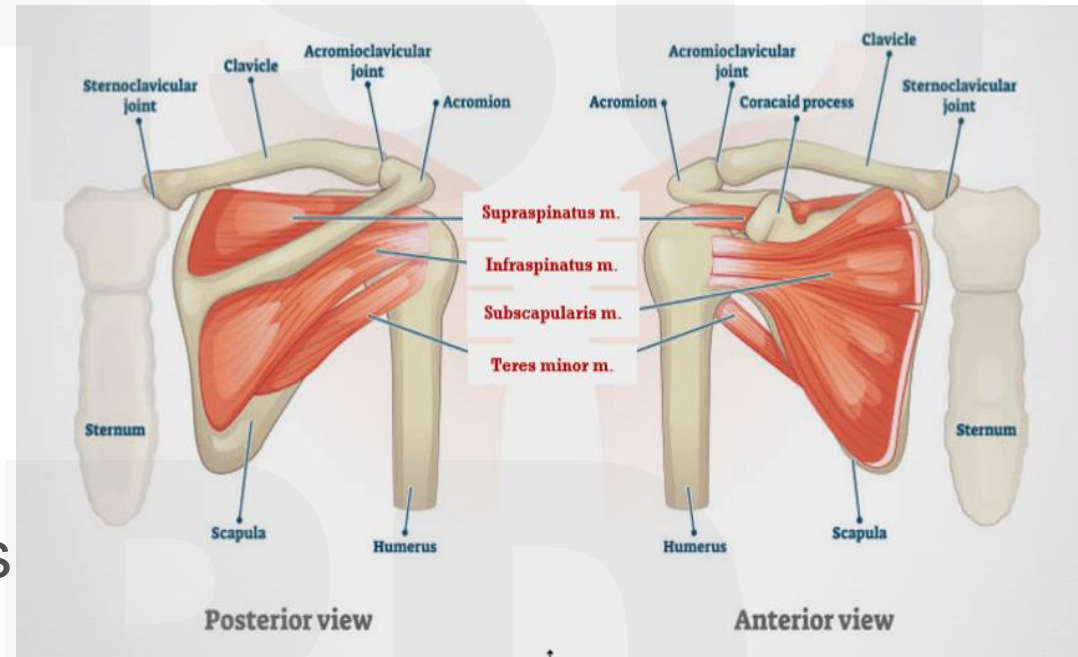
# Shoulder Anatomy

- Joints
  - Glenohumeral joint
  - Acromioclavicular joint
  - Sternoclavicular joint
  - Scapulothoracic articulation



# Shoulder Anatomy

- Muscles/Tendons
  - Rotator Cuff
    - Supraspinatus
    - Infraspinatus
    - Subscapularis
    - Teres Minor
  - Scapula Stabilizers



# Shoulder Physical Exam

- Inspection
  - Winging
  - Deformity
  - Atrophy
- ROM
  - Active
  - Passive
- Palpation
- Rotator Cuff Strength
  - Internal rotation
  - External rotation
  - Abduction
- Impingement Maneuvers
  - Impingement
  - Hawkins
  - Neer

