GENERAL APPROACH TO HISTORY AND EXAMINATION IN NEUROLOGY

1. **HISTORY:**
   - IMPORTANT AID IN DIAGNOSIS.
   - TAKEN IN CONJUNCTION WITH INFORMATION FROM OTHER SYSTEMS, PREVIOUS MEDICAL HISTORY, FAMILY AND SOCIAL HISTORY AND CURRENT MEDICATION.

   A) **HEADACHE**: ONSET, TIMING, FREQUENCY, PRECIPITATING AND RELIEVING FACTORS, DURATION, SEVERITY, CHARACTER, ASSOCIATED FEATURES (VISUAL, VOMITING...).

B) VISUAL DISORDER: ONSET, FREQUENCY, DURATION, PRECIPITATING FACTORS, IMPAIRMENT OF ONE OR BOTH EYES, TOTAL OR PARTIAL, DIPLOPIA (GAZE DIRECTION), HALLUCINATIONS.

C) LOSS OF CONSCIOUSNESS: ONSET, FREQUENCY, DURATION, TONGUE BITING/INCONTINENCE/TWITCHING, PRECIPITATING FACTORS, CARDIOVASCULAR OR RESP. SYMPTOMS, HEAD INJURY, ALCOHOL/DRUG ABUSE.

D) SPEECH DISORDER: ONSET, FREQUENCY, DURATION, DIFFICULTY IN ARTICULATION/ EXPRESSION/ COMPREHENSION.

E) MOTOR DISORDER: ONSET, FREQUENCY, DURATION, PRECIPITATING AND RELIEVING FACTOR (WALKING, REST), LACK OF COORDINATION, WEAKNESS, INVOLUNTARY MOVEMENT.

F) SENSORY DISORDER: ONSET, FREQUENCY, DURATION, PRECIPITATING FACTORS (WALKING, NECK MOVEMENT), RELIEVING FACTORS (REST), PAIN, NUMBNESS, SITE.

G) SPHINCTER DISORDER: ONSET, FREQUENCY, DURATION, DIFFICULTY IN CONTROL (INCONTINENCE, RETENTION), BLADDER, ANAL.

H) LOWER C.N. DISORDER: ONSET, FREQUENCY, DURATION, DEAFNESS/ TINNITUS, VERTIGO, BALANCE OR SWALLOWING DISORDER, VOICE CHANGE.

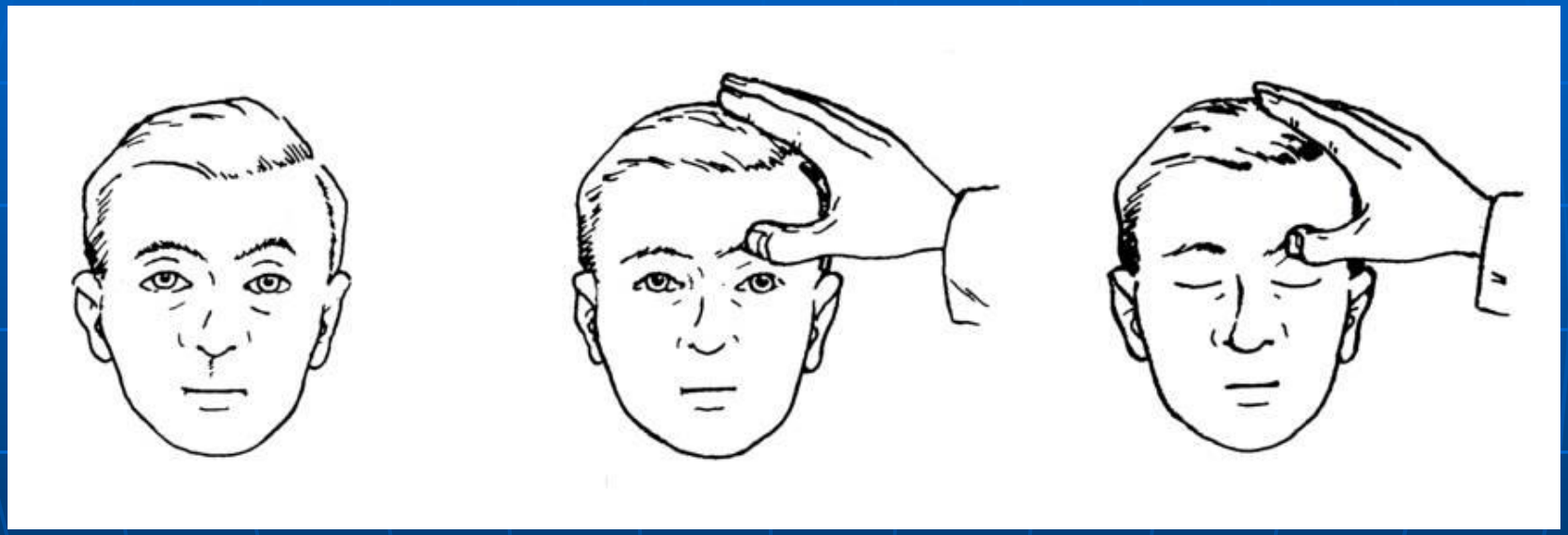
I) MENTAL DISORDER: ONSET, FREQUENCY, DURATION, MEMORY, INTELLIGENCE, PERSONALITY, BEHAVIOR.

2. **EXAMINATION:**

- **TEMP., BP, PULSE, NECK STIFFNESS, CAROTID BRUIT, CARDIAC MURMURS, WEIGHT LOSS, HEPATOSPLENOMEGALY, SEPTIC SOURCE, SKIN MARKS (ANGIOMATA), HC/AF IN BABY.**
- **CNS EXAM: CONSCIOUS LEVEL AND HIGHER CEREBRAL FUNCTION, CRANIAL NERVES (1-12), UPPER LIMBS (MOTOR, SENSORY, DTR), TRUNK, SPHINCTERS, LOWER LIMBS (MOTOR, SENSORY, DTR).**

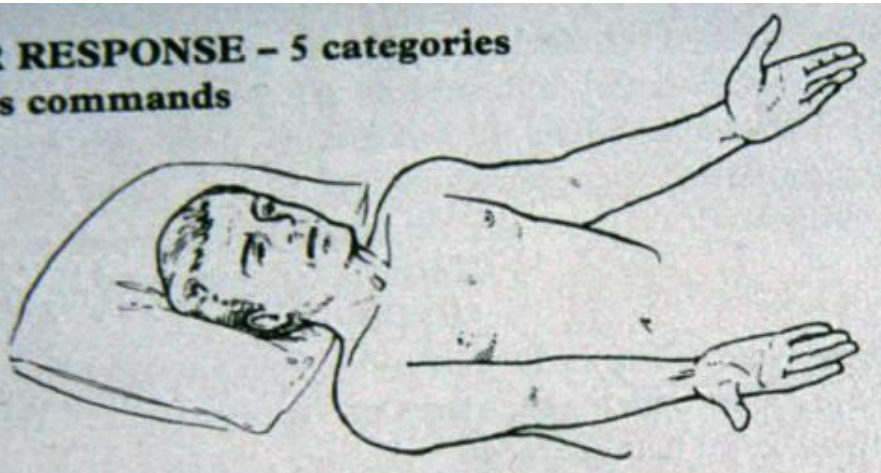
A. **CONSCIOUS LEVEL ASSESSMENT: GLASGOW COMA SCALE:**

- **EYE OPENING: SPONTANEOUS; TO SPEECH TO PAIN; NONE.**
- **VERBAL RESPONSE: ORIENTATED, CONFUSED, UTTERING WORDS, SOUNDS, NONE.**
- **MOTOR RESPONSE: OBEYS COMMANDS, LOCALIZING TO PAIN, FLEXING TO PAIN, EXTENDING TO PAIN, NONE.**



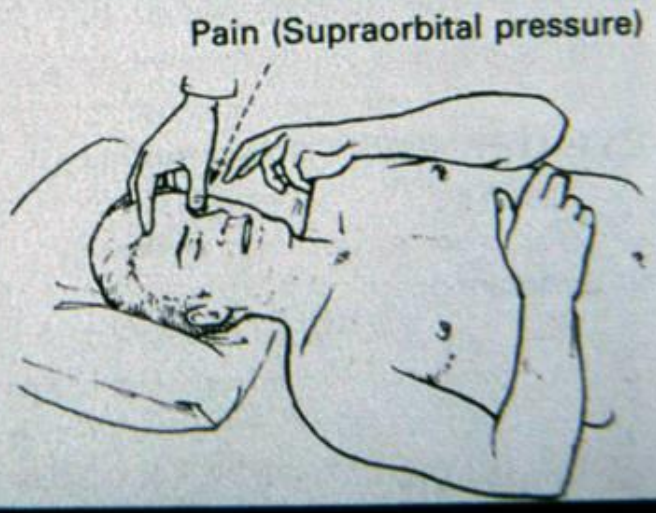
MOTOR RESPONSE – 5 categories

(i) **Obeys commands**



(ii) **Localising to pain**

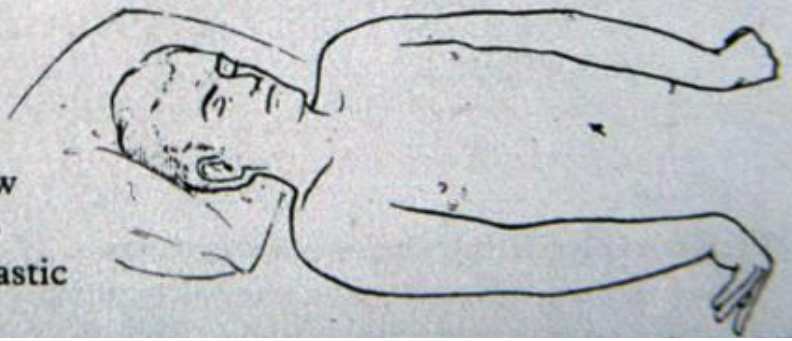
Apply a painful stimulus to the supraorbital nerve, e.g. rub thumb nail in the supraorbital groove, increasing pressure until a response is obtained. If the patient responds by bringing the hand up beyond the chin = 'localising to pain'. (Pressure to nail beds or sternum at this stage may not differentiate 'localising' from 'flexing'.)



(iii) **Flexing to pain**

(iii) **Flexing to pain**

If the patient does not localise to supraorbital pressure, apply pressure with a pen or hard object to the nail bed. Record elbow flexion as 'flexing to pain'. Spastic wrist flexion may or may not accompany this response.



(iv) **Extending to pain**

If in response to the same stimulus elbow extension occurs, record as 'extending to pain'. This is always accompanied by spastic flexion of the wrist.

B. HIGHER CEREBRAL FUNCTION:

- **COGNITIVE SKILL:**

1) **DOMINANT HEMISPHERE:**

APHASIA (EXPRESSIVE/RECEPTIVE), ALEXIA, AGRAPHIA, A CALCULIA, AGNOSIA.

2) **NON-DOMINANT HEMISPHERE:**

NEGLECT SYNDROME, DRESSING AND CONSTRUCTIONAL APRAXIA.

- **MEMORY TEST:**
  - **IMMEDIATE, RECENT, REMOTE, VERBAL AND VISUAL MEMORY.**
  - **RETROGRADE AMNESIA.**
  - **POSTTRAUMATIC AMNESIA.**
- **REASONING AND PROBLEM SOLVING (CALCULATION, PROVERBS).**
- **EMOTIONAL STATE: DEPRESSION, EXCITEMENT, SLOWNESS..**

C. CRANIAL NERVE EXAMINATION:

- **OLFACTORY NERVE (I):**

  TESTING EACH NOSTRIL USING AROMATIC NON-IRRITANT MATERIALS THAT AVOID STIMULATION OF TRIGEMINAL NERVE FIBRES IN THE NASAL MUCOSA (SOAP, TOBACCO).

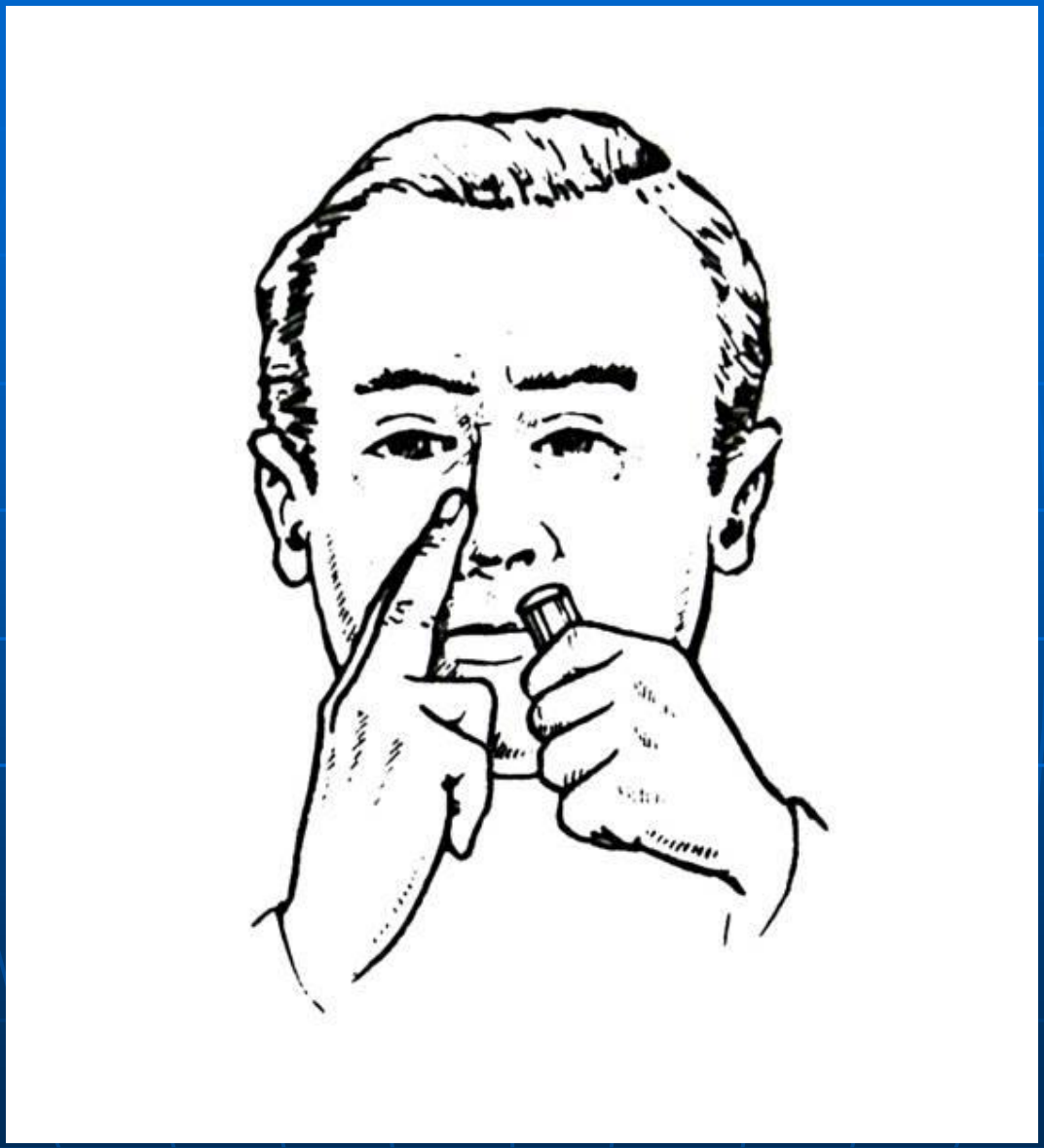
- **OPTIC NERVE (II):**

  - **VISUAL ACUITY:**

    1) **SEVERE DEFICIT:**

       CAN PATIENT SEE LIGHT OR MOVEMENT?

       CAN PATIENT COUNT FINGERS?



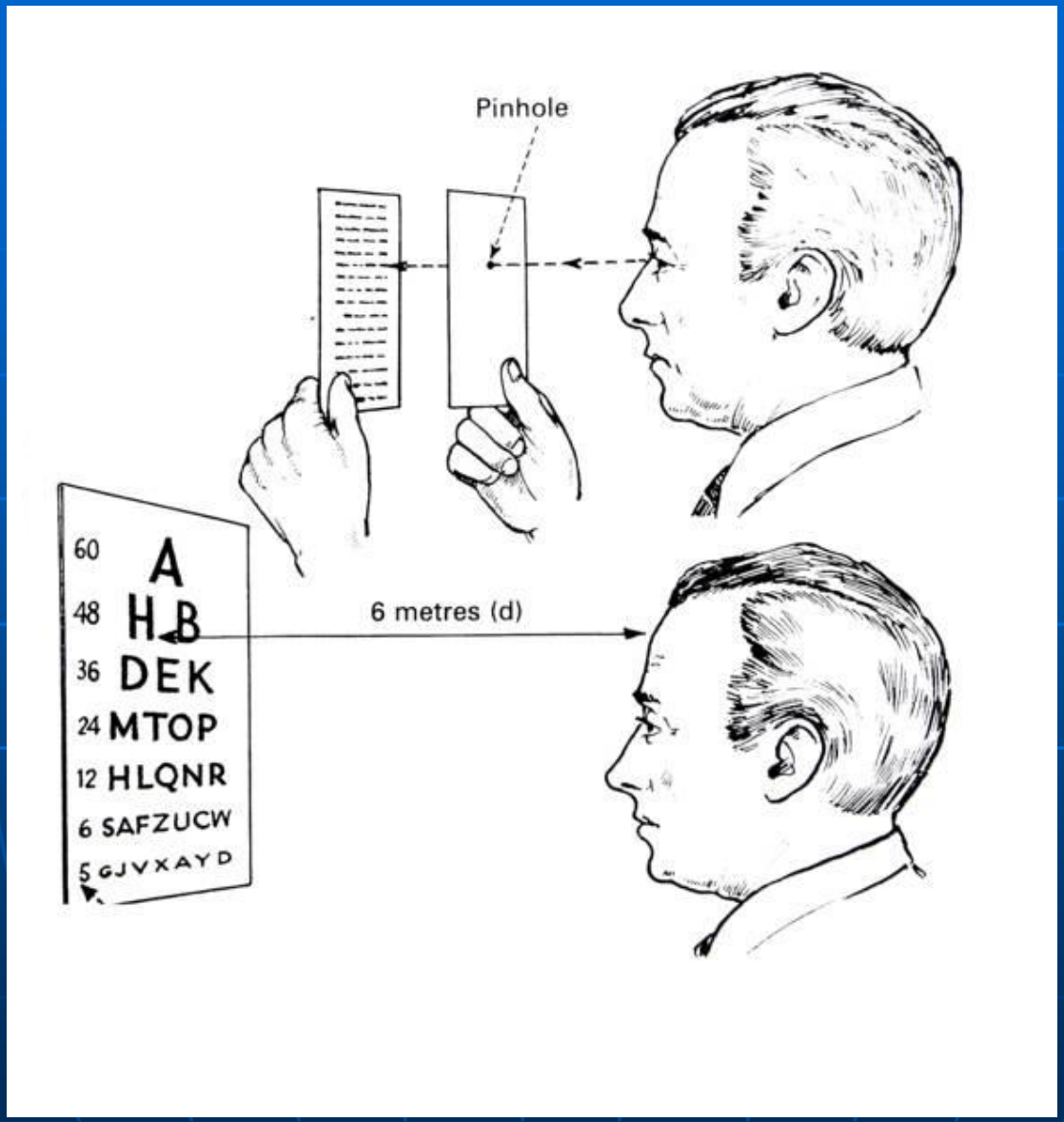
2) **MILD DEFICIT:**

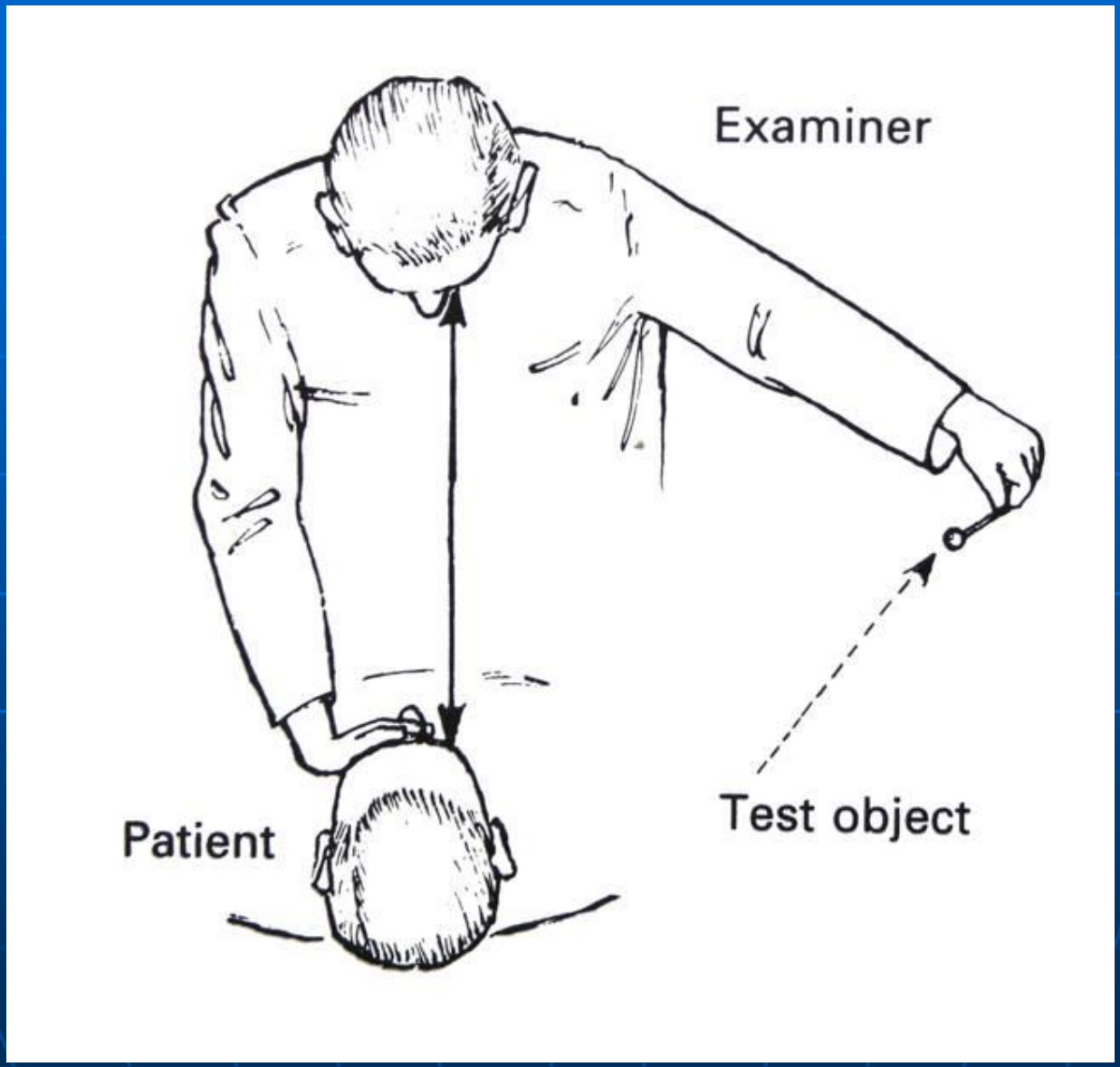
RECORD READING ACUITY WITH WALL OR HAND CHART (SNELLEN).

