

# Practical Physiology

<b>Sensory System Examination</b>		
<b>Transmit</b>	Spinothalamic tract : - <b>Lateral:</b> - Pain - Temperature  - <b>Ventral:</b> - Crude touch - Tickle - Itch	Dorsal column tract - Fine touch (tactile localization, two point discrimination) - Stereognosis - Vibration - Position - Movement
<b>Cross</b>	: Spinal cord	Lower medulla
<b>Velocity of transmission</b>	: Slow	Rapid

### ① Tactile localization:

- **Definition:** It is the ability of subject to localize the point touched with his eyes closed

- **Steps:** - Ask the subject to close his eyes
  - Touch different parts of the body with one limb of **caliber**
  - Ask him to point with his index on the touched point

- **Results:** - Normal
  - Hypoesthesia: Reduced touch sensation
  - Hyperesthesia: - Painful
    - Irritating or
    - Tingling sensation



## ② Two point discrimination:

- **Definition:** It is the ability of the subject to differentiate 2 points touching his skin as two separate points

**NB:** Threshold distance: Is the minimal distance at which the subject can feel two touched points as two different points

- **Steps:** - Ask the patient to close his eyes
  - Touch the following parts of the skin using two limbs of caliber:
    - ① Lips
    - ② Index finger
    - ③ Thumb
    - ④ Palm of hand
    - ⑤ Dorsum of the hand
    - ⑥ Back of the neck
  - At first make the two points of caliber very close, then separate them till the subject say **2 points**
  - Record the least distance at which subject can differentiate 2 points

- **Normal Results:**

① Lips	: 1 - 2 mm
② Index finger	: 1 - 2 mm
③ Thumb	: 2 - 5 mm
④ Palm of hand	: 5 - 10 mm
⑤ Dorsum of hand	: 10 - 15 mm
⑥ Back of neck	: 15- 20 mm

- **Factors affecting two point discrimination:**
  - Number of receptors
  - Number of afferents
  - Cortical representation
  - Convergence

*Threshold distance decreased with:*

- ① Increased receptors
- ② Increased afferents
- ③ Increased cortical representation
- ④ Less convergence

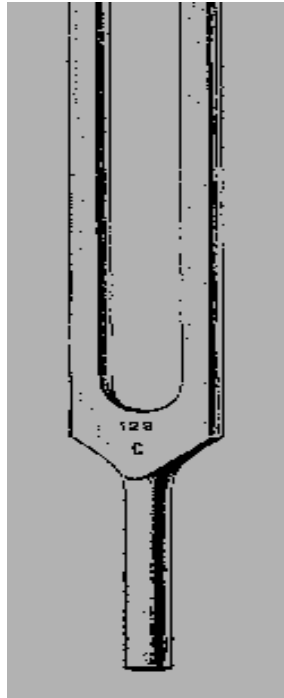
### ③ Steriognosis:

- **Definition:** It is the ability of the subject to identify common object placed in hand with closed eyes
- **Steps:**
  - Ask the subject to close his eyes
  - Place a common object like coin or keys in his palm and ask him to identify the object without looking towards it

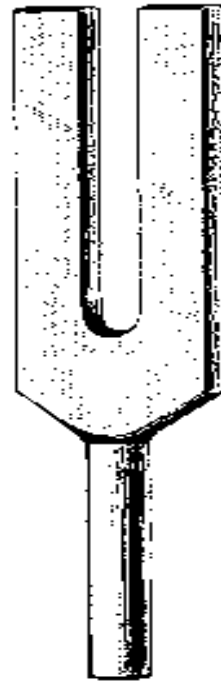
**NB:** Asteriognosis:  
 Loss of recognition of object  
 Due to dorsal column tract lesion or lesion of sensory associated area

### ④ Vibration sense:

- **Vibration receptors:**
  - Meissner's corpuscle: Respond to vibrations up to **80 /sec**
  - Pacinian corpuscle: Respond to vibrations up to **500 /sec**
- **Steps:**
  - Place **the long - arm vibrating tuning fork** over the bony prominence :
    - ① Medial malleolus
    - ② Anterior tibial tubercle
    - ③ Anterior superior iliac spine
  - Ask the patient if he feels the **vibrations** and if they are felt equally on all sites
  - If vibration sense is diminished or lost over medial malleolus, **check ASIS:** (anterior superior iliac spine)
    - If lost:** It suggests posterior column tract lesion
    - If intact:** It suggests **peripheral nerve lesion**



(long arm for Vibration test)  
128 hertz



(short arm For hearing test )  
512 hertz

#### ⑤ Temperature sense:

- **Steps:** - With two test- tubes containing **warm** and **cold water**, touch at different sites of the body of your subject
- Ask him to identify the temperature difference

