



Prifysgol Cymru  
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**University of Wales**  
Trinity Saint David

# SHSS6065

## Peripheral Nerve Mobilisations (PNM)

*Trawsnewid Addysg; Trawsnewid Bywydau*  
*Transforming Education; Transforming Lives*



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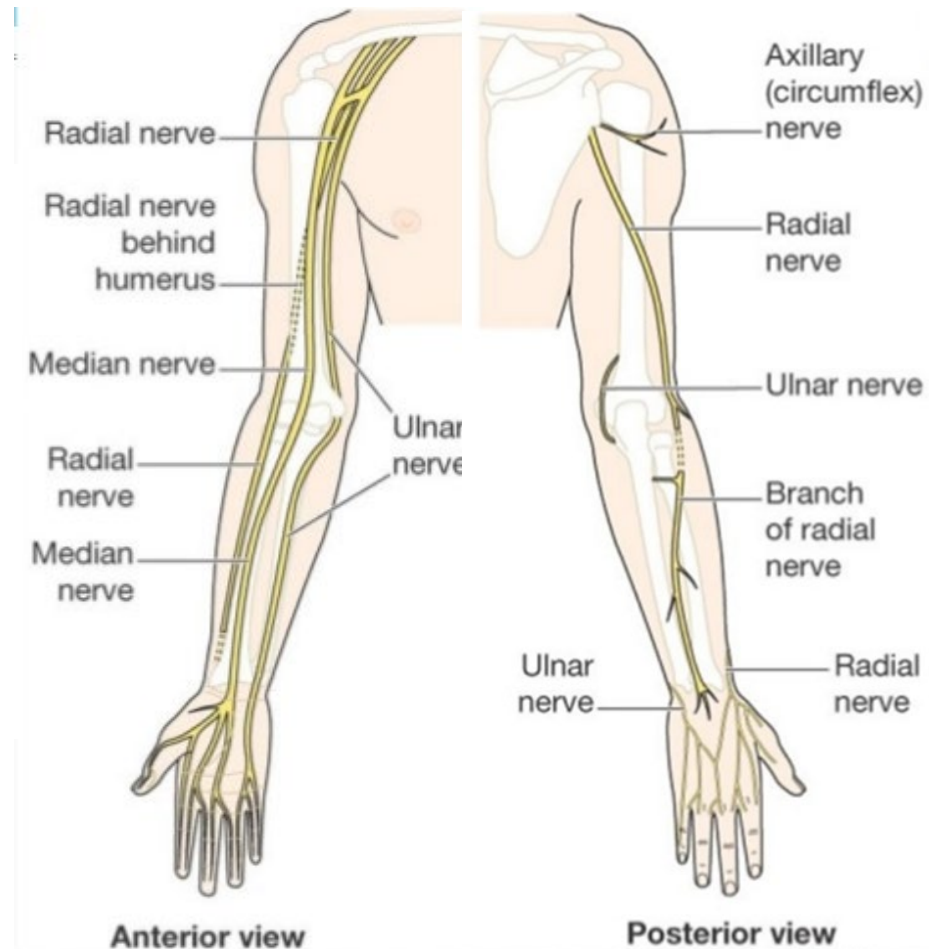
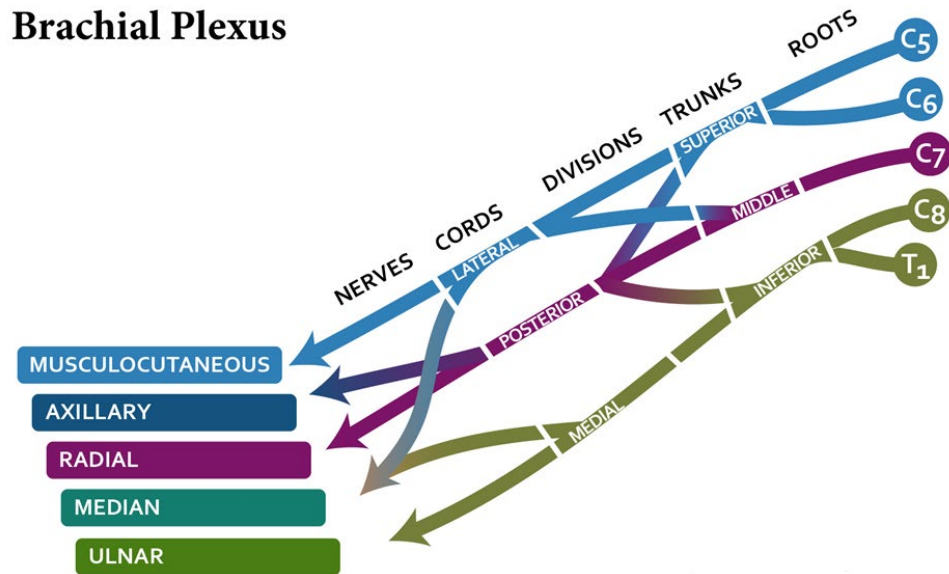
# Aims

- Review some neural anatomy
- Ensure that you have a basic understanding of neuropathic pain
- Review & introduce new techniques used for a neural assessment
- Understand what a PNM is and when it might be indicated