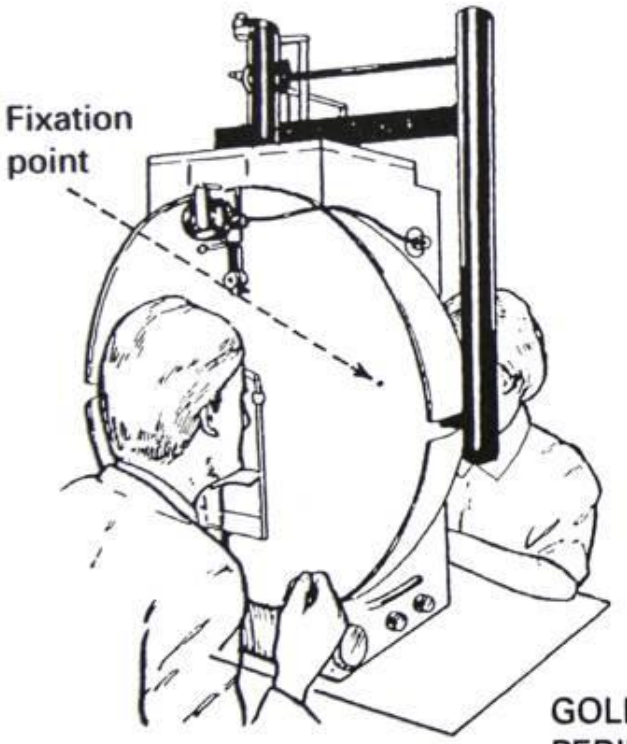
- **VISUAL FIELDS:**
  - **GROSS TESTING BY CONFRONTATION (MOVING FINGER OR RED 5mm PIN).**
  - **GOLDMAN PERIMETER.**
  - **OPTIC FUNDUS (OPHTHALMOSCOPY):**

    TO CHECK THE OPTIC DISC.

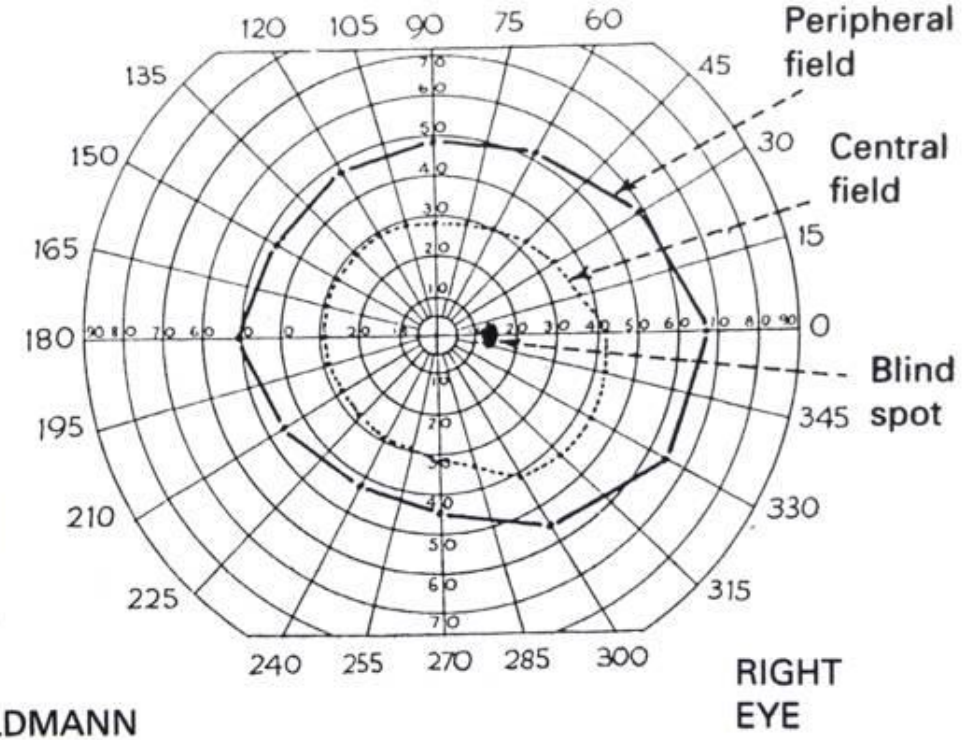
    (R/O PAPILLEDEMA).
  - **PUPILS SIZE, SHAPE, EQUALITY, REACTION TO LIGHT AND ACCOMMODATION.**


Pinhole
60 A
48 HB
36 DEK
24 MTOP
12 HLQNR
6 SAFZUCW
5 GJVXAYD
6 metres (d)

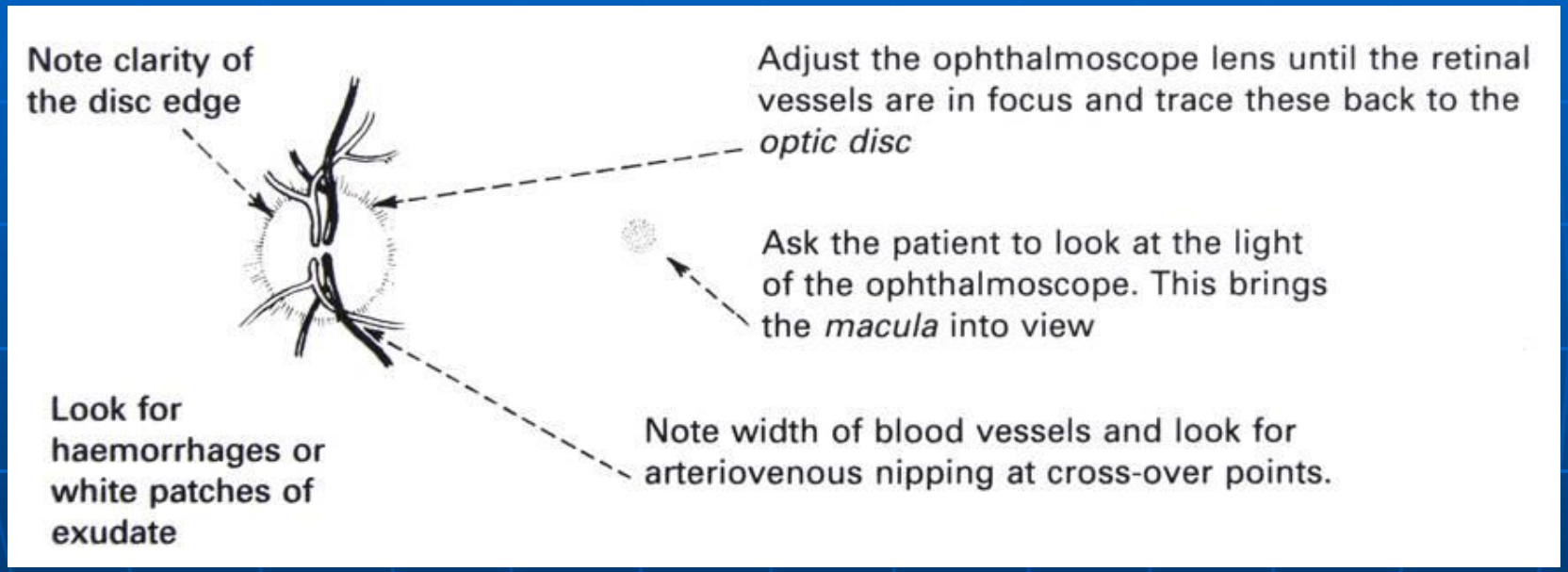

Examiner
Patient
Test object

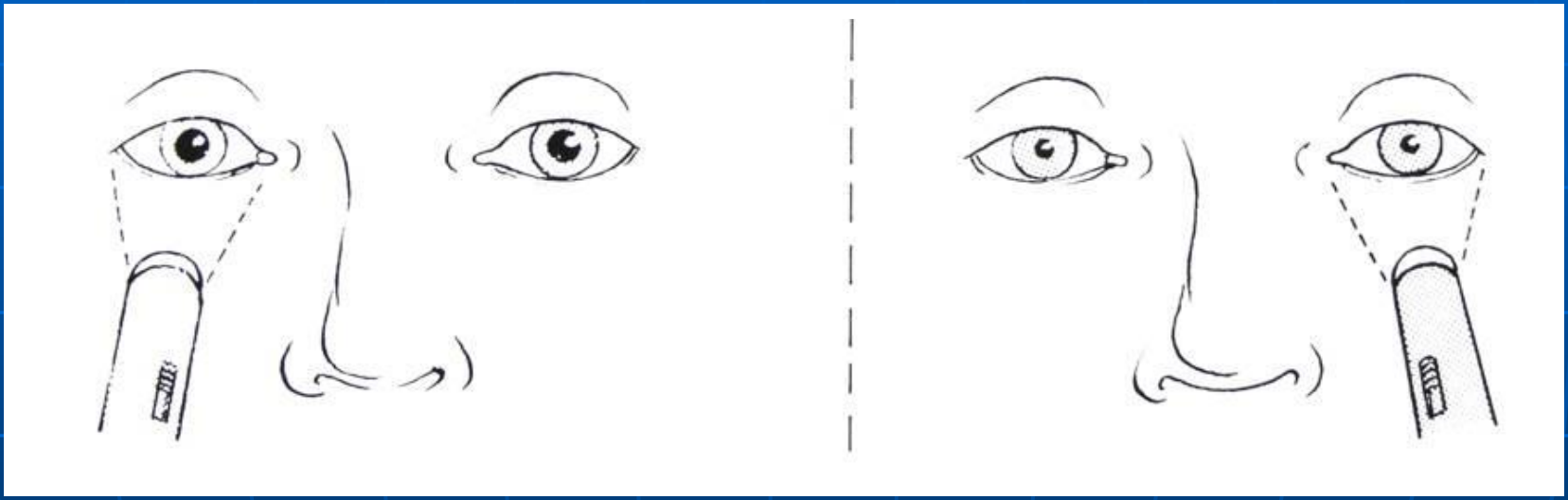


GOLDMANN
PERIMETER



RIGHT
EYE


Note clarity of the disc edge
Adjust the ophthalmoscope lens until the retinal vessels are in focus and trace these back to the *optic disc*
Ask the patient to look at the light of the ophthalmoscope. This brings the *macula* into view
Look for haemorrhages or white patches of exudate
Note width of blood vessels and look for arteriovenous nipping at cross-over points.

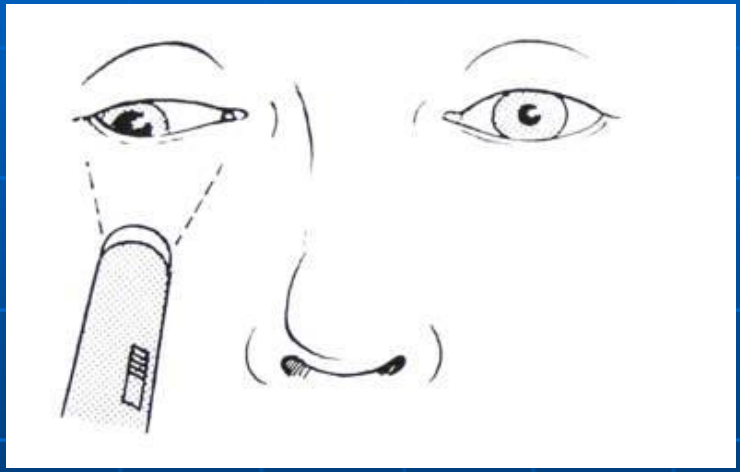


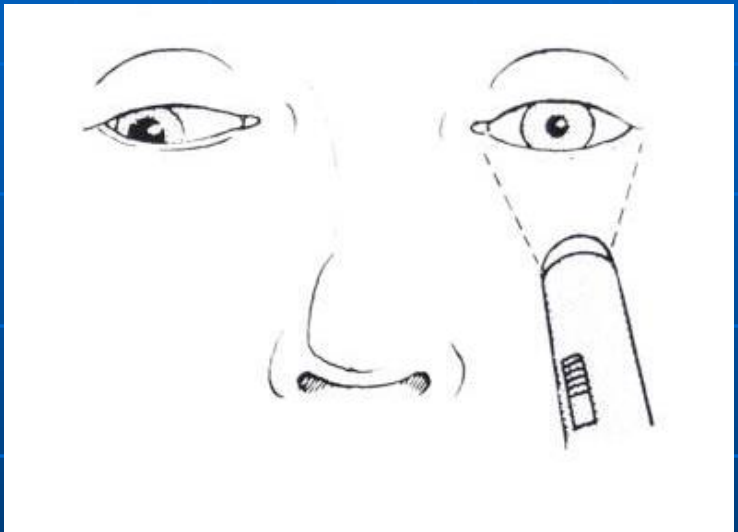
- **OCULOMOTOR (III), TROCHLEAR (IV) AND ABDUCENS (VI) NERVES:**

  III. MEDIAL RECTUS (EYE ADDUCTION); INFERIOR OBLIQUE (LOOKING UP AND IN). SUPERIOR RECTUS (LOOKING UP AND OUT); INFERIOR RECTUS (LOOKING DOWN AND OUT).

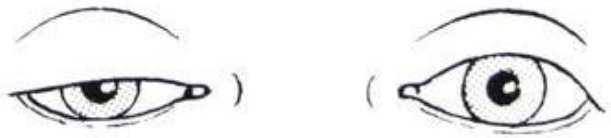
  VI LATERAL MOVEMENT (ABDUCTION).

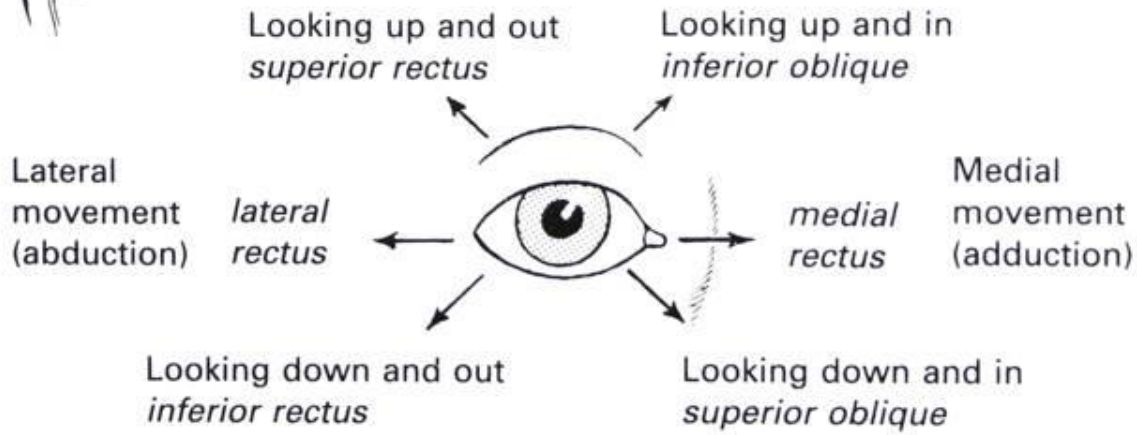
  IV SUPERIOR OBLIQUE (LOOKING DOWN AND IN).





Ocular movement





- **TRIGEMINAL NERVE:**
  - **FACIAL SENSATION (OPHTHALMIC, MAXILLARY AND MANDIBULAR BRANCHES).**
  - **JAW JERK.**

- **FACIAL NERVE:**

  FACIAL MOVEMENTS AND EYE CLOSURE.

- **AUDITORY NERVE:**

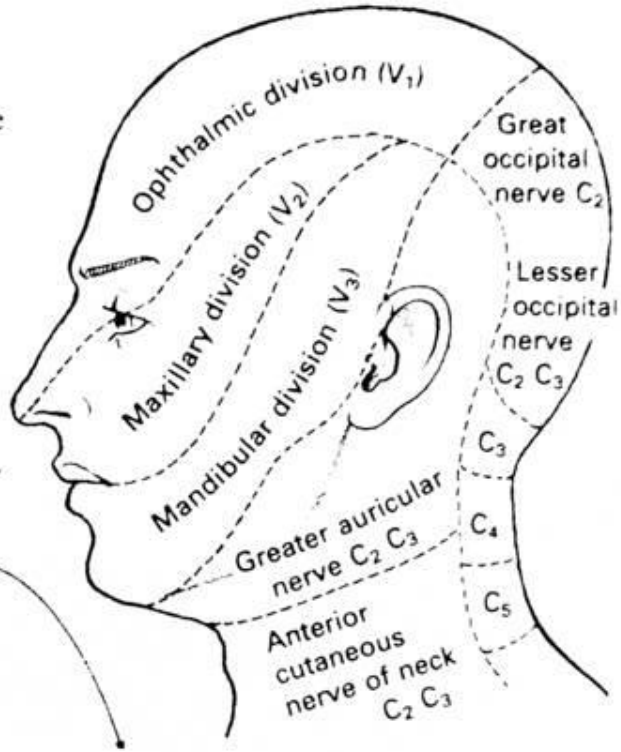
  RINNE AND WEBER TESTS TO DIFFERENTIATE BETWEEN A CONDUCTIVE (MIDDLE EAR) DEAFNESS FROM PERCEPTIVE (NERVE) DEAFNESS.

