

The 60 Second Neurologic Exam: Upper and Lower Extremities February 13, 2026

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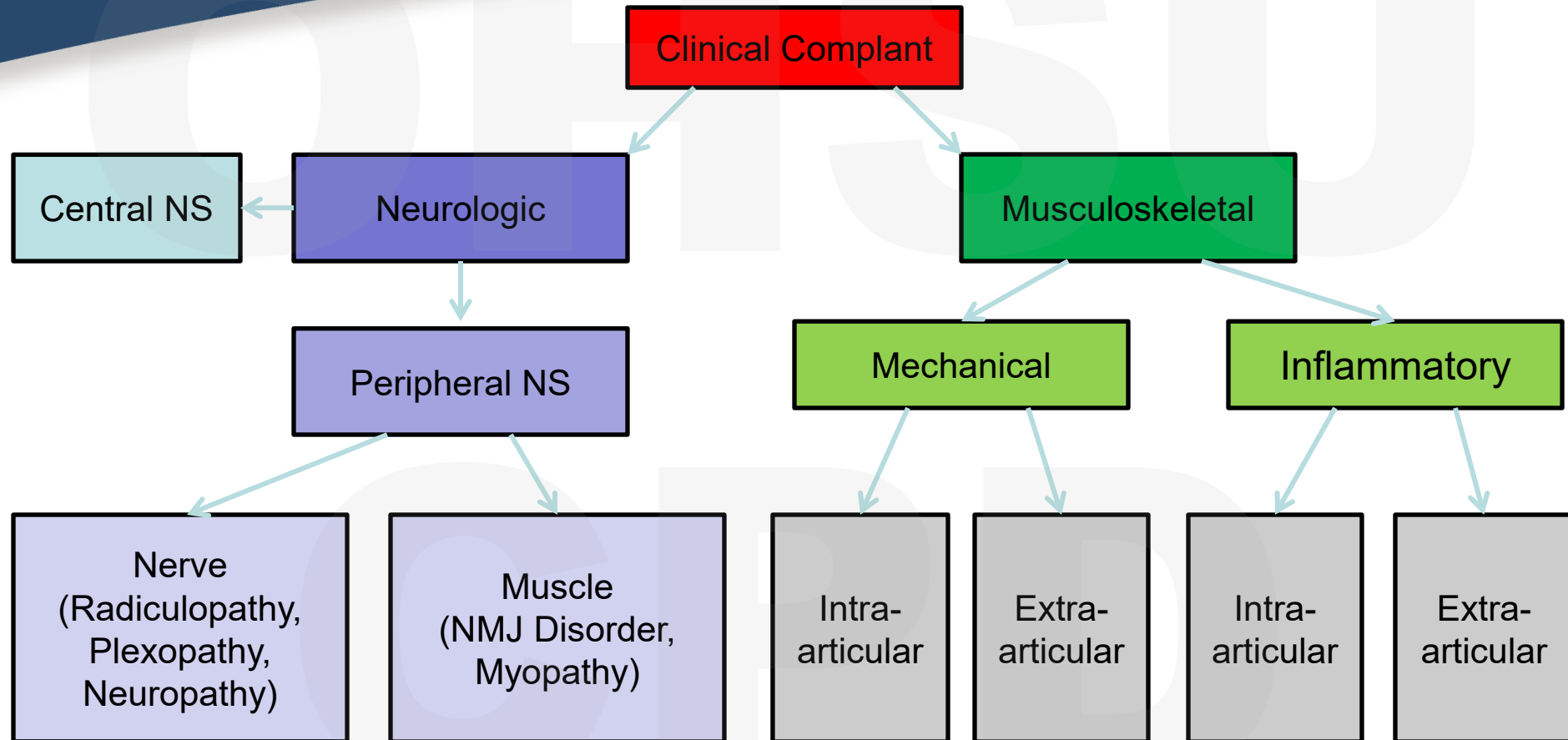


Session Objectives

- 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.
- Review upper and lower extremity nerve and muscle anatomy (and review of upper and lower extremity musculoskeletal anatomy in the next session)
- Work through several “cases” to illustrate how to apply anatomy to a clinical presentation

Decision Making Roadmap

- Navigate with Signs and Symptoms



Clinical Complaint:

I'm having increasing leg pain and difficulty walking

- Our goal - evaluate this concern, determine a differential diagnosis, the likely etiology, and a diagnostic and/or management plan
- Our primary clinical tools - 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

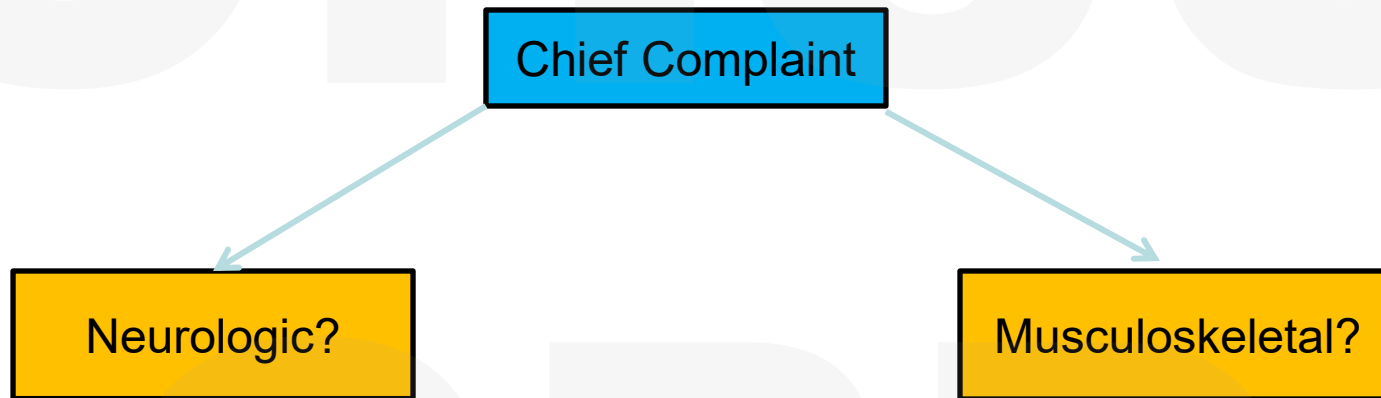
- Unsteadiness
- Pain (local vs. radiating or diffuse)
- Numbness
- Weakness or fatigue
- Stiffness
- Abnormal range of motion
- Rash
- Tripping or stumbling
- Impaired balance
- Atrophy
- Tingling or burning
- Catching, locking or sticking
- Twitching
- Swelling
- Redness
- Painful range of motion
-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