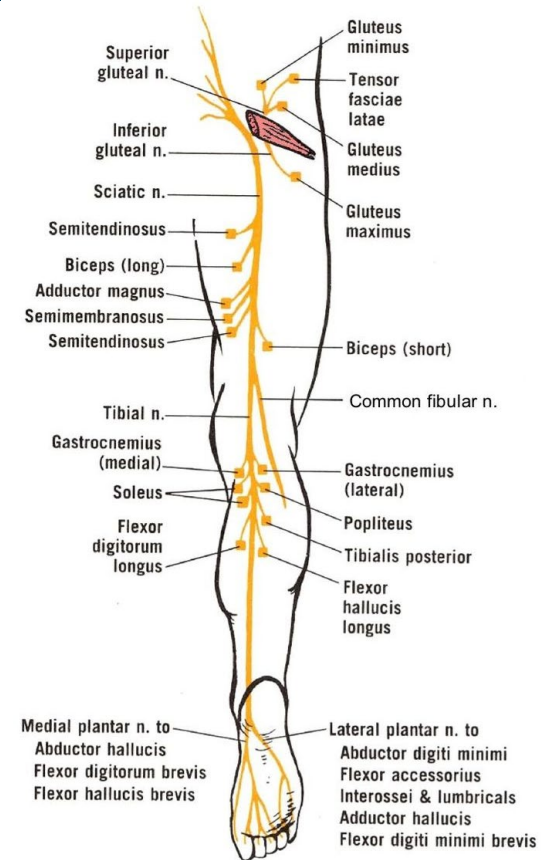
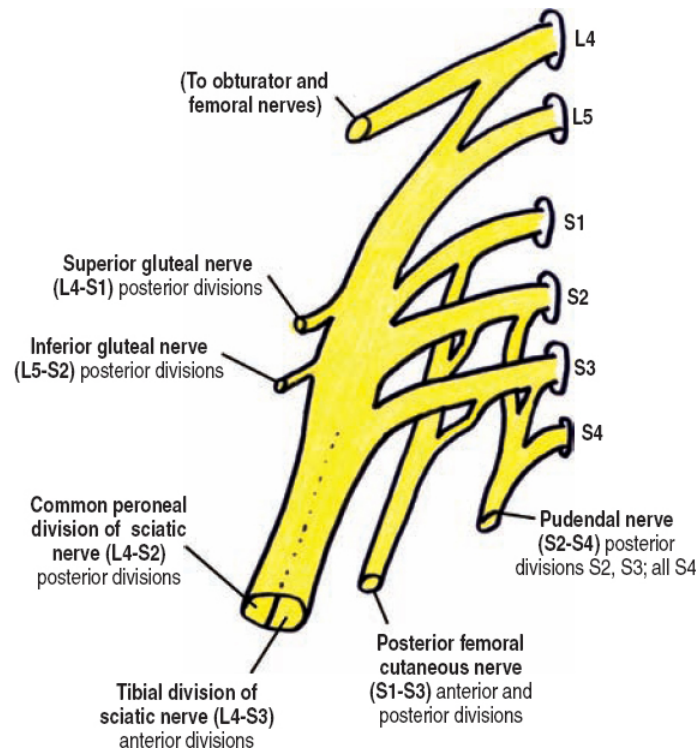
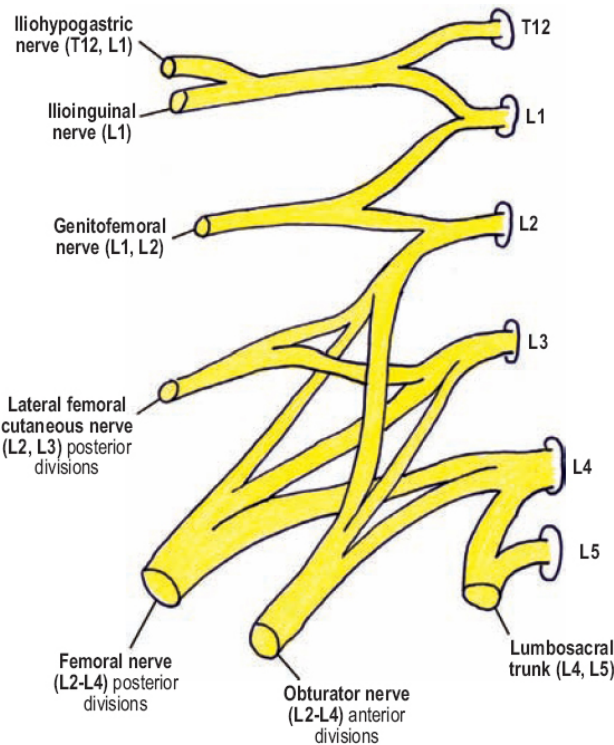


# Anatomy

## Brachial Plexus



# Anatomy



# Nerve Pain

- What are the characteristics of nerve pain?
- **What subjective markers will the patient present with?**
- What objective markers will the patient present with?



# Neuropathic Pain

- Central
- Peripheral
- Trauma/Injury association
  - Swelling
  - Scarring
  - Post surgical
  - Immobilisation
- Gradual



# Physical examination of the neural tissue

- Palpate the peripheral nervous system
  - Mechanical sensitivity
  - Palpate away from Sx site
  - Paraesthesia and tenderness present
- Passive and active neurodynamic tests
  - SLR
  - Slump
  - ULNT – median nerve
  - ULNT – radial
  - ULNT- ulnar
- Manual examination of conduction
  - Dermatomes
  - Myotomes
  - Reflexes
  - Nerve conduction test



# Peripheral nerve mobilisations

- Neurodynamics approach to nerve pain
- Nerves pass through 'tunnels'
- We should not stretch nerves (tensioners)
- We should mobilise them! (sliders)



# Sliders and Tensioner

- Nunes et al. (2017)
- Neural mobilization techniques:
  - A. Neural slide of femoral nerve.
  - B. Neural stretching of femoral nerve.
  - C. Neural slide of sciatic nerve.
  - D. Neural stretching of sciatic nerve.
  - E. Neural slide of tibial nerve.
  - F. Neural stretching of tibial nerve.

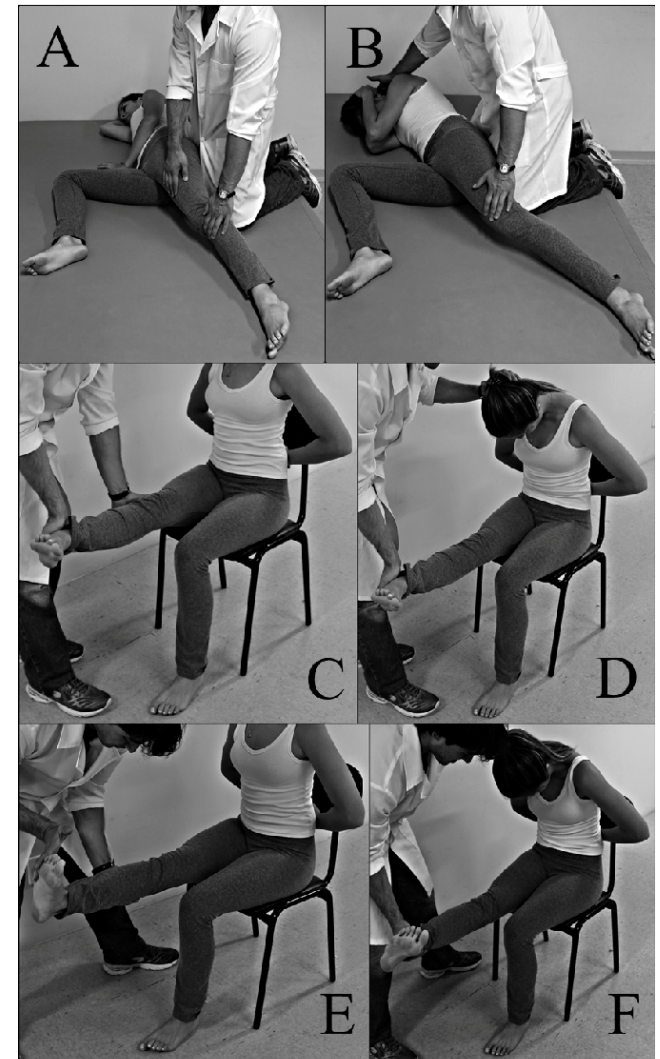


Figure 2. Neural mobilization techniques

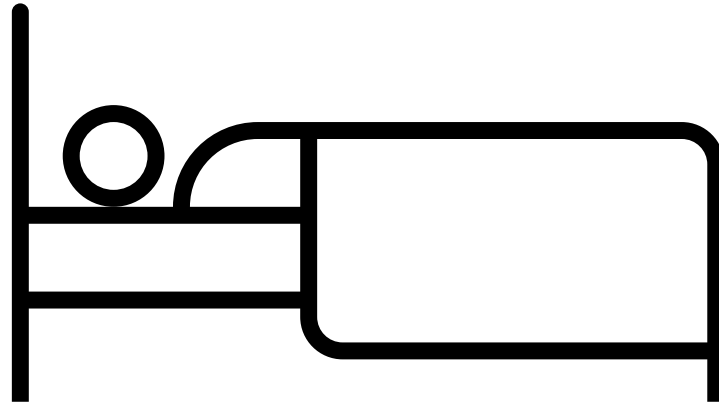


# Peripheral nerve mobilisation

- The physical abilities of the nervous system are remarkable
- Gliding and tensioning abilities
- Slides against neighbouring tissues (2cm)
- System bends, twists, slides transversely
- Increases in pressure as loading is put on nerves by movement or local muscle contractions without increasing strain
- Distal movements create significant movements elsewhere via the continuum
  - Median nerve moves 3cm with simple wrist flex & ext
  - Walking moves Cx nerves