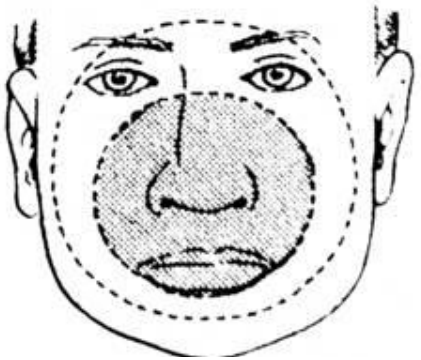
TRIGEMINAL NERVE (V)

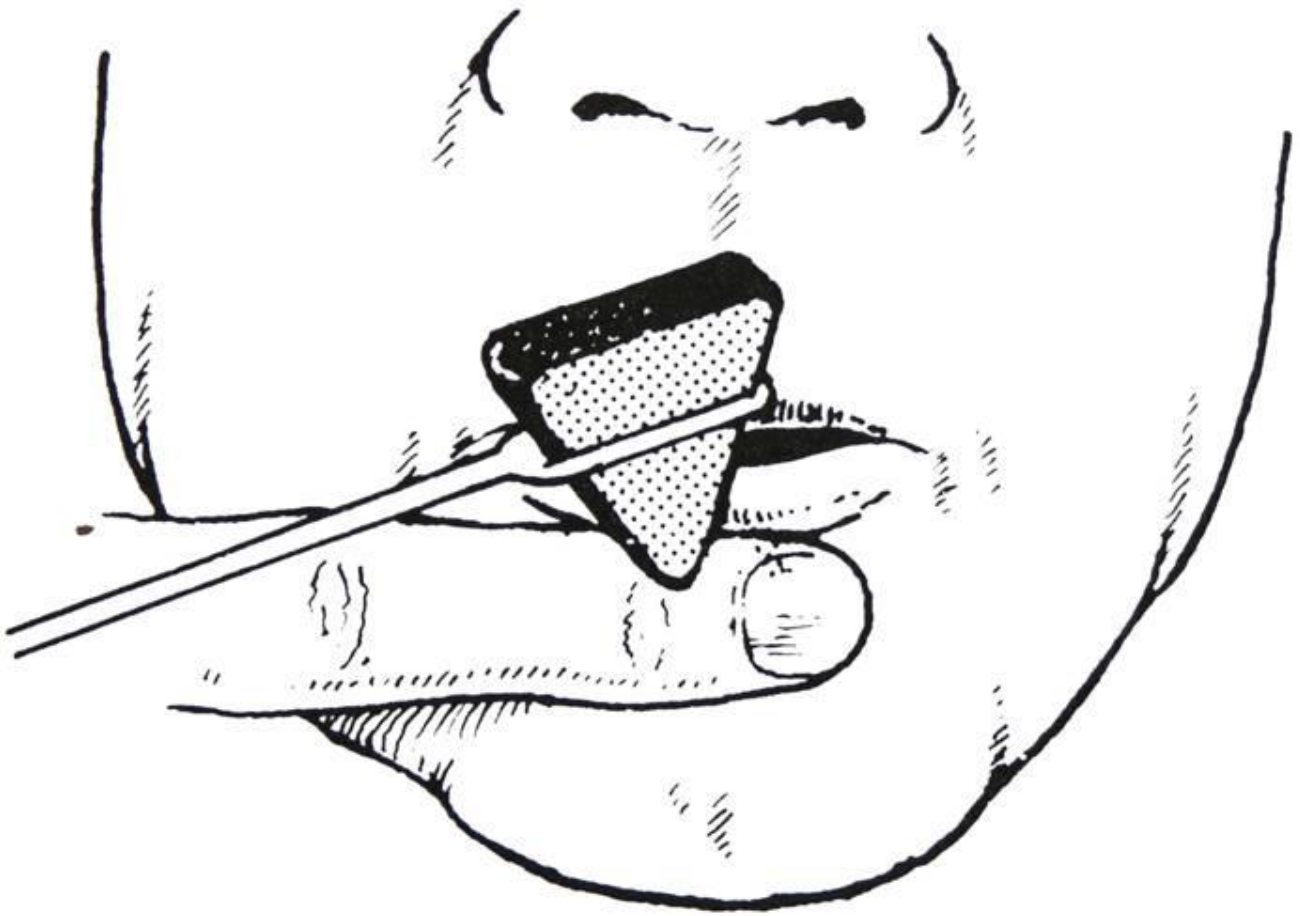
Test *pain* (pin prick) sensation
temperature (cold object or hot/cold tubes) } over whole face
light touch

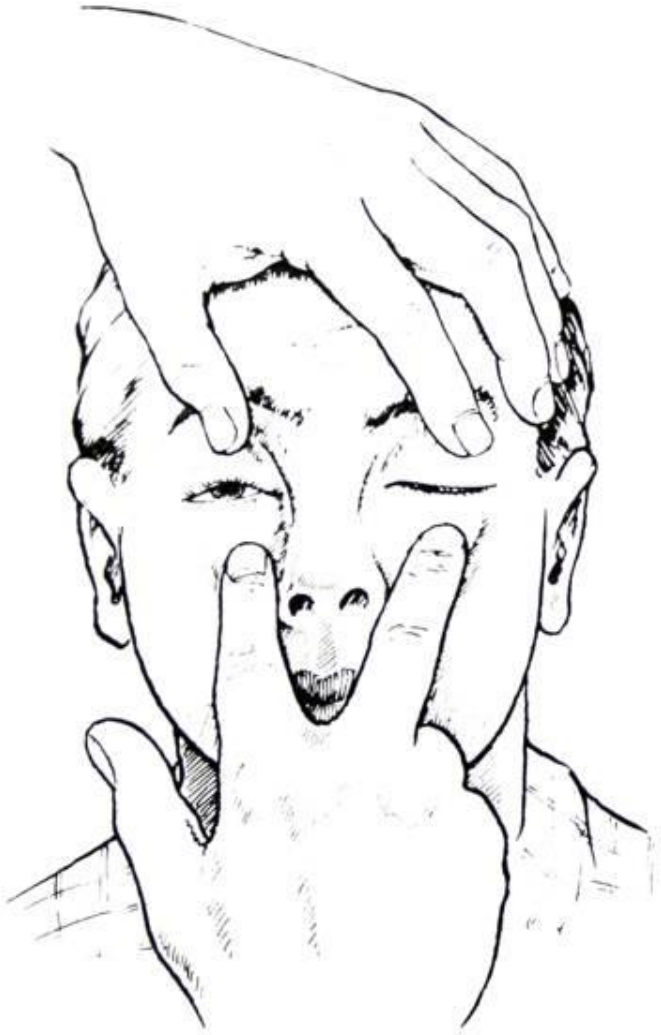
Compare each side.
Map out the sensory deficit, testing from the abnormal to the normal region.

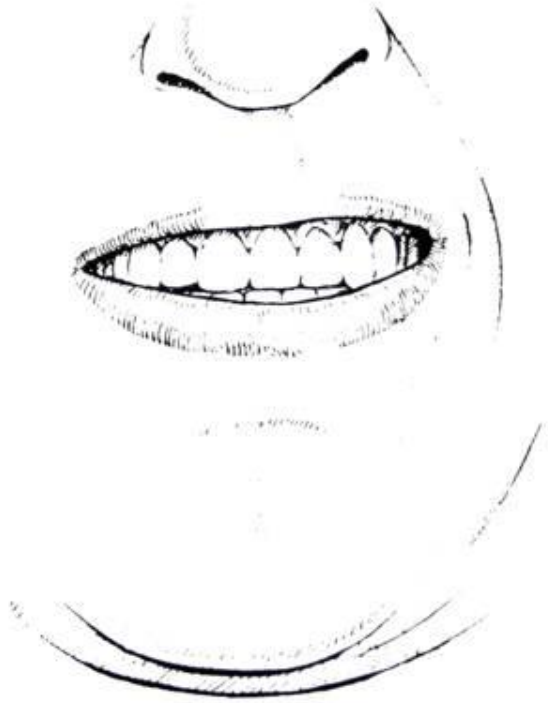
Does distribution involve
- a *root* pattern?
- or a *brain stem* 'onion skin' pattern?

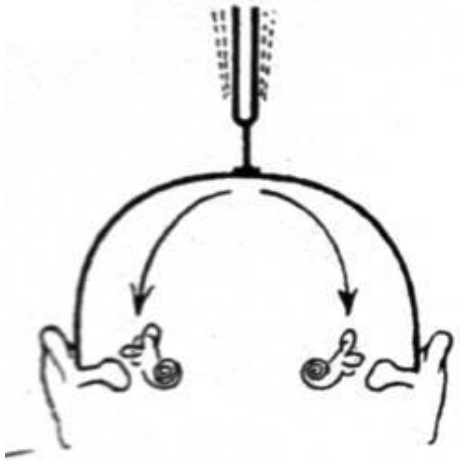




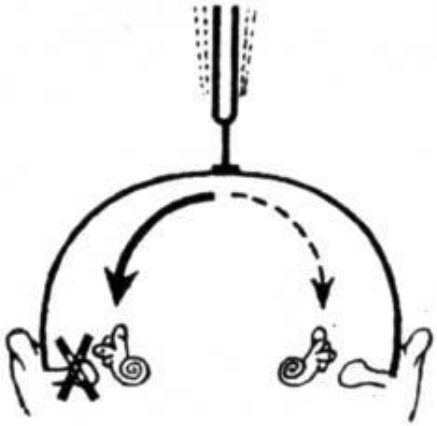




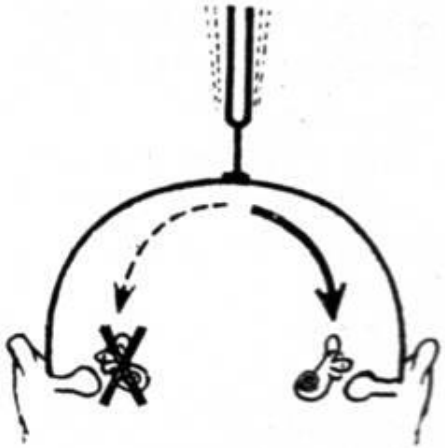




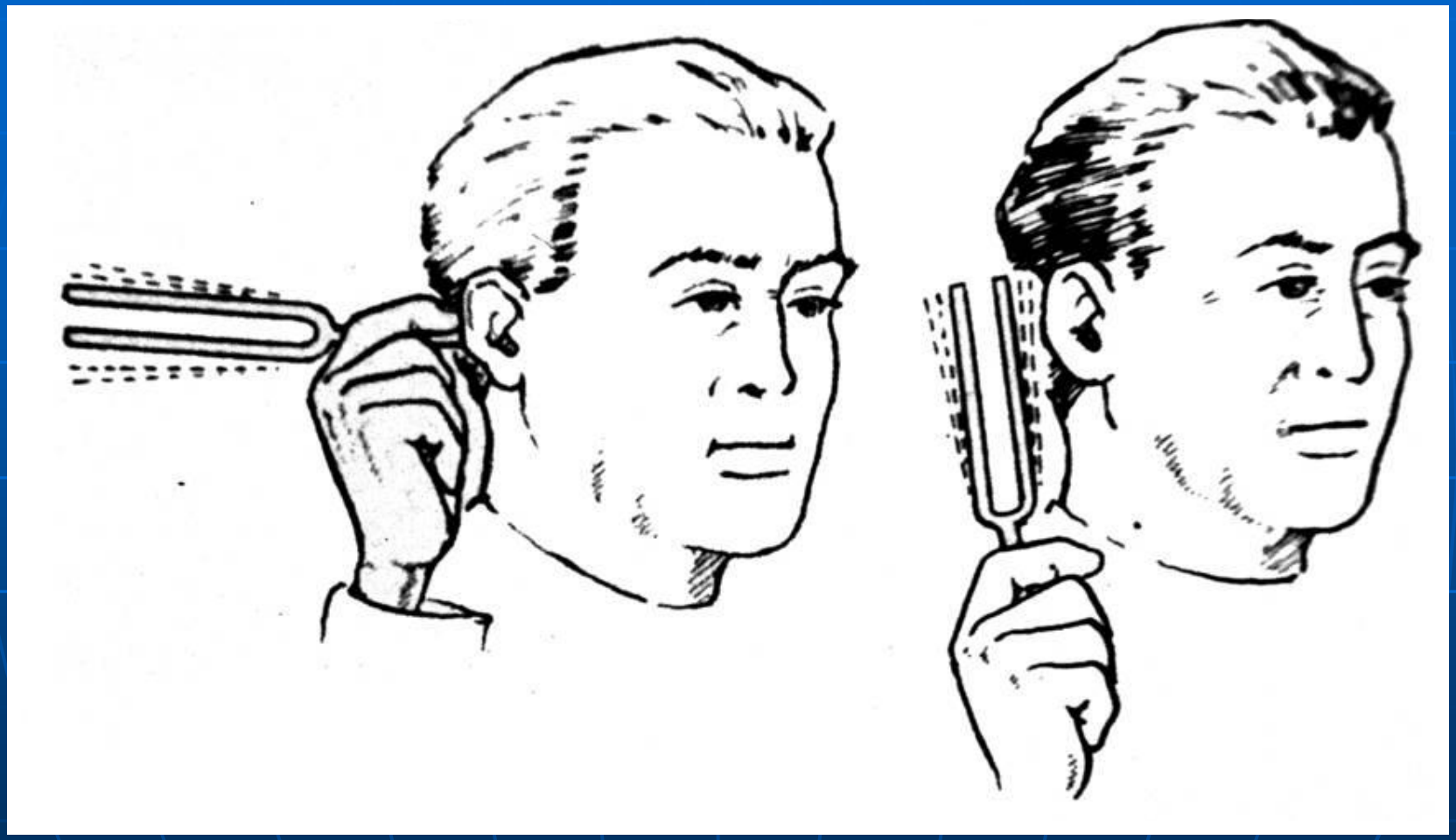
NORMAL hearing



CONDUCTIVE DEAFNESS
Sound is louder in affected ear since distraction from external sounds is reduced in that ear



NERVE DEAFNESS
Sound is louder in the normal ear



- **GLOSSOPHARYNGEAL NERVE (IX) AND VAGUS NERVE (X):**
  - VOCAL CORD PARALYSIS: HOARSENESS.
  - DYSPHAGIA; REGURGITATION OF FLUIDS.
  - GAG REFLEX.

- **ACCESSORY NERVE (XI):**

  STERNOMASTOID AND TRAPEZIUS MUSCLES.

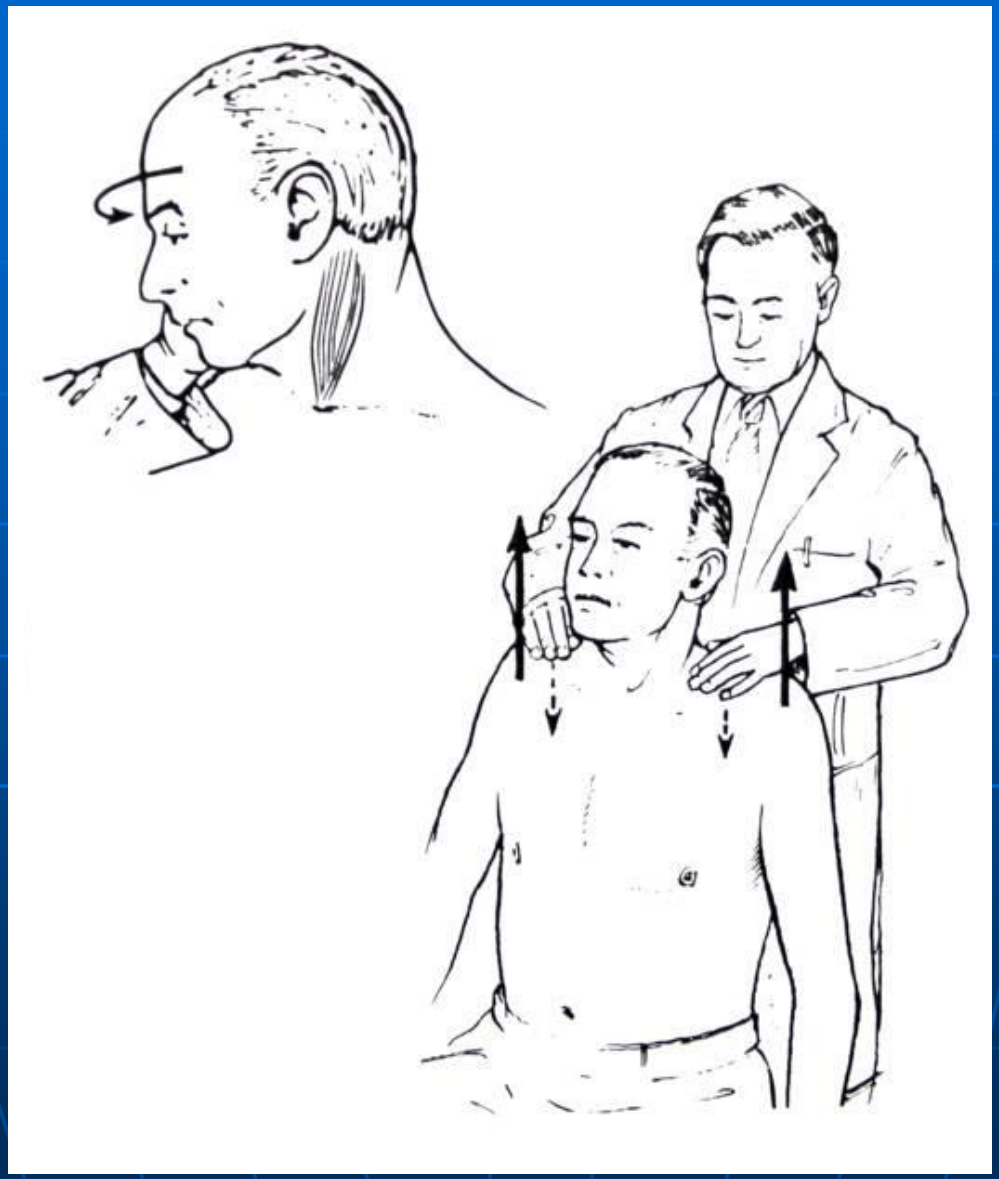
- **HYPOGLOSSAL NERVE (XII):**

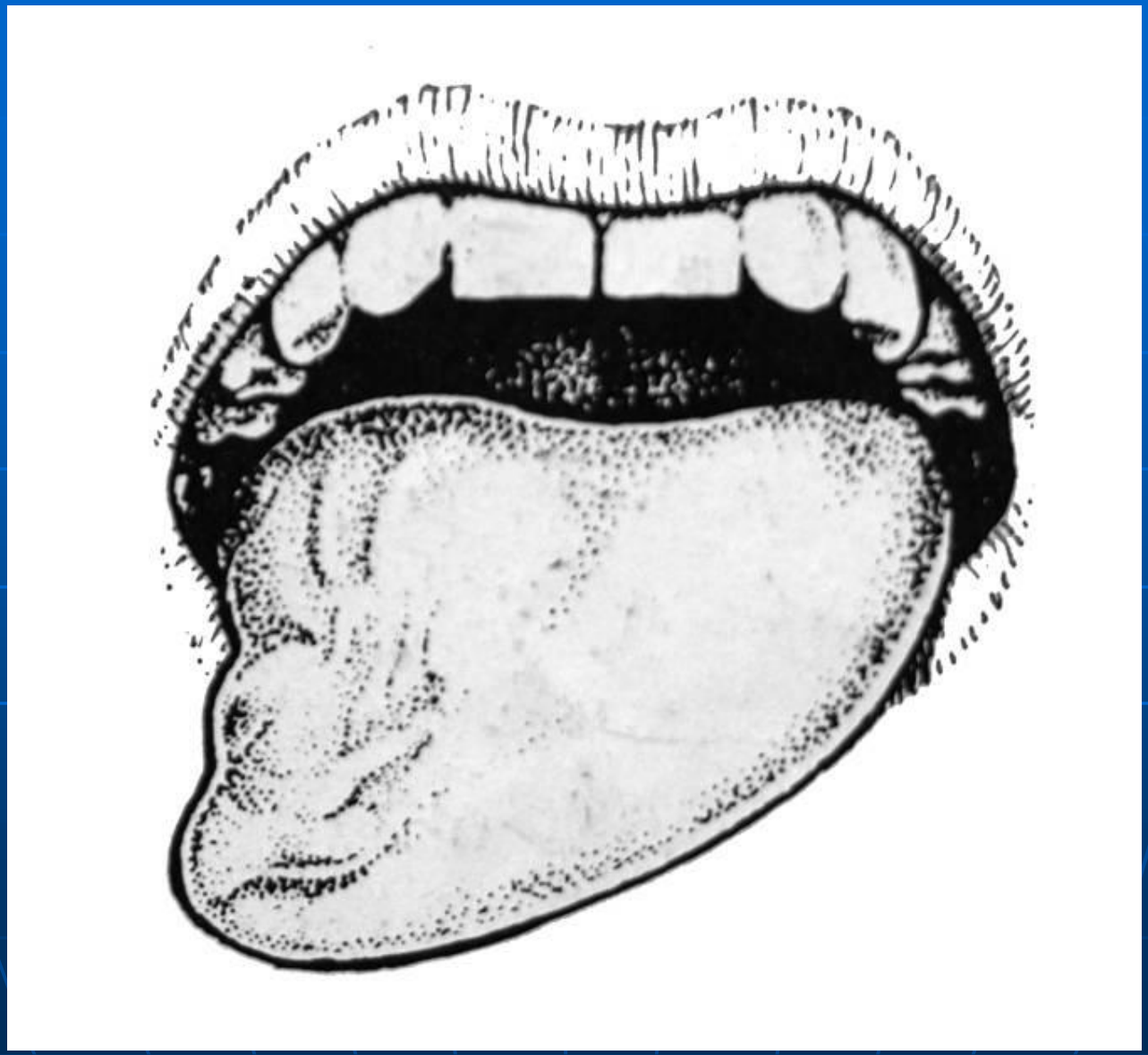
  TONGUE MOVEMENT AND BULK.

'Ah'

Palatal weakness

Uvula swings due to unopposed muscle action on one side





D. UPPER LIMBS:

1) MOTOR SYSTEM:

- **APPEARANCE: DEFORMITY OR ASYMMETRY, MUSCLE WASTING, HYPERTROPHY, MUSCLE FASCICULATION.**
- **TONE:**

  IN A RELAXED PATIENT, ALTERNATELY FLEX AND EXTEND THE ELBOW OR WRIST.