Signs

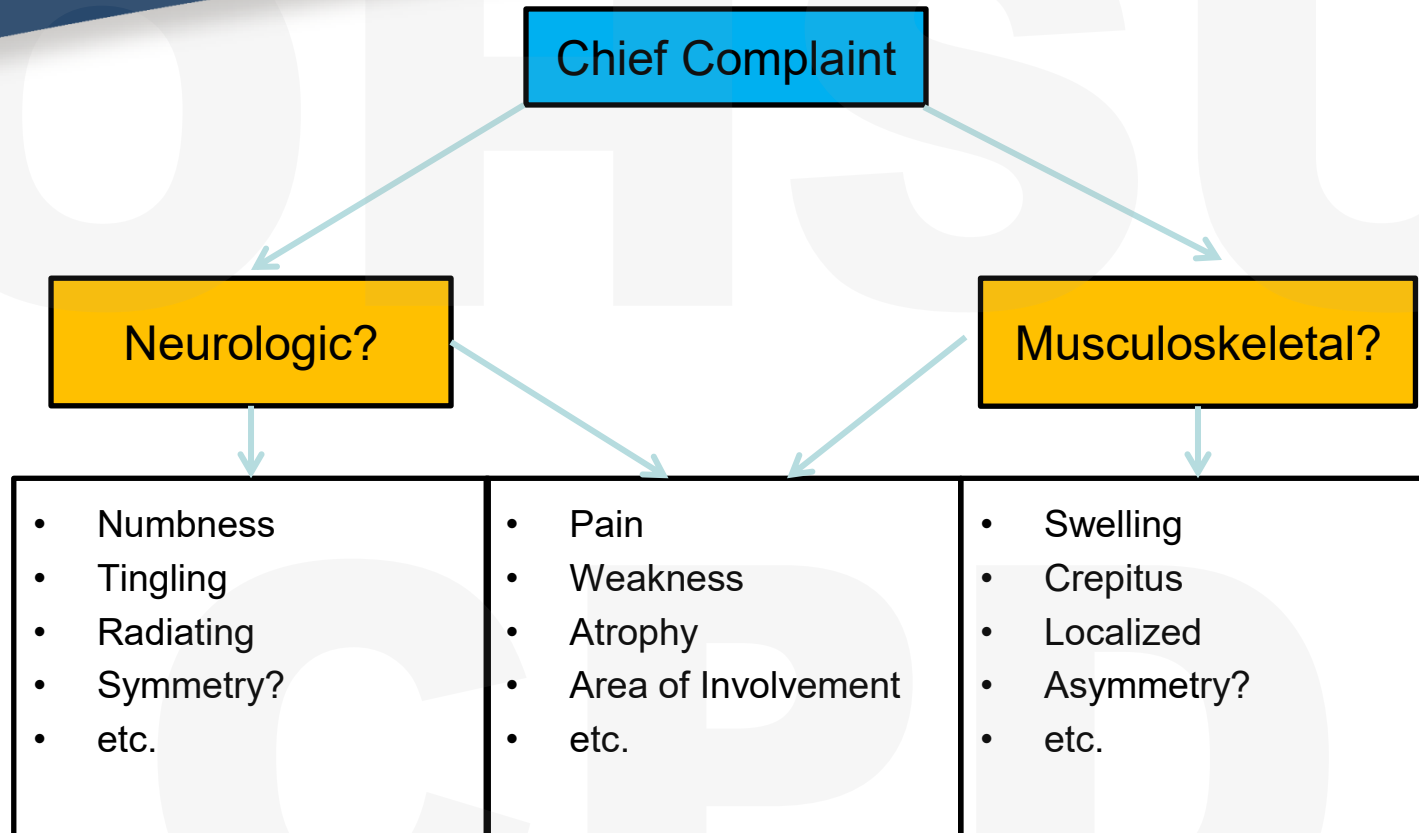
- Clues from the physical exam

- 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
- ***

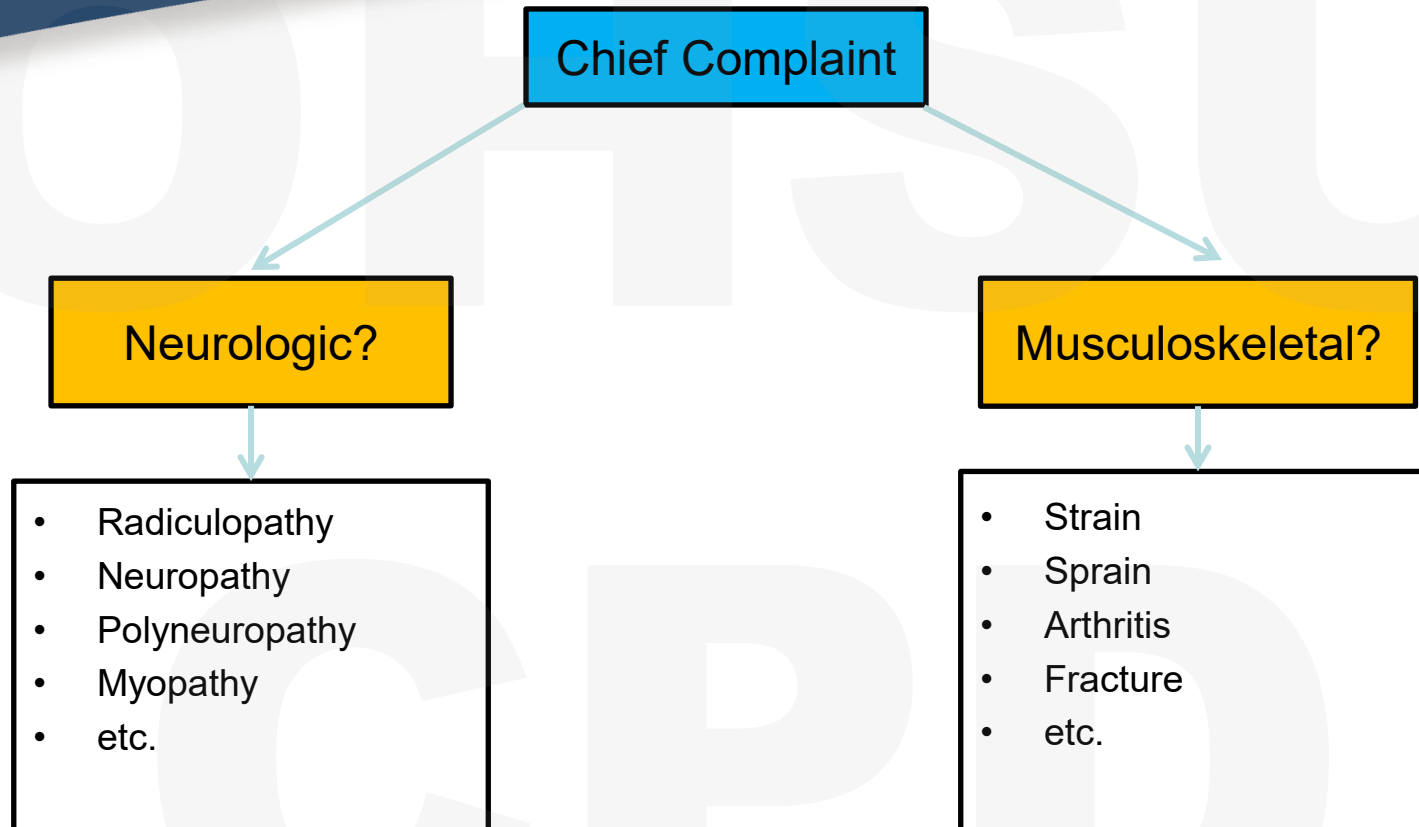
Using the history and physical exam to make a Dx