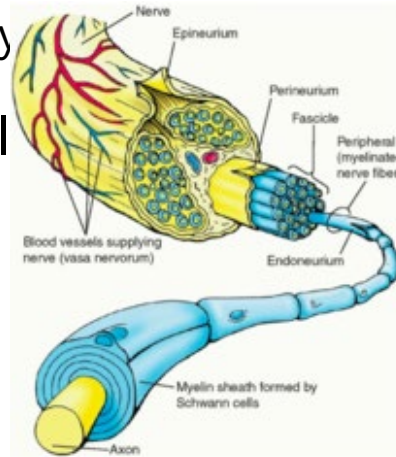


# Get your patient moving!!!



# Peripheral nerve mobilisation

- Axoplasmic flow
- Plasma in axons
- Sciatic nerve axon is 1.5m
- Antegrade flow (away from cell body)
  - Fast flow (chemical receptors) 400mm/day (3-5d)
  - Slow flow (nutrients) 6mm/day (2-3wk)
- Retrograde flow (towards cell body from synapse)
  - 200mm day
- Healing time of 200d for neuron (normal)
- Circulation is posture and movement dependent
- Nerves are blood thirsty
- 6-8% peripheral nerve elongation **CRITICAL VALUE**
- Significant reduction in blood flow



11% stretch = arrest of blood flow



# References

- Basson, A., Olivier, B., Ellis, R., Coppieters, M., Stewart, A., & Mudzi, W. (2017). The effectiveness of neural mobilization for neuromusculoskeletal conditions: a systematic review and meta-analysis. *Journal of Orthopaedic & Sports Physical Therapy*, 47(9), 593-615.
- Nunes, G. S., Uhlig, S., Ribas, L. M. D. A., Gonçalves, F. B., Wageck, B., & De Noronha, M. (2017). Influence of neural mobilization of lower limbs on the functional performance and dynamic balance in asymptomatic individuals: a cross-over randomized controlled trial. *Human Movement*, 18(4), 10-16.
- Waldhelm, A., Gacek, M., Davis, H., Saia, C., & Kirby, B. (2019). ACUTE EFFECTS OF NEURAL GLIDING ON ATHLETIC PERFORMANCE. *International Journal of Sports Physical Therapy*, 14(4), 603.





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## Peripheral Nerve Mobilisations

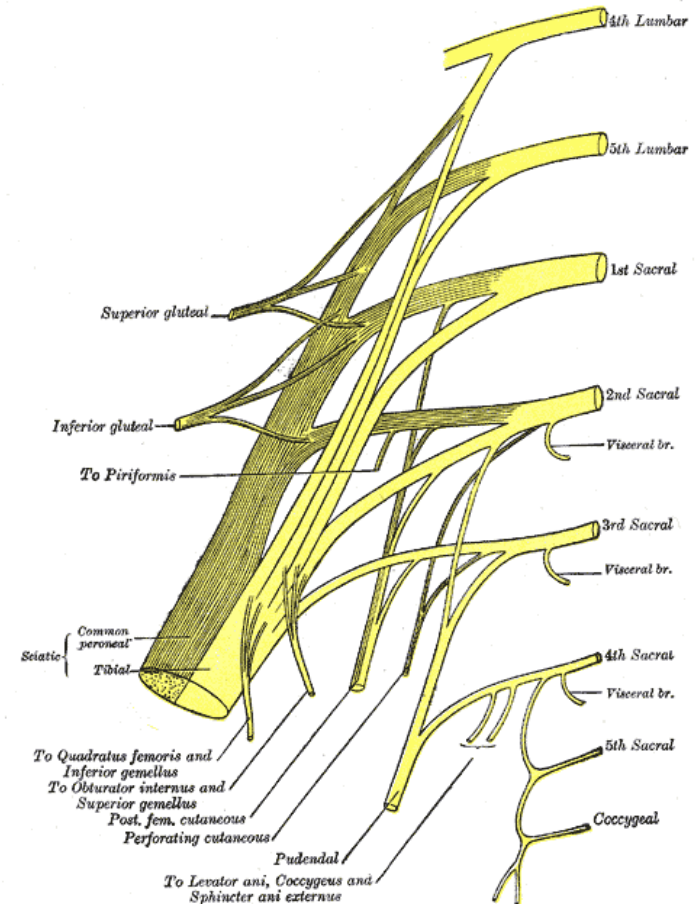
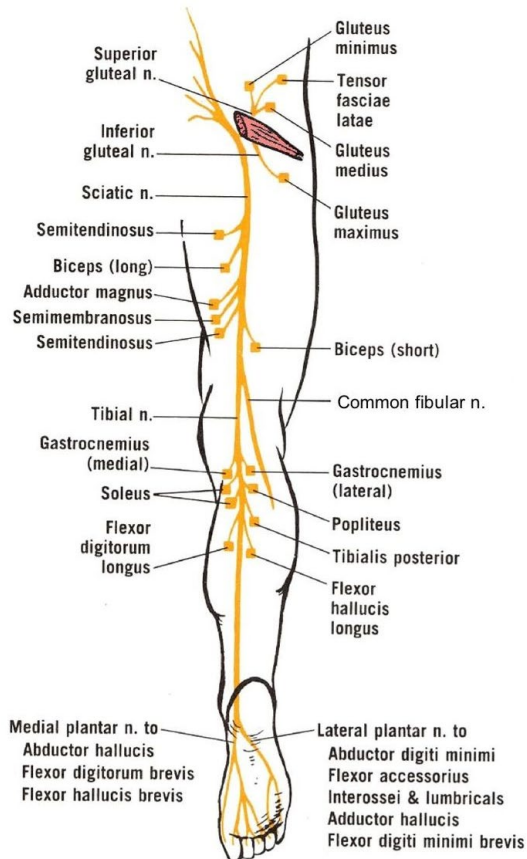
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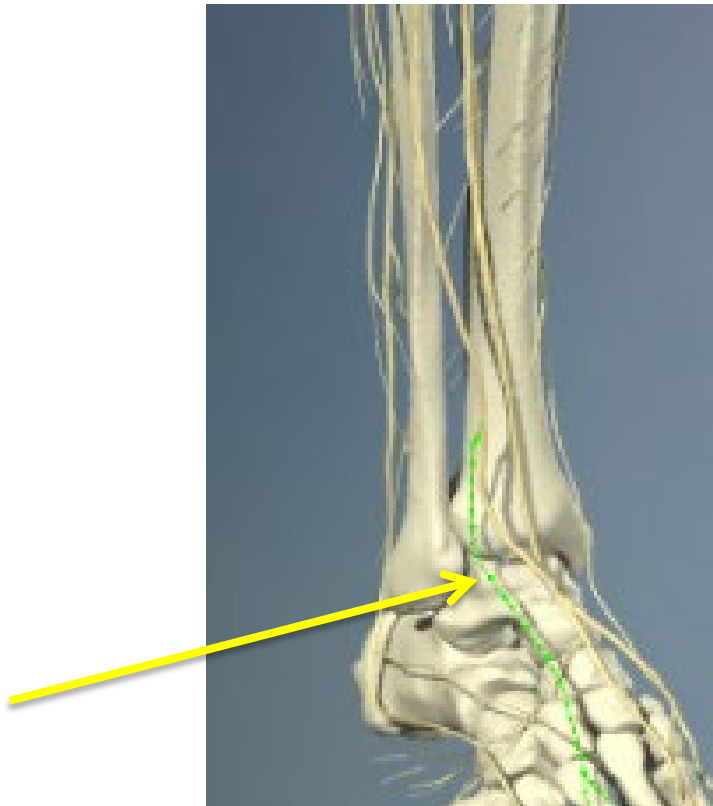
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# Palpation of nervous system