  - **DECREASED = HYPOTONIA.**
  - **INCREASED = HYPERTONIA.**

    CLASP-KNIFE, LEAD-PIPE, COGWHEEL.
- **POWER:**
  - **UMN WEAKNESS: PRONATOR DRIFT.**
  - **SPINAL ROOT OR NERVE LESION: TEST INDIVIDUAL MUSCLE GROUPS.**

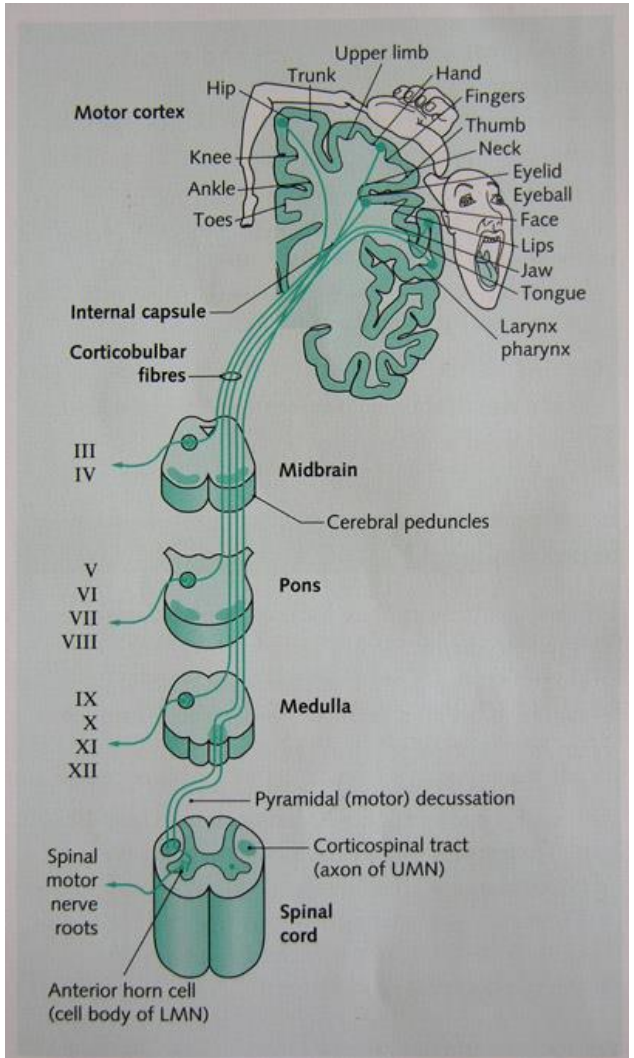
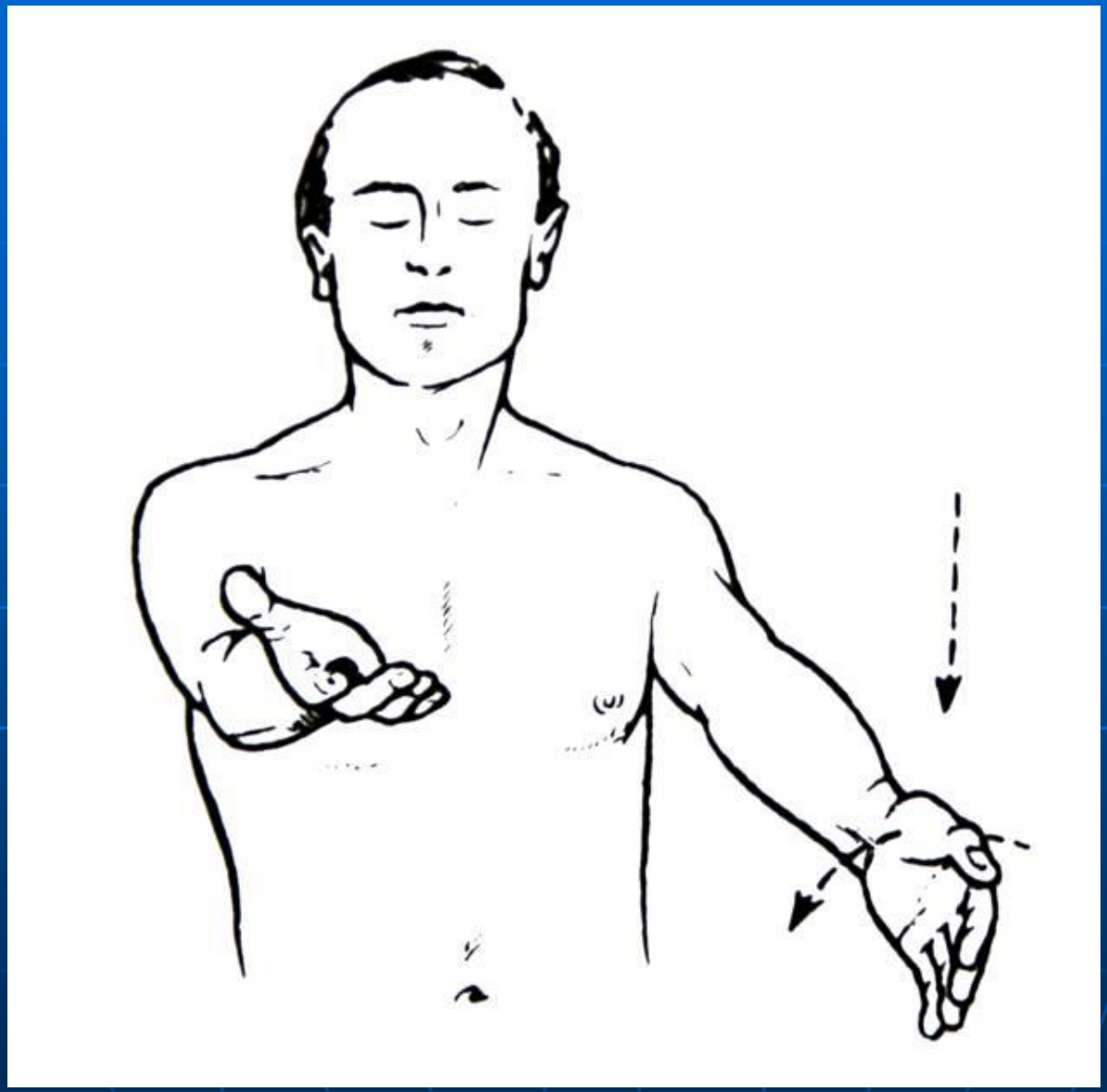


Fig. 12.1 Descending motor pathways from the cortex to the brainstem, cranial nerves, and spinal cord.

Anatomical sites of weakness		
	Site of pathology	**Clinical syndrome**
UMN pathway	Motor cortex, corona radiata, internal capsule, brainstem Spinal cord (corticospinal tract)	Hemisphere or brainstem (pyramidal weakness) Myelopathy (pyramidal weakness)
LMN pathway	Anterior horn or motor neuron cell body Spinal nerve root Brachial or lumbosacral plexus Peripheral nerve	Motor neuronopathy or 'anterior horn cell disease' Radiculopathy Plexopathy Neuropathy
Neuromuscular junction	Synapse	Neuromuscular junction disorder
Muscle	Muscle	Myopathy



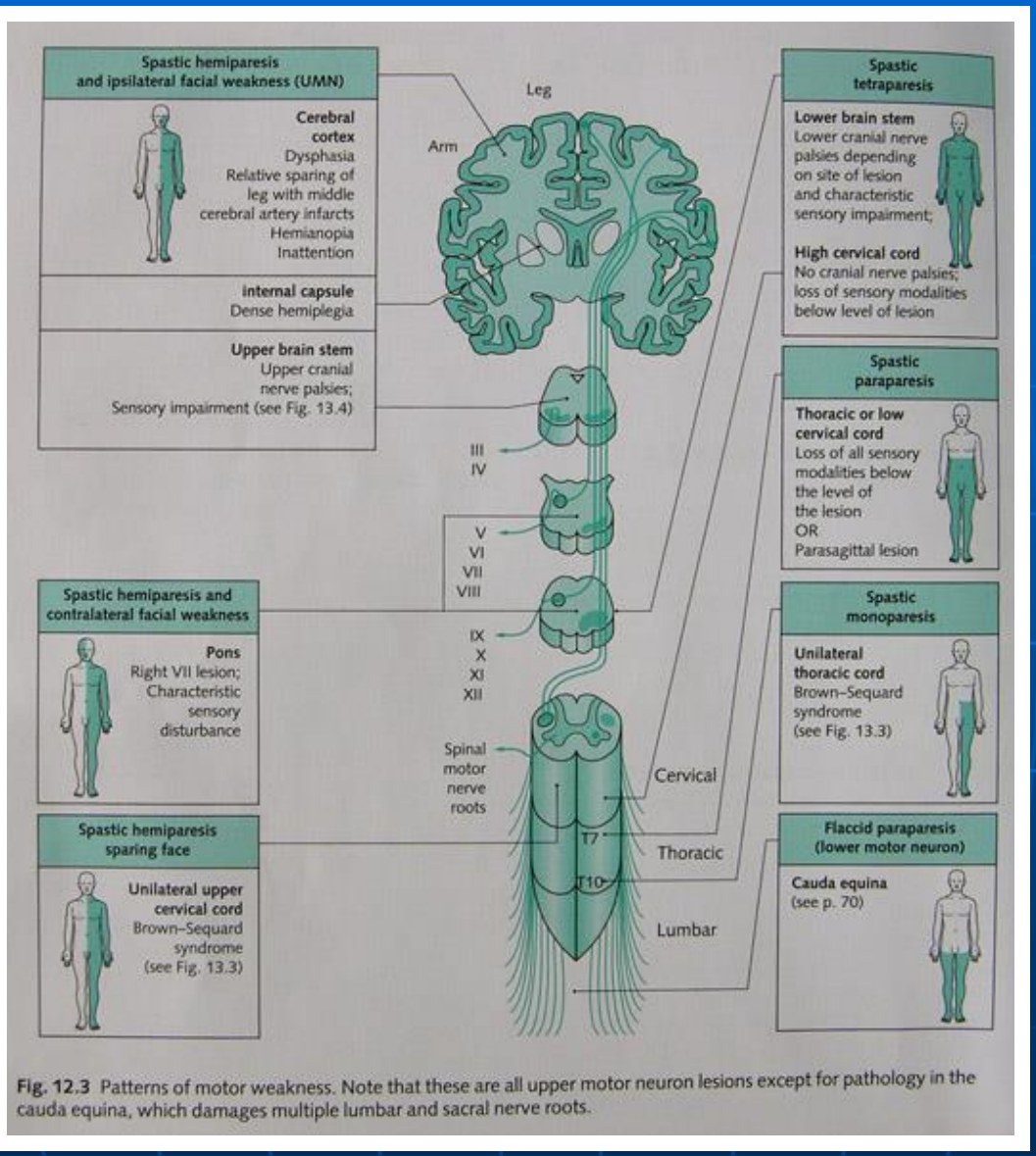
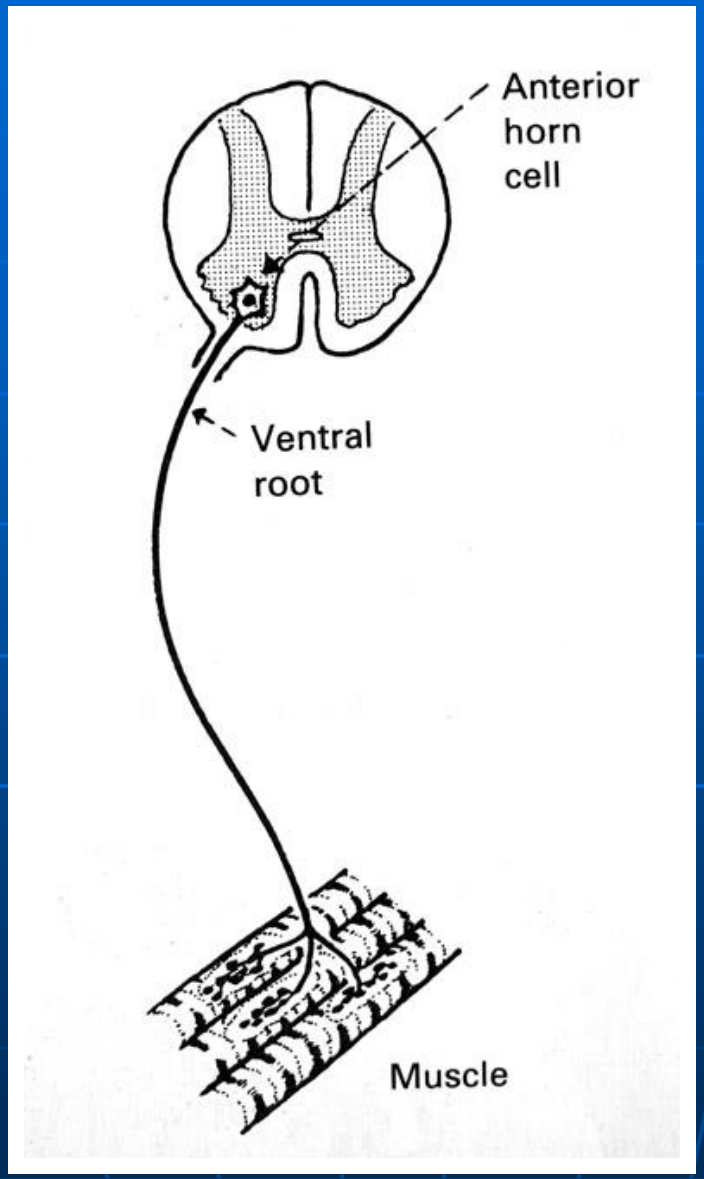


Fig. 12.3 Patterns of motor weakness. Note that these are all upper motor neuron lesions except for pathology in the cauda equina, which damages multiple lumbar and sacral nerve roots.

Causes of spastic paraparesis	
Spinal cord compression	Cervical spondylosis Cervical or thoracic disc herniation Metastatic tumour Primary tumour (meningioma, neurofibroma) Infective (epidural abscess, spinal TB) Epidural haematoma
Inflammatory disorders	Multiple sclerosis Idiopathic transverse myelitis Sarcoidosis Infections (Lyme, zoster, TB, AIDS)
Degnerative disorders	Motor neuron disease Syringomyelia
Vascular	Spinal cord infarction Vasculitis, systemic lupus erythematosus (SLE) Spinal AVM
Trauma	Cord contusion, laceration or transection Displaced vertebral fracture or disc Traumatic epidural haematoma
Metabolic/nutritional	B_{12} deficiency (subacute combined degeneration)
Rare hereditary conditions	Friedreich's ataxia Hereditary spastic paraparesis
Parasagittal brain lesions	Meningioma Cerebral venous sinus thrombosis Congenital spastic diplegia (cerebral palsy).

Fig. 12.4 Causes of spastic paraparesis.


Anterior
horn
cell
Ventral
root
Muscle

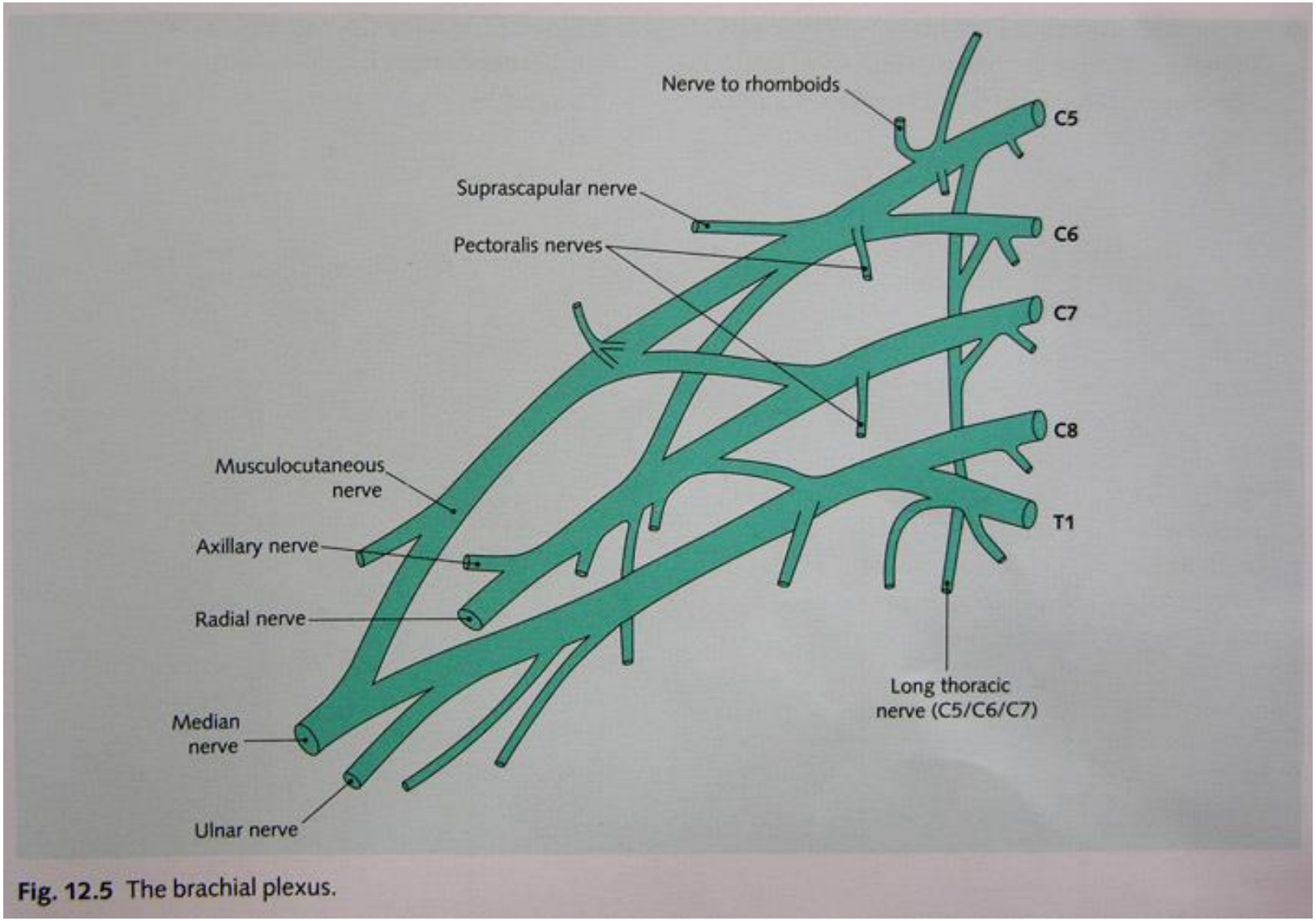


Fig. 12.5 The brachial plexus.

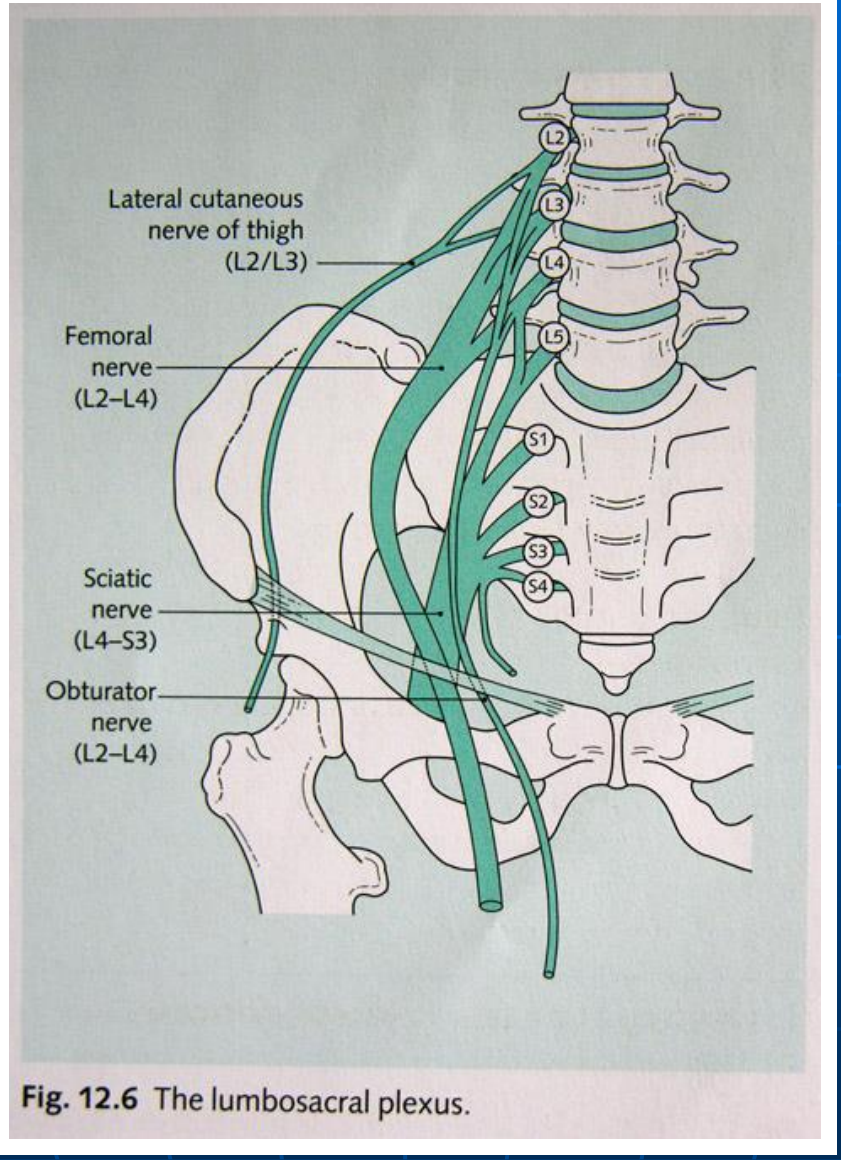
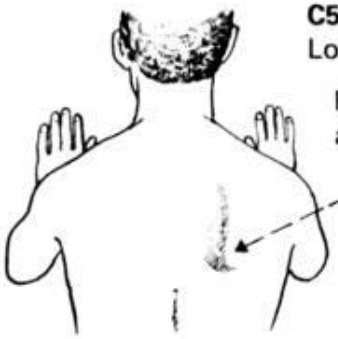


Fig. 12.6 The lumbosacral plexus.