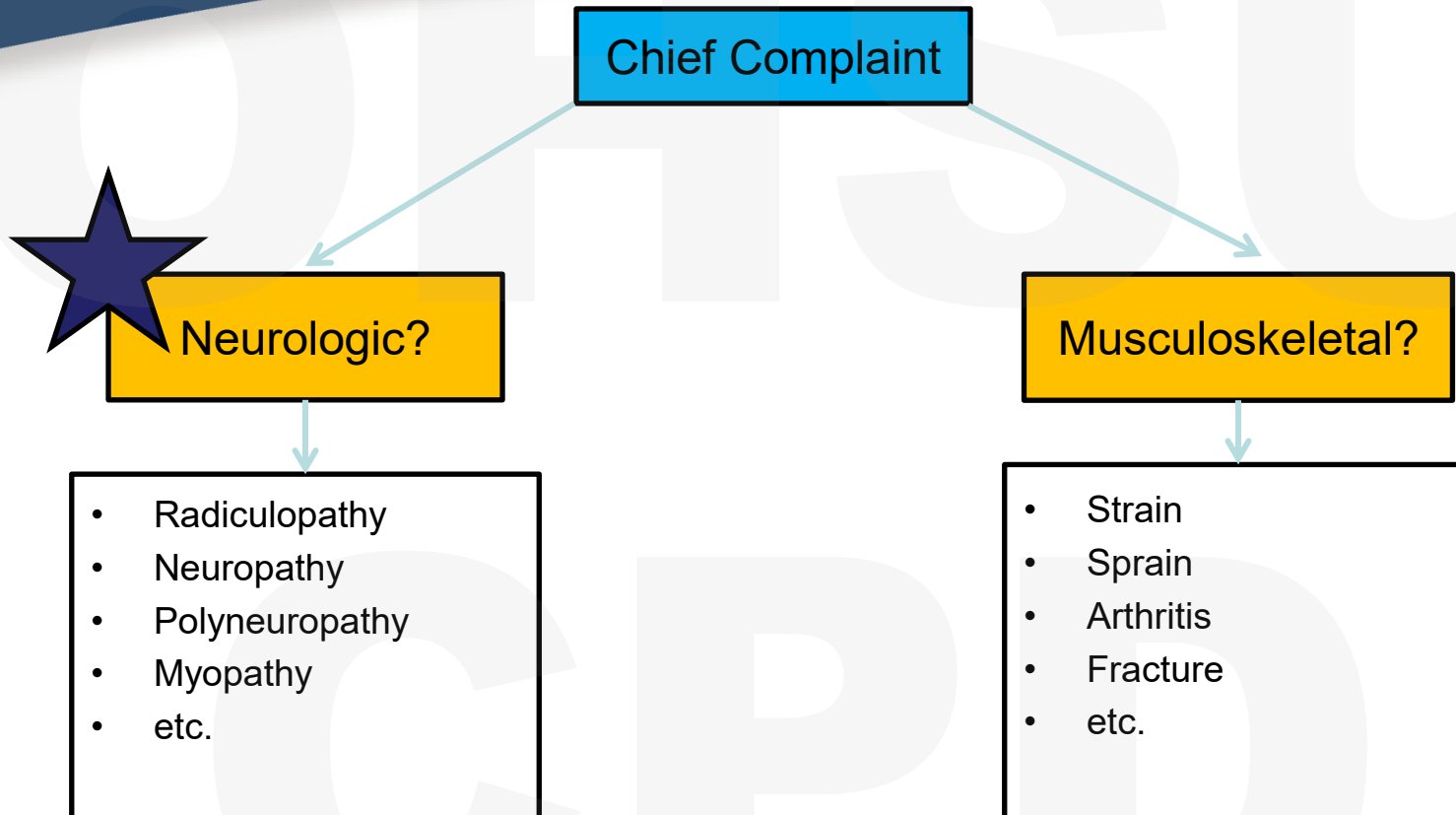
Using the history and physical exam to make a Dx



Using the history and physical exam to make a Dx



Using the history and physical exam to make a Dx

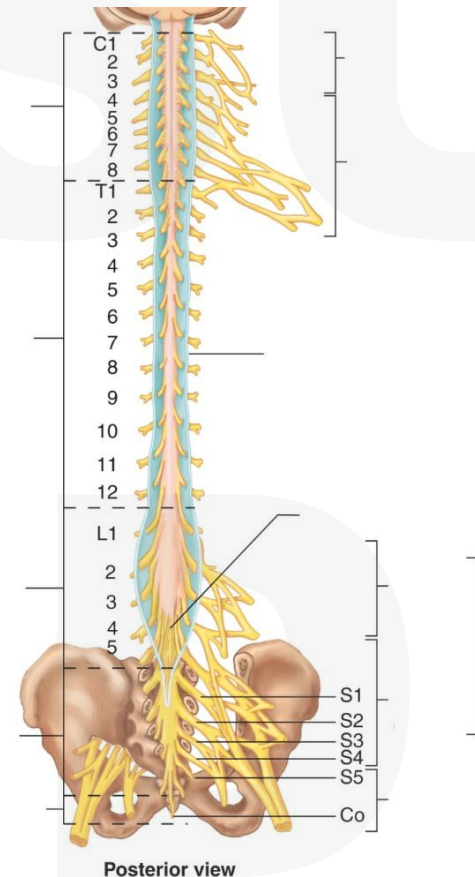


The 60 Second Neuro Exam

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 st DWS (Deep Per.)	Lat. Heel (Sural)

Spinal Nerves, Dermatomes, Myotomes and Peripheral Nerves

- Spinal Nerve
 - Nerve roots coming off the spinal cord
 - 31 paired spinal nerves (cervical, thoracic, lumbar, sacrococcygeal)
- Dermatomes
 - Area of skin supplied by a spinal nerve/nerve root
- Myotomes
 - Muscles supplied by a spinal nerve/nerve root
- Peripheral Nerve
 - Formed from spinal nerves
 - Often have both motor and sensory axons



