



*Refresher Course 2019*

*The Neurological Society of Thailand*

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# **Pearls and Pitfalls in Neurological Examination**

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# Neurological Examination



**Cranial nerves**

**Motor system**

**Reflexes**

**Sensory system**

**Cerebellar system**



# Neurological Examination



## Cranial nerves

**CN I: Not tested! Why not?**

**Smoking is no longer popular!**

**Other choices?**

**Toiletries**

**Soap, toothpaste,  
shampoo, body lotion**



# Neurological Examination



## Cranial nerves

**CN II: VA Visual acuity**

**Pocket near-vision chart**

**14 inches**

**P.S. Be sure it's 14 inches ..**



# Neurological Examination



## Cranial nerves

**CN II: VA Visual acuity**

**Pocket near-vision chart**

**14 inches**

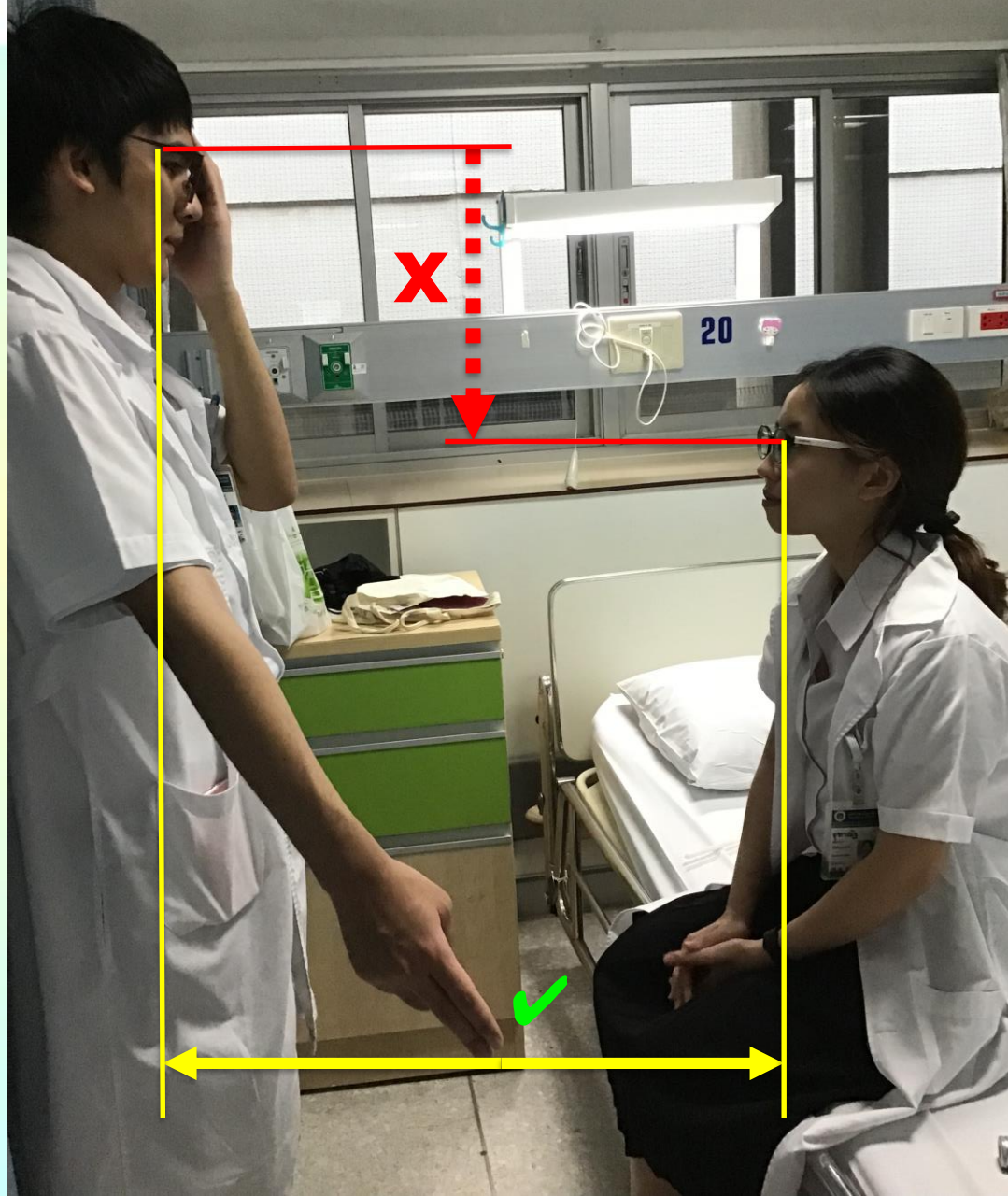
**VF Visual field (confrontation test)**



height

distance

examination



examination chart

(confrontation test)  
eye separately  
(right, distance)



# Neurological Examination



## Cranial nerves

**CN II: VA** Visual acuity

**Pocket near-vision chart**

**14 inches**

**VF** Visual field (confrontation test)

**Symmetry (height, distance)**

**Fundoscopy exam:** Remove glasses

**No hand on head please!**

**Avoid forced upper lid opening**

**Same eye, same hand**



# Neurological Examination



## Cranial nerves

### CN III, IV, VI:

**Ptosis: complete, partial**

**Extraocular muscles movement**

**Pupillary reflexes**

**Complete** in CN III palsy

**Partial** in CN III palsy

**Horner's syndrome**

**Myasthenia gravis**





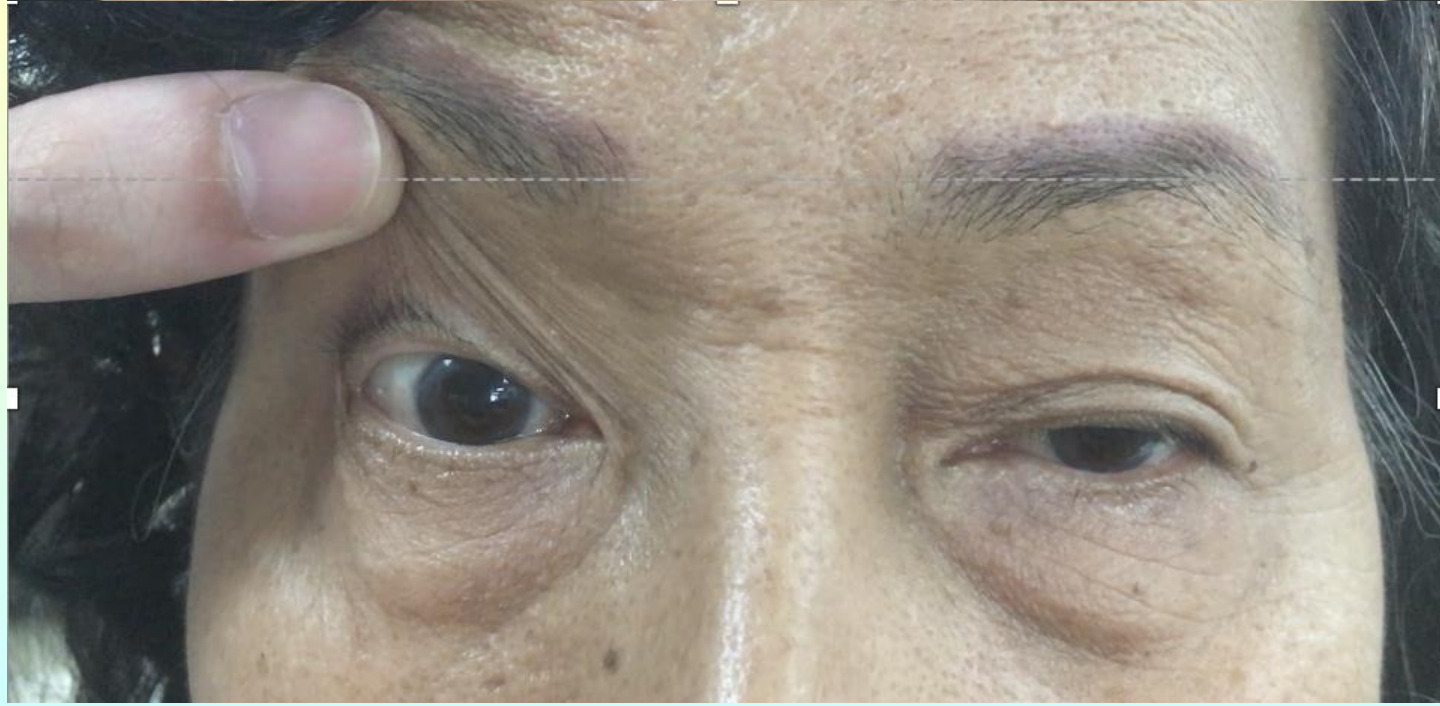
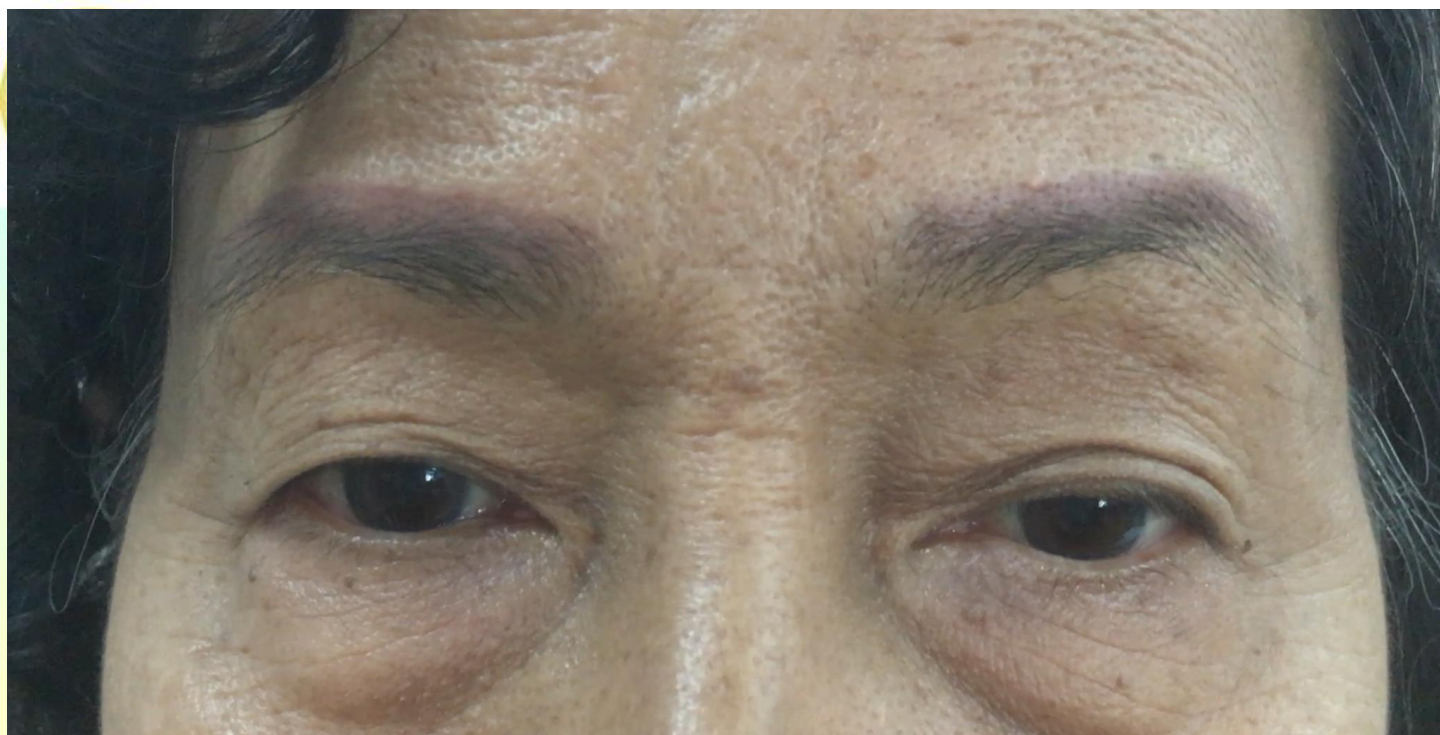
# Neurological Examination