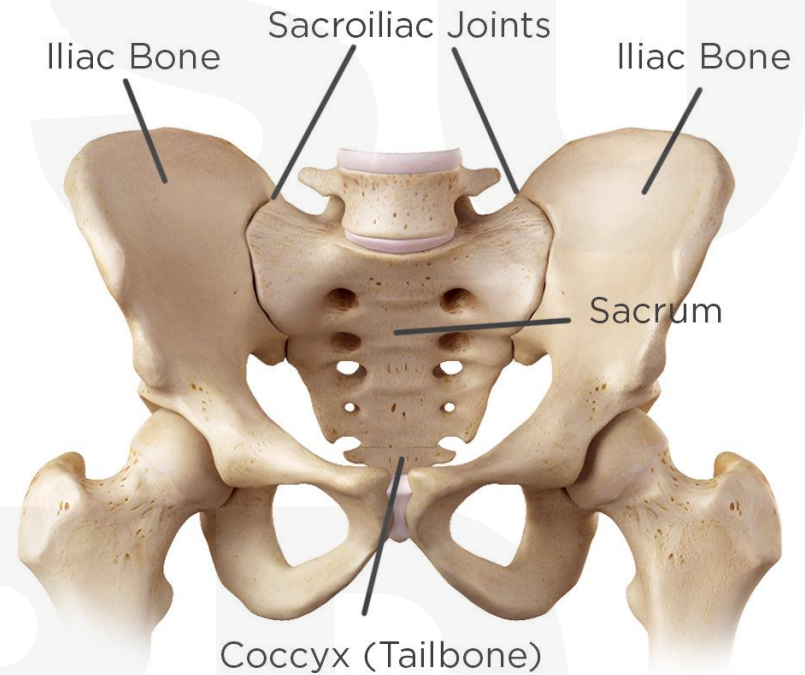
# Shoulder Physical Exam

- Impingement Maneuvers
  - Impingement
  - Neer
  - Hawkins



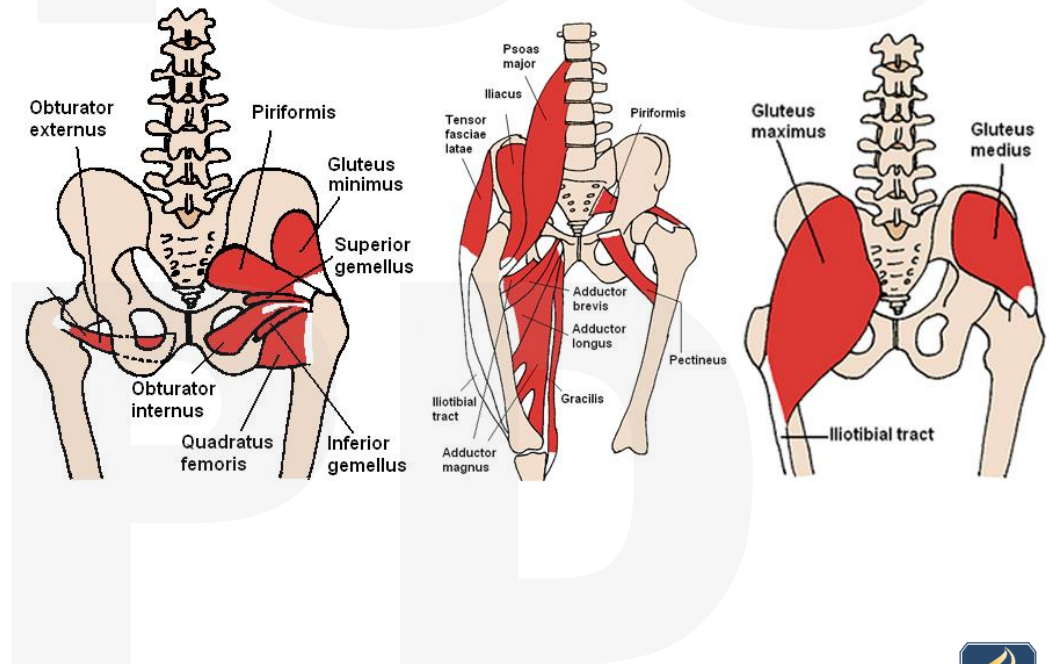
# Hip Anatomy

- Joints
  - Femoroacetabular joint
  - Sacroiliac joint



# Hip Anatomy

- Muscles/Tendons
  - Abductors
    - Gluteus medius
  - Adductors
    - Iliopsoas
  - Flexors
    - Gluteus maximus
  - Rotators

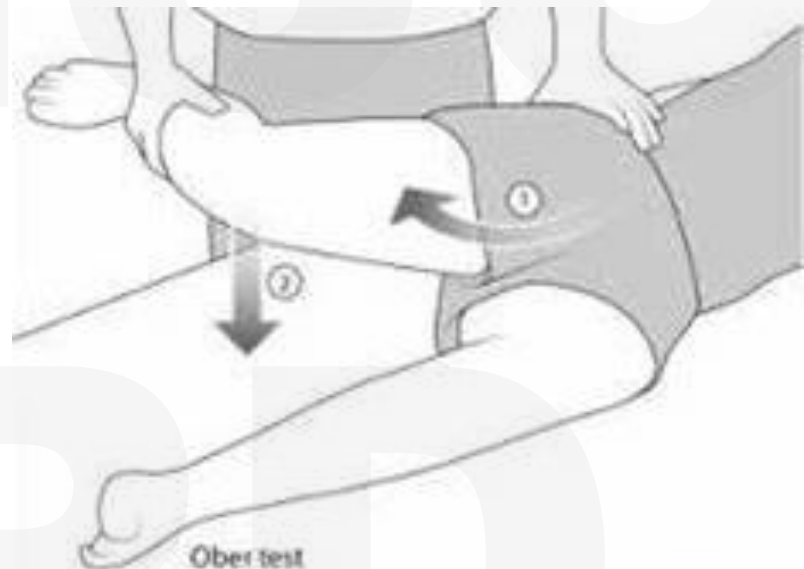


# Hip Physical Exam

- Inspection
  - Gait abnormality
- ROM
  - Active
  - Passive
- Palpation
  - Greater trochanter
  - Ischial tuberosity
- Hip Strength
  - Adduction/Abduction
  - Flexion/Extension
- Provocative Maneuvers
  - Osteoarthritis
    - Passive ROM
    - Active SLR
  - Ober
  - FABER