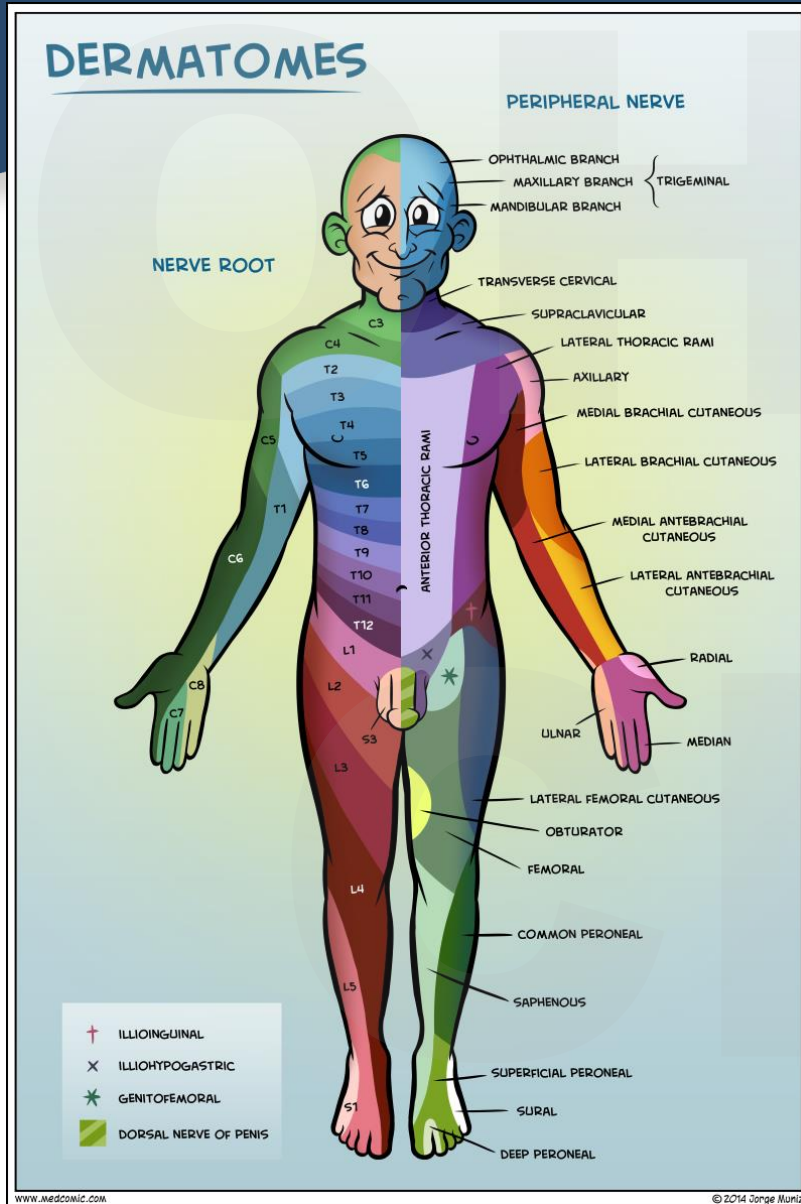
Anatomy Patterns

- There are some patterns to the organization of dermatomes and myotomes that can help us to remember the anatomy
- The **Dermatomes** have a “*loop*” pattern
 - C5-T1 – lateral to medial
 - L4-S1 – medial to lateral
- The **Myotomes** have a “*proximal to distal*” pattern
 - Based on muscle location in the upper extremity
 - Based on hand placement during manual muscle testing in the lower extremity

Why do we need to know the peripheral neuroanatomy?

- 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 – your anatomy knowledge is this picture
- Step 1 – we are going to diagram the cover picture of the box
- Step 2 – we will practice physical exams
- Step 3 - we will review cases

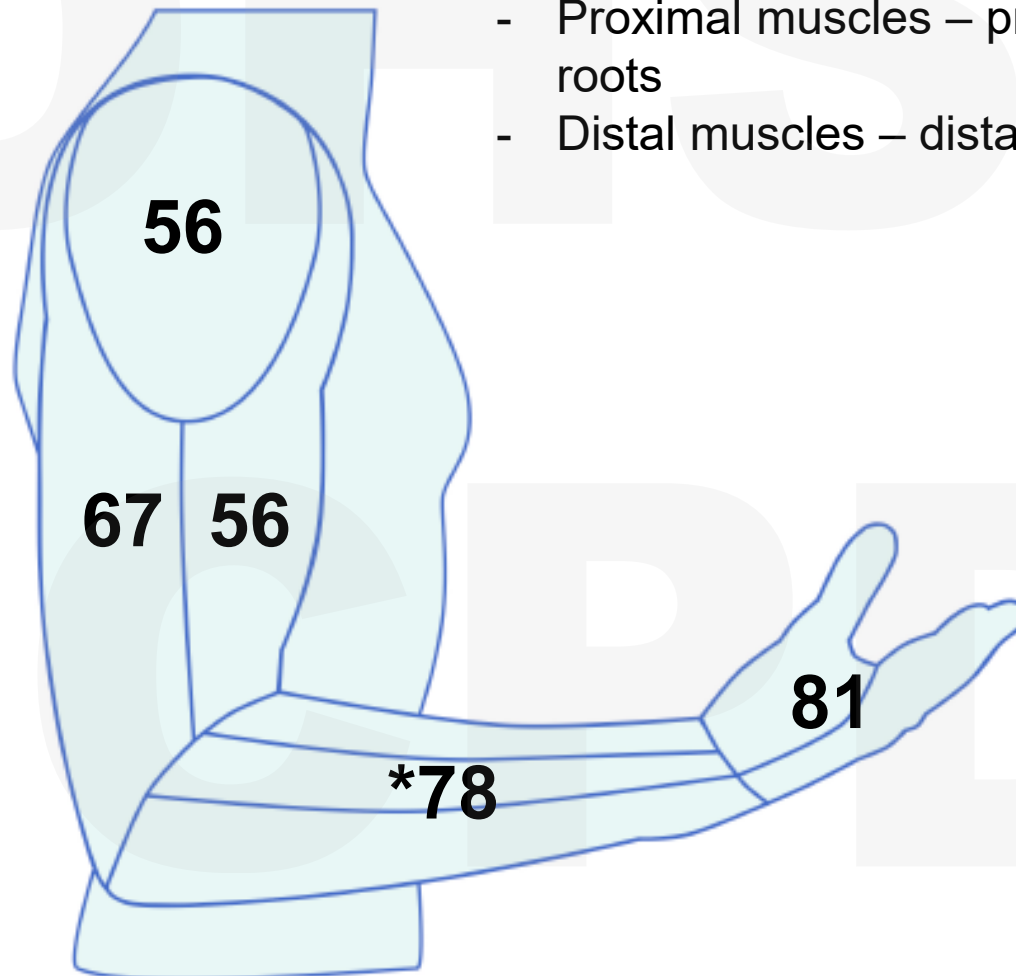
Sensation – Dermatomes/Cutaneous Nerves



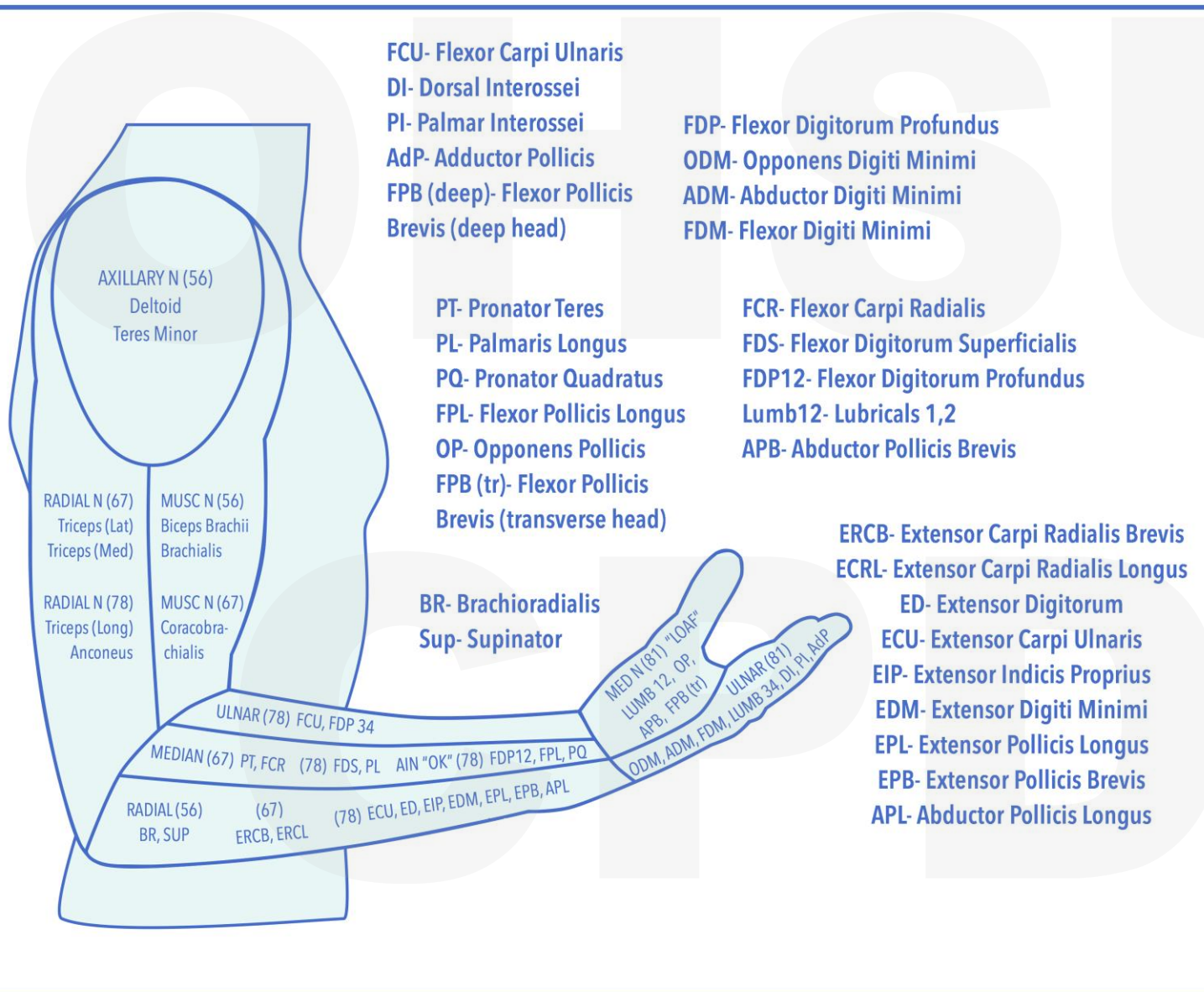
- Upper Extremity
 - C5-T1
 - Lateral to Medial “Loop”
- Lower Extremity
 - L4-S1
 - Medial to Lateral “Loop”