Compensatory eyebrow elevation

**Partial ptosis**

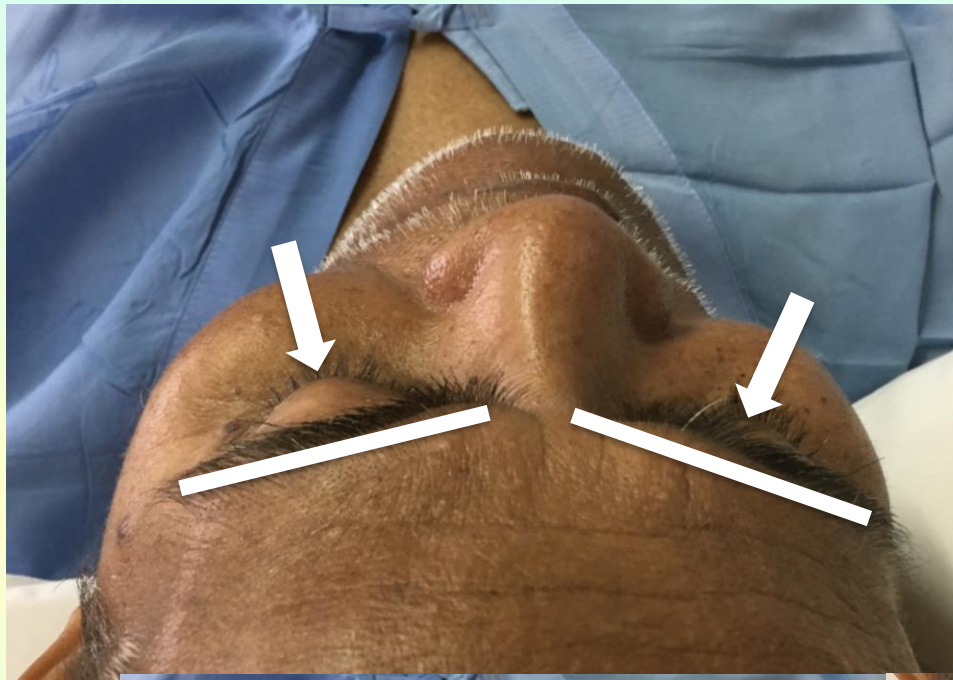
**Partial CN III palsy  
Horner's syndrome  
Myasthenia gravis**



**Enhanced  
ptosis**



# Neurological Examination



- Check for **proptosis**
- Eyes closed
- ✓ Observe from above forehead
- ✓ Eyeball protrusion in one side