**Types of thermos receptors:**

- ① Warm receptors
- ② Cold receptors

**Characters of thermos receptors:**

- ① Are located immediately under the skin
- ② Cold receptors are more numerous than warm receptors
- ③ Both receptors are moderately adapting
- ④ Cold receptors adapt more slowly than warm receptors

### Motor System Examination

#### Reflexes: Superficial reflexes

- ① Corneal reflex:

**Technique:** - Ask the patient to look upward & away from the eye to be stimulated

- Touch the eye from lateral side

**Result:** - Normal: Blinking of both eyes

- 7<sup>th</sup> Nerve lesion: Loss of blinking in the same side of the lesion

- Bilateral loss of blinking: ① 5<sup>th</sup> nerve lesion

② Bilateral 7<sup>th</sup> nerve lesion

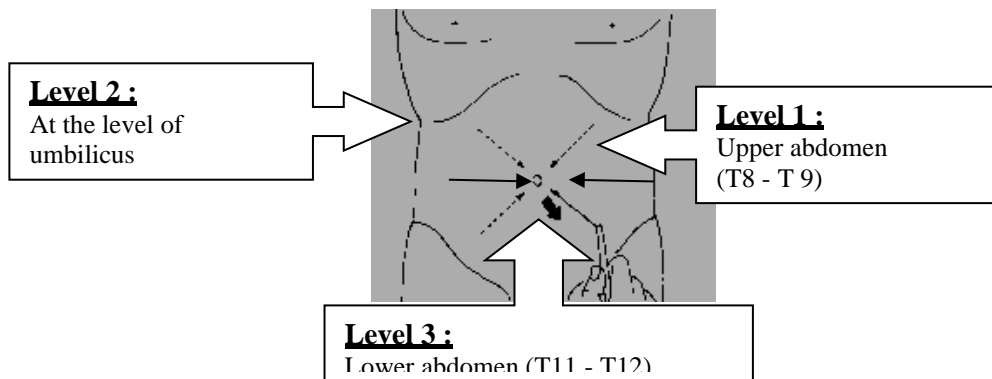
③ Coma

**Explanation:** - Afferent: → Ophthalmic division of trigeminal nerve

- Efferent: → Facial nerve

## ② Abdominal reflex:

**Technique:** Scratch abdominal skin from lateral to medial comparatively in 3 levels



**Normal Response:** Abdominal muscle contraction pulling the umbilicus

## ③ Planter reflex:

**Technique:** - Scratch the lateral aspect of the sole of foot

- **Center:** S<sub>1</sub>, S<sub>2</sub>



**Result:**



**Normal:**

Normal response

### **Babinski sign : ( extensor response )**

- **Definition:** Dorsiflexion of big toe and fanning of other toes
- **Causes :**
  - Pyramidal tract lesion
  - Deep sleep, deep coma
  - deep anesthesia
  - infants less than 1 year

**NB:** Absent response due to:

Defect in: ① Receptor: - Thick skin  
- Cold skin

- ② Afferent: Peripheral neuropathy
- ③ Centre: Lesion of S1, S2
- ⑤ Efferent: LMNL (Lower Motor)
- ⑤ Musculoskeletal: Foot deformity

## **Deep reflexes (Tendon Jerk)**

**Biceps reflex:** - Centre: C<sub>5</sub> - C<sub>6</sub>

- Technique: - Elbow 120 degree

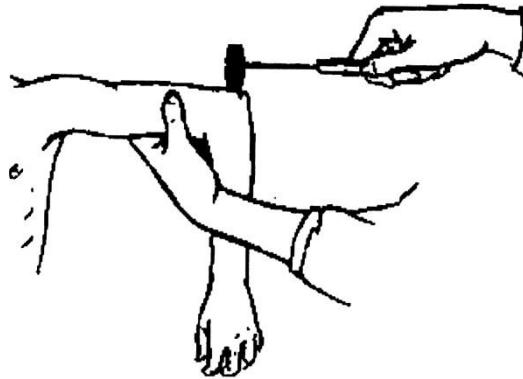
- Finger (index or thumb) over biceps tendon (medially)

- Response: Slight flexion of arm



**Triceps reflex:** - Centre: C<sub>6</sub> – C<sub>7</sub>

- Technique: - Elbow 90 degree
- Direct above olecranon
- Response: Slight extension of arm