Strength – Upper Extremity Myotomes

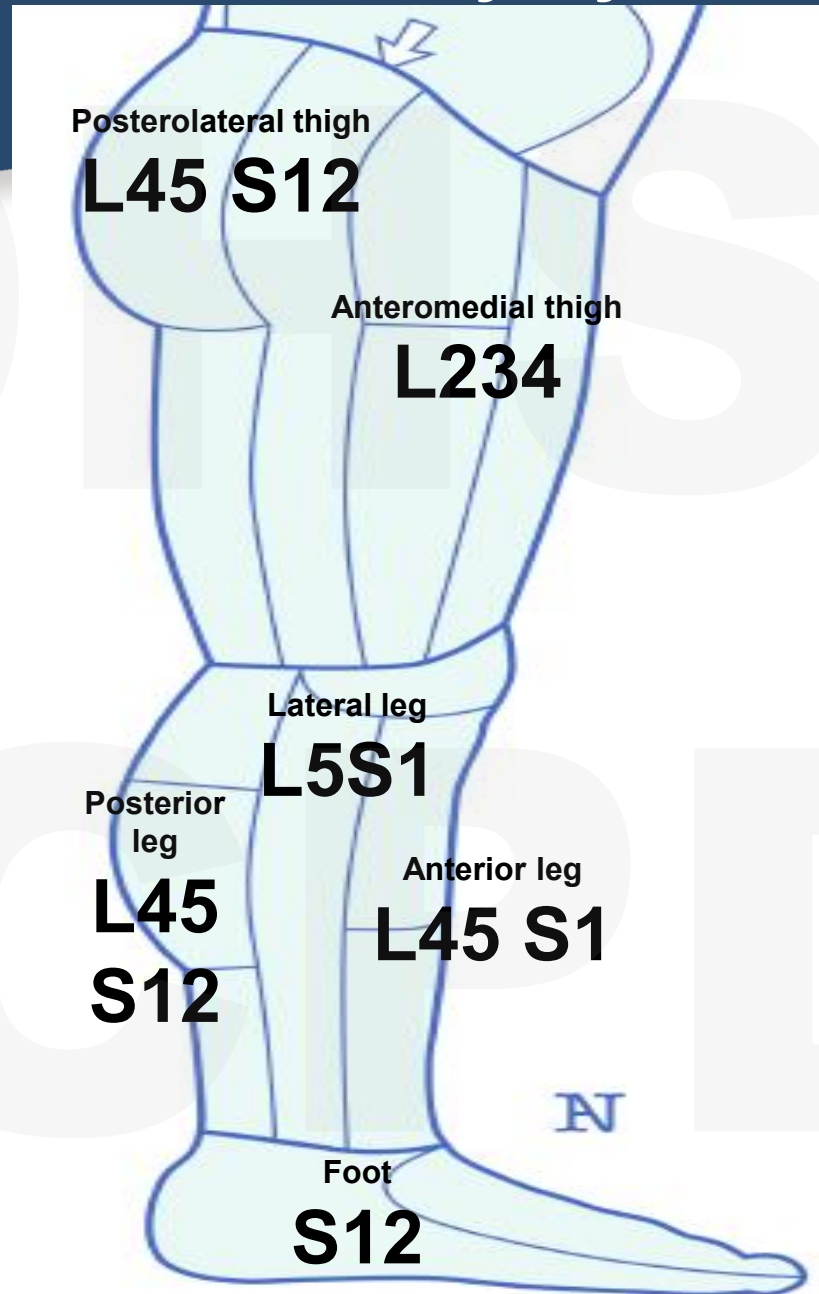
- All muscles innervated by 2 nerve roots
- Proximal muscles – proximal nerve roots
- Distal muscles – distal nerve roots



Strength – Upper Extremity Myotomes and Nerves

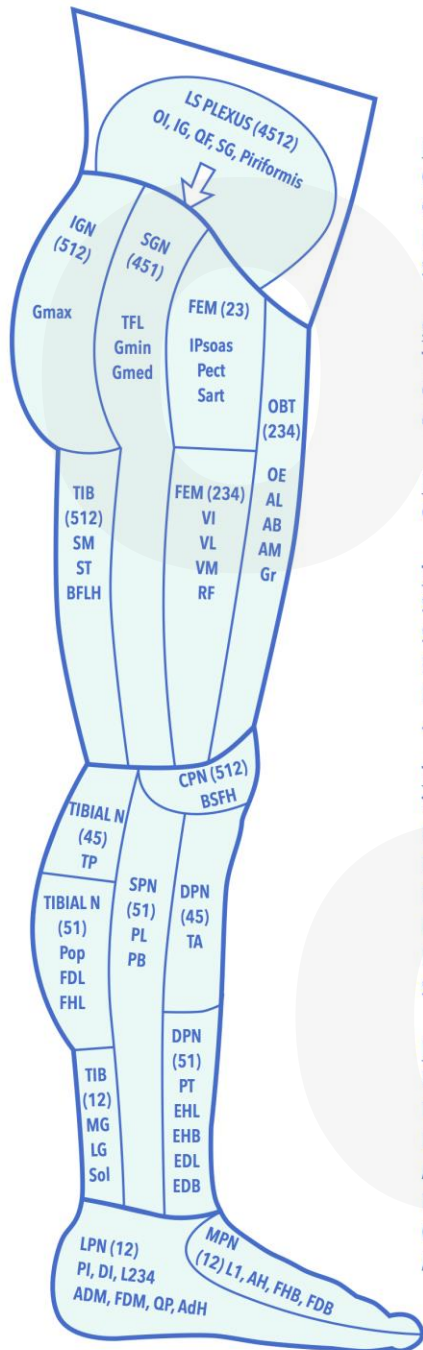


Strength – Lower Extremity Myotomes



- All muscles innervated by 2 nerve roots
- Proximal and distal organization is not so clear
- Some patterns emerge:
 - Anteromedial thigh is L234
 - Posterior LE is L45 S12
 - 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/Thumb Abd (Ulnar/Med)
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)	1st DWS (Deep Per.)	Lat. Heel (Sural)