Neck bend forward

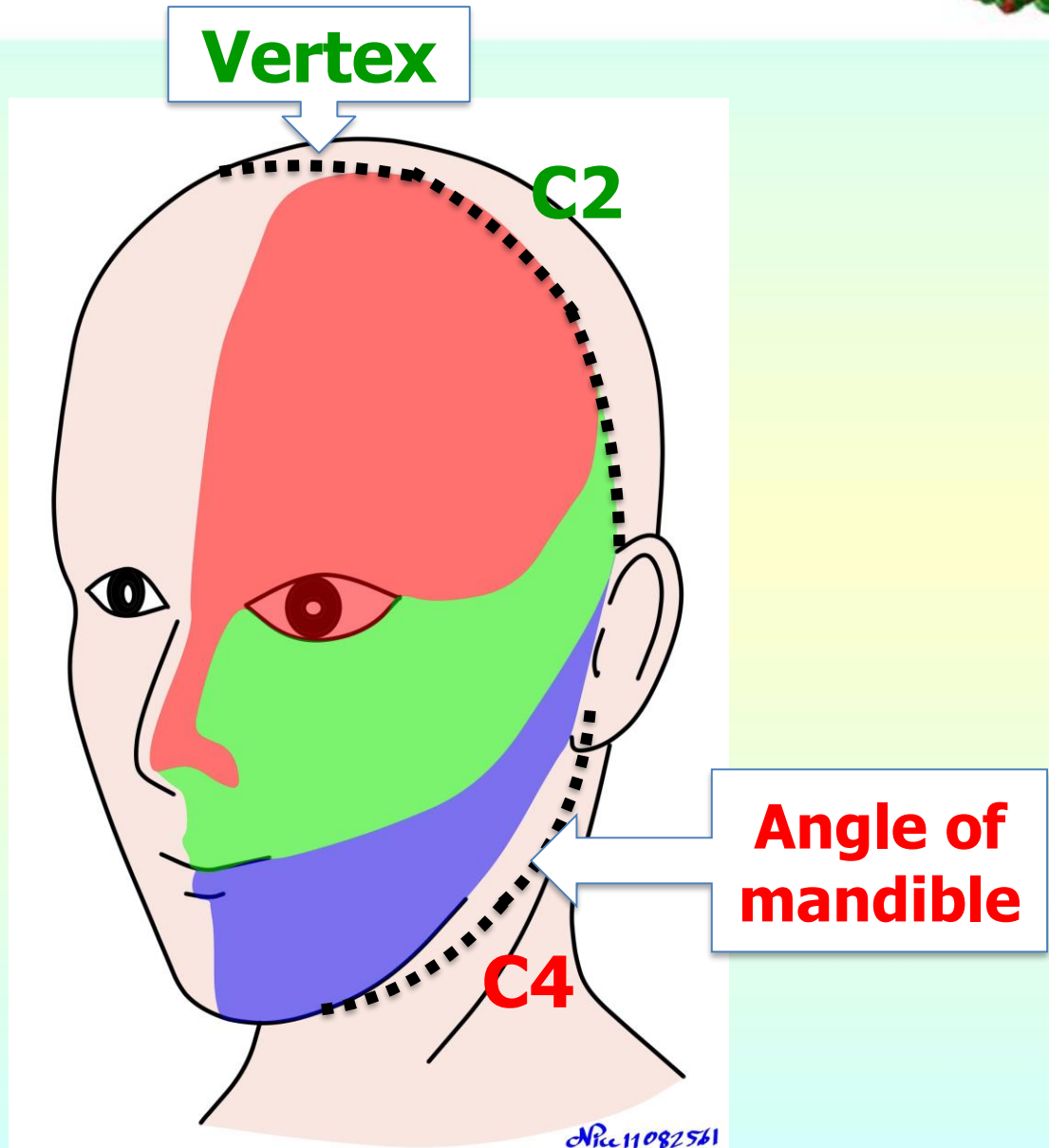


# Neurological Examination



## Cranial nerves

**CN V:** Motor  
Sensory  
Reflex



Dr. 11082561

Illustrated by Songkram Chotik-anuchit, MD



# Neurological Examination



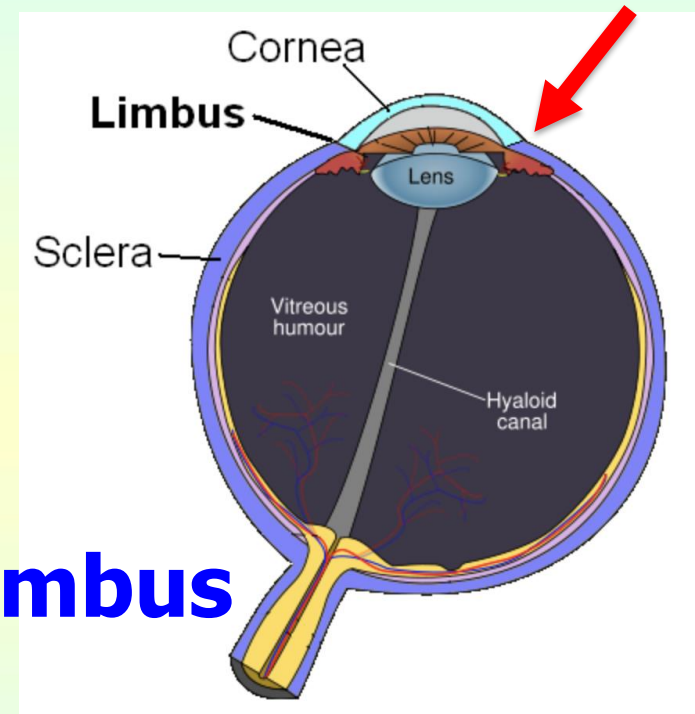
## Cranial nerves

**CN V:** Motor  
Sensory

**Reflex:**

**corneal reflex**

**touch at the limbus**





# Neurological Examination



## Cranial nerves

**CN V:** Motor  
Sensory

### Reflex:

**corneal reflex**  
**jaw jerk**

**tap lower jaw downward,  
not backward, to stretch  
masseter muscles**



# cal Examination



versus LMN lesion

LMN: - less blinking

- facial **synkinesia**

(post complete palsy)

**Synchronous contraction  
of muscles supplied  
by CN VII (aberrantly  
regenerated fibers)**

Check at **platysma**



# Neurological Examination



## Cranial nerves

**CN VIII: Weber, Rinne tests**

**Not heard?**

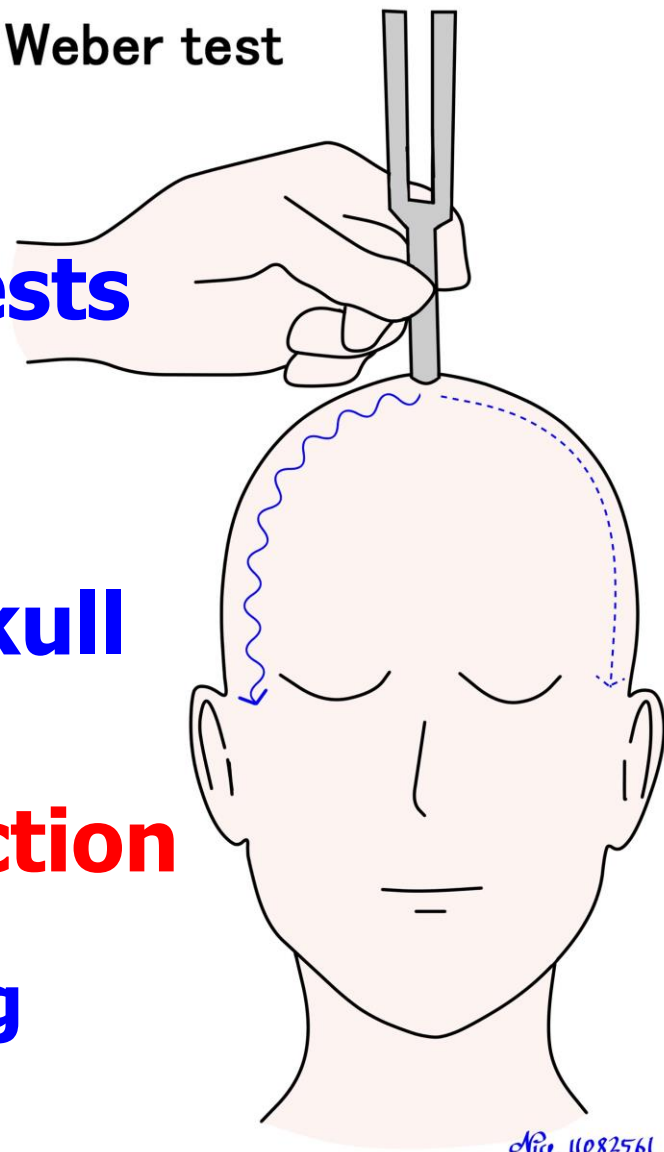
**Press footplate**

**firmly on the skull  
at the vertex**

**>> Bone conduction**

**P.S. No need to put the tuning  
fork on the forehead!**

Weber test







# Neurological Examination



**My curiosity:**

**How do you make a  
tuning fork vibrate?**