## Lower limb palpation

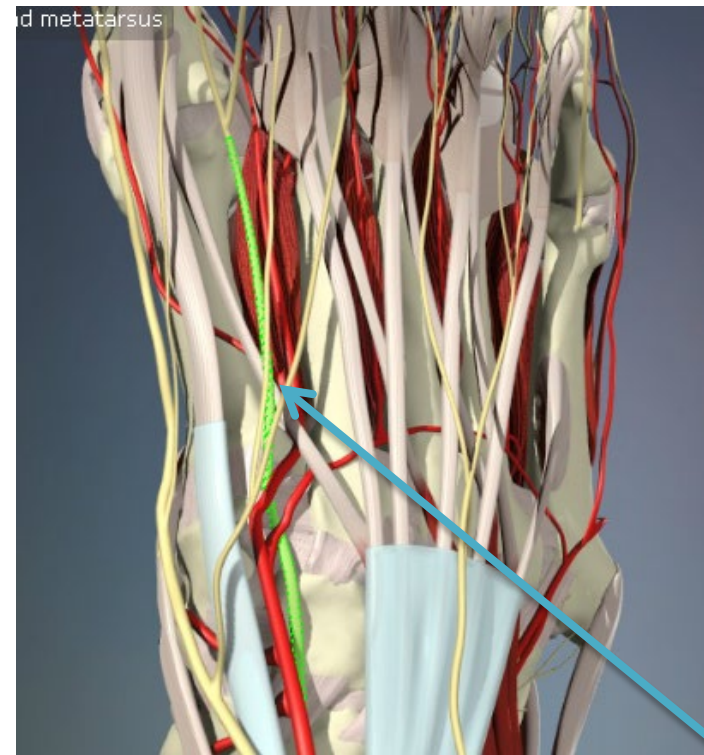


# Palpation of nervous system



## **Superficial fibular nerve**

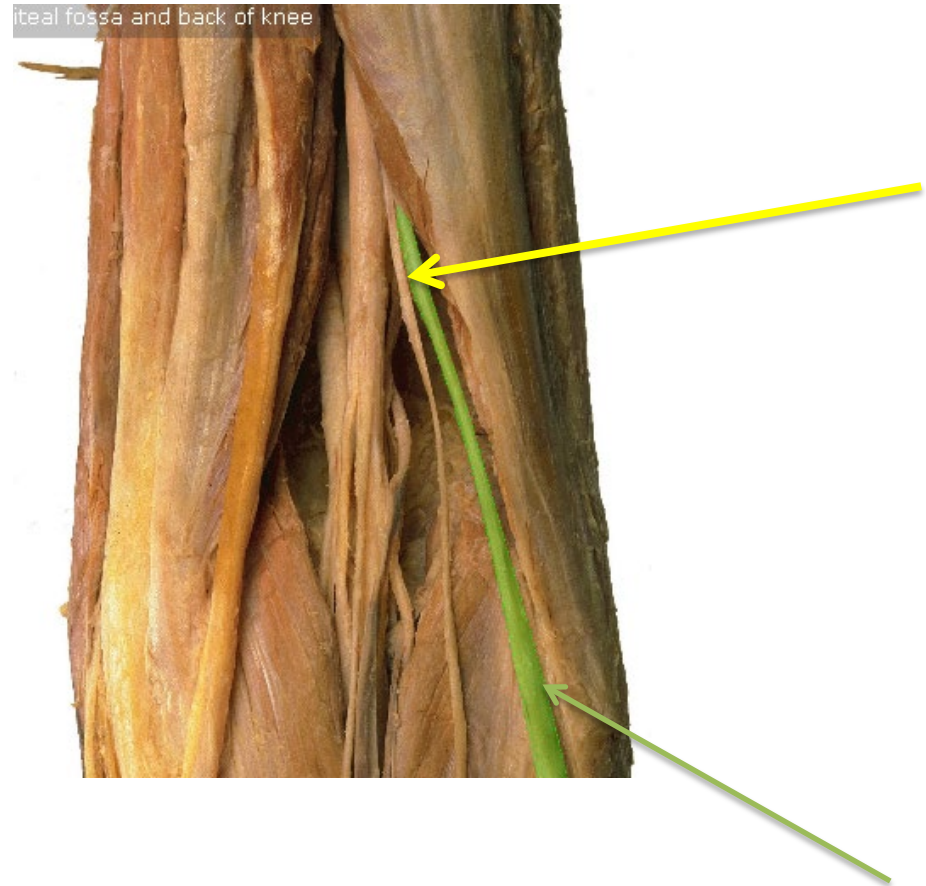
**Dorsum of foot: couple of inches in to fascia**