Pair Up and Practice Physical Exam

- Upper Extremity

- Reflexes (3)

- Biceps C56
- Brachioradialis C56
- Triceps C67

- Sensation (5)

- Strength (5)

- Lower Extremity

- Reflexes (2)

- Patellar L34
- Achilles S12

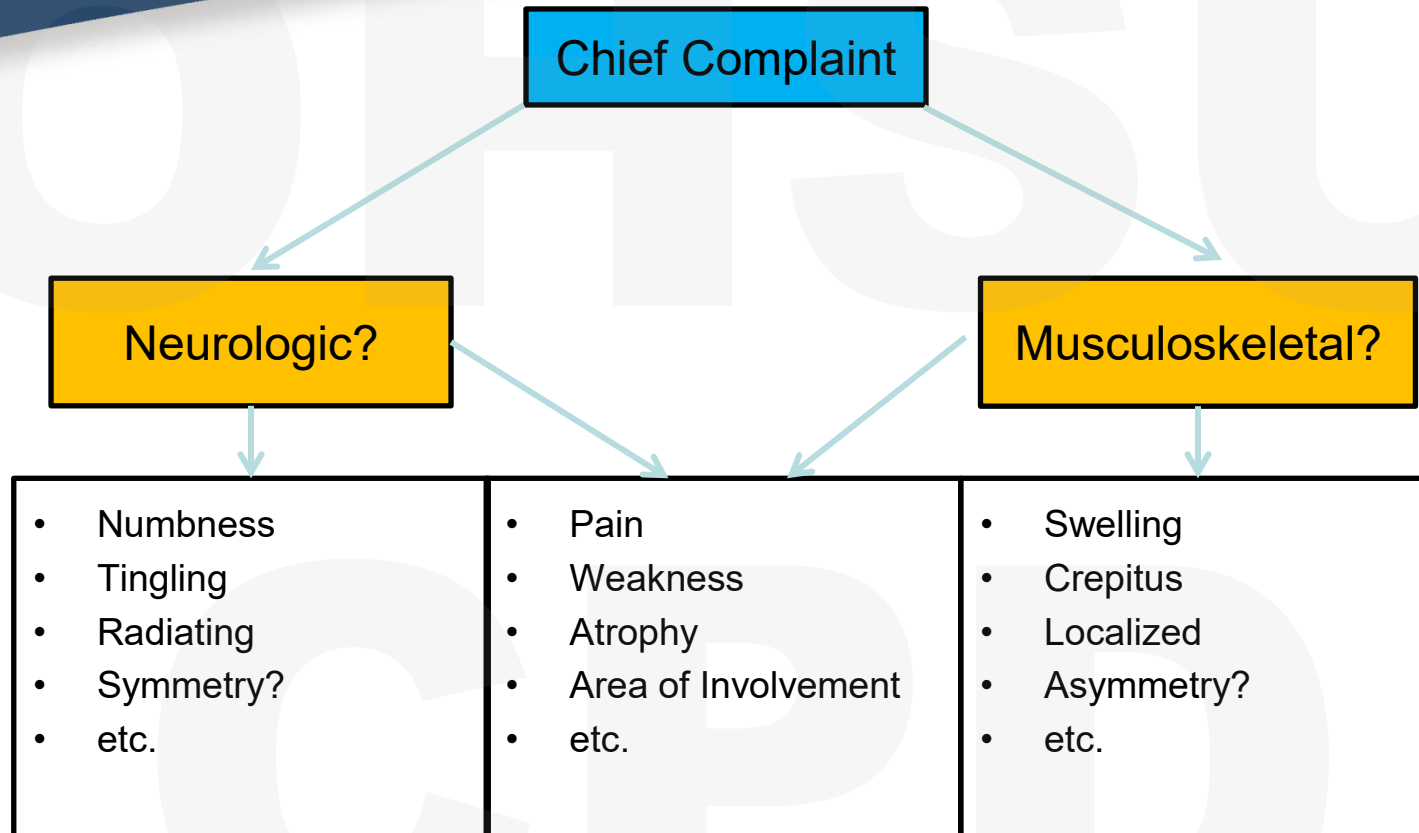
- Sensation (3)

- Strength (4)

The 60 Second Neuro Exam

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Sensation	Lat. Sh. (Axillary)	Thumb (Med/Rad)	Middle (Med/Rad)	Little (Ulnar)	Med. Arm (MBC)
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Cases - First Step: Neurologic or Musculoskeletal?