- a) Strike on a solid surface**
- b) Strike at your elbow**
- c) Strike on your hypothenar eminence**
- d) Strike on a jerk hammer**
- e) Squeeze both prongs together and release**



**Sensory system**  
**Cerebellar system**

**Compare both sides**  
**Always check for tone**  
**(muscles relaxed)**  
**Avoid exert pressure**  
**directly upon muscles**



# Neurological Examination



**Motor system: Power, upper limb**

**Shoulder: Deltoid**

**Biceps**

**Triceps**

**Brachioradialis**

**Radioulnar:**

**Pronator**

**Supinator**

**Wrist:**

**Flexor**

**Extensor**

**Finger:**

**Flexion (handgrip)**

**Extension**

**Abduction**

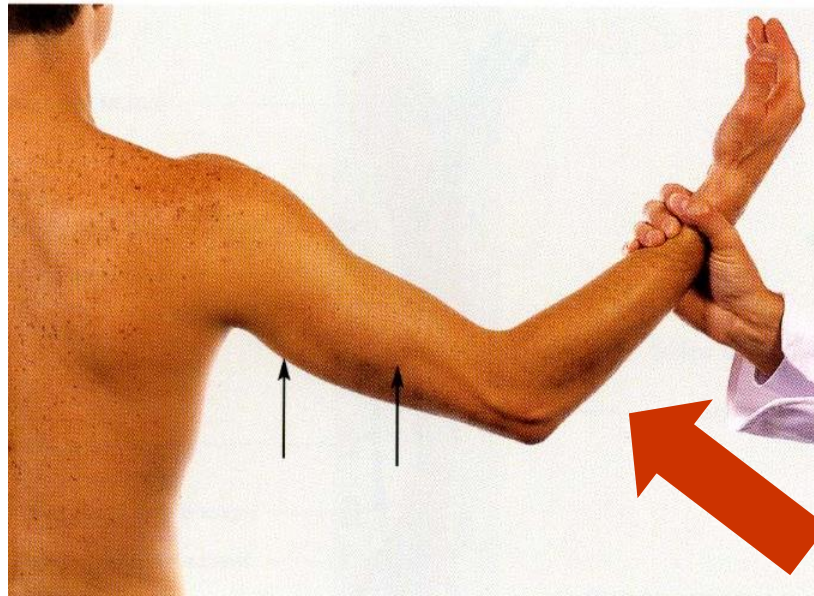
**Adduction**



# Neurological Examination



**Triceps:** Extend elbow ~ half way



**To extend with arm flexed is very painful.**



# Neurological Examination



**To avoid pulling the patient forward (e.g. when checking the wrist flexion, wrist extension and handgrip, etc.), examine one side at a time by fix the distal part of the patient's forearm with one hand and use the other hand to apply force**



# Neurological Examination



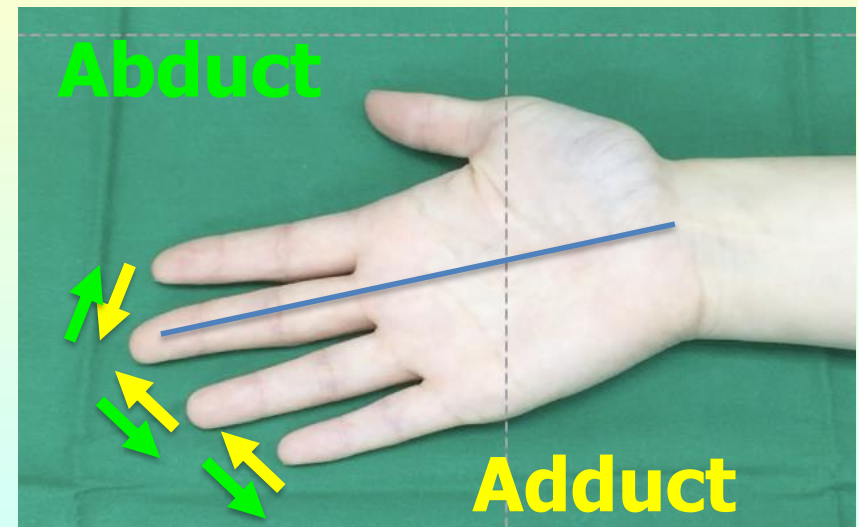
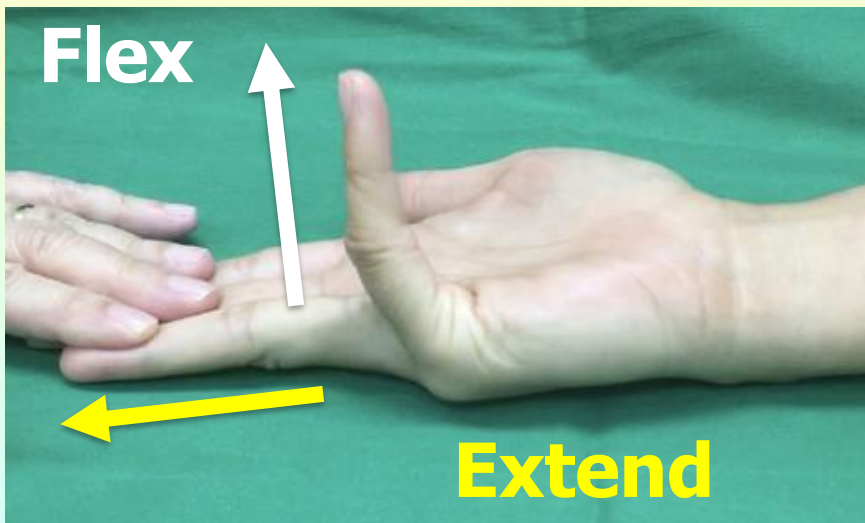
## Function of fingers