## **Deep peroneal nerve**

**Lateral (inside) EHL tendon**

# Palpation of nervous system



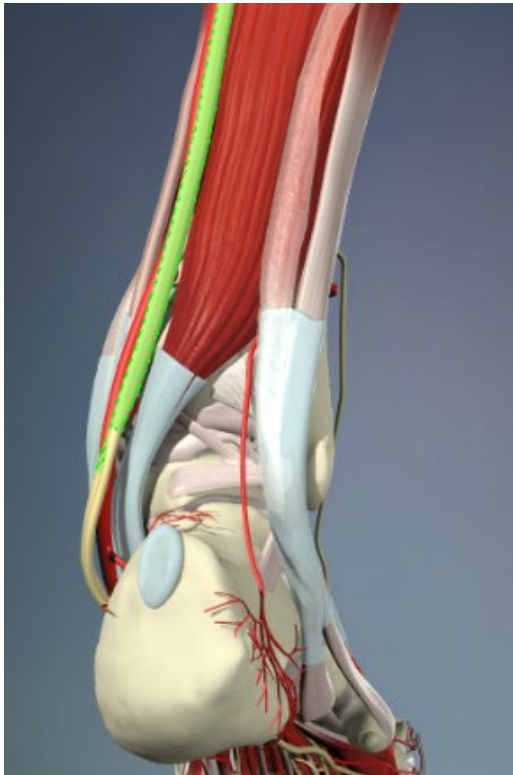
**Common peroneal nerve:**

**Foot on shoulder, palpate behind knee, Medial to BF tendon**

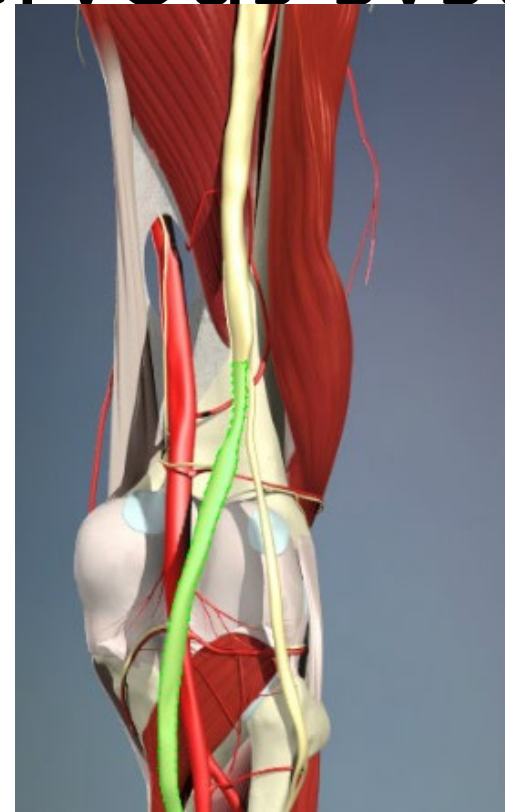
# Palpation of nervous system

- Sciatic/tibial nerve and branches

# Palpation of the nervous system



**Tibial nerve:**  
Posterior tarsal tunnel, MM TDANH  
towards tuberosity of navicular



**Tibial nerve:**  
Posterior knee, Hip flexion, knee  
extension: felt through soft tissue

# Palpation of the nervous system



## **Sural nerve:**

**Lateral aspect of foot, behind lateral malleolus and laterally along Achilles tendon**

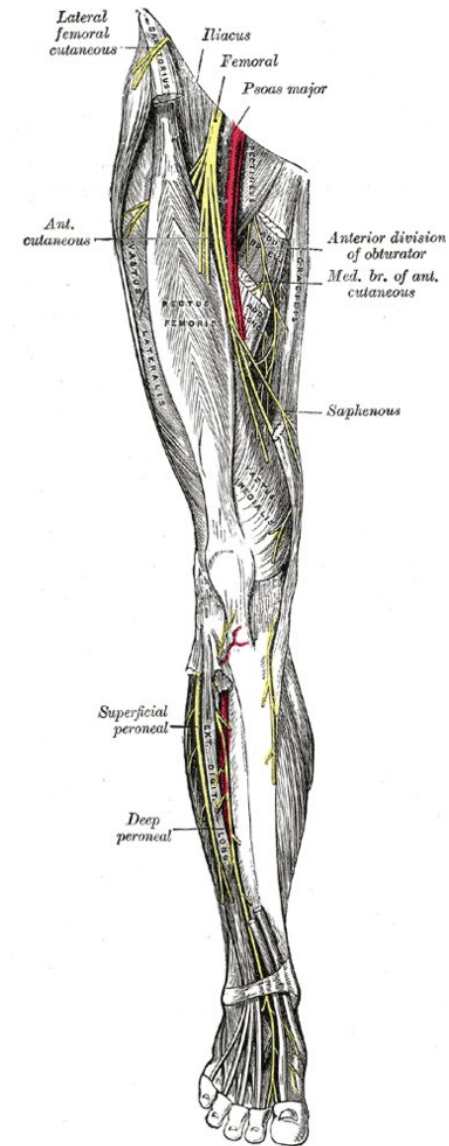


## **Sciatic nerve:**

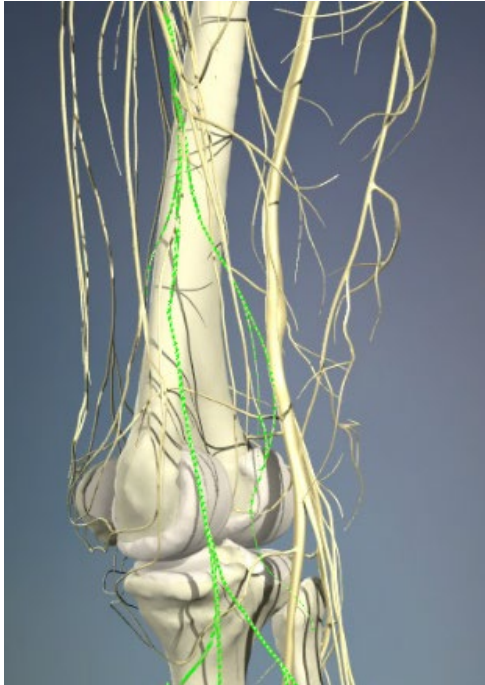
**Buttocks, ischial tuberosity to greater trochanter about  $\frac{1}{3}$  or  $\frac{1}{2}$  way**