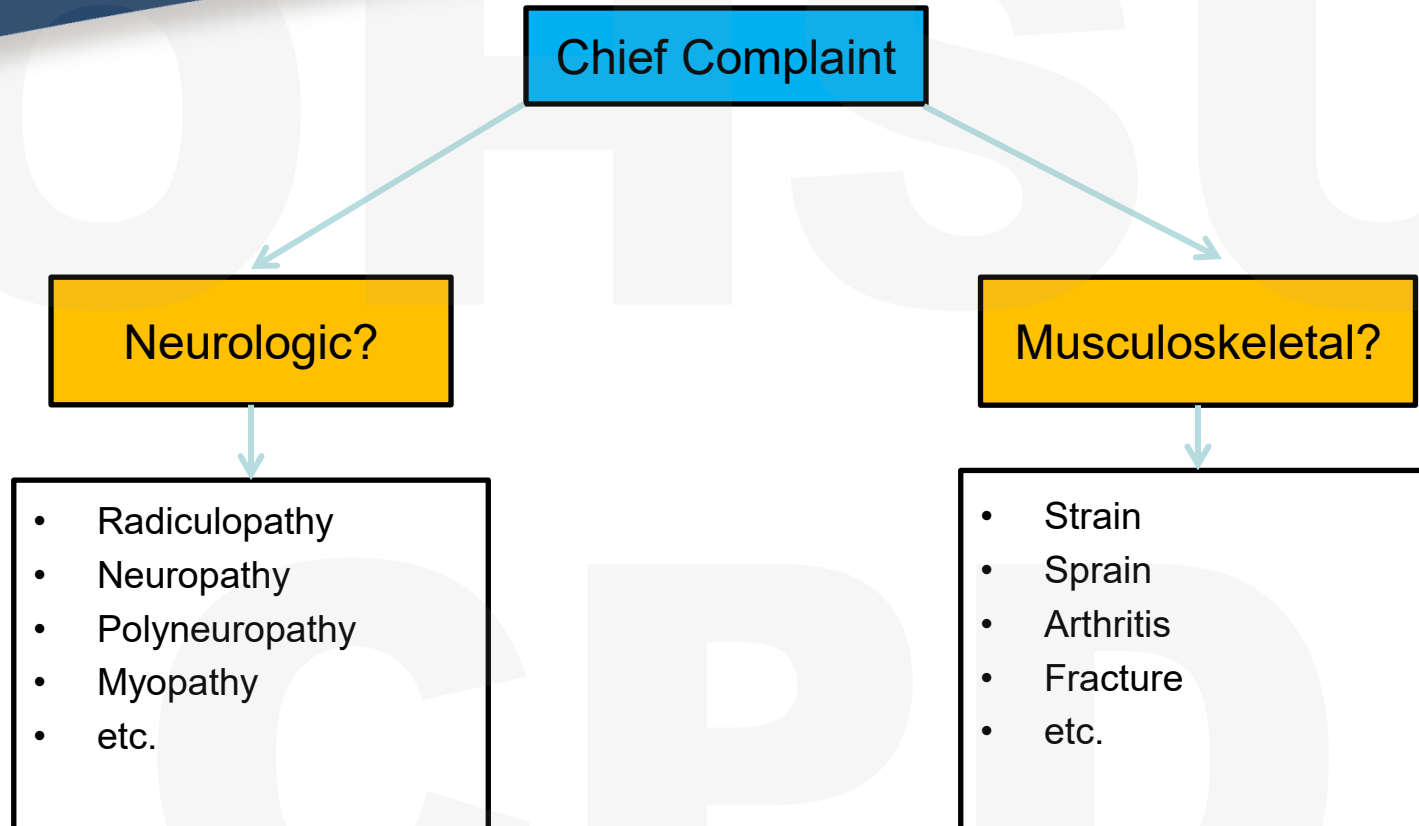


Cases – First Step: Neurologic or Musculoskeletal?

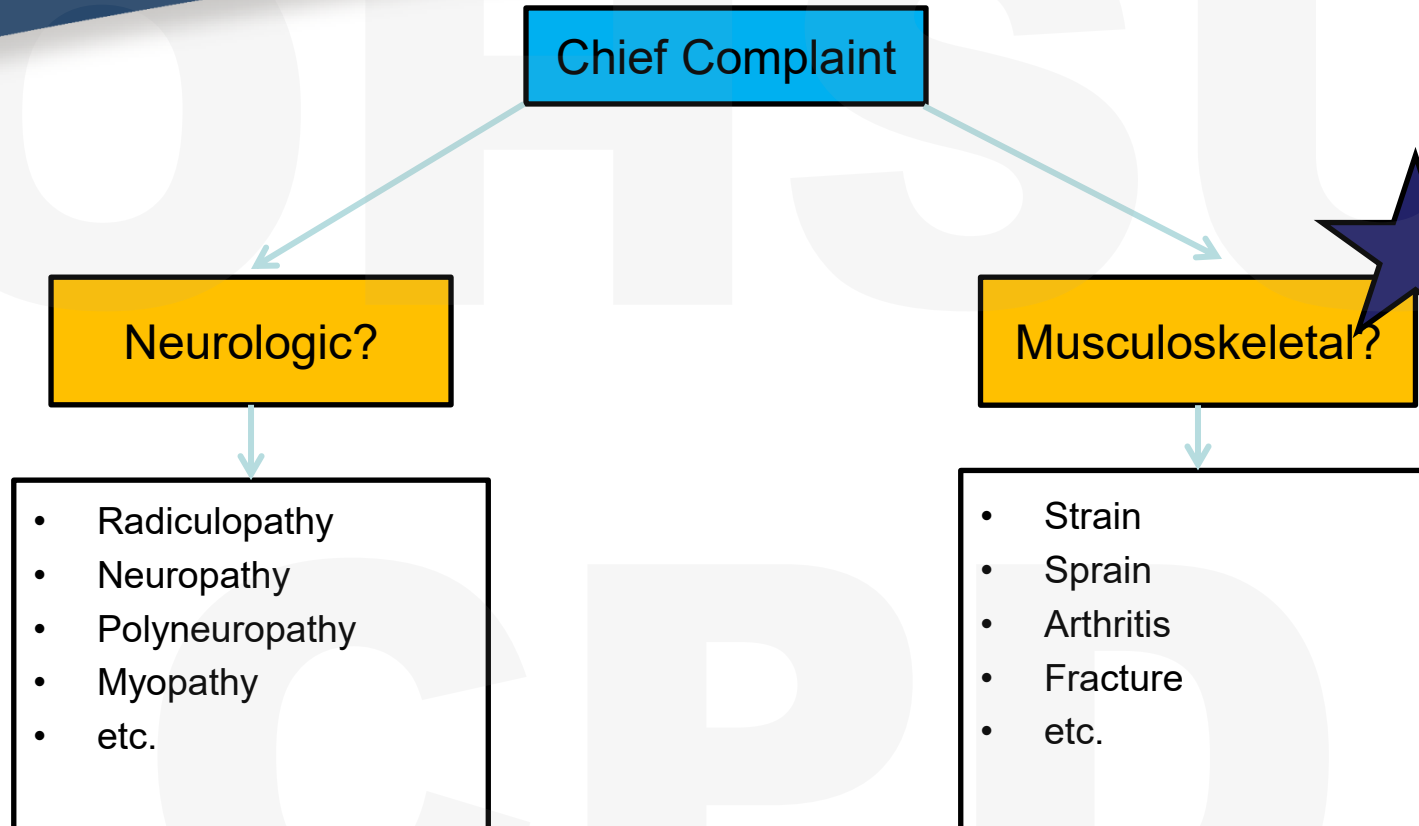
“I’m having increasing leg pain and difficulty walking”

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

Cases – First Step: Neurologic or Musculoskeletal?



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“I’m having increasing leg pain and difficulty walking”

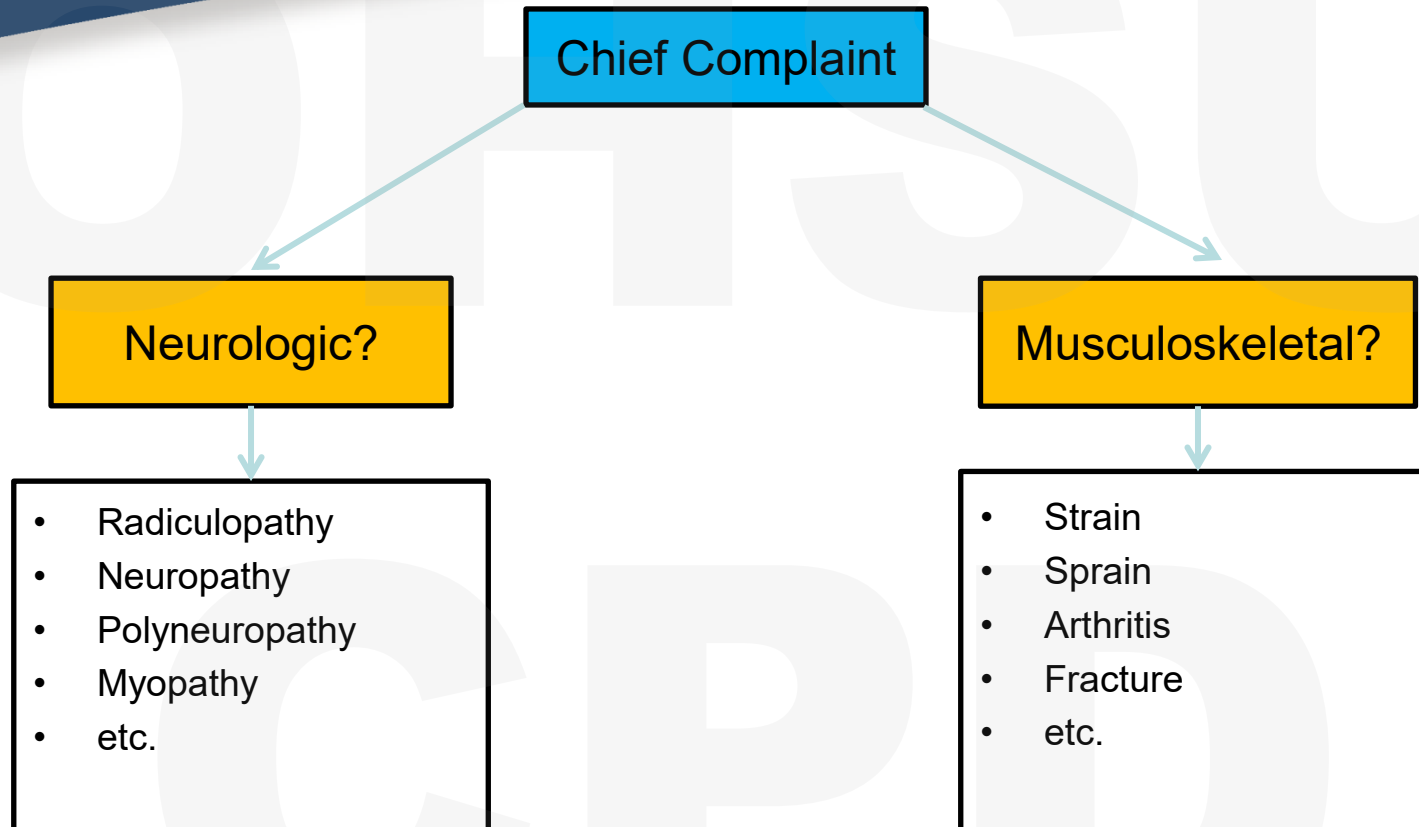
- History/Exam
 - Deep groin pain
 - Pain in thigh, not distal to knee
 - No numbness/paresthesias
 - Waddling gait
- Dx
 - Hip pathology