✓ : Flex-Extend

Move **vertical-horizontal** to the palm

✓ : Adduct-Abduct

Move **to-from** the middle finger





# Neurological Examination



## Thumb muscle functions

✓ : Flex-Extend

Thumb **in-out**

- Flexor pollicis longus

**Anterior interosseous nerve C7, C8**

- Flexor pollicis brevis

**Median, Ulnar nerves C8, T1**

- Extensor pollicis longus

- Extensor pollicis brevis

**Posterior interosseous nerve C7, C8**

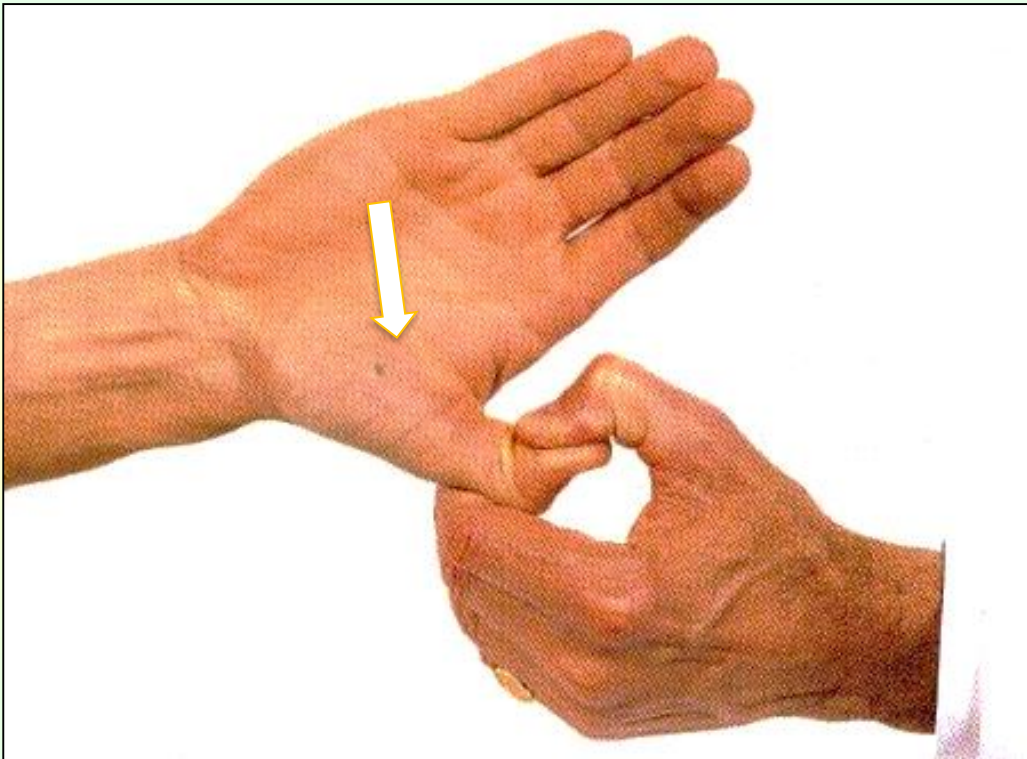


# Neurological Examination



## Flexor pollicis longus **FPL**

**Flex distal phalanx  
of the thumb**



**Insert at **distal**  
phalanx of the thumb**





# Neurological Examination



## Flexor pollicis brevis **FPB**

Flex proximal phalanx  
towards index finger

Insertion at **proximal**  
**phalanx of the thumb**

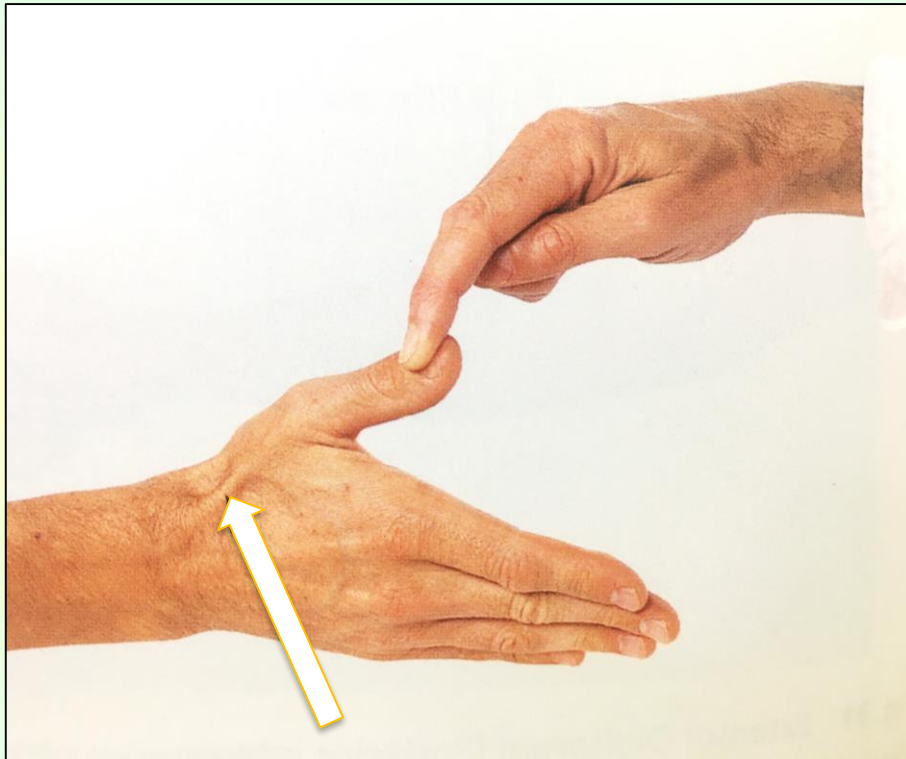


# Neurological Examination



## Extensor pollicis longus **EPL**

**Extend distal phalanx  
of thumb at inter-  
phalangeal, MCP  
joints**



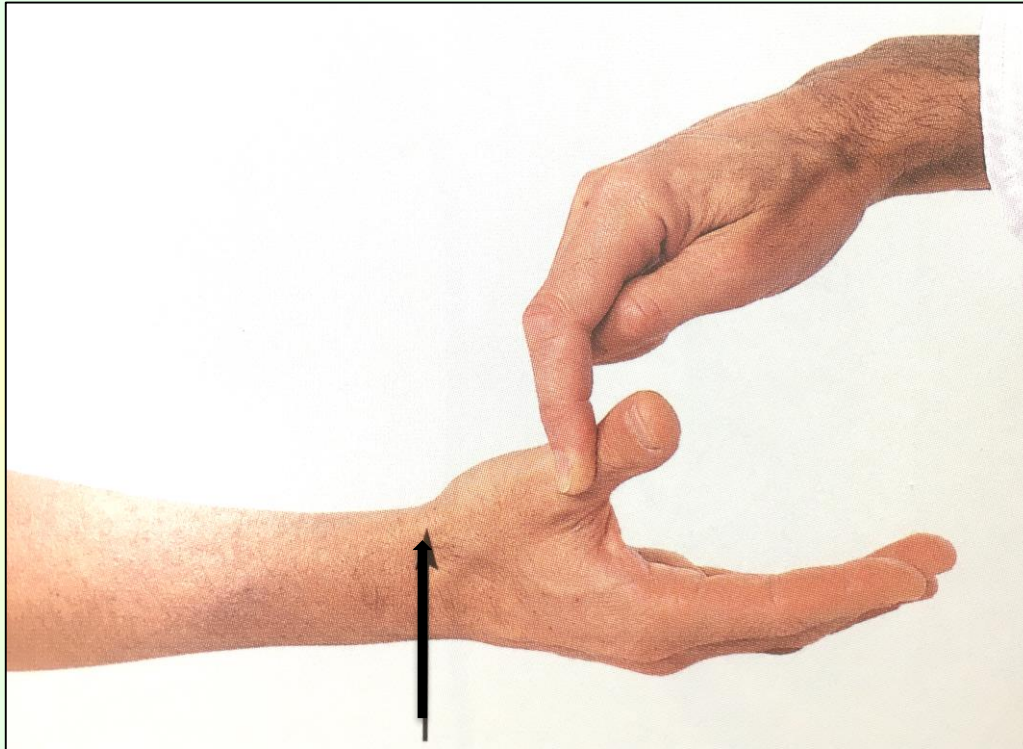


# Neurological Examination



## Extensor pollicis brevis **EPB**

**Extend proximal  
phalanx of thumb  
at MCP joint**





# Neurological Examination



## Thumb muscle functions

✓ : Adduct-Abduct

Thumb **down-up**

- Adductor pollicis

**Ulnar** nerve **C8, T1**

- Abductor pollicis longus

**Posterior interosseous** nerve **C7, C8**

- Abductor pollicis brevis

**Median** nerve **C8, T1**



# Neurological Examination



## Adductor pollicis



**Thumb down**

**Hand horizontal plane**  
**Thumb down to palm**

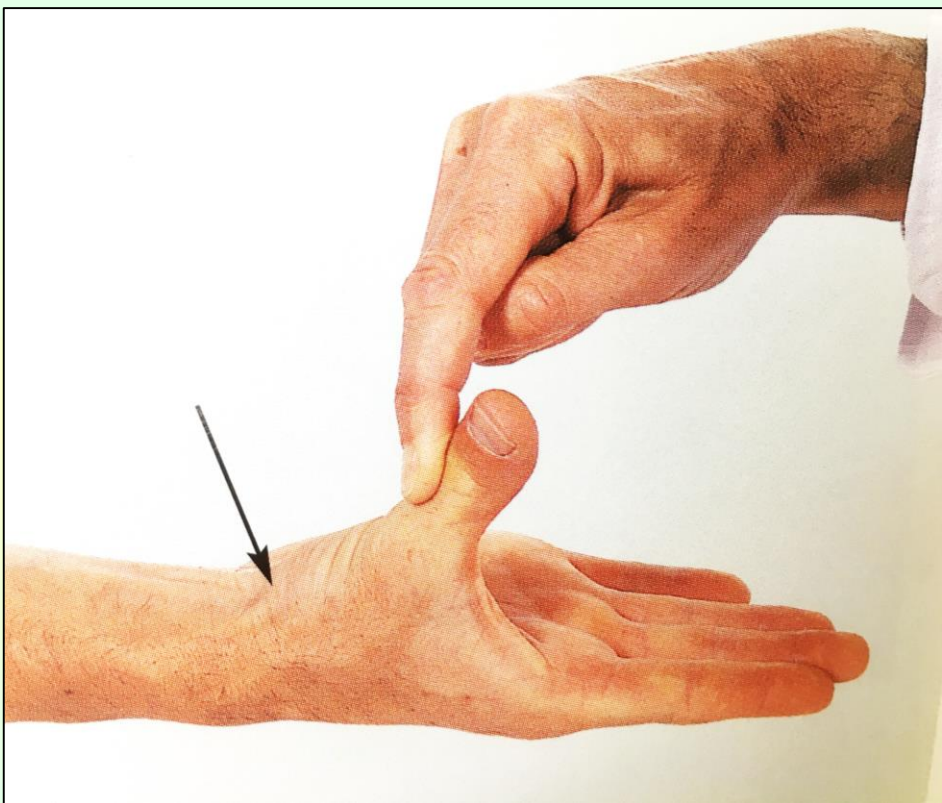