# Palpation of nervous system

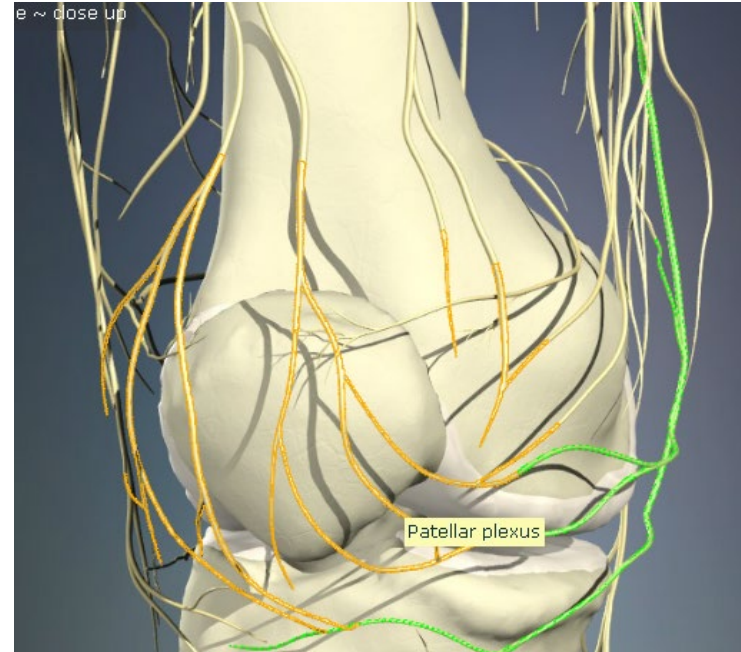
- Saphenous nerve and branches



# Palpation of the nervous system

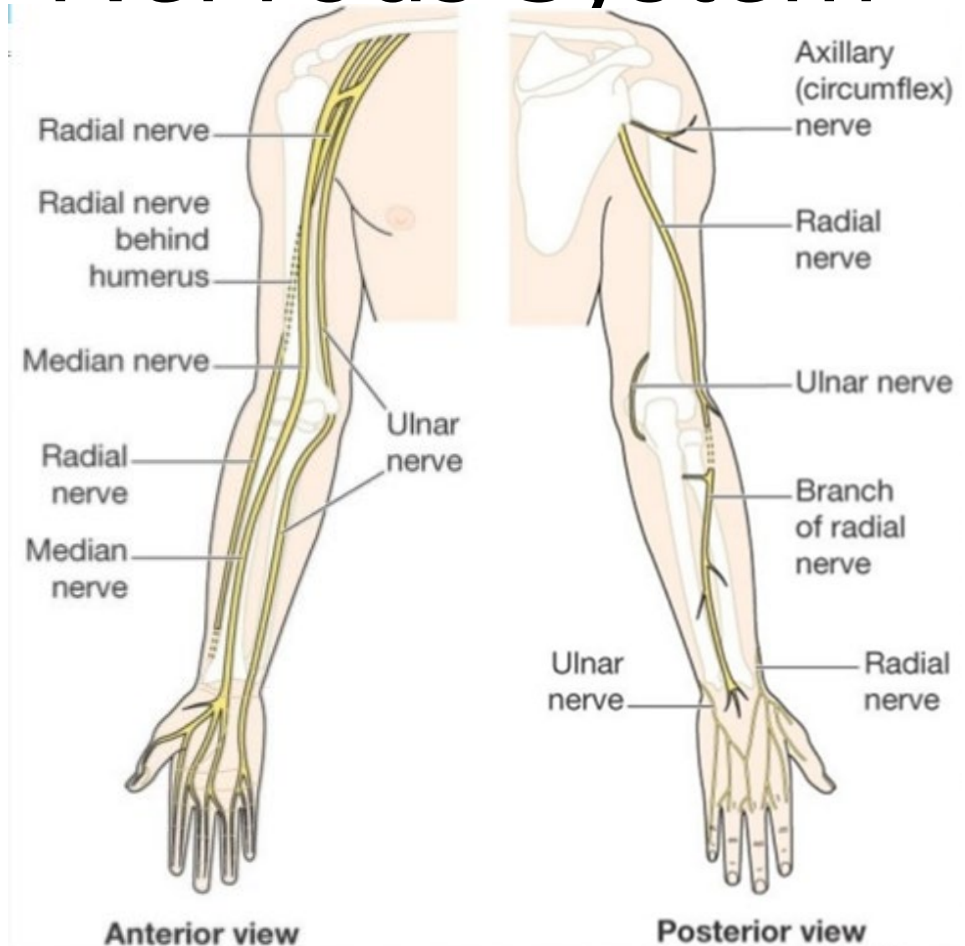
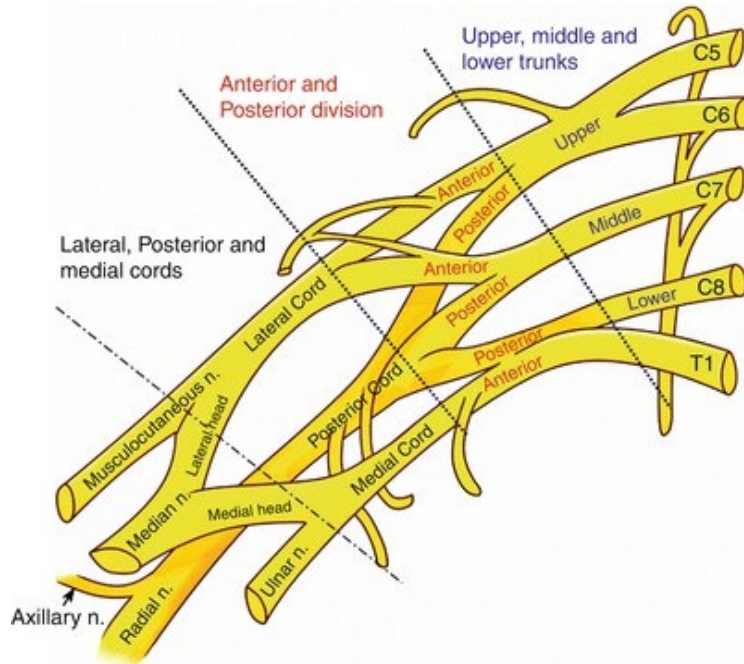


**Saphenous Nerve:**  
Knee in slight flex, Medial aspect of knee between sartorius and gracilis tendons



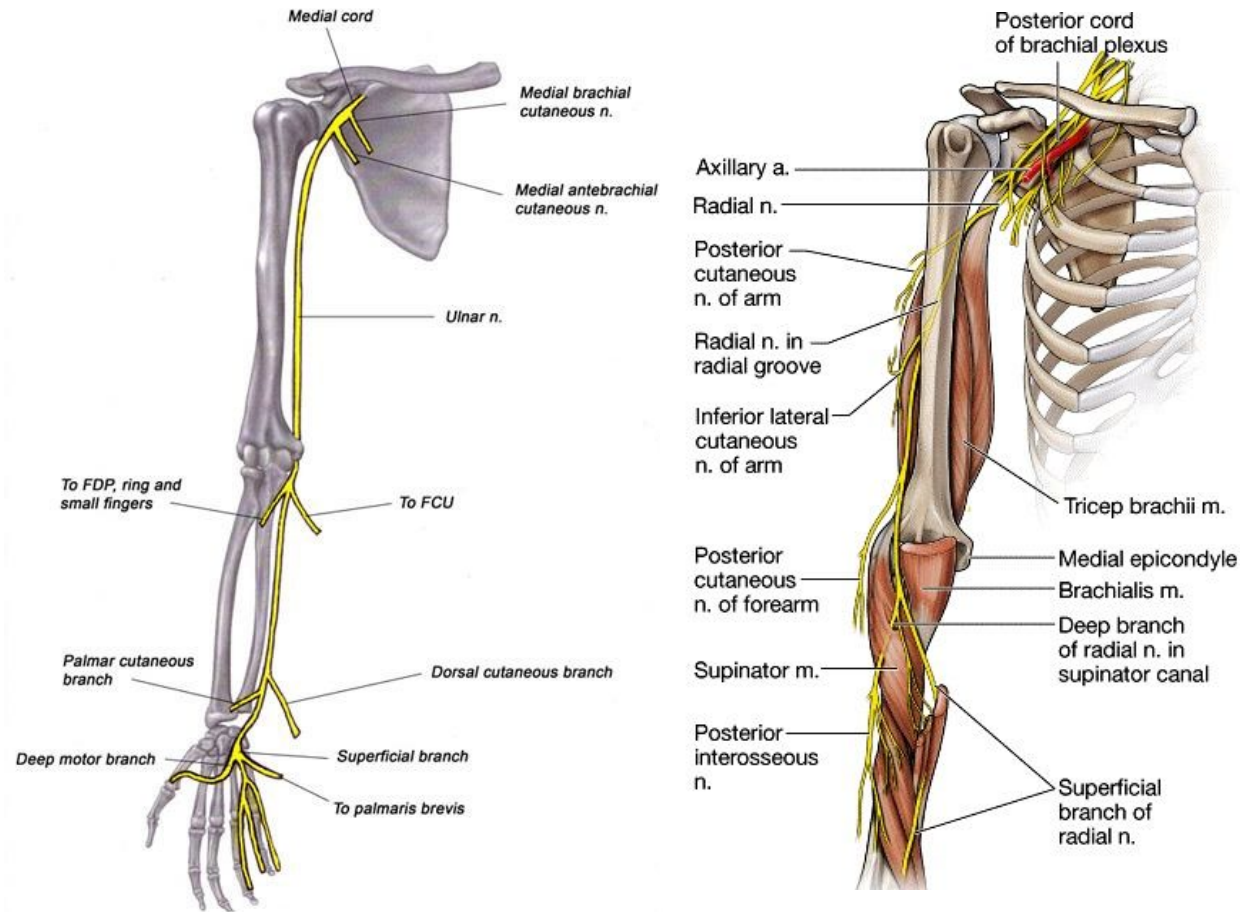
**Infrapatellar branches of saphenous nerve:**  
Medial aspect of knee and tibia,  
Typically 4-5 branches across knee,  
Stroke downwards with nail