# Hip Physical Exam

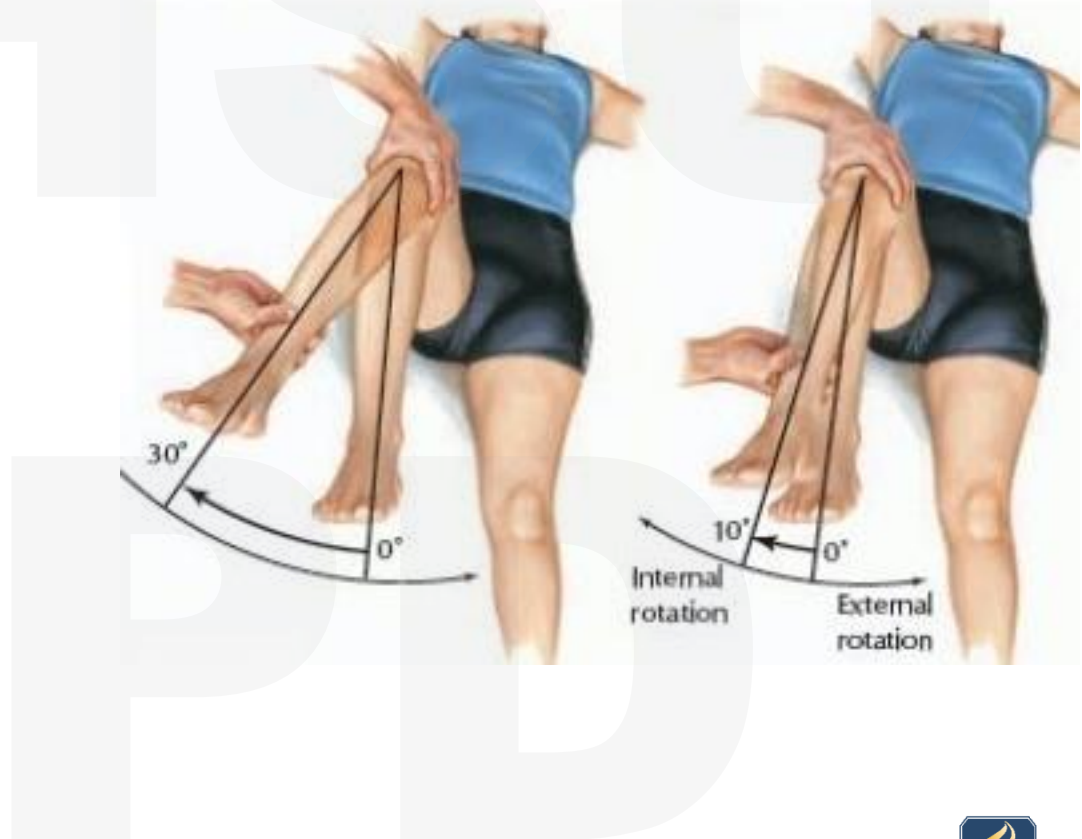
- Ober Test
  - Iliotibial band syndrome
  - Tensor fascia latae tightness
  - (Good position to test:
    - Greater trochanteric tenderness to palpation
    - Gluteus medius strength)





# Hip Physical Exam

- Hip OA/impingement
  - Hip flexion
  - Hip internal rotation



# Hip Physical Exam

- FABER Test
  - Flexion, Abduction, External Rotation
  - Sacroiliac joint



# Moving on...

- Neuromuscular Anatomy
  - Strength
  - Sensation
  - Reflexes
- Goal
  - Be able to do a motor, sensory and reflex exam of the upper and lower extremities in 60 seconds!