# Neurological Examination



## Abductor pollicis longus **APL**

**Abduct at carpo-meta  
carpal joint**



**Hand horizontal plane**

**Thumb up, vertical**

**to palm**

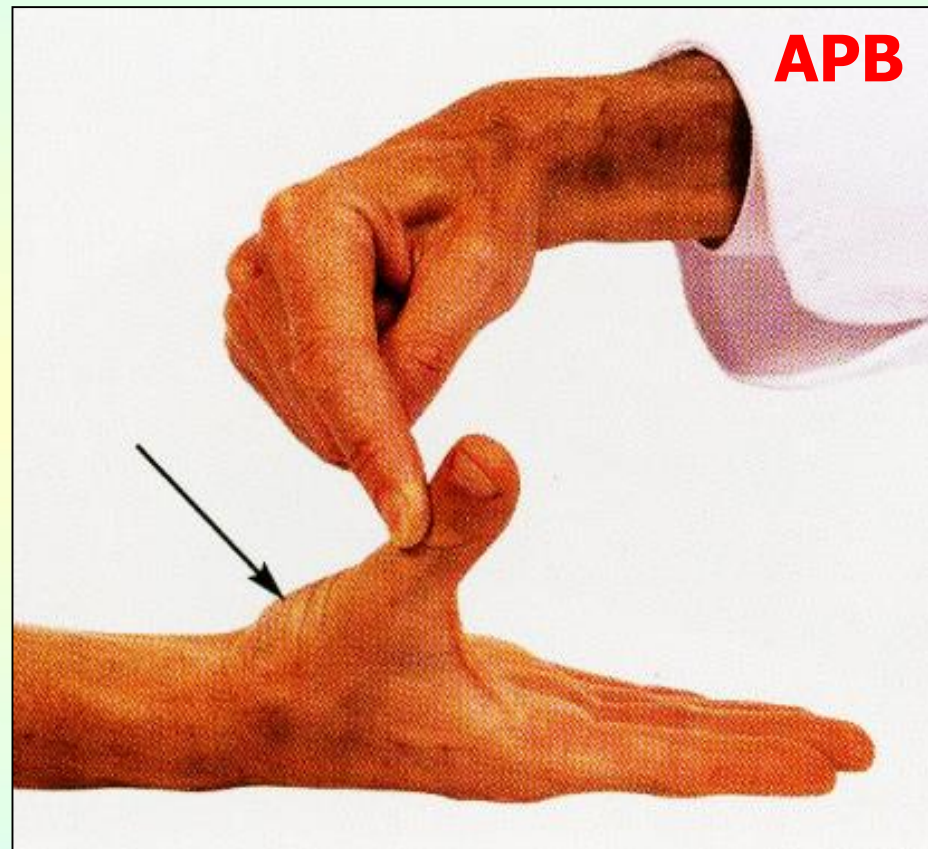


# Neurological Examination



## Abductor pollicis brevis **APB**

Abduct at MCP joint



Thumb up, **vertical**

$\Omega$  NP to palm



# Neurological Examination



## Thumb muscle functions

✓ : **Opponens**

**Thumb across**

- **Opponens pollicis**

**Median nerve C8, T1**





# Neurological Examination



## Opponens pollicis

**Thumb across,  
touching the base of  
the little finger**



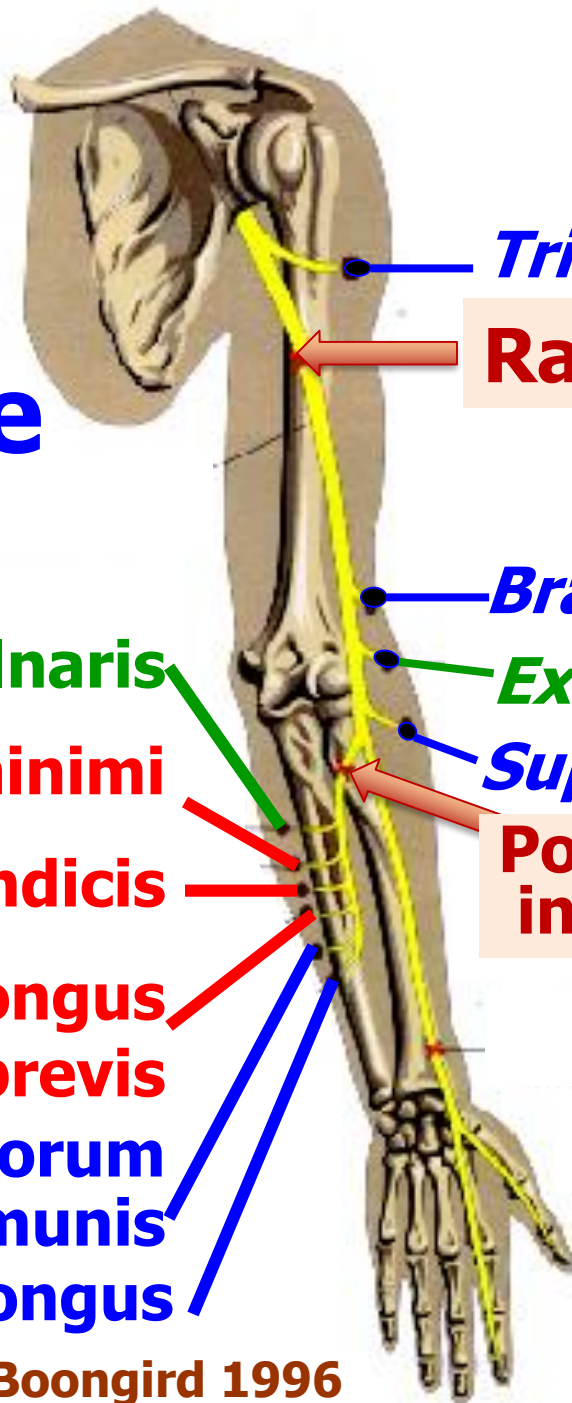


**Neuro**

**nation**



# Radial nerve



*Triceps brachii*

**Radial groove**

*Brachioradialis*

*Extensor carpi radialis*

*Supinator*

**Posterior interosseous nerve**

**Extensor carpi ulnaris**

**Extensor digiti minimi**

**Extensor indicis**

**Extensor pollicis longus & brevis**

**Extensor digitorum communis**

**Abductor pollicis longus**



Boongird 1996



# Neurological Examination



## Extensor digitorum



**Hint:** Patient's hand is supported; fingers extended at MCP joint

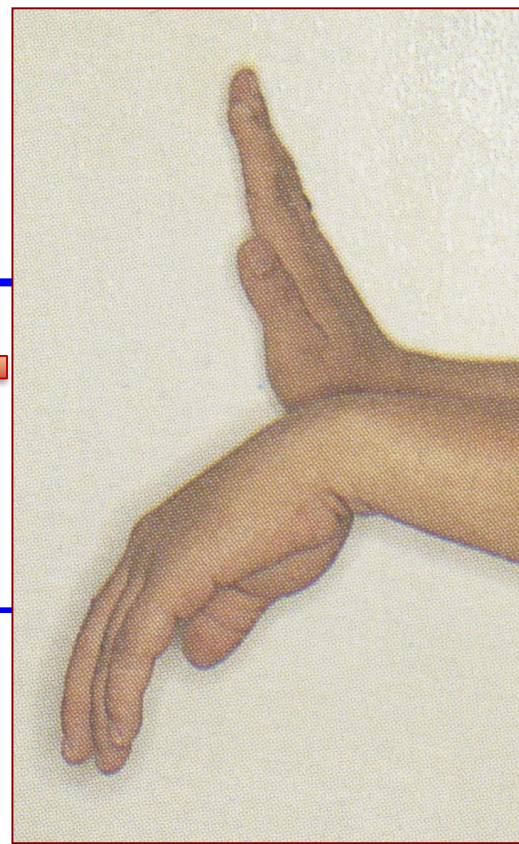
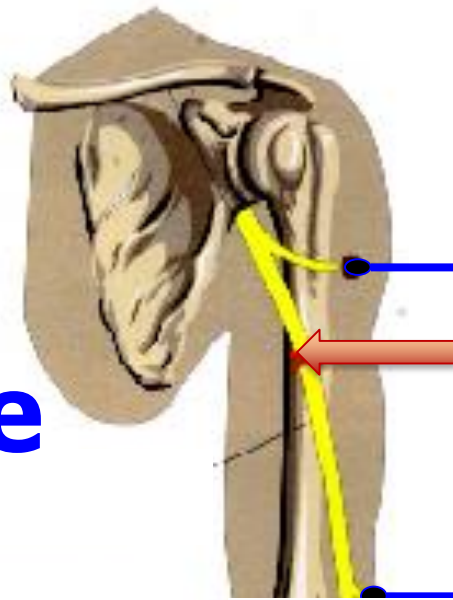
**MCP:** metacarpophalangeal joint



**Neuro**



# Radial nerve



Ext



**“Saturday night palsy”**  
**Wrist and finger drop**  
**Normal elbow extension**

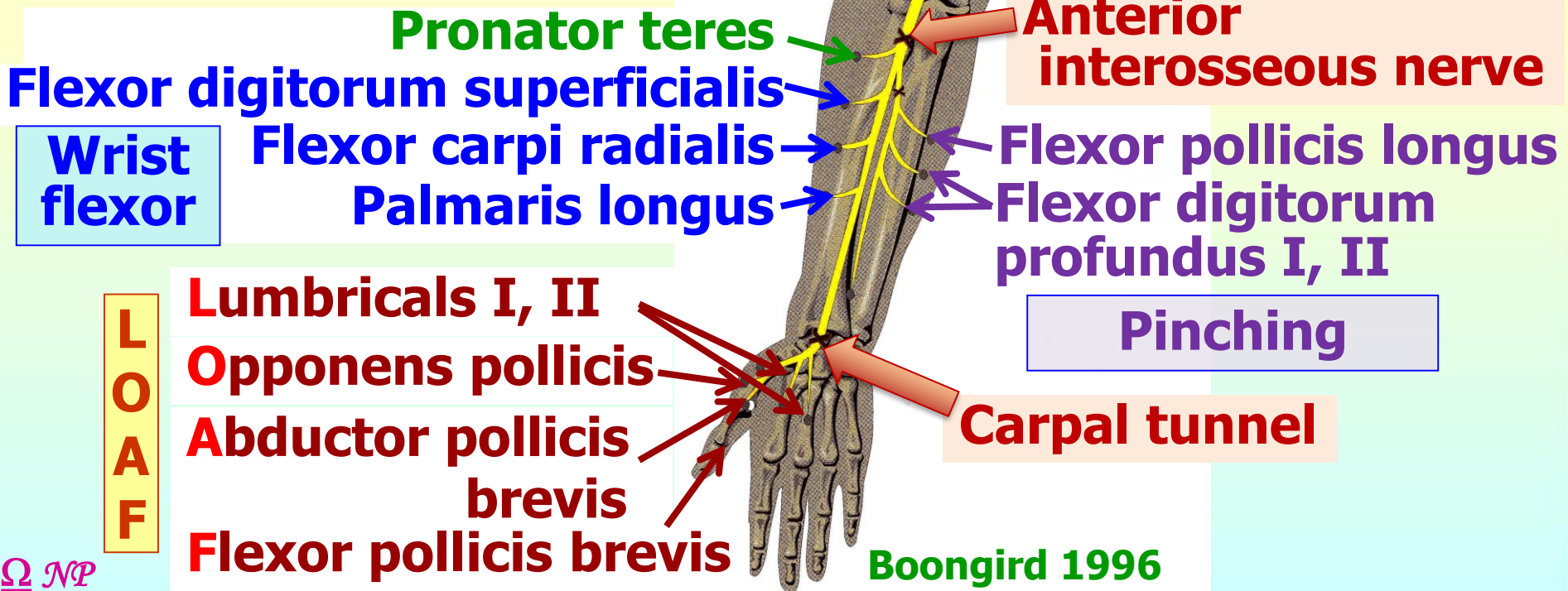
**“Posterior interosseous nerve palsy”**