# Palpation of the Nervous System

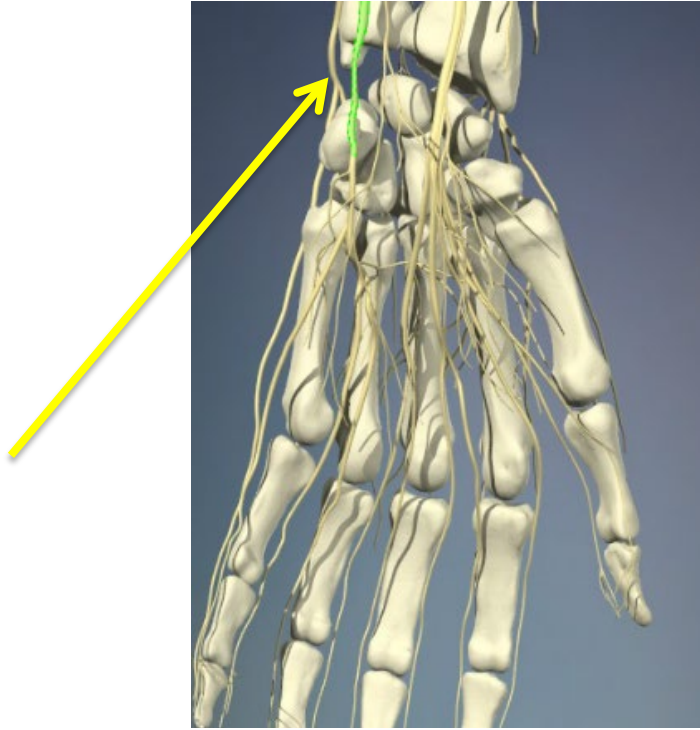


# Palpation of nervous system

- Ulnar Nerve
- Radial nerve

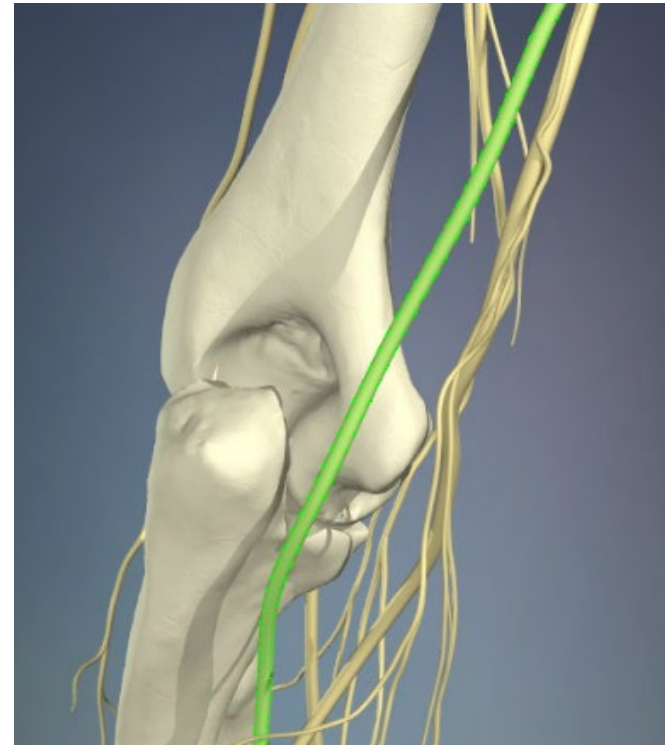


# Palpation of the nervous system



## **Ulnar nerve 1:**

Guyon's canal: lateral to pisiform and hook of hamate



## **Ulnar nerve 2:**

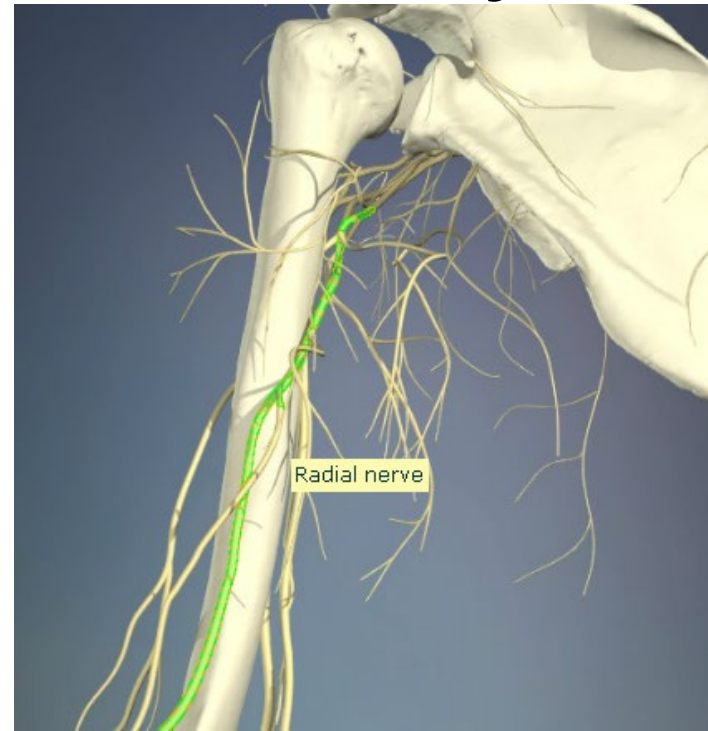
Sulcus of elbow and distal to cubital tunnel

# Palpation of the nervous system



## Radial sensory nerve

Anterolateral aspect of radius, distal to its emergence between brachioradialis and ECRL tendon