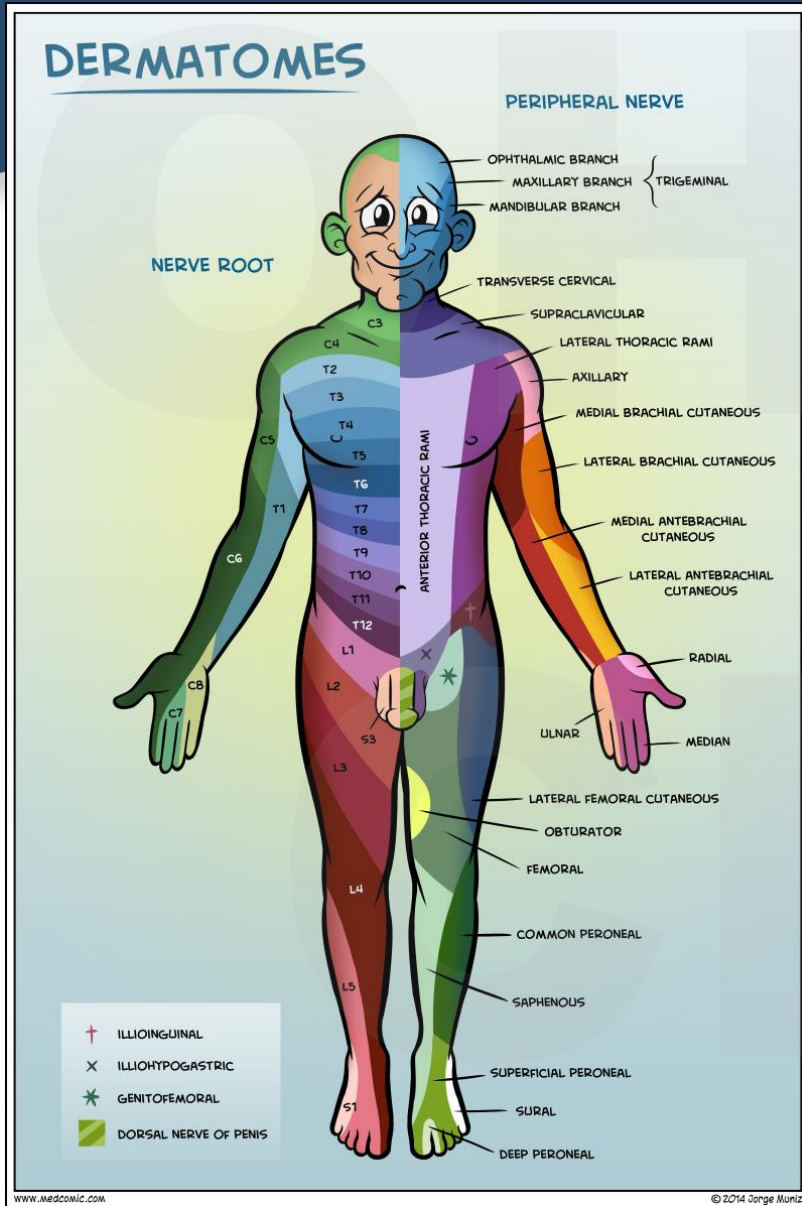
# Neuromuscular Anatomy

- There are some patterns to the organization of dermatomes and myotomes that can help us to remember the anatomy
- The dermatomes tend to form “loops” around the upper (lateral to medial, C5-T1) and lower extremity (medial to lateral, L4-S1)
- The myotomes have a proximal to distal pattern in the upper extremity (muscle location) and lower extremity (hand location during manual muscle testing)

# Clinical Correlations

- Trying to sort out the wide variety of causes of numbness and weakness without knowing anatomy is like trying to do a jigsaw puzzle without having the picture on the cover of the box – if we know anatomy, we have the picture
- Step 1 – review anatomy patterns
- Step 2 – practice physical exams
- Step 3 – try sample cases

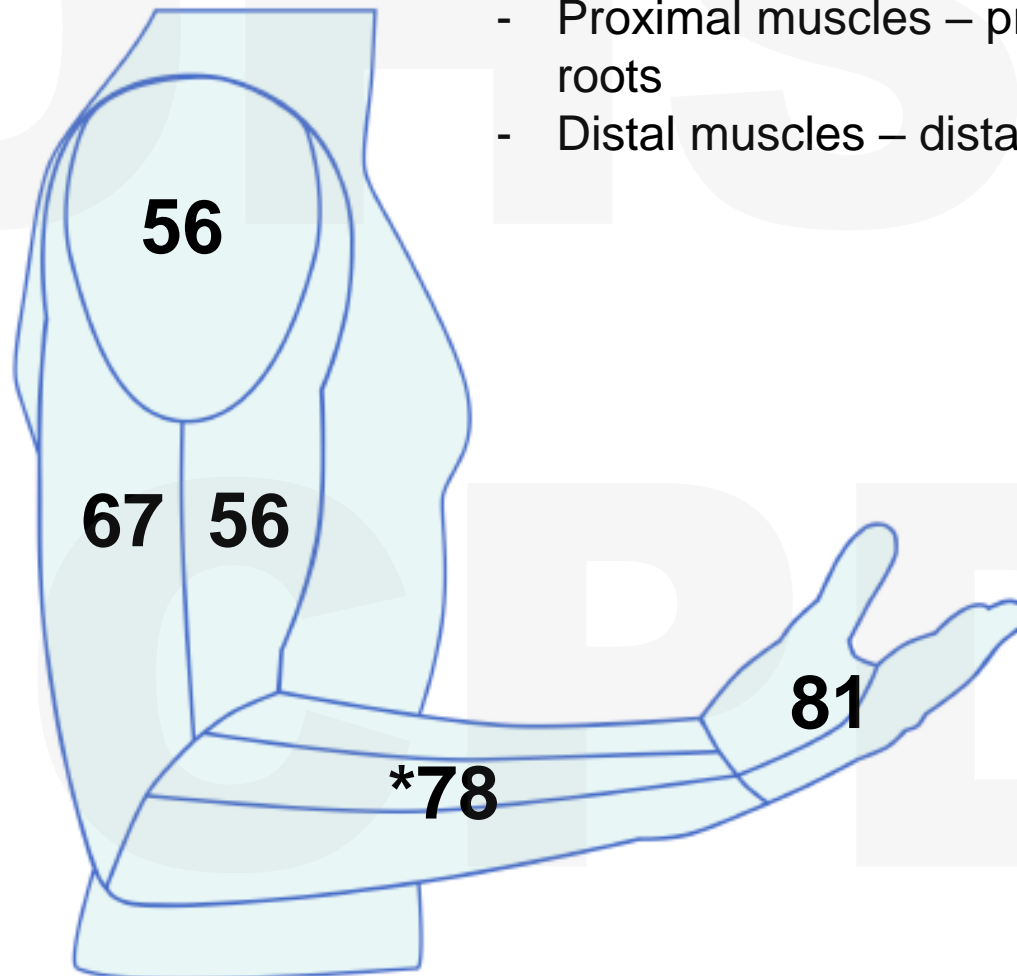
# Sensation – Dermatomes/Cutaneous Nerves