**Finger drop without wrist drop**

Abduc



## Median nerve



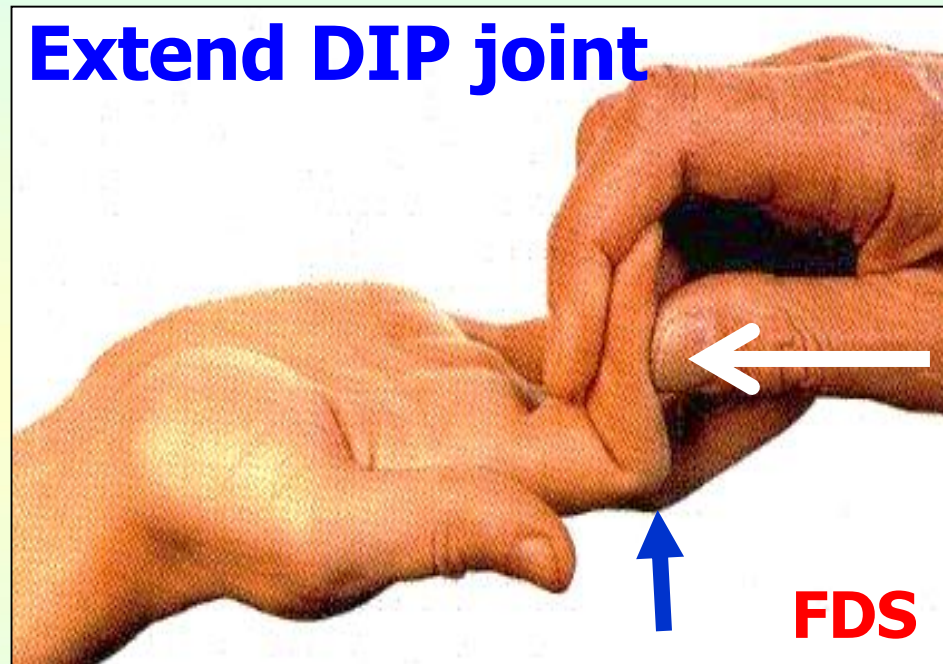


# Neurological Examination



## Flexor digitorum superficialis **FDS**

**Extend DIP joint**



**Flex PIP joint**

**Hint:** DIP is extended and fixed to minimize function of FDP.

**DIP:** distal interphalangeal

**PIP:** proximal interphalangeal

**FDP:** flexor digitorum profundus

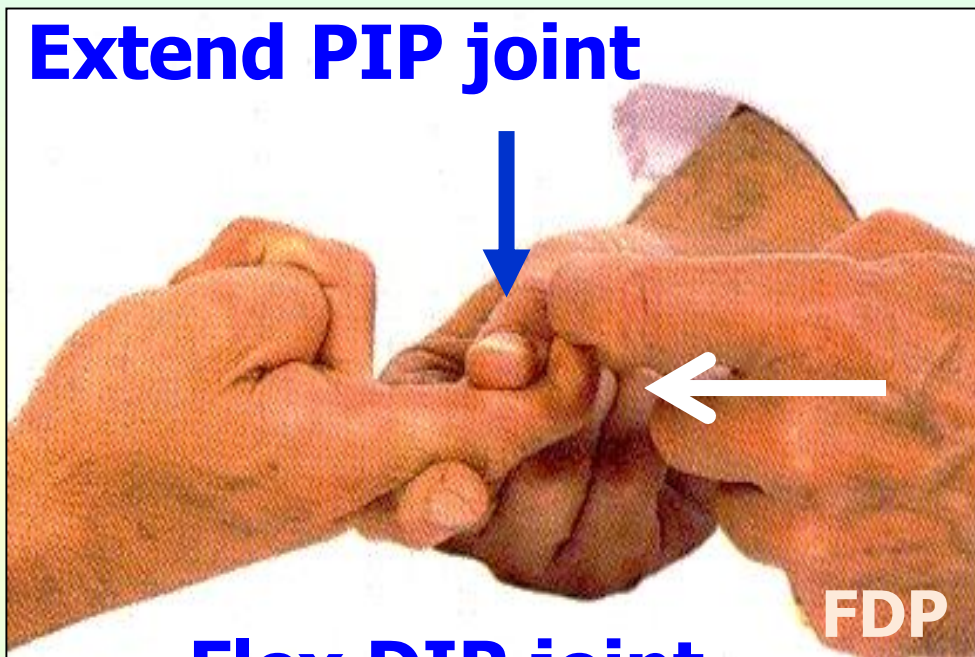


# Neurological Examination



## Flexor digitorum profundus **FDP**

**Extend PIP joint**



**Flex DIP joint**

**Hint:** PIP is extended and fixed to minimize function of FDS.

<b>FDP</b>	<b>Nerve</b>
<b>I,II</b>	<b>Median</b>
<b>III,IV</b>	<b>Ulnar</b>

**PIP:** proximal interphalangeal

**DIP:** distal interphalangeal

**FDS:** flexor digitorum

**superficialis**



# Neurological Examination



Lumbricals	Nerve
I,II	Median
III,IV	Ulnar

## Lumbricals

Extend MCP, PIP joints



Extend distal phalanx

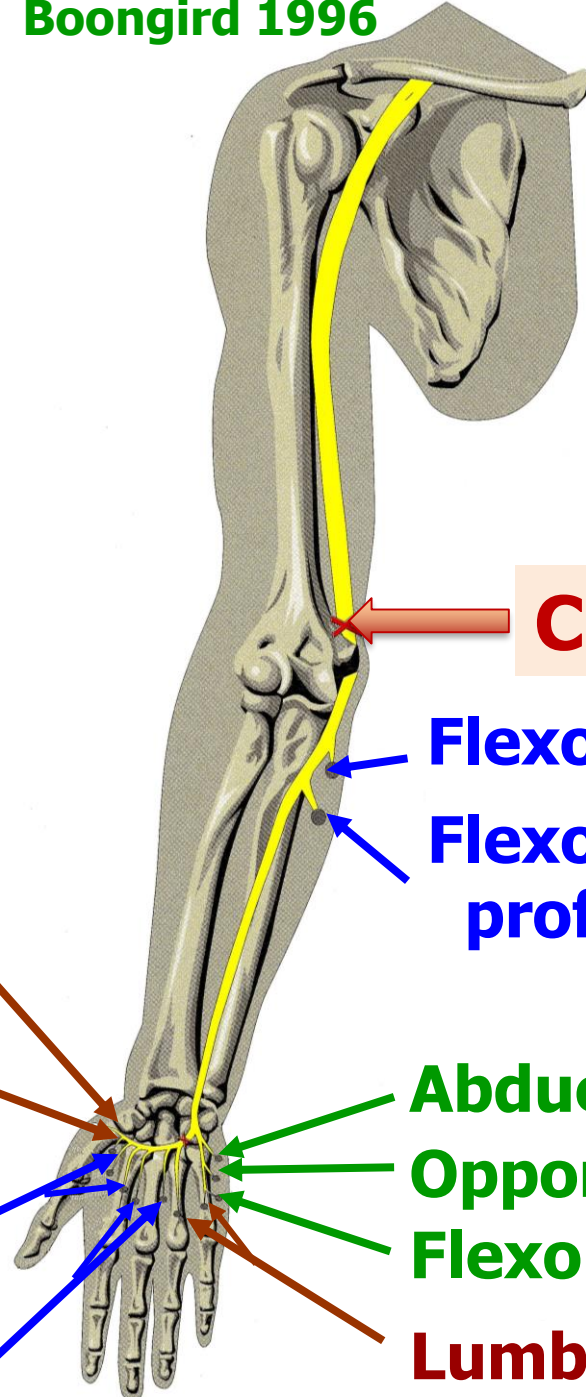
**PIP:** proximal interphalangeal

**MCP:** metacarpophalangeal





# Ulnar nerve



**Cubital tunnel**

**Flexor carpi ulnaris**

**Flexor digitorum profundus III, IV**

**Flexor pollicis brevis**  
**Adductor pollicis**

**Abductor digiti minimi**  
**Opponens digiti minimi**  
**Flexor digiti minimi**

**Dorsal interossei**  
**Palmar interossei**

**Lumbricals III, IV**



# Neurological Examination



## Dorsal interossei

**Abduct fingers**





# Neurological Examination



## Palmar interossei

**Adduct fingers**





# Neurological Examination



## Abductor digiti minimi ADM





# Neurological Examination



## Flexor digiti minimi **FDM**



**Flex little finger at  
MCP joint; extend at  
PIP and DIP joints**



## Froment's sign



**Distal phalanx flexion**

**Adduction**

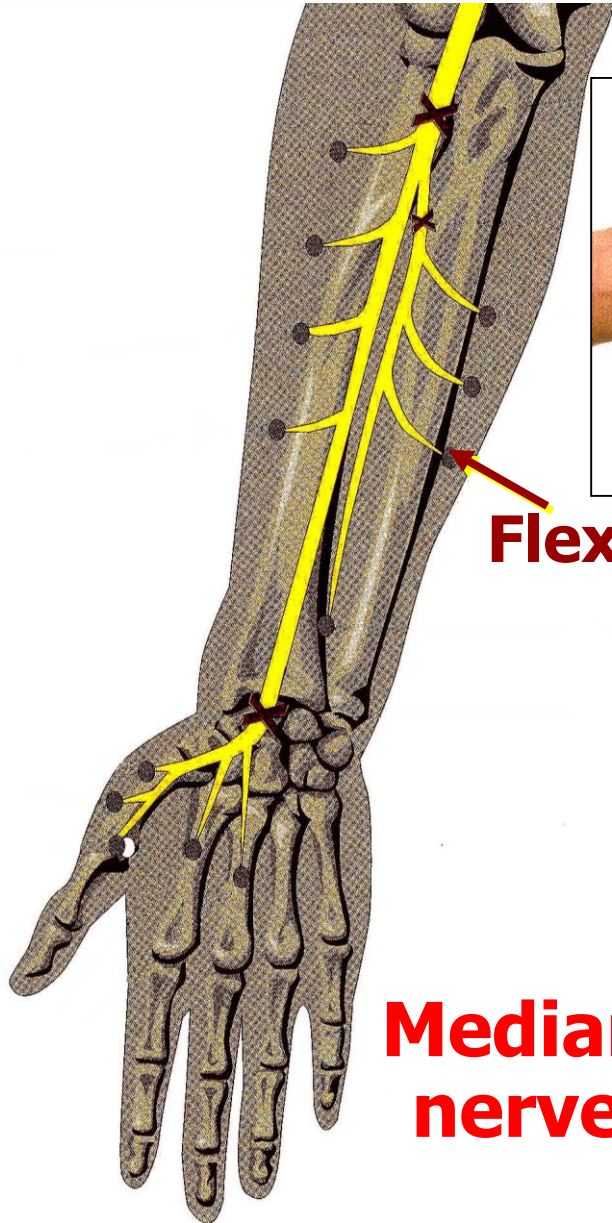
Andrea Palmier

**Froment's sign:** hold a paper by adducting the thumb against the index finger, then pull the paper apart

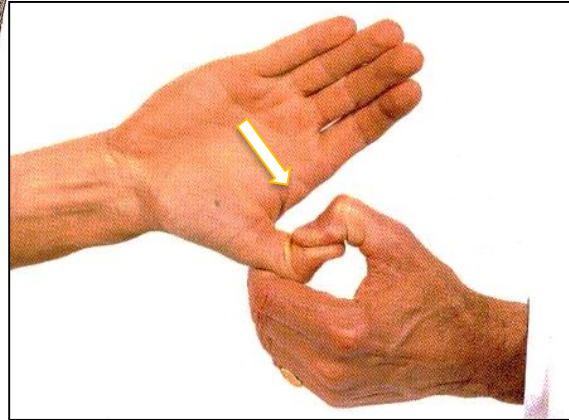
**Positive:** flexor pollicis longus (median nerve) is used to compensate for adductor pollicis