- SERRATUS ANTERIOR, C5C6 C7 ROOTS, LONG THORACIC NERVE.
- ELBOW FLEXION, C5C6, MUSCULOCUTANEOUS NERVE.
- ARM FLEXION IN MIDPOSITION, C5C6, RADIAL NERVE.
- SHOULDER ABDUCTION, C5C6, DELTOID, AXILLARY NERVE.
- ELBOW EXTENSION, C6 C7 C8, RADIAL NERVE.
- FINGER AND THUMB EXTENSION, C7C8, POSTERIOR INTEROSSEOUS NERVE.
- FINGER FLEXORS, C7C8, (FINGERS I AND II: MEDIAN NERVE, FINGERS III AND IV: ULNAR).
- FINGERS ABDUCTION AND ADDUCTION, $C8T_1$, ULNAR NERVE.

Test for *Serratus anterior:*



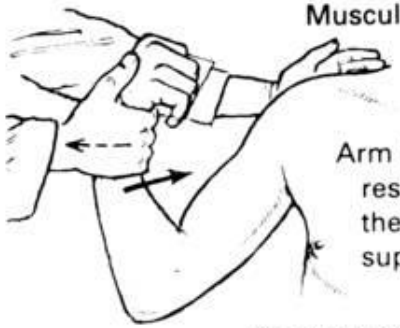
C5, C6, C7 roots
Long thoracic nerve

Patient presses arms against wall

Look for winging of scapula i.e. rises from chest wall

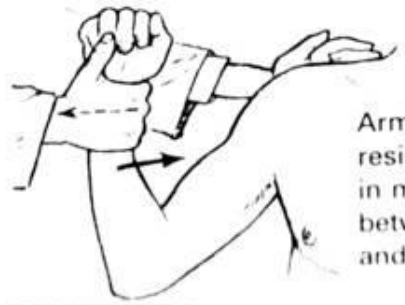
Elbow flexion

Biceps: **C5, C6** roots
Musculocutaneous nerve



Arm flexed against resistance with the hand fully supinated

Brachioradialis: C5, **C6** roots
Radial nerve



Arm flexed against resistance with hand in mid-position between pronation and supination

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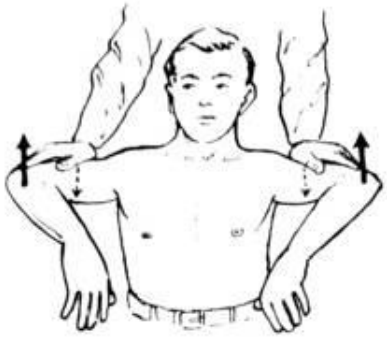
Shoulder abduction



Deltoid:
C5, C6 roots
Axillary nerve

Arm (at more than 15° from the vertical) abducts against resistance

---

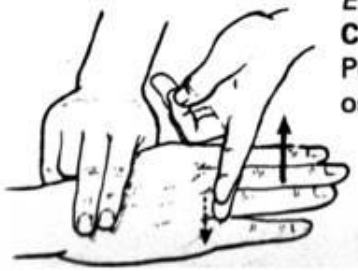
Elbow extension

Triceps: C6, **C7,** C8 roots
Radial nerve

Patient extends arm against resistance

Finger extension

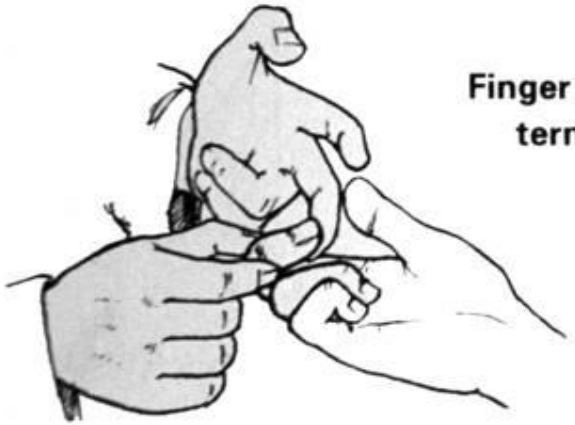
Extensor digitorum:
C7, C8 roots
Posterior inter-osseous nerve



Patient extends fingers against resistance

Thumb extension – terminal phalanx

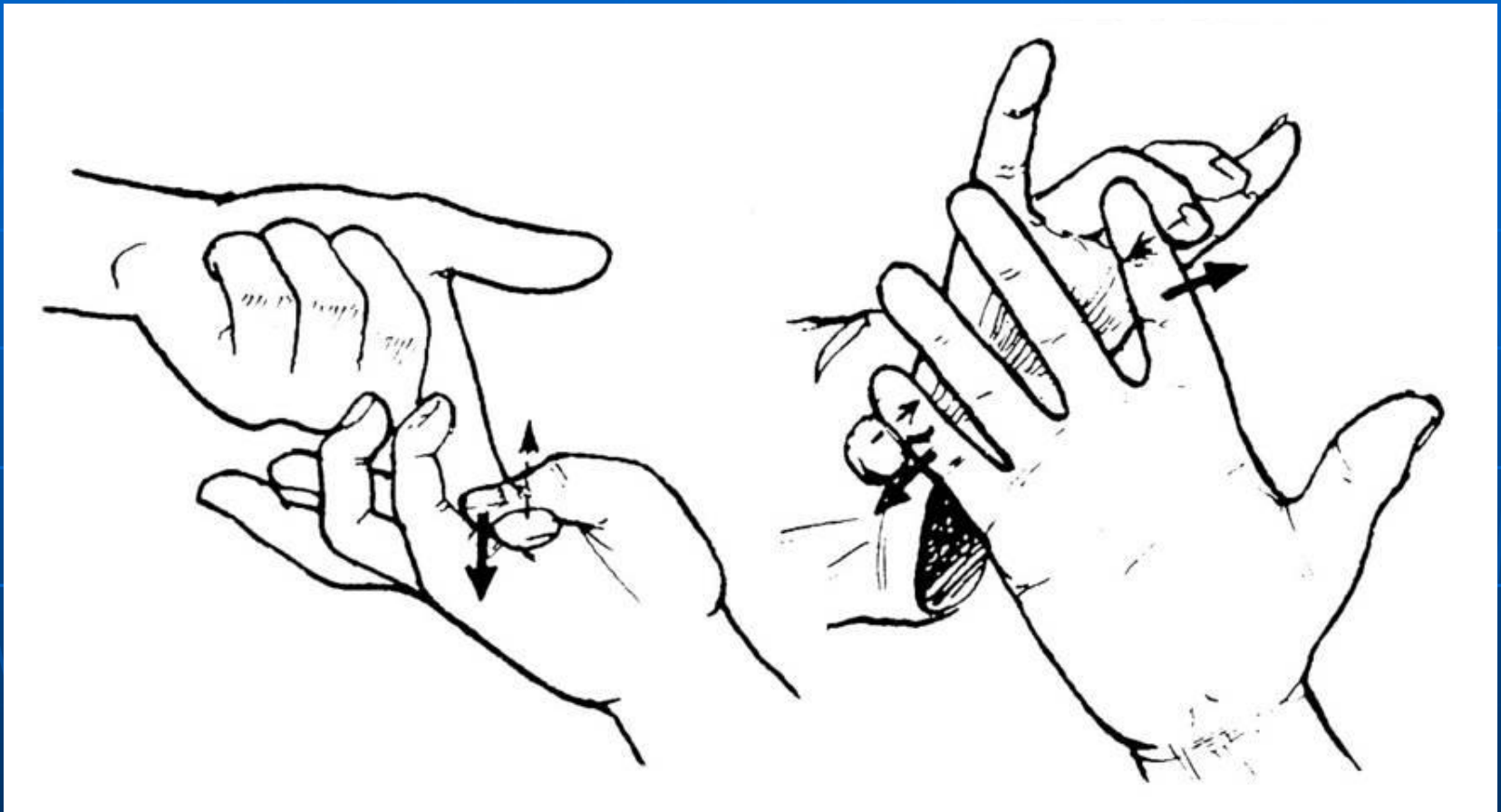
Extensor pollicis longus and brevis: **C7,** C8 roots
Posterior interosseous nerve
Thumb is extended against resistance



Finger flexion –
terminal phalanx

Flexor digitorum profundus I and II: C7, **C8** roots
Median nerve
Flexor digitorum profundus III and IV: C7, **C8** roots
Ulnar nerve

Examiner tries to extend patient's flexed terminal phalanges



2) **SENSATION: - TO PAIN, LIGHT TOUCH AND TEMPERATURE:**

ACCORDING TO DERMATOMAL DISTRIBUTION (FIG).

- JOINT POSITION SENSE, VIBRATION, TWO POINT DISCRIMINATION, SENSORY INATTENTION, STEREOGNOSIS, GRAPHESTHESIA.

3) **REFLEXES:**

- BICEPS JERK, C5 C6, MUSCULOCUTANEOUS NERVE.
- SUPINATOR JERK, C6 C7, RADIAL NERVE.
- TRICEPS JERK, C6 C7 C8, RADIAL NERVE.
- HOFFMAN REFLEX, C7 C8.

REFLEX ENHANCEMENT BY CLENCHING THE TEETH.

SENSATION

Pain

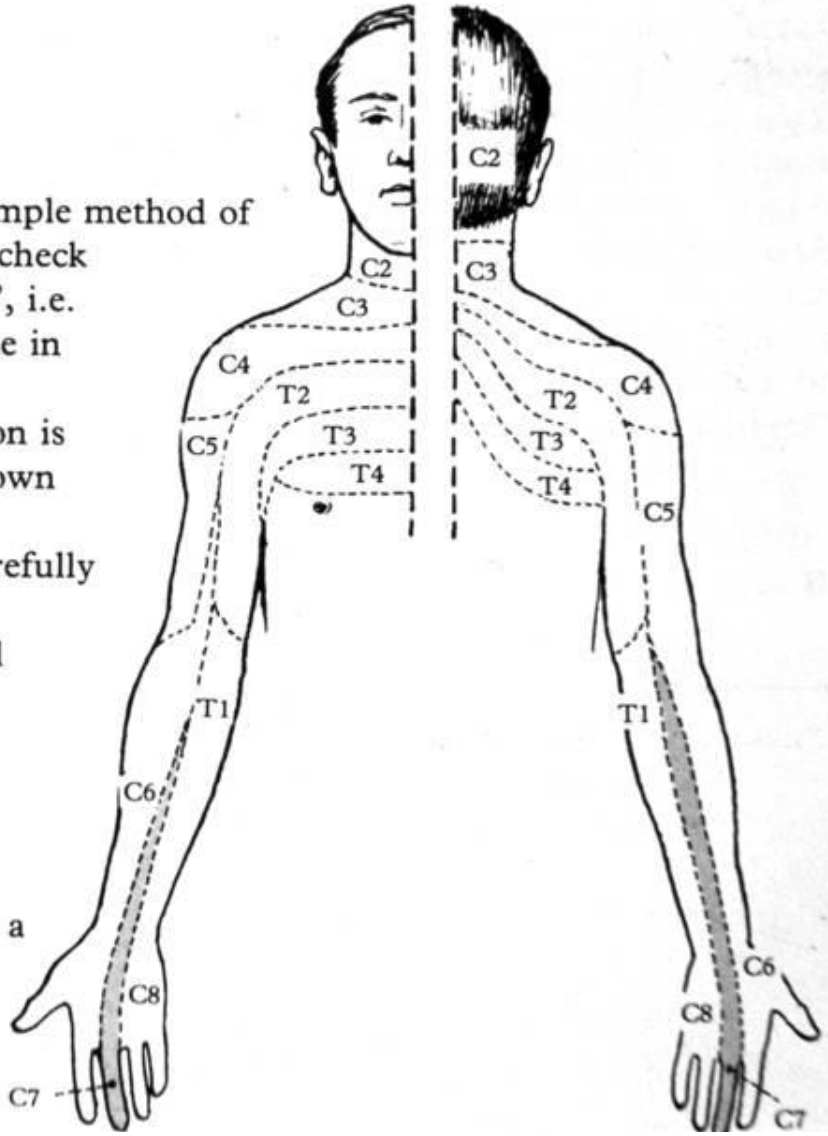
Pin prick with a sterile pin provides a simple method of testing this important modality. Firstly, check that the patient detects the pin as 'sharp', i.e. painful, then rapidly test each dermatome in turn.

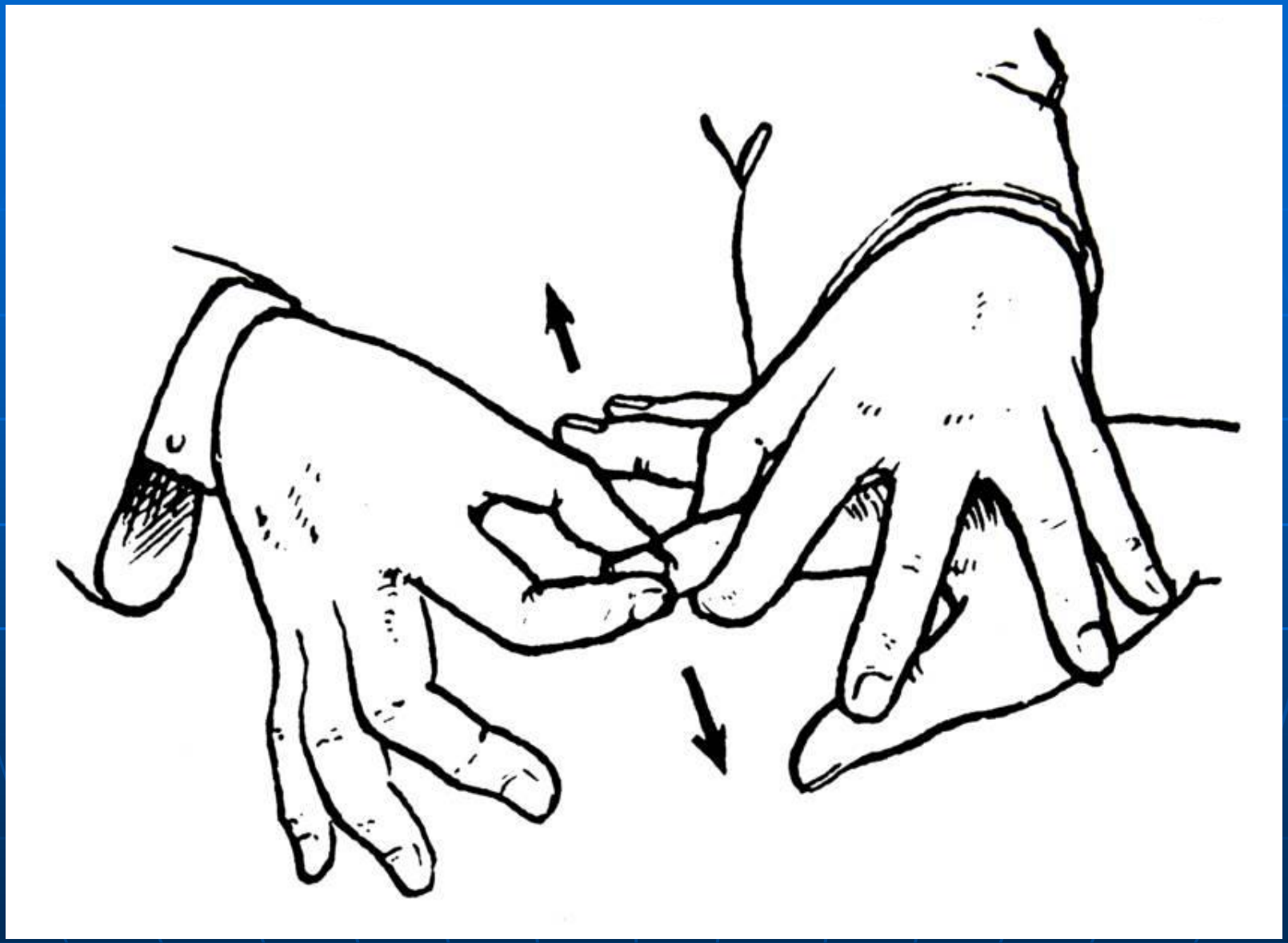
Memorising the dermatome distribution is simplified by noting that 'C7' extends down the middle finger.

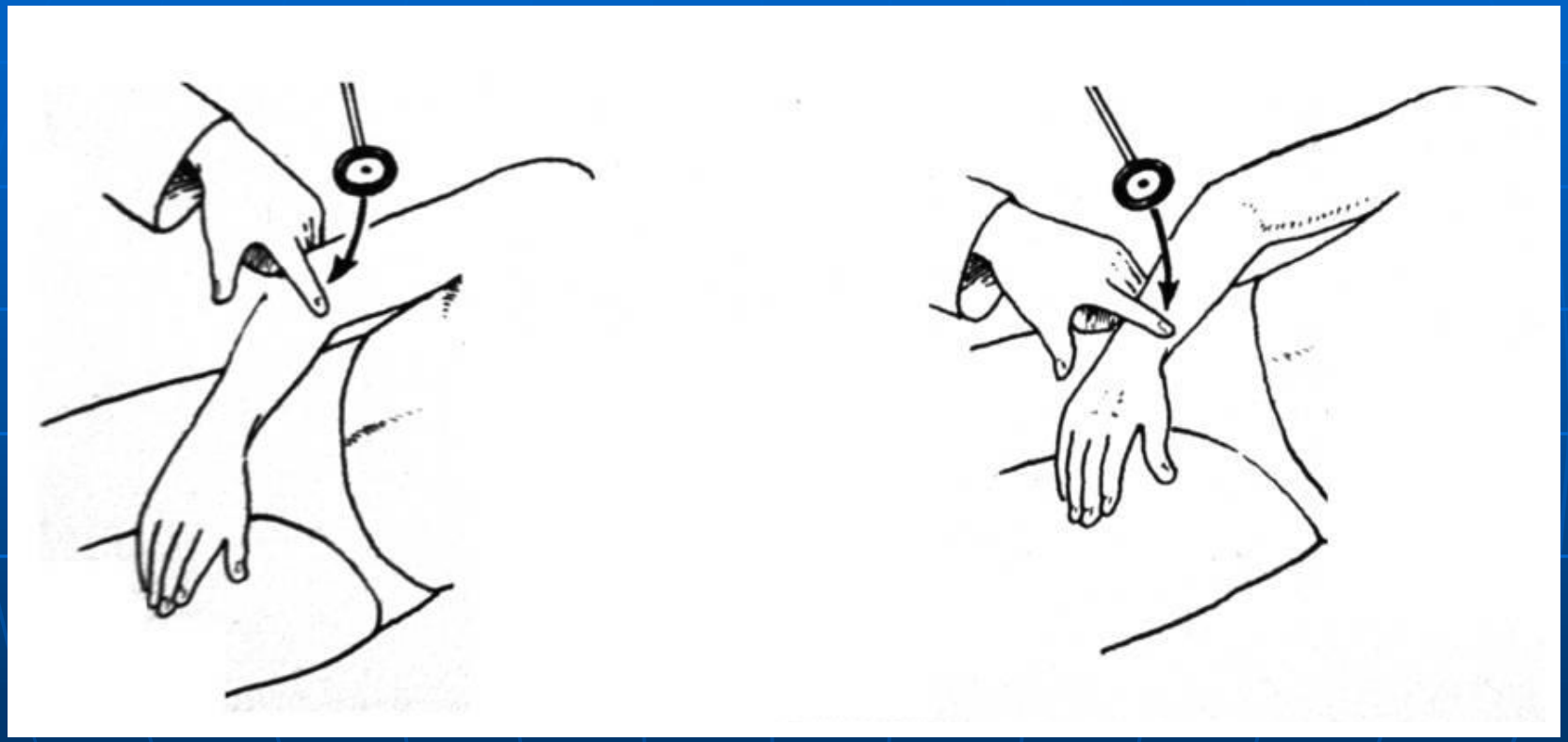
If pin prick is impaired, then more carefully map out the extent of the abnormality, moving from the abnormal to the normal area.

Light touch

This is tested in a similar manner, using a wisp of cotton wool.







Triceps jerk

C6, C7, C8 roots.
Radial nerve.

Strike the patient's elbow a few inches above the olecranon process. Look for elbow extension and triceps contraction.

Hoffman reflex C7, C8

Flick the patient's terminal phalanx, suddenly stretching the flexor tendon on release. Thumb flexion indicates hyperreflexia. (May be present in normal subjects with brisk tendon reflexes.)