- Upper Extremity
  - C5-T1
  - Lateral to Medial “Loop”
- Lower Extremity
  - L4-S1
  - Medial to Lateral “Loop”

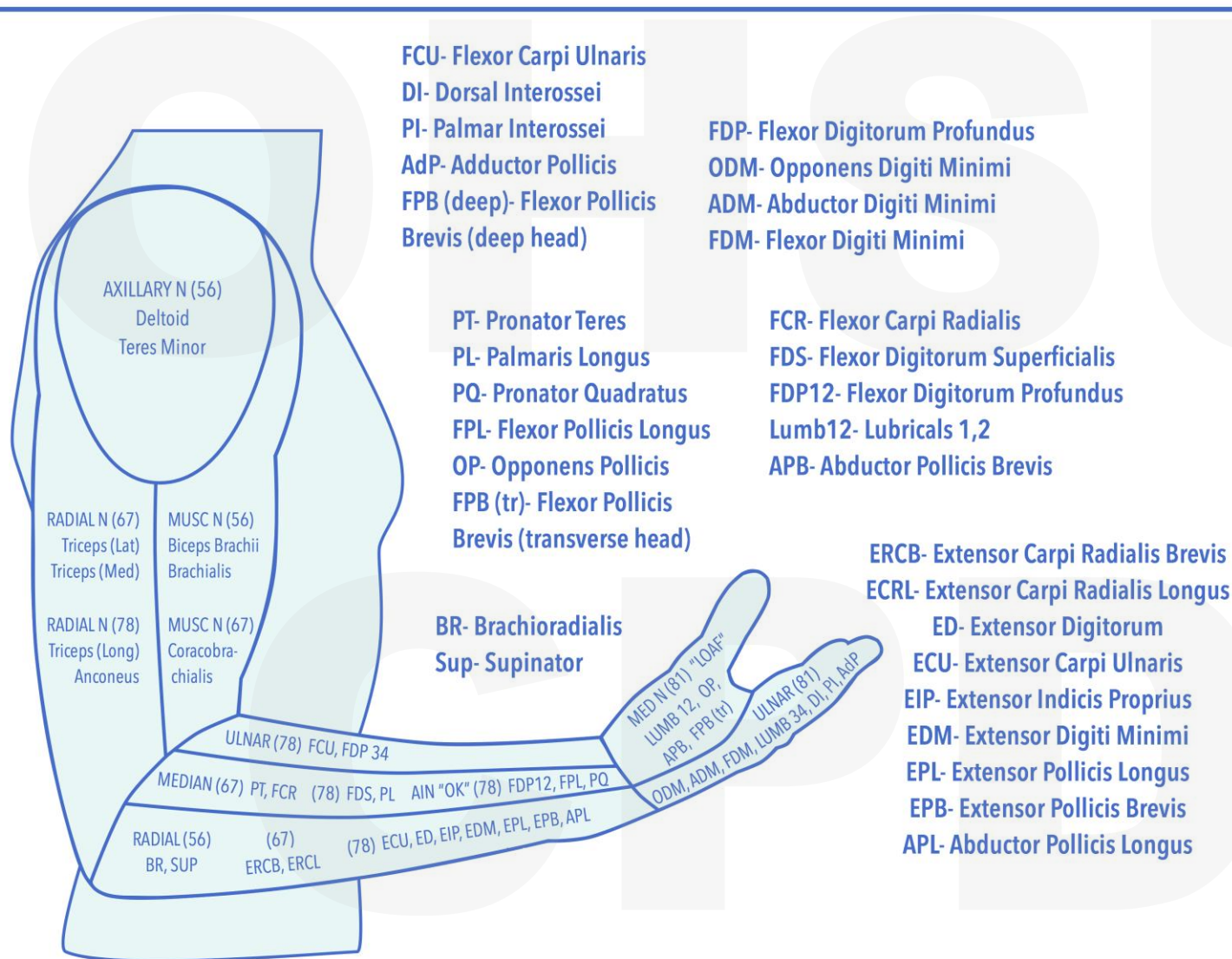
# Strength – Upper Extremity Myotomes

- All muscles innervated by 2 nerve roots
- Proximal muscles – proximal nerve roots
- Distal muscles – distal nerve roots