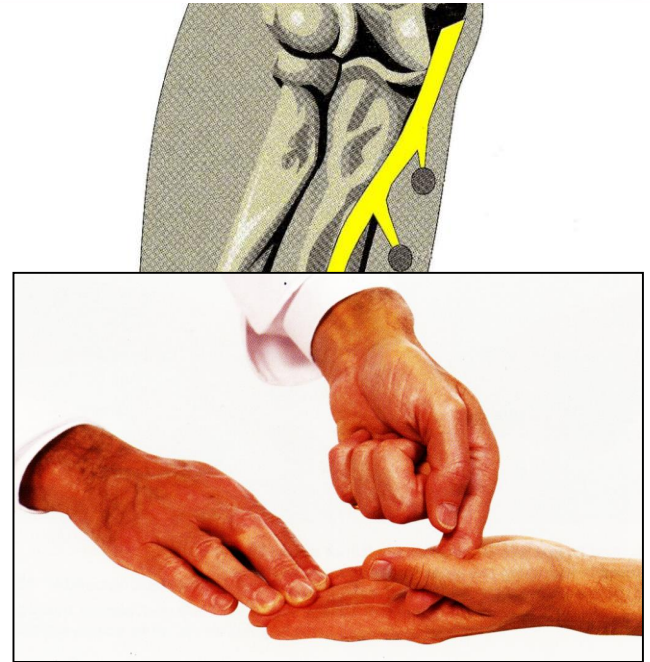
# Neurological Examination



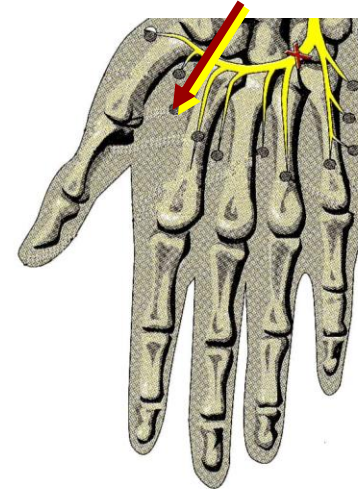
**Median  
nerve**



**Flexor pollicis longus**



**Adductor pollicis**



**Ulnar  
nerve**



# Neurological Examination



**Motor system: power, lower limb**

**Hip:** flexion (iliopsoas) extension  
abduction adduction

**Knee:** flexion (hamstring)  
extension (quadriceps)

**Ankle:**  
flexion extension  
inversion eversion

**Toe:** flexion extension

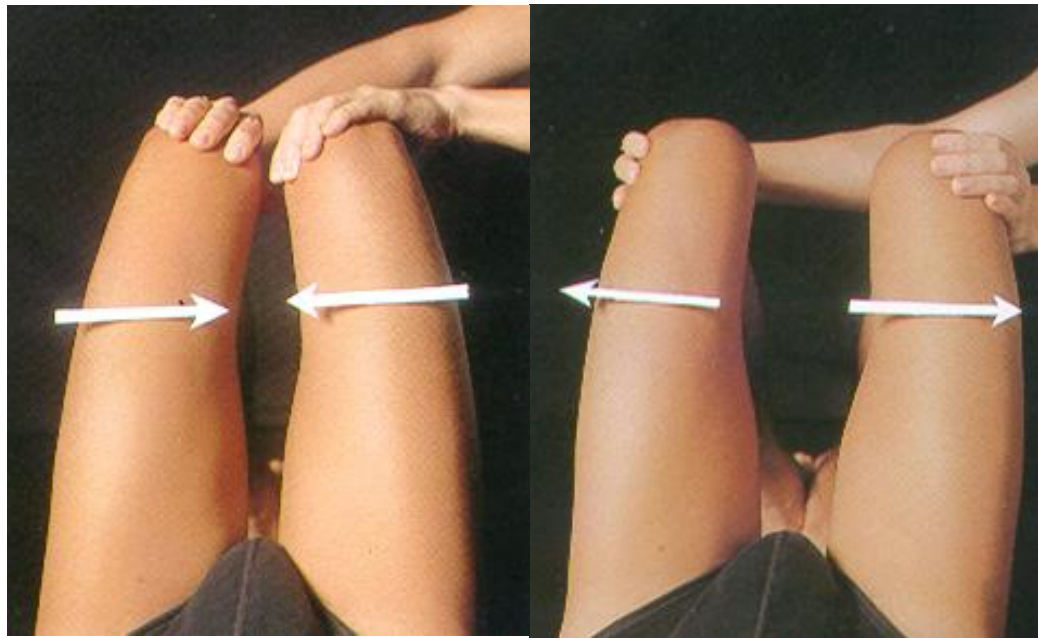




# Neurological Examination



**Always place your hands on the patient's knees**



**Never ever at the thigh!**



# Neurological Examination



**Cranial nerves**

**Motor system**

**Reflexes**

**Sensory system**

**Cerebellar system**

**Compare both sides**  
**Ascertain muscles**  
**relaxation**

**In generalized hyperreflexia,  
what else should be checked for?**

**: Tromner/Hoffman signs**

**: Jaw jerk >>> why?**



# Neurological Examination



**Cranial nerves**

**Motor system**

**Reflexes**

**Sensory system**

**Cerebellar system**



# Neurological Examination



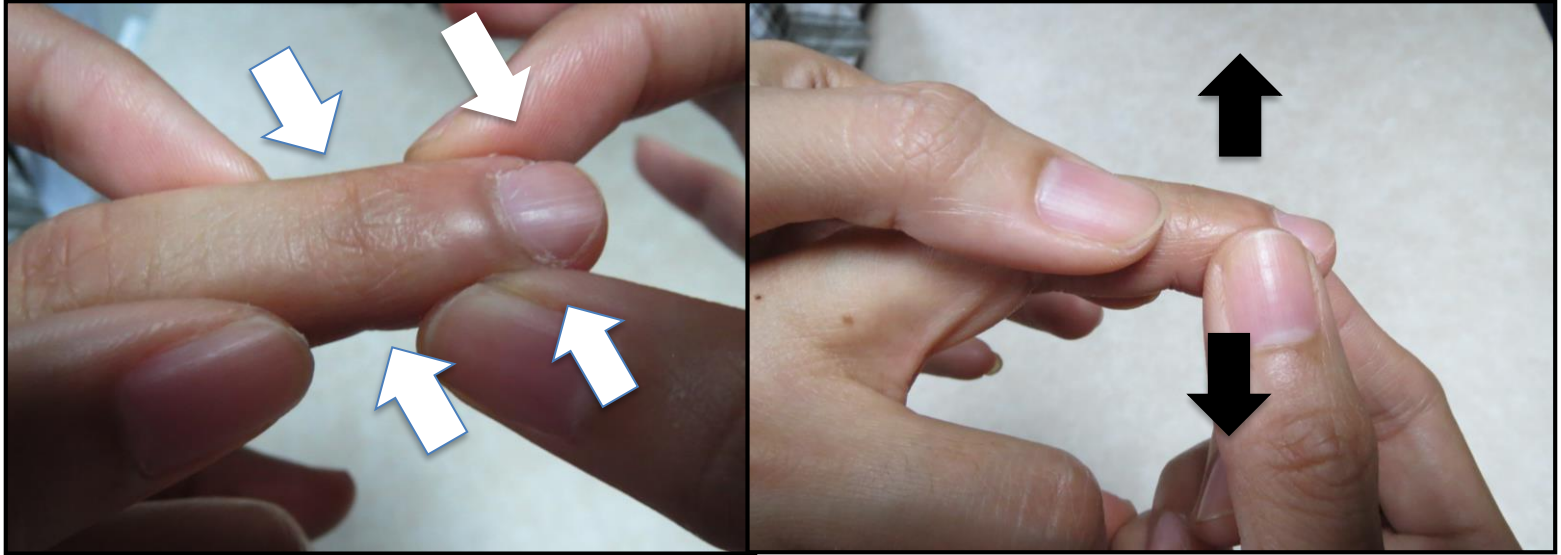
- Use a vibrating tuning fork **128 Hz**



- Place base of footplate (or round shaft) on **distal phalanx** (on nail or nail bed); support the patient's finger with examiner's finger
- Ask if the patient can feel the vibration
- Ask the patient to report when sensation **disappears**



# Neurological Examination



- Fix patient's finger (or toe) by holding **sideway** just proximal to **distal** joint
- Hold distal phalanx **sideway**
- Move distal phalanx up or down, randomly



# Neurological Examination



**Cranial nerves**

**Motor system**

**Reflexes**

**Sensory system**

**Cerebellar system**



# Neurological Examination



## Cerebellar ataxia:

- nystagmus
- dysmetria
- dysdiadochokinesia
- cerebellar speech 'scanning speech'
- hypotonia
- pendular reflex



# Neurological Examination



## Cerebellar ataxia:

- nystagmus

- **dy** **Dysmetria**

- **dy** **Compare both sides**

- **ce** **Arm: Finger-to-nose (FN)/(FNF) test**

- **hy** : allow the arm to extend fully

- : change directions

- **pe** **Leg: Heel-to-knee test**

- : place the heel on the knee cap

- : slide the heel not the **sole**

- down the shin





# Neurological Examination



## Cerebellar ataxia:

- nystagmus
- **Ataxic dysarthria (scanning speech)**
- **Words in phrase/sentence are**
- **broken into separate syllables, with**
- **pauses and spoken with variable**
- **forces (loudness)**
- **poor coordination**



# Neurological Examination



**Cranial n**

<b>CN:</b>	<b>I</b>	<b>II</b>	<b>II, IV, VI</b>
	<b>V</b>	<b>VII</b>	<b>VIII</b>
	<b>IX, X</b>	<b>XI</b>	<b>XII</b>

**Motor sys**

**Motor tone and power:**

**Reflexes**

**Upper limb**

**Lower limb**

**Sensory syste**

**Reflex:**

**Cerebellar sys**

**Relaxation**

**Sensory:**

**Vibratory**

**Joint position**

**Cerebellar:**

**Dysmetria**

**Dysdiadochokinesia**