Cases – First Step: Neurologic or Musculoskeletal?

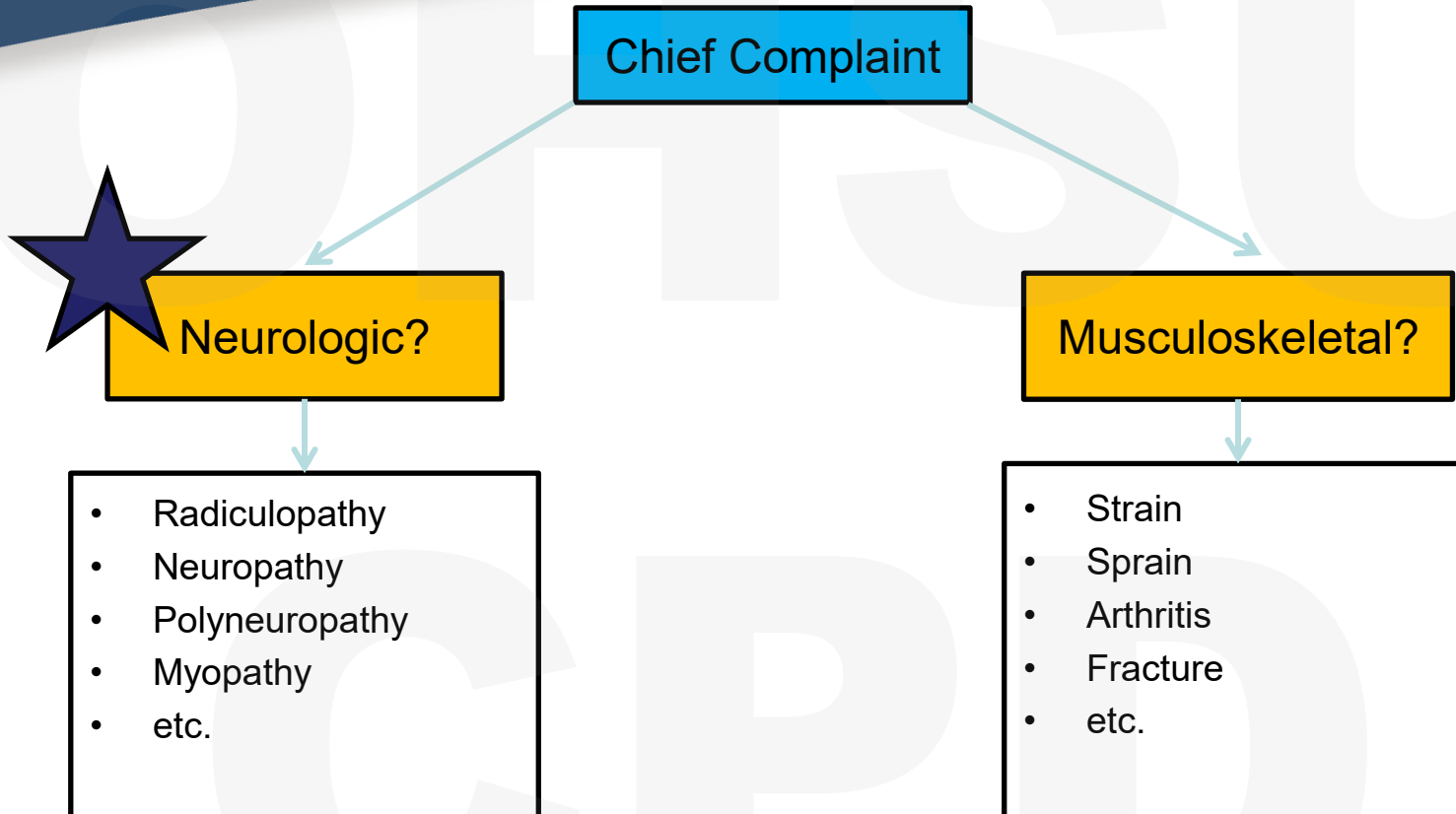
“I’m having increasing leg pain and difficulty walking”

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

Cases – First Step: Neurologic or Musculoskeletal?



Cases – First Step: Neurologic or Musculoskeletal?



Cases – First Step: Neurologic or Musculoskeletal?

“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

Case 1

- **Sensation**

- Numb thumb
 - Palmar and Dorsal
- Normal middle, little finger

- **Strength**

- Weak wrist extension
- Normal sh. abduction, wr. flexion, finger flexion

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

Case 1

- **Sensation**

- Numb thumb
 - Palmar and Dorsal
- Normal middle, little finger

- **Strength**

- Weak wrist extension
- Normal sh. abduction, wr. flexion, finger flexion

Upper Extremity	C5	C6	C7	C8	T1
DTR	Bic (Musc.)	BR (Radial)	Tri (Radial)	-	-
Strength	Sh. Abd (Axillary)	Wr. Ext. (Radial)	Wr. Flex. (Med/Uln)	Fing. Flex. (Med/Uln)	Fing. Abd. (Ulnar)
Sensation	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. abduction, wr. flexion, finger flexion

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

Case 3

- Numb medial malleolus
- Normal 1st 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 st DWS (Deep Per.)	Lat. Heel (Sural)

Case 3

- Numb medial malleolus
- Normal 1st 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 st DWS (Deep Per.)	Lat. Heel (Sural)

Case 3 – L4 Radiculopathy

- Numb medial malleolus
- Normal 1st 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 st DWS (Deep Per.)	Lat. Heel (Sural)

The main concepts from this session are:

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