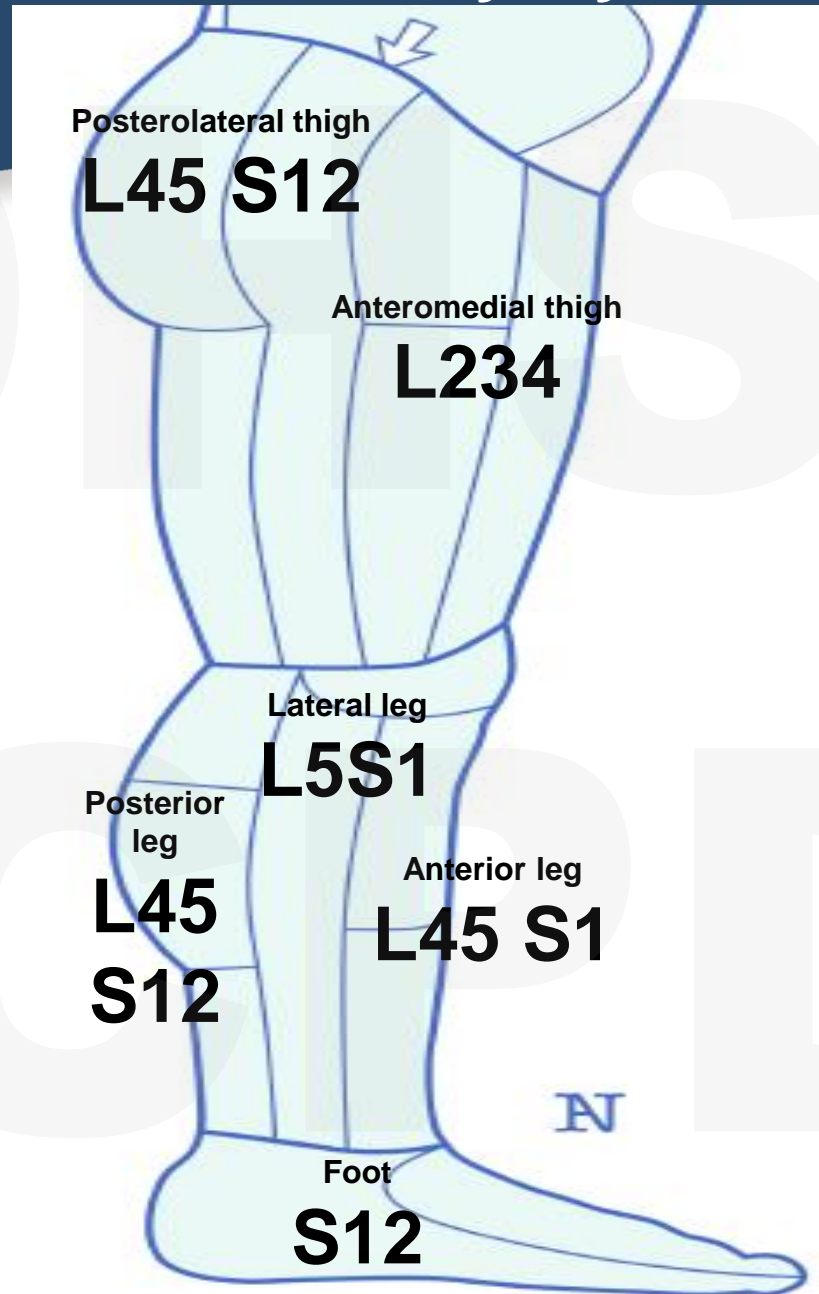


# Strength – Upper Extremity Myotomes and Nerves



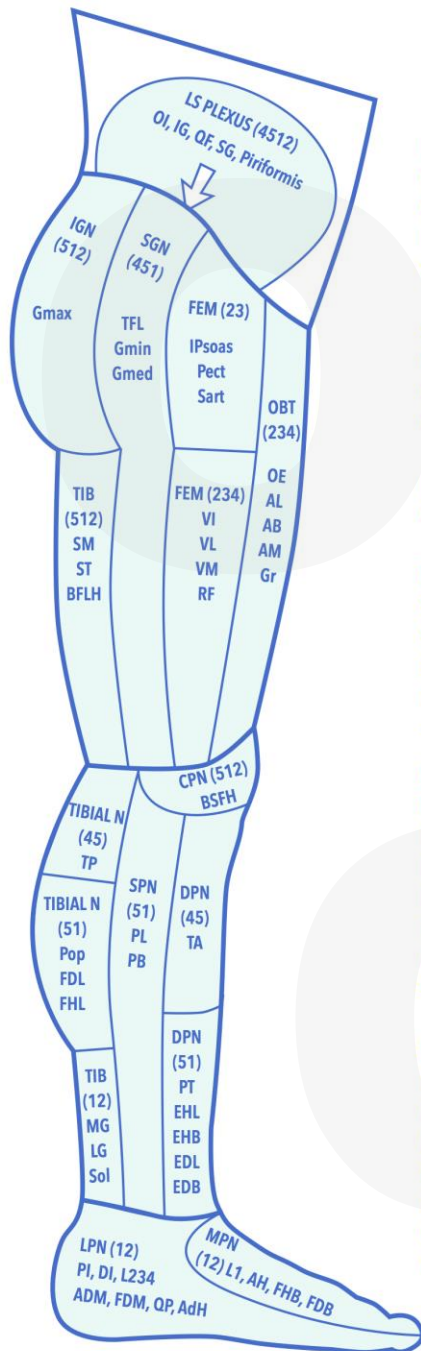


# Strength – Lower Extremity Myotomes



- All muscles innervated by 2 nerve roots
- Proximal and distal organization is not so clear
- Some patterns emerge:
  - Posterior LE is L45 S12
  - Anteromedial thigh is L234
  - Foot is S12

# Strength – Lower Extremity Myotomes and Nerves



## Lumbosacral Plexus

OI- Obturator Internus  
QF- Quadratus Femoris  
IG- Inferior Gamellus  
SG- Superior Gamellus

## Superior Gluteal Nerve

TFL- Tensor Fascia Latae  
Gmin- Gluteus Minimus  
Gmed- Gluteus Medius

## Inferior Gluteal Nerve

Gmax- Gluteus Maximus

## Tibial Nerve

SM- Semimembranosus  
ST- Semitendinosus  
BFLH- Biceps Femoris Long Head

## Tibial Nerve (lower)

TP- Tibialis Posterior  
Pop- Popliteus  
FDL- Flexor Digitorum Longus  
FDH- Flexor Hallucis Longus  
MG- Medial Gastrocnemius  
LG- Lateral Gastrocnemius  
Sol- Soleus

## Lateral Plantar Nerve

PI- Palmar Interossei  
DI- Dorsal Interossei  
L234- Lumbricals 2,3,4  
ADM- Abductor Digiti Minimi  
FDM- Flexor Digiti Minimi  
QP- Quadratus Plantaris  
AdH- Adductor Halicus

## Obturator Nerve

OE- Obturator Externus  
AL- Adductor Longus  
AB- Adductor Brevis  
AM- Adductor Magnus  
Gr- Gracillis

## Femoral Nerve

IPsoas- Iliopsoas  
Pect- Pectineus  
Sart- Sartorius  
VI- Vastus Intermeius  
VL- Vastus Lateralis  