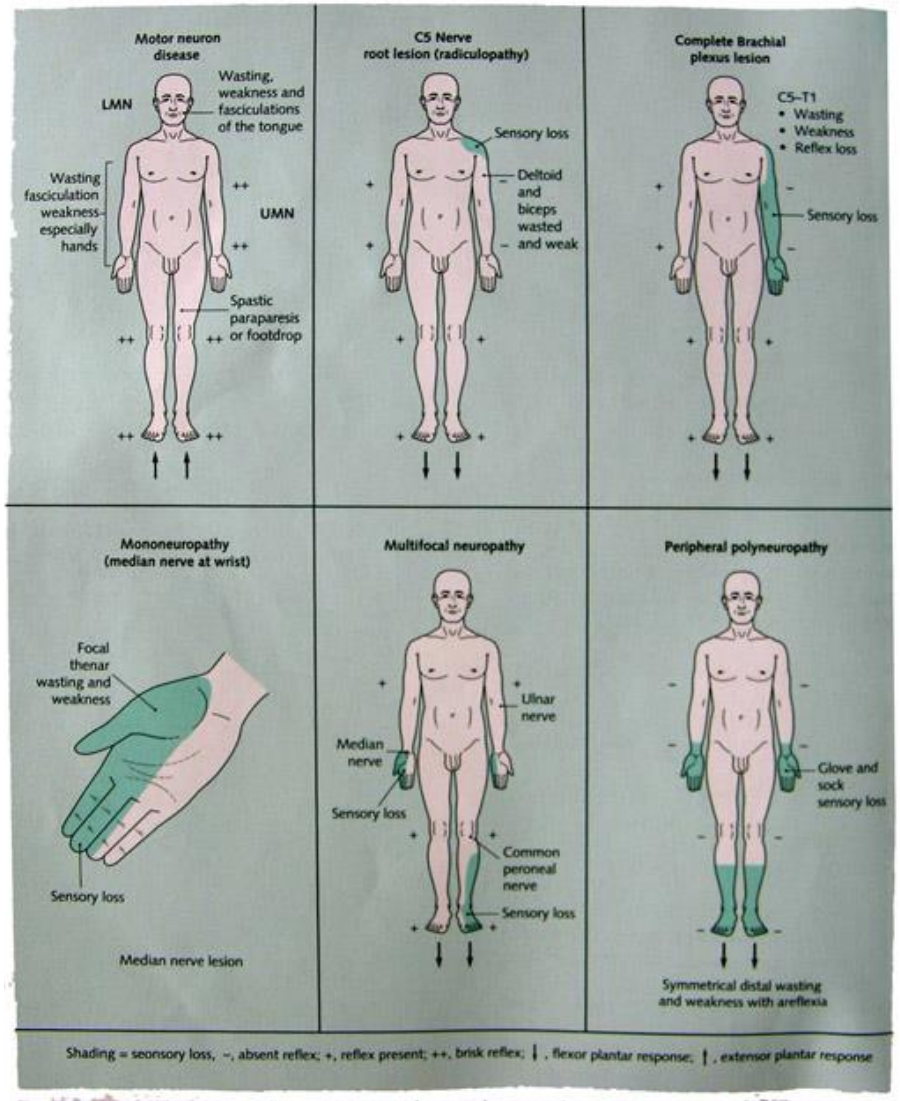


Fig. 12.7 Patterns of weakness and sensory loss due to lower motor neuron lesions. The shaded areas indicate sensory loss.

4) COORDINATION:

- INCOORDINATION (ATAXIA) IS A FEATURE OF CEREBELLAR DISEASE.
- ENSURE THAT PROPRIOCEPTION IS NORMAL.
  - FINGER-TO-NOSE TESTING: DYSMETRIA OR INTENTION TREMOR.
  - DYSDIADOCHOKINESIA: RAPID ALTERNATING MOVEMENTS.
  - REBOUND PHENOMENON: HYPOTONIA.

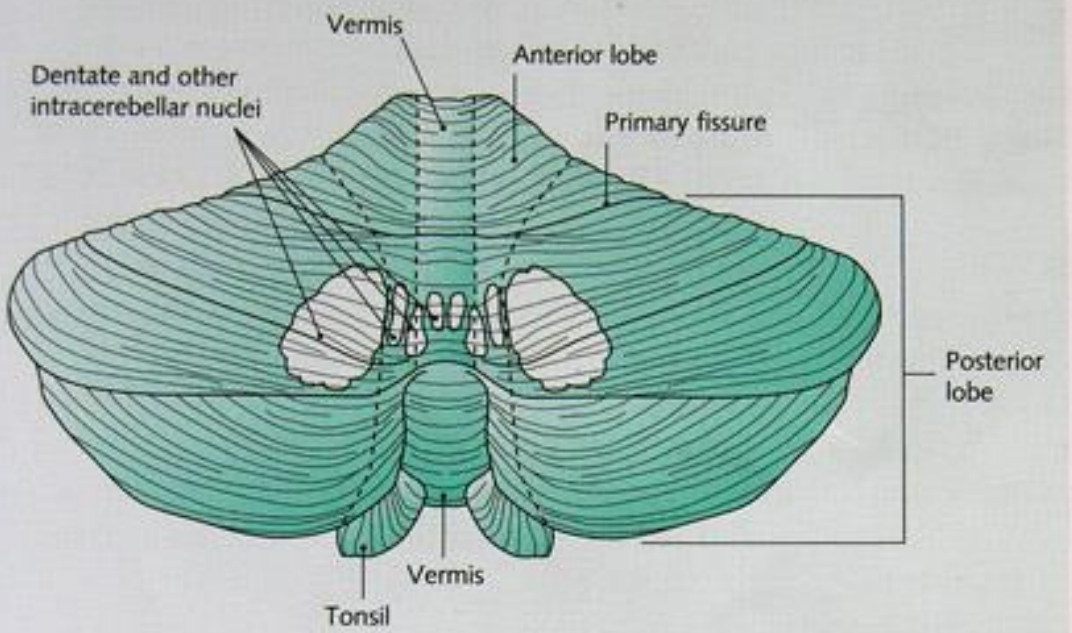


Fig. 10.1 Posterior aspect of the cerebellum.

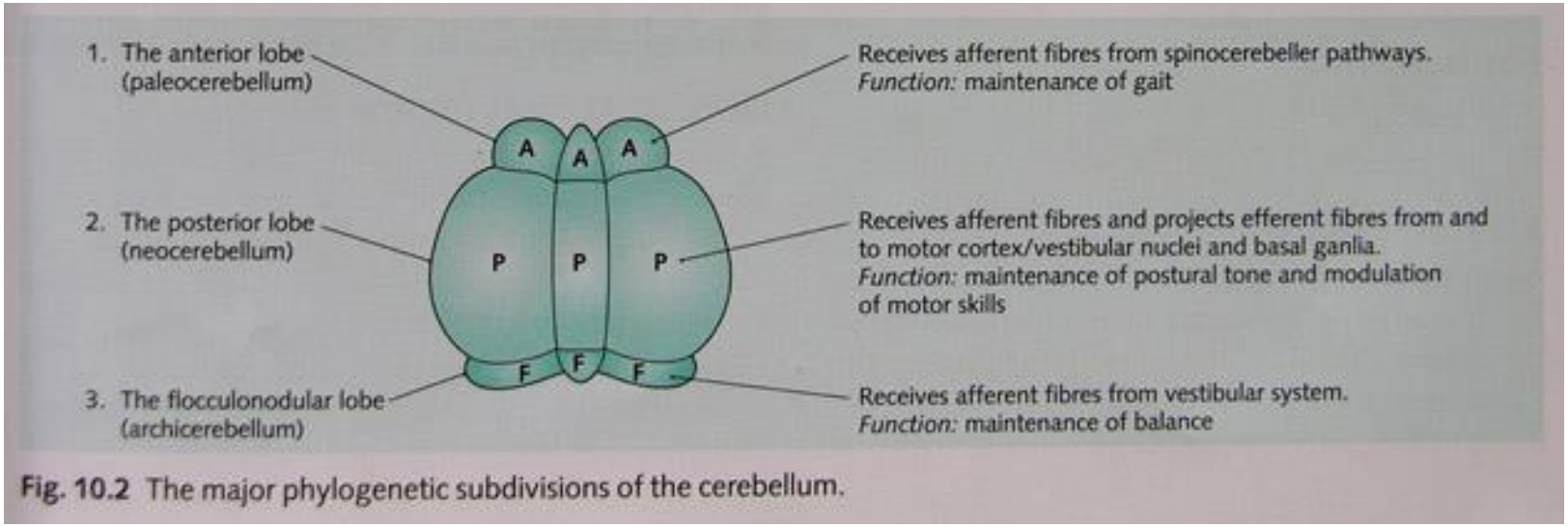


Fig. 10.2 The major phylogenetic subdivisions of the cerebellum.

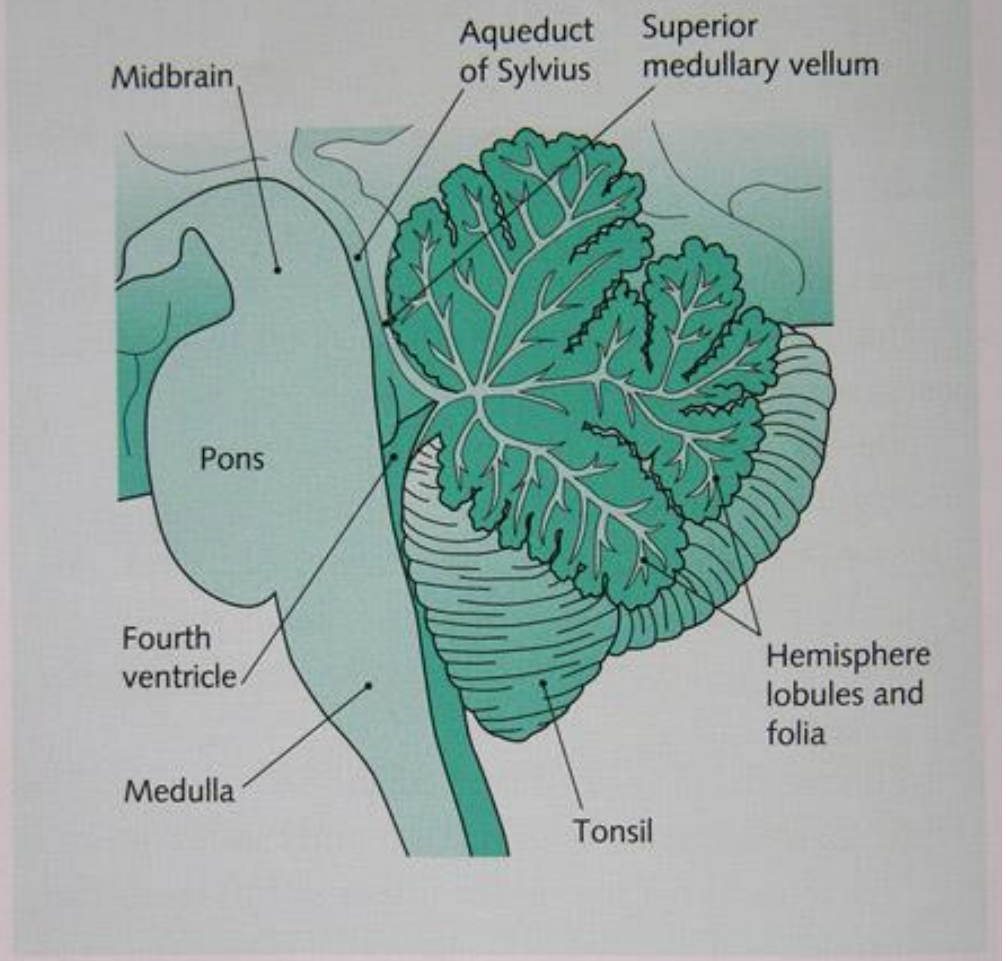
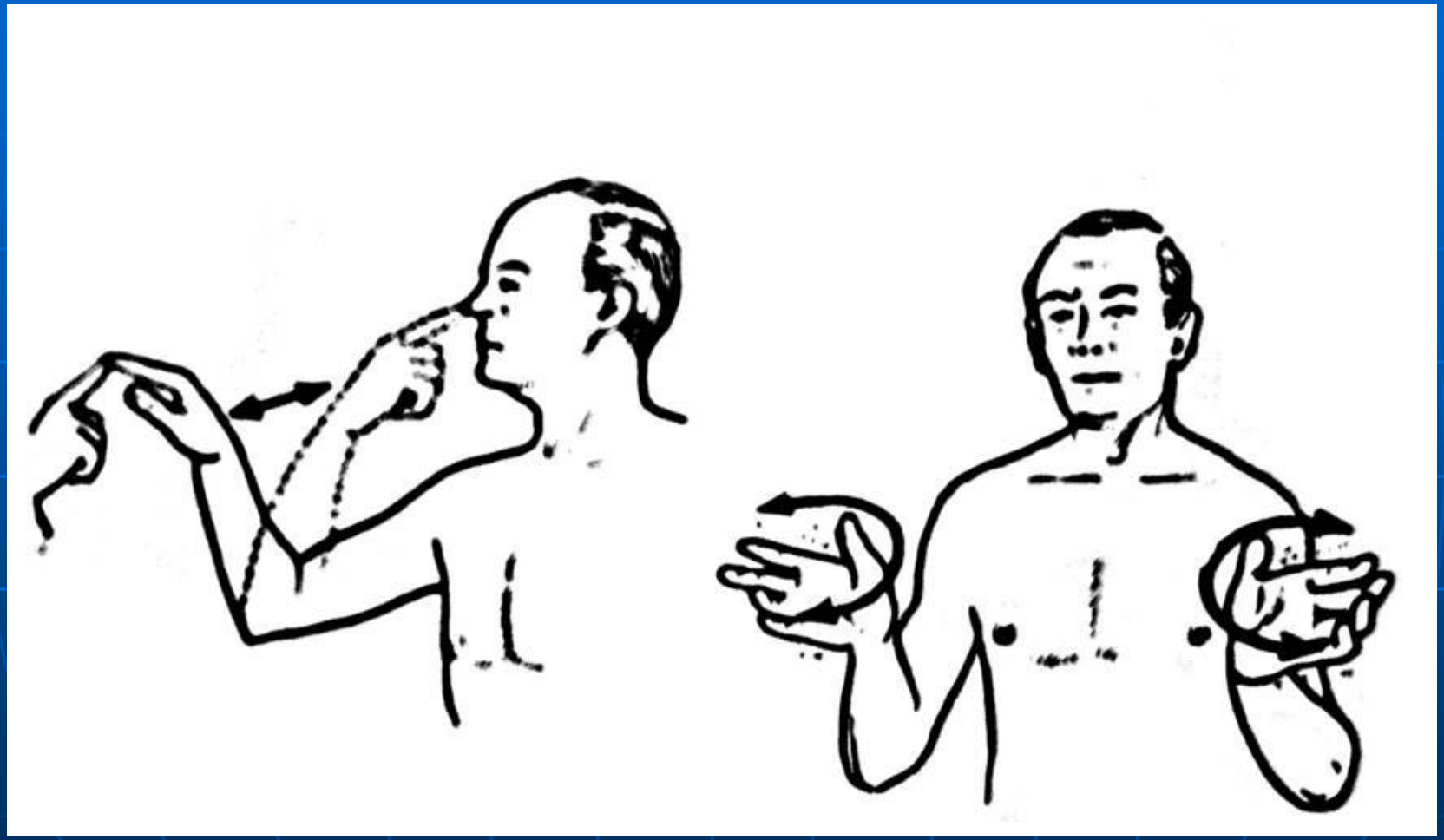
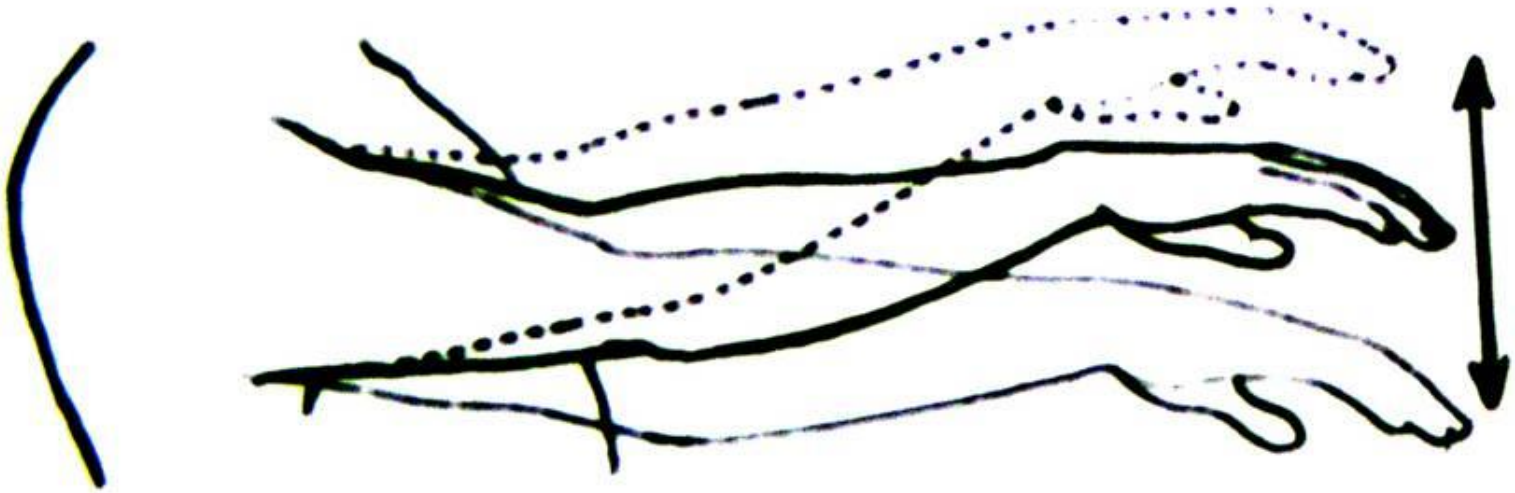
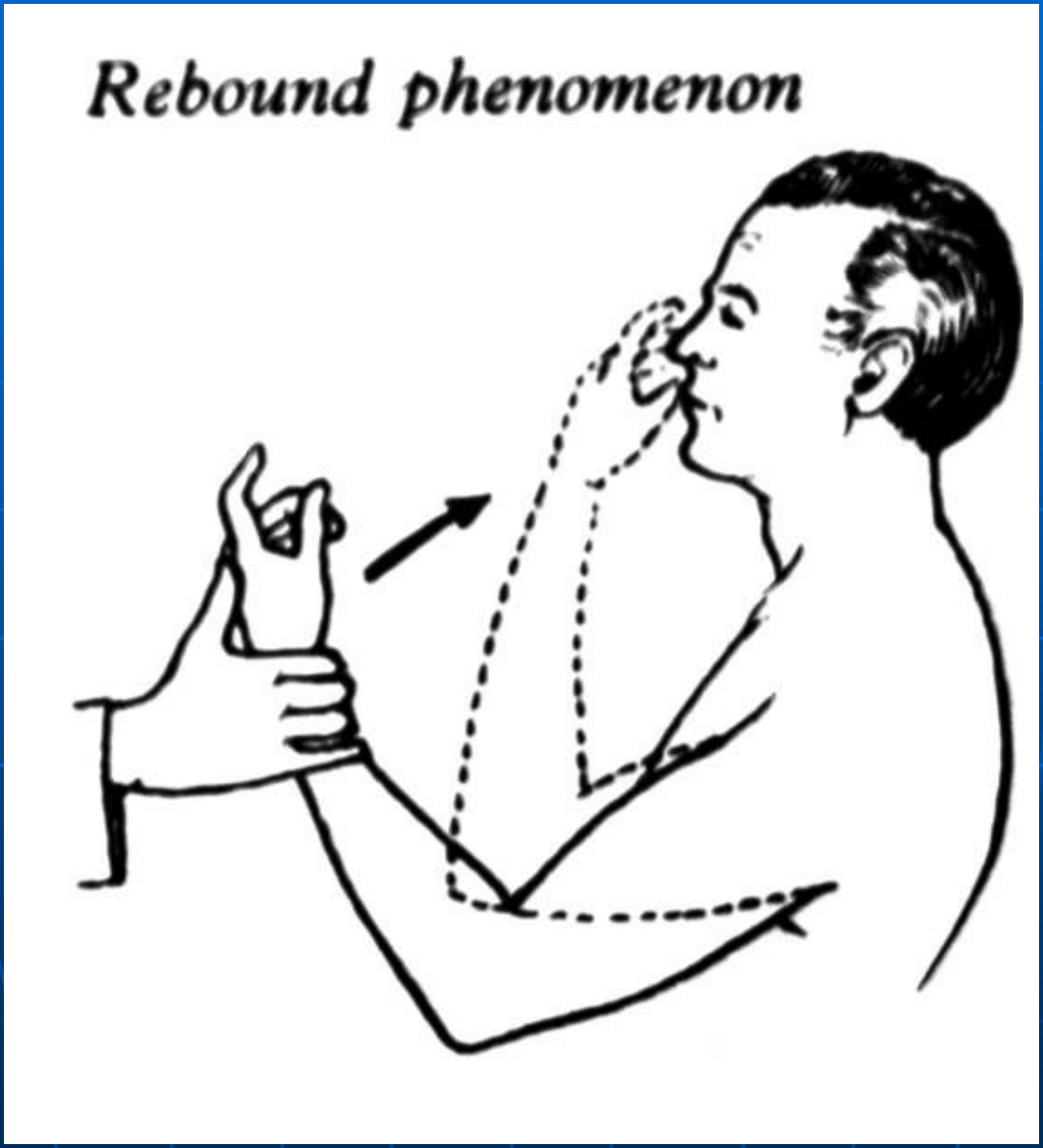


Fig. 10.3 Sagittal section though the cerebellum and brainstem.