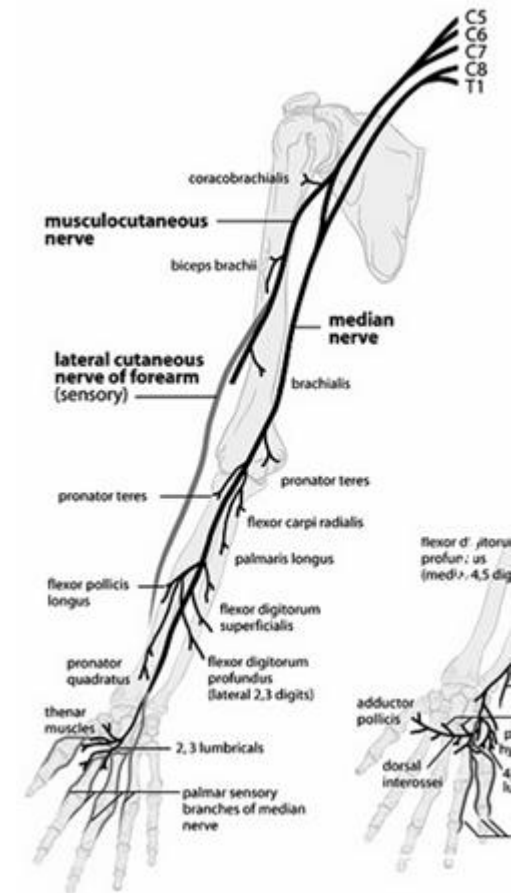


## Radial nerve

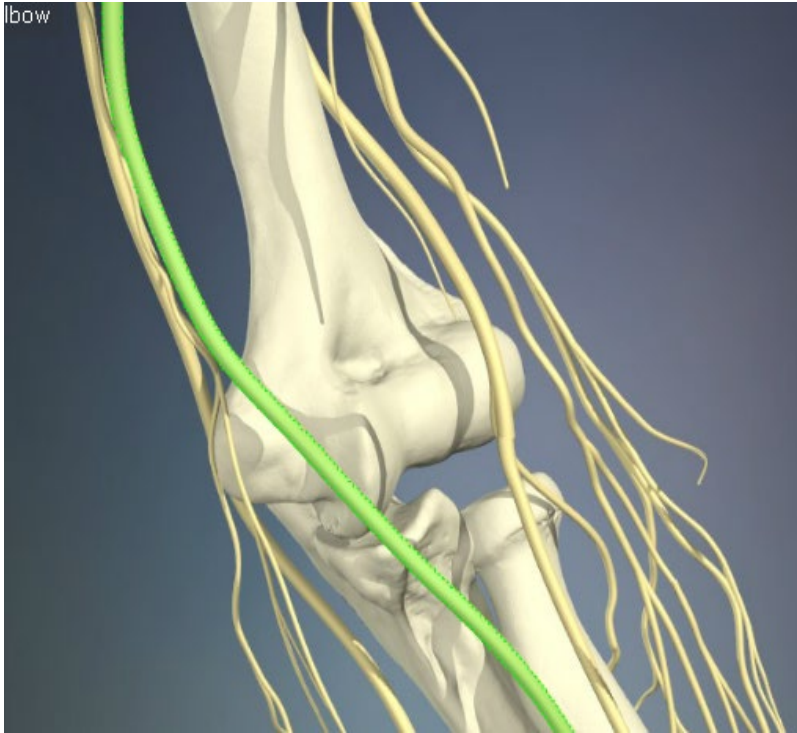
Spiral groove approx 3 fingers under deltoid insertion

# Palpation of the nervous system

- Median nerve

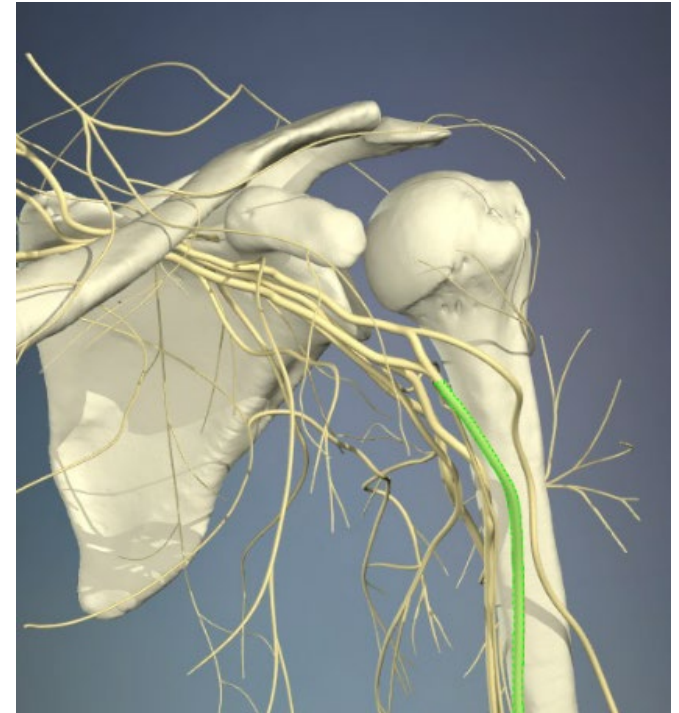


# Palpation of the nervous system



## Median nerve

Medial to biceps tendon at the elbow



## Median nerve:

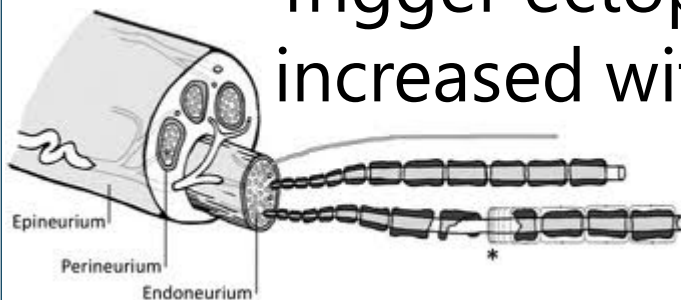
Upper arm, underside (axilla)

Feel it move if arm is outstretched and hand moves

May also feel ulnar nerve here too!

# AIGS

- Abnormal Impulse Generating Sites
- Peripheral nerves are mainly impulse conducting not impulse generating sites
- Ectopia – impulse generating in wrong place
  - Trigger ectopic charges if nerve strain increased with elongation



# Neurodynamic tests

- SLR
- SLR + Ankle DF + Ev = TIBIAL NERVE
- SLR + Ankle PF + Inv = PERONEAL NERVE
- SLR + Ankle DF + Inv = SURAL NERVE
- Uncomfortable/discomfort in nearly everyone: normal mechanical sensitivity
- Clinical findings = asymmetrical findings, enhanced sensitivity or reproduce Sx

# Slider for SLR

- One off – one on
- Knee off
- Ankle on
  
- Hip off
- Ankle on
  
- Perform 1 min worth of sliders and retest
- TAKE HOME EXERCISES

# Slump test (Maitland '79)

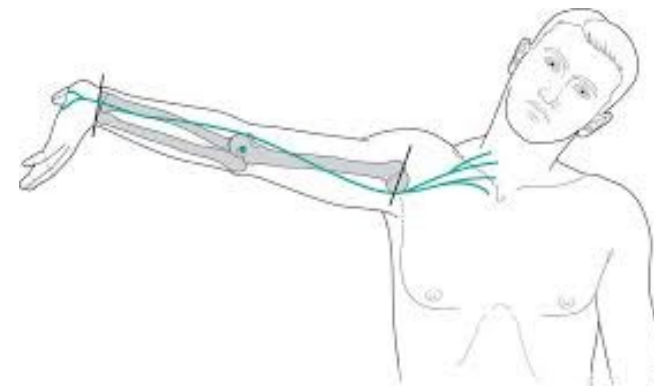
1. Seated hands behind back
2. Spinal (thoracic & lumbar) flexion (head up)
3. Neck flexion
4. Knee extension
5. Release neck flexion
6. ? Knee further extended

Can you develop a Slider for this test?

# ULNT (ULTT1) Median Nerve

1. Pt supine, 110° ABD, shoulder depressed
2. Elbow flexed
3. Supination
4. Wrist extension
5. Scoop in to elbow extension and shoulder lateral rotation
6. Neck lat flex (away) increase P+
7. Lat flex (towards) decrease P+

Now think of your sliders!



# ULNT (ULTT2a) Median Nerve

- Shoulder depression (thigh)
- Slight abd
- Elbow ext
- LR shoulder
- Extend wrist and fingers
- Increase shoulder abduction
  
- LF as differential

Now think of your sliders!

# ULNT (ULTT2b) Radial Nerve

- Shoulder depression
  - Extend elbow
  - MR of shoulder
  - Wrist and Finger Flexion
  - Shoulder Abduction
- 
- Now think of your sliders!

# ULNT (ULTT3) Ulnar Nerve

- Shoulder depressed
- Abducted
- Externally rotated
  
- Elbow flexed
- Forearm pronated
- Wrist extended & pronated
- Fingers extended

Now think of your sliders!

# For further info...

- Neuro Orthopaedic Institute (NOI)
- Short courses

Coppieters, M. W., and Butler, D. (2007). Do sliders slide and tensioners tense? An analysis of neurodynamic techniques and considerations regarding their applications. *Manual Therapy*. 13. Pp. 213-221

Butler, D. S., and Moseley, G. L. (2003). *Explain Pain*. NOI Group: Adelaide.