VM- Vastus Medialis  
RF- Rectus Femoris

## Medial Plantar Nerve

L1- Lumbrical 1  
AH- Abductor Hallucis  
FHB- Flexor Hallucis Brevis  
FDB- Flexor Digitorum Brevis

## Common Peroneal Nerve

BFSH- Biceps Femoris Short Head

## Superficial Peroneal Nerve

PL- Peroneus Longus  
PB- Peroneus Brevis

## Deep Peroneal Nerve

PT- Peroneus Tertius  
EHL- Extensor Hallucis Longus  
EHB- Extensor Hallucis Brevis  
EDL- Extensor Digitorum Longus  
EDB- Extensor Digitorum Brevis

# The 60 Second Neuro Exam

Upper Extremity	C5	C6	C7	C8	T1
DTR	Bic (Musc.)	BR (Radial)	Tri (Radial)	-	-
Strength	Sh Abd (Axillary)	Wr Ext/Elb Flx (Radial/Musc)	Wr Flx/Elb Ext (MedUln/Rad)	Fing Flx (MedUln)	Fing Abd (Ulnar)
Sensation	Lat. Sh. (Axillary)	Thumb (Med/Rad)	Middle (Med/Rad)	Little (Ulnar)	Med. Arm (MBC)
Lower Extremity	L2	L3	L4	L5	S1
DTR	-	-	Patellar (Femoral)	-	Achilles (Tibial)
Strength	Hip Flx (Femoral)	Knee Ext (Femoral)	Ankle DF (Peroneal)	Gr. Toe Ext (Peroneal)	Ankle PF (Tibial)
Sensation	-	-	Med. Mall. (Saphenous)	1 <sup>st</sup> DWS (Deep Per.)	Lat. Heel (Sural)

# Pair Up and Practice Physical Exam

- Upper Extremity

- Reflexes (3)
- Sensation (5)
- Strength (5)

- Lower Extremity

- Reflexes (2)
- Sensation (3)
- Strength (4)

# Case 1

- **Sensation**
  - Numb thumb
    - Palmar and Dorsal
  - Normal middle, little finger
- **Strength**
  - Weak wrist extension
  - Normal sh. abd., wr. flex., finger flexion