Arm bounce




Rebound phenomenon

E. TRUNK:

- **SENSORY LEVELS:**

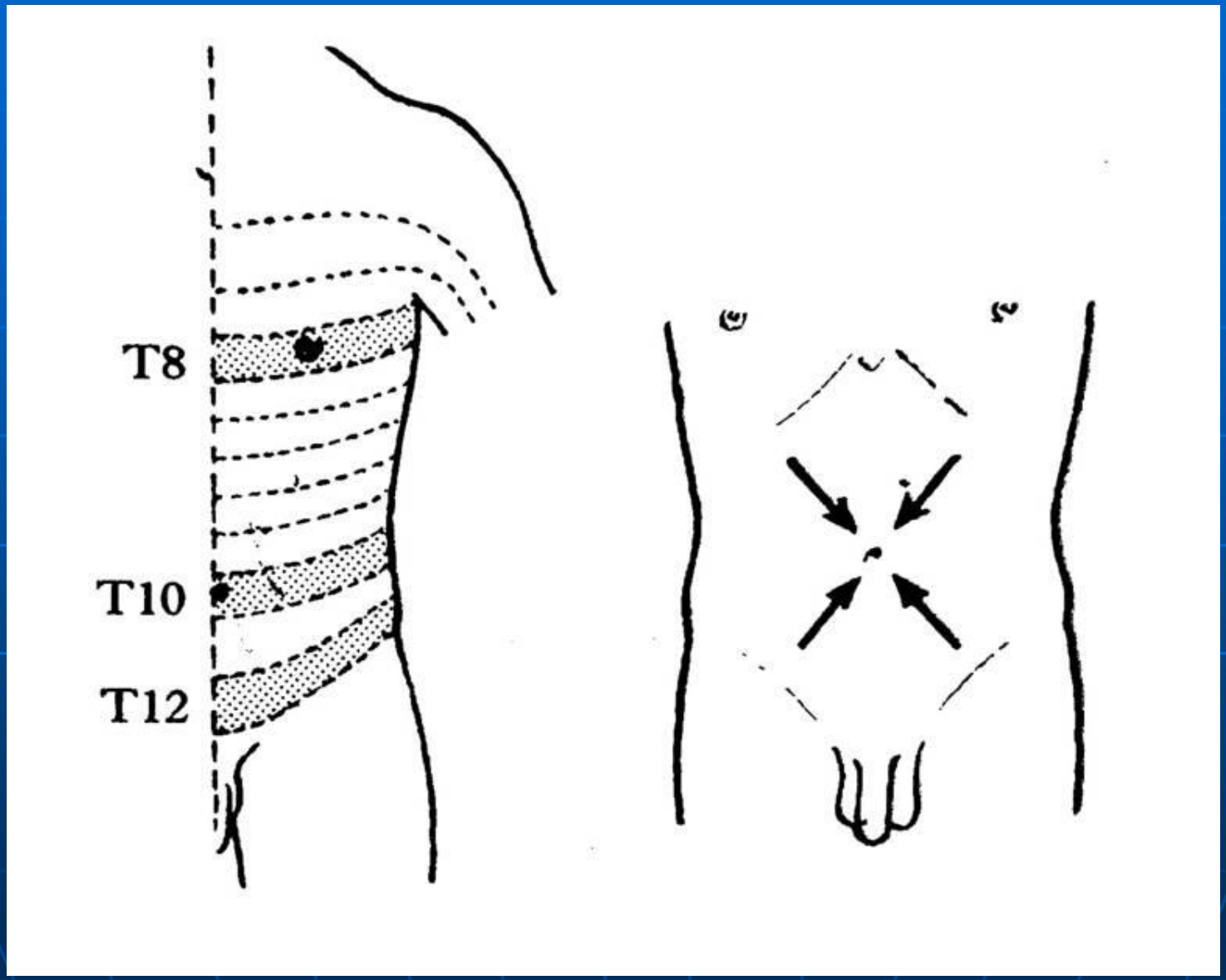
  T5 AT NIPPLE.

  T10 AT UMBILICUS.

  T12 AT INGUINAL LIGAMENT.

- **ABDOMINAL REFLEXES: T7 - T12 ROOTS.**

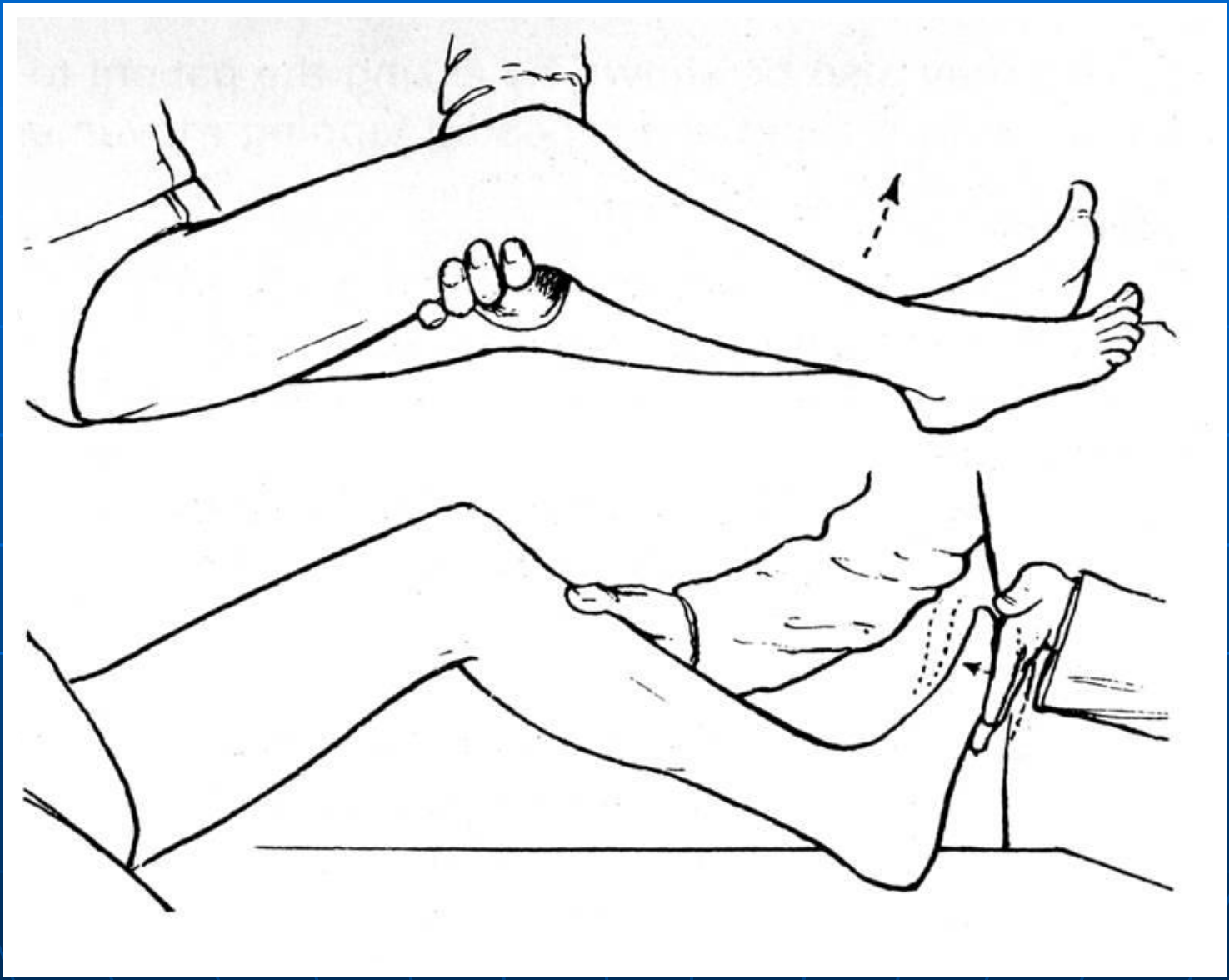
- **CREMASTERIC AND ANAL REFLEXES.**


T8
T10
T12

F. LOWER LIMBS:

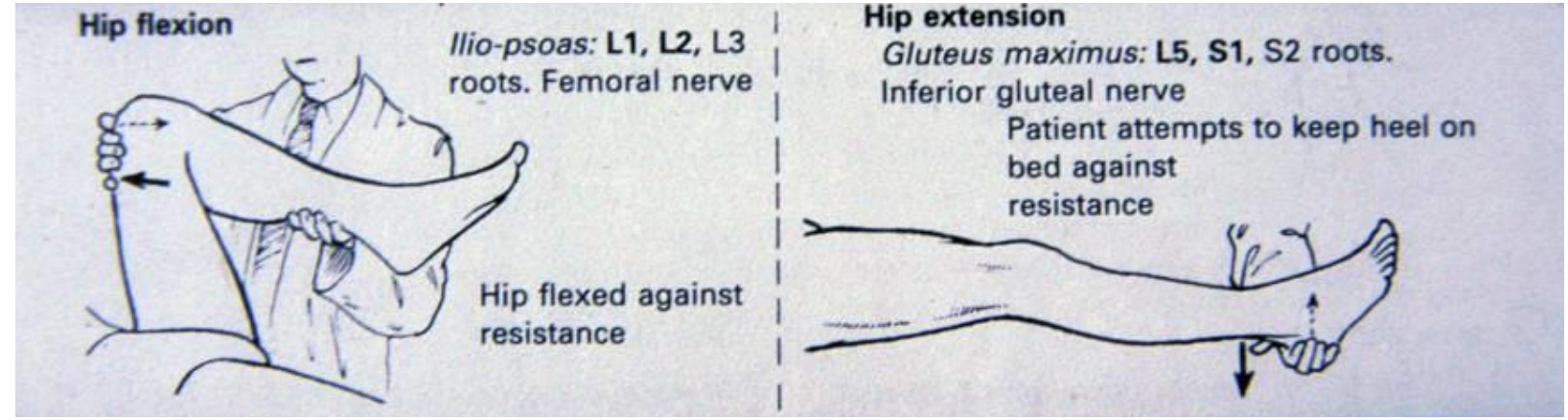
1) MOTOR SYSTEM:

- **APPEARANCE AS IN UL.**
- **TONE:**
  - **ALTERNATELY FLEX AND EXTEND THE KNEE JOINT.**
  - **ROLL PATIENT'S LEGS.**
  - **THIGH LIFTING AND LOWER LEG RESPONSE.**
  - **CLONUS.**

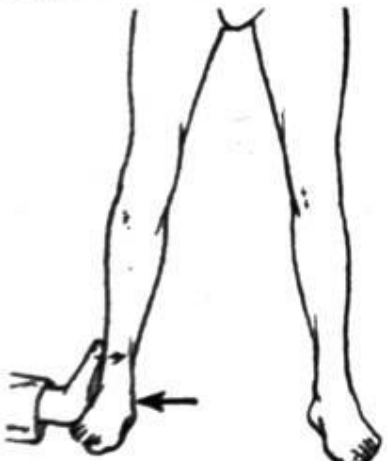


- **POWER:**
  - HIP FLEXION, ILIOPSOAS, L1 L2 L3, FEMORAL NERVE.
  - HIP EXTENSION, GLUTEUS MAXIMUS, L5 S1 S2, INFERIOR GLUTEAL NERVE.
  - HIP ABDUCTION, GLUTEUS MEDIUS AND MINIMUS, L4 L5, SUPERIOR GLUTEAL NERVE.
  - HIP ADDUCTION, L2 L3 L4, OBTURATOR NERVE.
  - KNEE FLEXION, L5 S1 S2, SCIATIC NERVE.

- KNEE EXTENSION, QUADRICEPS, L2 L3 L4, FEMORAL NERVE.
- PLANTAR FLEXION, GASTROCNEMIUS, S1 S2, TIBIAL NERVE.
- FOOT INVERSION, TIBIALIS POSTERIOR, L4 L5, TIBIAL NERVE.
- FOOT EVERSION, PERONEUS LONGUS AND BREVIS, L5 S1, SUPERFICIAL PERONEAL NERVE.


Hip flexion
Ilio-psoas: **L1, L2,** L3 roots. Femoral nerve
Hip flexed against resistance
Hip extension
Gluteus maximus: **L5, S1,** S2 roots.
Inferior gluteal nerve
Patient attempts to keep heel on bed against resistance

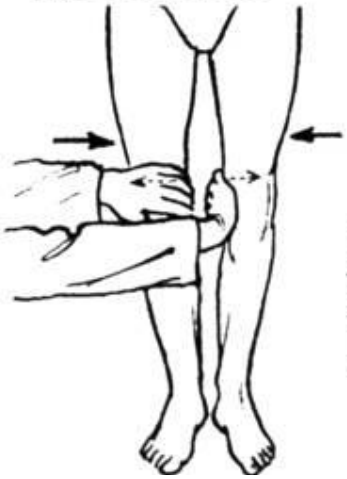
Hip abduction



Gluteus medius and minimus and tensor fasciae latae: **L4, L5,** S1 roots.
Superior gluteal nerve

Patient lying on back tries to abduct the leg against resistance

Hip adduction



Adductors:
L2, L3, L4 roots.
Obturator nerve

Patient lying on back tries to pull knees together against resistance

Knee flexion

Hamstrings L5, **S1**, S2 roots. Sciatic nerve

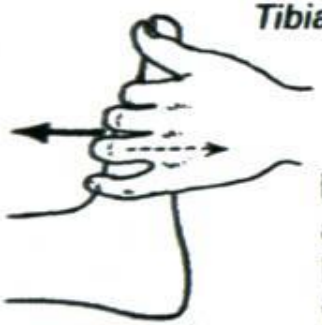
Patient pulls heel towards the buttock and tries to maintain this position against resistance.

Knee extension

Quadriceps: L2, **L3**, **L4** roots. Femoral nerve

Patient tries to extend knee against resistance

Dorsiflexion



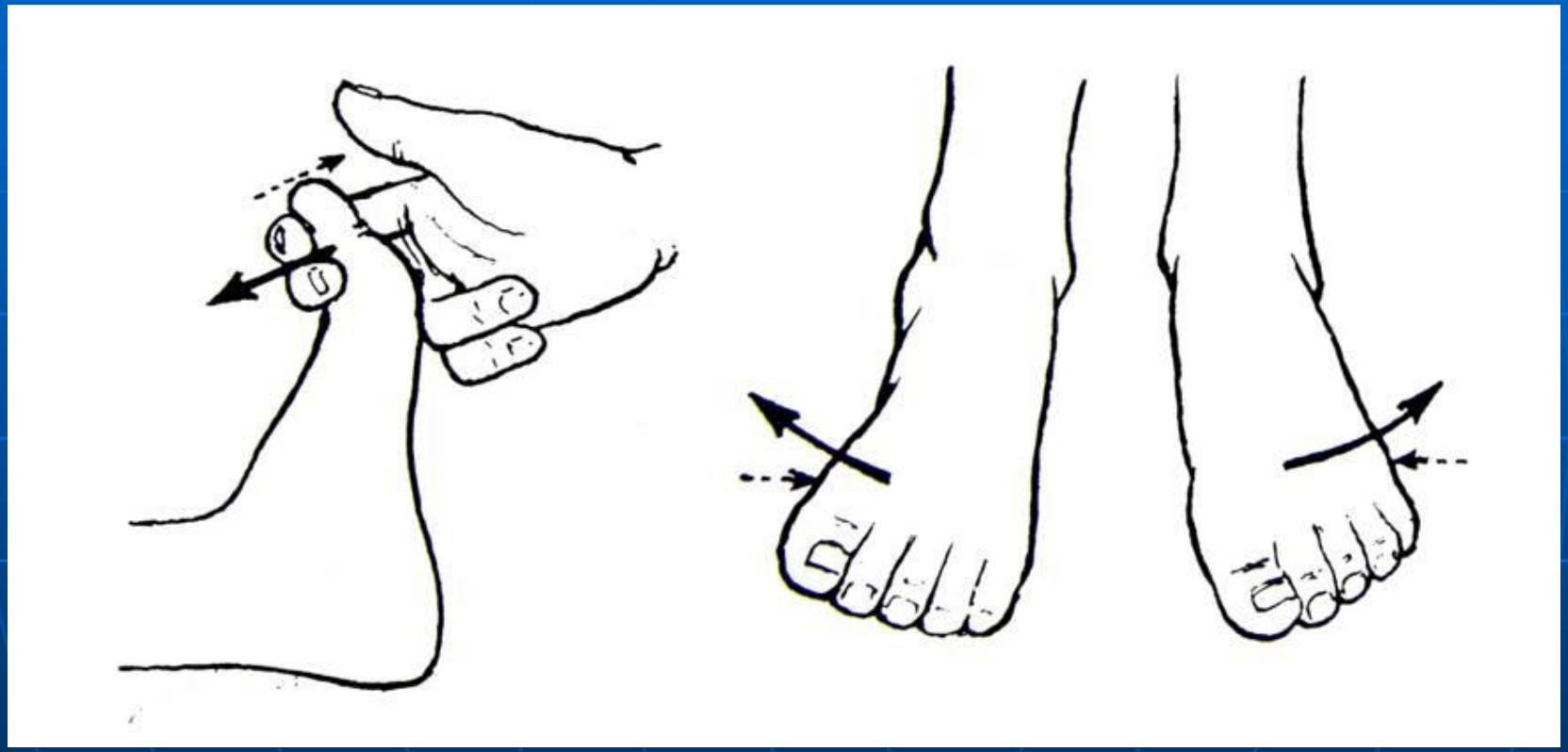
Tibialis anterior: **L4,** L5 roots. Deep peroneal nerve

Patient dorsiflexes the ankle against resistance. May have difficulty in walking on heels

Plantarflexion

Gastrocnemius, soleus: **S1, S2,** roots. Tibial nerve.

Patient plantarflexes the ankle against resistance. May have difficulty in walking on toes before weakness can be directly detected



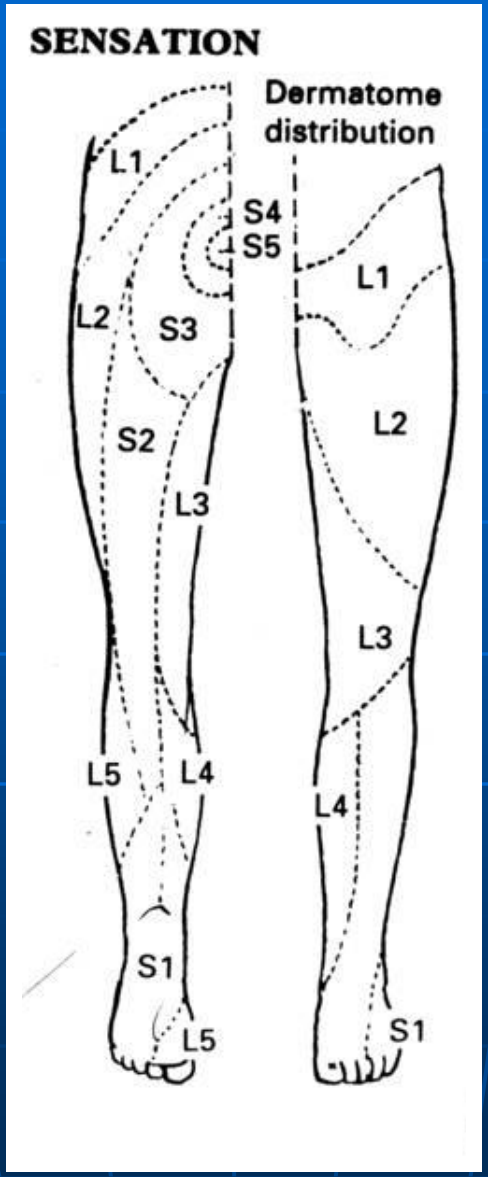
- **SENSATION:**
  - **TO PAIN, LIGHT TOUCH AND TEMPERATURE:**

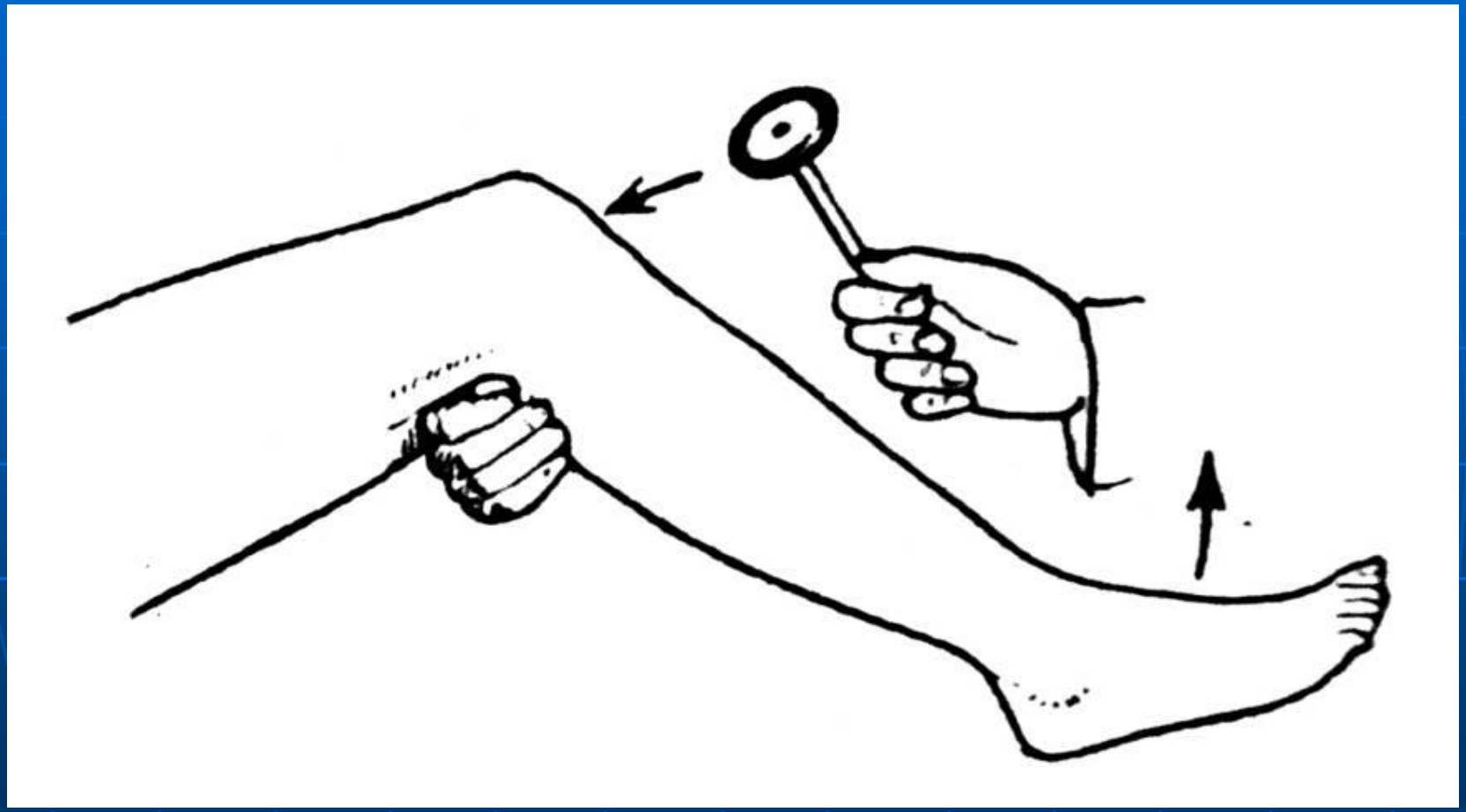
    ACCORDING TO DERMATOMAL DISTRIBUTION (FIG).
  - **JOINT POSITION AND VIBRATION SENSE.**