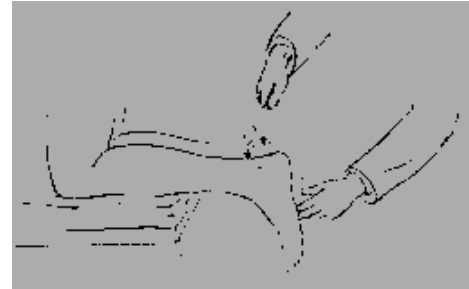
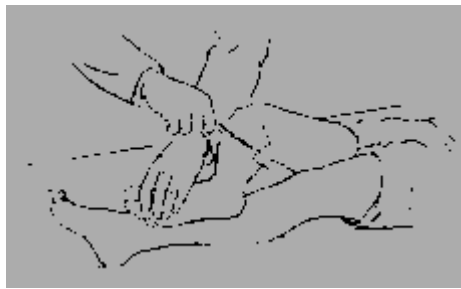
**Knee reflex:** - Centre: L<sub>2</sub>, L<sub>3</sub>, L<sub>4</sub>

- Technique: - Knee 120 degree(heel just touching the bed)
- or 90 degree (hanging)
- Direct on patellar ligament
- Response: Extension of knee





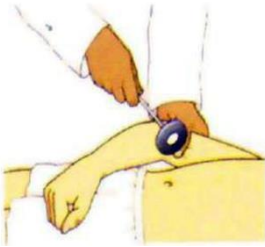
- Ankle reflex:**
- Centre:  $S_1 - S_2$
  - Technique:
    - Ankle 90 degree, knee 90 degree with eversion or kneeling method
    - Direct on tendoachilis
  - Response: Plantar flexion of foot



<b>NB: ❶ Jendrassic phenomenon:</b> <ul style="list-style-type: none"> <li>- Is a method for enhancing response of tendon jerk</li> <li>- It's mechanism is increasing <b>gamma efferent discharge</b> by:               <ol style="list-style-type: none"> <li>1. Clenching the teeth</li> <li>2. Pull the hand apart when the flexed fingers are hooked together</li> </ol> </li> </ul>	
<b>❷ Differentiation between UMNL &amp; LMNL</b>	
<p style="text-align: center;"><u><b>UMNL</b></u></p> <ul style="list-style-type: none"> <li>• From cerebral cortex to AHCs</li> <li>• Clasp knife spasticity</li> <li>• Slight wasting of the muscles</li> <li>• Exaggerated deep reflexes</li> <li>• + ve Babiniski sign</li> </ul>	<p style="text-align: center;"><u><b>LMNL</b></u></p> <ul style="list-style-type: none"> <li>• From AHCs and downwards</li> <li>• Hypotonic</li> <li>• Marked wasting of the muscles</li> <li>• Lost deep reflexes</li> <li>• Plantar flexion or no response</li> </ul>
<b>❸ Tendon jerk is dynamic stretch reflex</b>	
<b>❹ Causes of hyperreflexia and hyooreflexia</b>	
<p style="text-align: center;"><u><b>Causes of hyperreflexia</b></u></p> <ul style="list-style-type: none"> <li>• Physiological: Anxiety</li> <li>• Pathological:               <ul style="list-style-type: none"> <li>• UMNL</li> <li>• Thyrotoxicosis</li> </ul> </li> </ul>	<p style="text-align: center;"><u><b>Causes of hyporeflexia</b></u></p> <ul style="list-style-type: none"> <li>• Physiological: Sleep</li> <li>• Pathological:               <ul style="list-style-type: none"> <li>• LMNL</li> <li>• Myxedema</li> </ul> </li> </ul>

**Deep tendon reflexes  
of upper limb**

Biceps jerk C5 (C6)



**Supinator (Brachio radials)  
jerk (C5) C6**

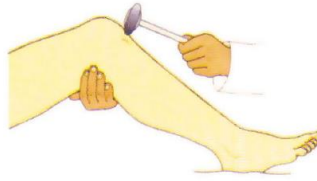


Triceps jerk C6, C7



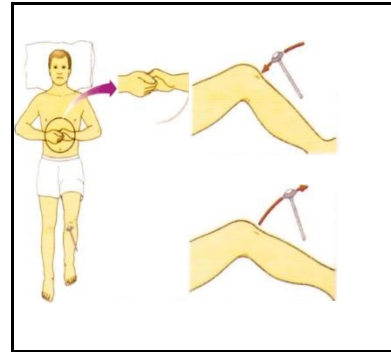
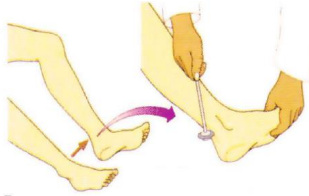
**Deep tendon reflexes  
of lower limb**