Upper Extremity	C5	C6	C7	C8	T1
<b>DTR</b>	Bic (Musc.)	BR (Radial)	Tri (Radial)	-	-
<b>Strength</b>	Sh. Abd (Axillary)	Wr. Ext. (Radial)	Wr. Flex. (Med/Uln)	Fing. Flex. (Med/Uln)	Fing. Abd. (Ulnar)
<b>Sensation</b>	Lat. Sh. (Axillary)	Thumb (Med/Rad)	Middle (Med/Rad)	Little (Ulnar)	Med. Arm (MBC)

# Case 1 – C6 Radiculopathy

- **Sensation**
  - Numb thumb
    - Palmar and Dorsal
  - Normal middle, little finger
- **Strength**
  - Weak wrist extension
  - Normal sh. abd., wr. flex., finger flexion

Upper Extremity	C5	C6	C7	C8	T1
<b>DTR</b>	Bic (Musc.)	BR (Radial)	Tri (Radial)	-	-
<b>Strength</b>	Sh. Abd (Axillary)	Wr. Ext. (Radial)	Wr. Flex. (Med/Uln)	Fing. Flex. (Med/Uln)	Fing. Abd. (Ulnar)
<b>Sensation</b>	Lat. Sh. (Axillary)	Thumb (Med/Rad)	Middle (Med/Rad)	Little (Ulnar)	Med. Arm (MBC)

## Case 2

- Numb little finger
- Normal thumb, middle
- Weak finger abd., finger flexion, wrist flexion
- Normal wr.ext., sh. abd.

Upper Extremity	C5	C6	C7	C8	T1
<b>DTR</b>	Bic (Musc.)	BR (Radial)	Tri (Radial)	-	-
<b>Strength</b>	Sh. Abd (Axillary)	Wr. Ext. (Radial)	Wr. Flex. (Med/Uln)	Fing. Flex. (Med/Uln)	Fing. Abd. (Ulnar)
<b>Sensation</b>	Lat. Sh. (Axillary)	Thumb (Med/Rad)	Middle (Med/Rad)	Little (Ulnar)	Med. Arm (MBC)

# Case 2 – Ulnar Neuropathy at the Elbow

- Numb little finger
- Normal thumb, middle
- Weak finger abd., finger flexion, wrist flexion
- Normal wr.ext., sh. abd.

Upper Extremity	C5	C6	C7	C8	T1
<b>DTR</b>	Bic (Musc.)	BR (Radial)	Tri (Radial)	-	-
<b>Strength</b>	Sh. Abd (Axillary)	Wr. Ext. (Radial)	Wr. Flex. (Med/Uln)	Fing. Flex. (Med/Uln)	Fing. Abd. (Ulnar)
<b>Sensation</b>	Lat. Sh. (Axillary)	Thumb (Med/Rad)	Middle (Med/Rad)	Little (Ulnar)	Med. Arm (MBC)



# Case 3

- Numb medial malleolus
- Normal 1<sup>st</sup> DWS, lateral heel
- Weak knee ext., ADF
- Normal gr. toe ext., APF

Lower Extremity	L2	L3	L4	L5	S1
DTR	-	-	Patellar (Femoral)	-	Achilles (Tibial)
Strength	-	Knee Ext. (Femoral)	Ank. DF (Peroneal)	Gr. Toe Ext. (Peroneal)	Ank. PF (Tibial)
Sensation	-	-	Med. Mall. (Saphenous)	1 <sup>st</sup> DWS (Deep Per.)	Lat. Heel (Sural)

# Case 3 – L4 Radiculopathy

- Numb medial malleolus
- Normal 1<sup>st</sup> DWS, lateral heel
- Weak knee ext., ADF
- Normal gr. toe ext., APF

Lower Extremity	L2	L3	L4	L5	S1
DTR	-	-	Patellar (Femoral)	-	Achilles (Tibial)
Strength	-	Knee Ext. (Femoral)	Ank. DF (Peroneal)	Gr. Toe Ext. (Peroneal)	Ank. PF (Tibial)
Sensation	-	-	Med. Mall. (Saphenous)	1 <sup>st</sup> DWS (Deep Per.)	Lat. Heel (Sural)

# I'm having increasing leg pain and difficulty walking

- History/Exam
  - Radiating pain from back to foot
  - Numbness in calf
  - Weakness, tripping
  - Steppage gait

# I'm having increasing leg pain and difficulty walking

- History/Exam
  - Radiating pain from back to foot
  - Numbness in calf
  - Weakness, tripping
  - Steppage gait
- Dx
  - Radiculopathy

# I'm having increasing leg pain and difficulty walking

- History/Exam
  - Deep groin pain
  - Pain in thigh, not distal to knee
  - No numbness/paresthesias
  - Waddling gait

# I'm having increasing leg pain and difficulty walking

- History/Exam
  - Deep groin pain
  - Pain in thigh, not distal to knee
  - No numbness/paresthesias
  - Waddling gait
- Dx
  - Hip pathology

## The main concepts from this session are:

- Know basic joint, nerve and muscle anatomy.
- Use your knowledge of anatomy to determine history questions and physical exam findings to determine diagnoses.