Knee jerk



Legs must not be in contact  
with each other

**Ankle jerk  
of recumbent patient (S1)**



## Examination of cerebellum function

Tests of coordination are not done in limbs showing paralysis

### Tests of coordination

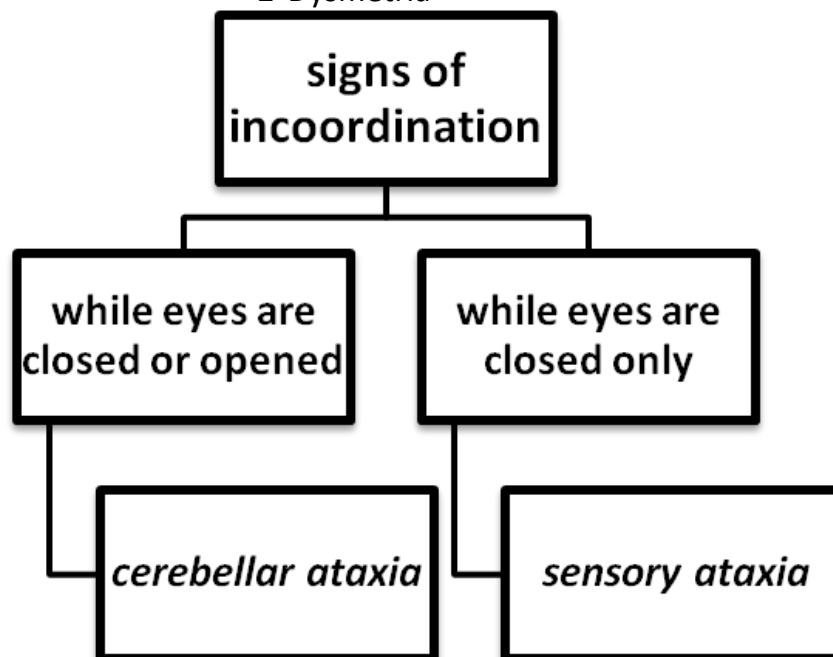
❶ **Finger to nose test:** 1-The patient brings the tip of his index from a distance onto the tip of nose

2-The test is done with closed & opened eyes

❷ **Heel to knee test:** 1-The patient raises his legs, brings down its heel onto knee of the other leg and slides it down along the shaft of tibia

2-The test is done with closed & opened eyes

**NB: Signs of incoordination:** 1-Kinetic intention tremors  
2-Dysmetria

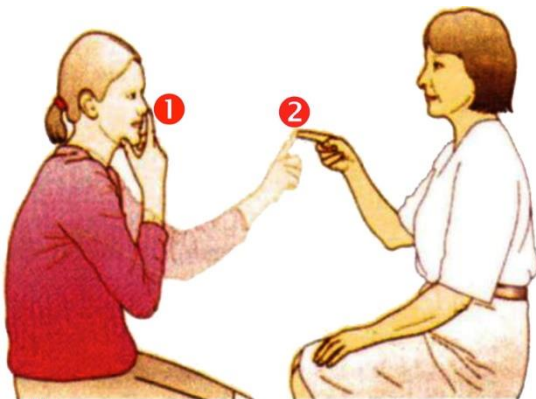


**Other tests for coordination:** 1-Rebound phenomenon  
2-Dysdiadocokinesis  
3-Buttoning and unbuttoning

**Romberg test:** - When the patient stands with his feet close together & his eyes closed, his body sways and he may fall if not supported  
- Sensory ataxia (dorsal column tract lesion)

## Ataxia

- **Definition:** It is an in coordination of voluntary movement in absence of motor weakness (normal motor power)
- **Types:**
  - ① Cerebellar ataxia ( motor ataxia )  
In neocerebellar syndrome
  - ② Sensory ataxia  
In dorsal column tract lesion
  - ③ Mixed ataxia  
In thalamic syndrome

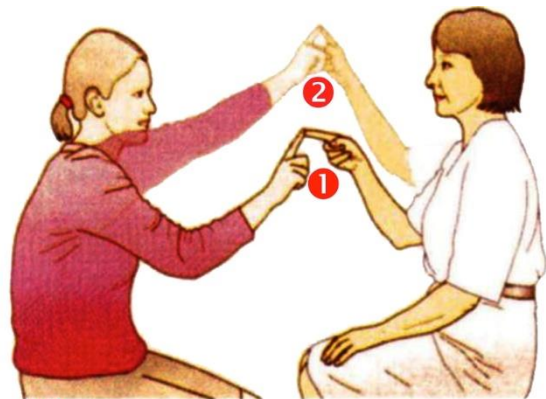


(A)

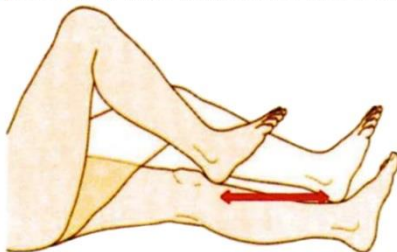
### Finger-nose test:

(A) Ask the patient to touch the tip of her nose and then your finger.

(B) Move your finger from one position to another, towards and away from the patient, as well as from side to side



(B)



Heel-shin test (with right leg)