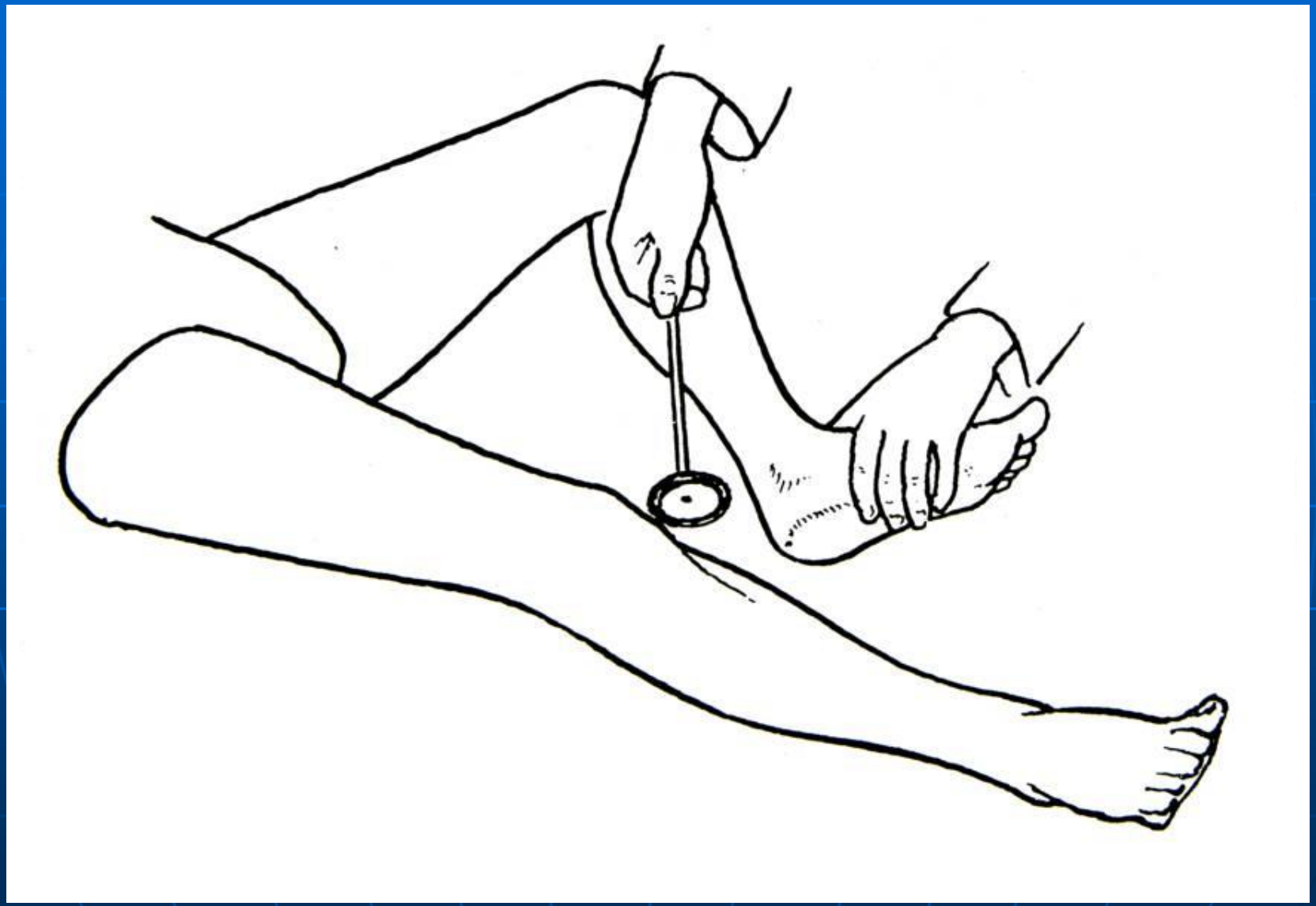
- **REFLEXES:**
  - **KNEE JERK, L2 L3 L4 ROOTS (MAINLY L4).**
  - **ANKLE JERK, S1 S2 ROOTS**

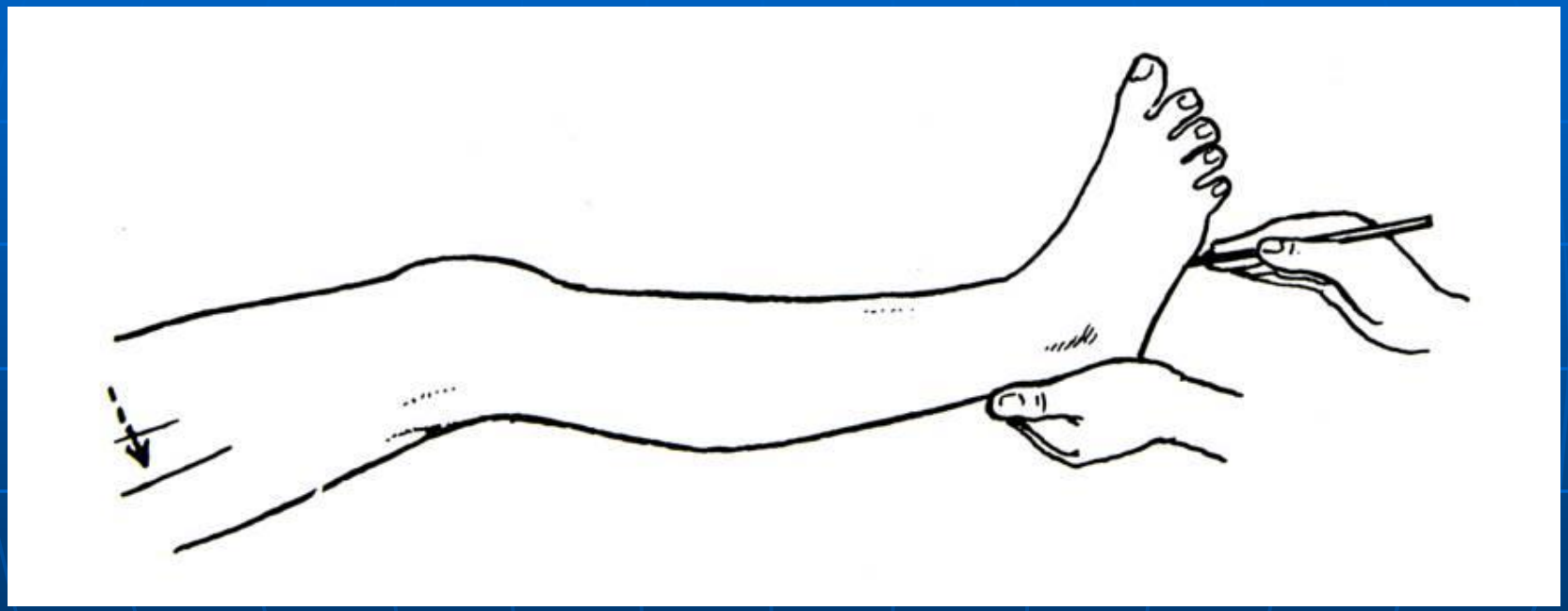
    REFLEX ENHANCEMENT BY JENDRESSIK'S MANEUVER.
  - **PLANTAR RESPONSE: NORMALLY FLEXION; IF EXTENSION DUE TO CONTRACTION OF EXTENSOR HALLUCIS**

    LONGUS = BABINSKI REFLEX = UMN LESION.

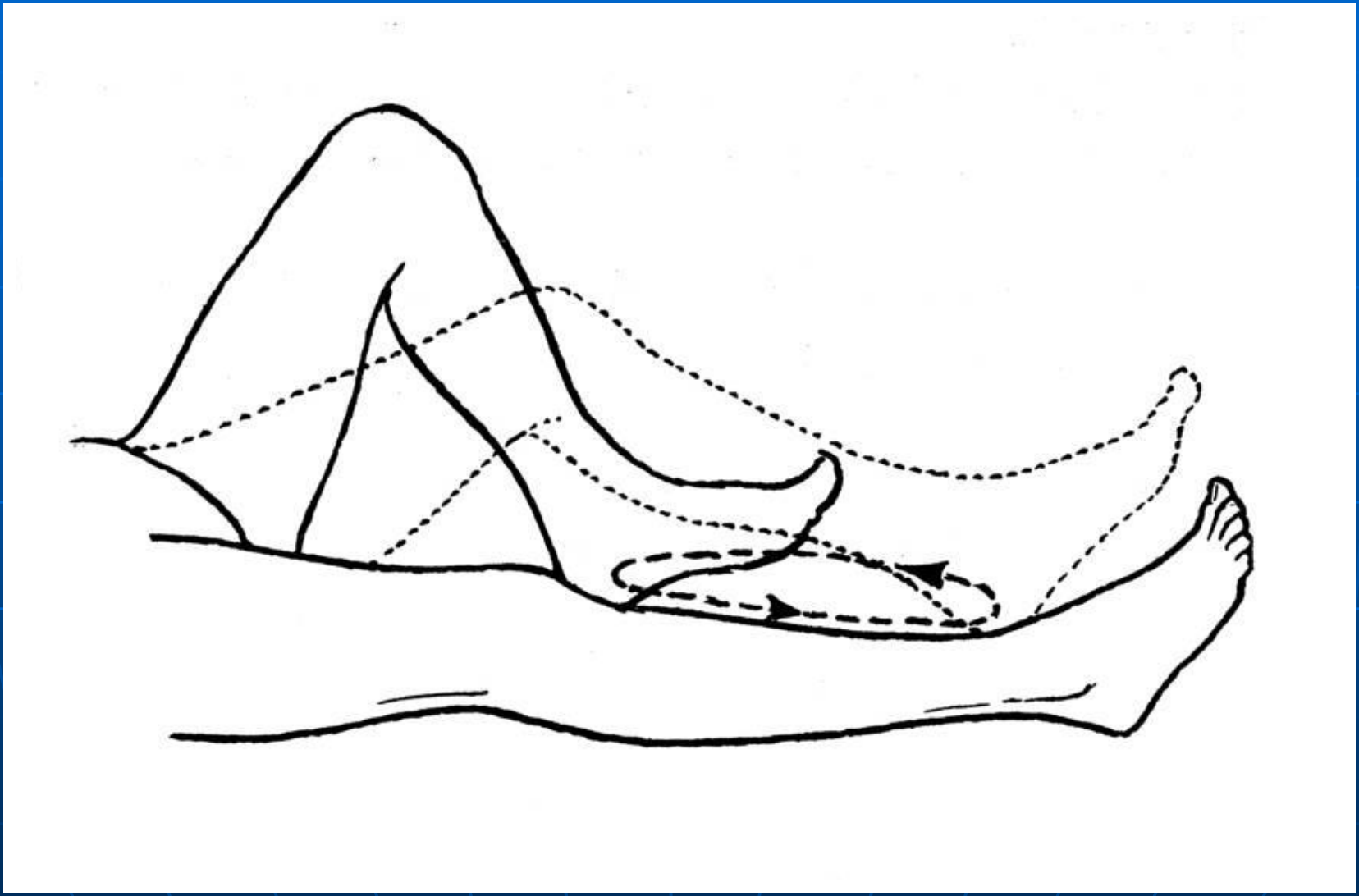

SENSATION
Dermatome distribution
L1
S4
S5
L2
S3
S2
L3
L5
L4
S1
L5
L1
L2
L3
L4
S1

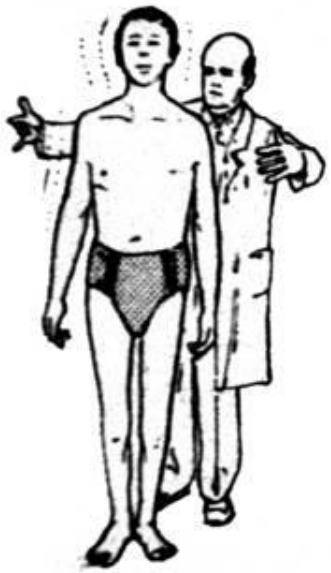






- **COORDINATION HEEL- KNEE - SHIN TEST.**
- **POSTURE AND GAIT:**
  - **ROMBERG'S TEST:**
    - » **STAND WITH THE HEELS TOGETHER FIRST WITH THE EYES OPEN, THEN WITH THE EYES CLOSED.**
    - » **NOTE ANY POSTURAL SWAYING OR LOSS OF BALANCE.**
      1) **IF PRESENT WHEN EYES OPEN OR CLOSED = CEREBELLAR ATAXIA.**
      2) **IF PRESENT ONLY WHEN EYES ARE CLOSED = POSITIVE ROMBERG = PROPRIOCEPTIVE DEFICIT = SENSORY ATAXIA.**





Ask patient to stand with the heels together, first with the eyes open, then with the eyes closed.

Note any excessive postural swaying or loss of balance

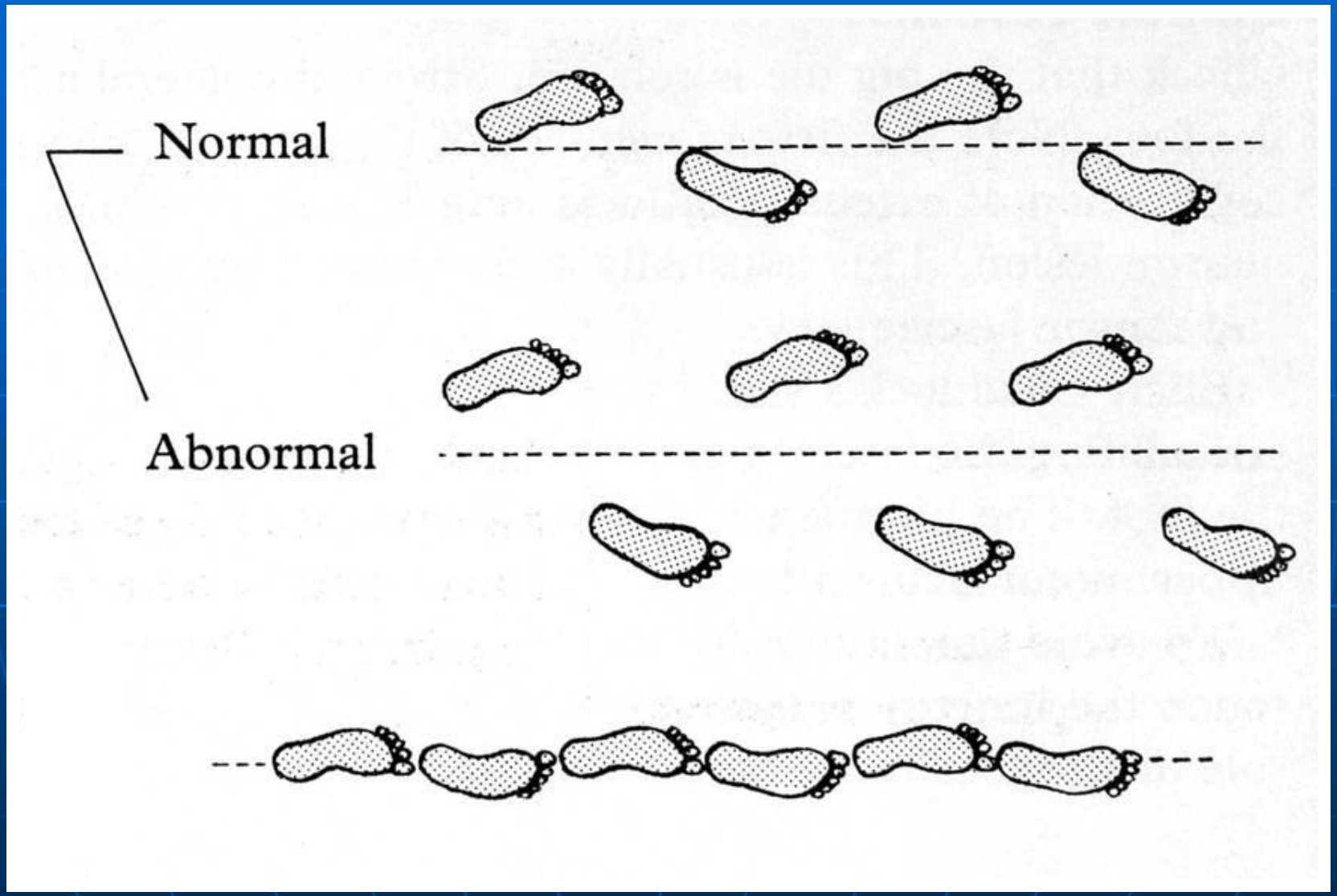
- Present when eyes open or closed = cerebellar deficit (cerebellar ataxia)
- Present only when eyes are closed ('positive' Romberg's) = proprioceptive deficit (sensory ataxia)

- **GAIT:**

  1) **LENGTH OF STEP AND WIDTH OF BASE:**
     - **EXCESSIVELY HIGH STEP = STEPPAGE GAIT.**
     - **INSTABILITY = GAIT ATAXIA.**
     - **PELVIC SWINGING = WADDLING GAIT.**

  2) **IF NORMAL = DO TANDEM GAIT.**

     (SHUFFLING GAIT, SPASTIC GAIT…).


Normal
Abnormal

G. EXAMINATION OF THE UNCONSCIOUS PATIENT:

1) HISTORY:

HEAD INJURY; SUDDEN CLLAPSE; LIMB TWITCHING; PREVIOUS SYMPTOMS OR ILLNESS; MEDICATIONS.

2) GENERAL EXAMINATION:

SIGNS OF HEAD INJURY, NEEDLE MARKS ON THE ARM, TONGUE BITING, SMELL OF ALCOHOL.

3) NEUROLOGICAL EXAMINATION:

- **CONSCIOUS LEVEL: GLASGOW COMA SCALE:**
  - **EYE OPENING**
  - **VERBAL RESPONSE.**
  - **MOTOR RESPONSE.**

- **PUPIL RESPONSE, FUNDI, CORNEAL REFLEX, LIMB TONE, REFLEXES, PLANTAR RESPONSE.**

- **EYE MOVEMENTS**
  - **SPONTANEOUS.**
  - **OCULOCEPHALIC (DOLL'S EYE) REFLEX.**
  - **OCULOVESTIBULAR REFLEX.**
- **VISUAL FIELDS = BLINKING TO MENACE.**
- **FACIAL WEAKNESS = GRIMACE DUE TO SUPRAORBITAL PAINFUL STIMULUS.**
- **LIMB WEAKNESS:**

  LOOK FOR ASYMMETRY IN RESPONSE TO PAINFUL STIMULI.

Eye movements

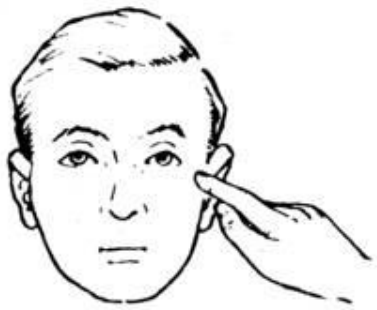
Observe any **spontaneous** eye movements.

(Eyes held open by examiner)

Elicit the **oculocephalic (doll's eye) reflex.** Rotation or flexion/extension of the head in a comatose patient produces transient eye movements in a direction opposite to that of the movement.

Note whether the movements, if present, are *conjugate* (i.e. the eyes move in parallel) or *dysconjugate* (i.e. the eyes do not move in parallel). These ocular movements assess midbrain and pontine function.

Visual fields
In the unco-operative patient, the examiner may detect a hemianopic field defect when 'menacing' from one side fails to produce a 'blink'.



Facial weakness
Failure to 'grimace' on one side in response to bilateral supraorbital pain indicates a facial weakness.

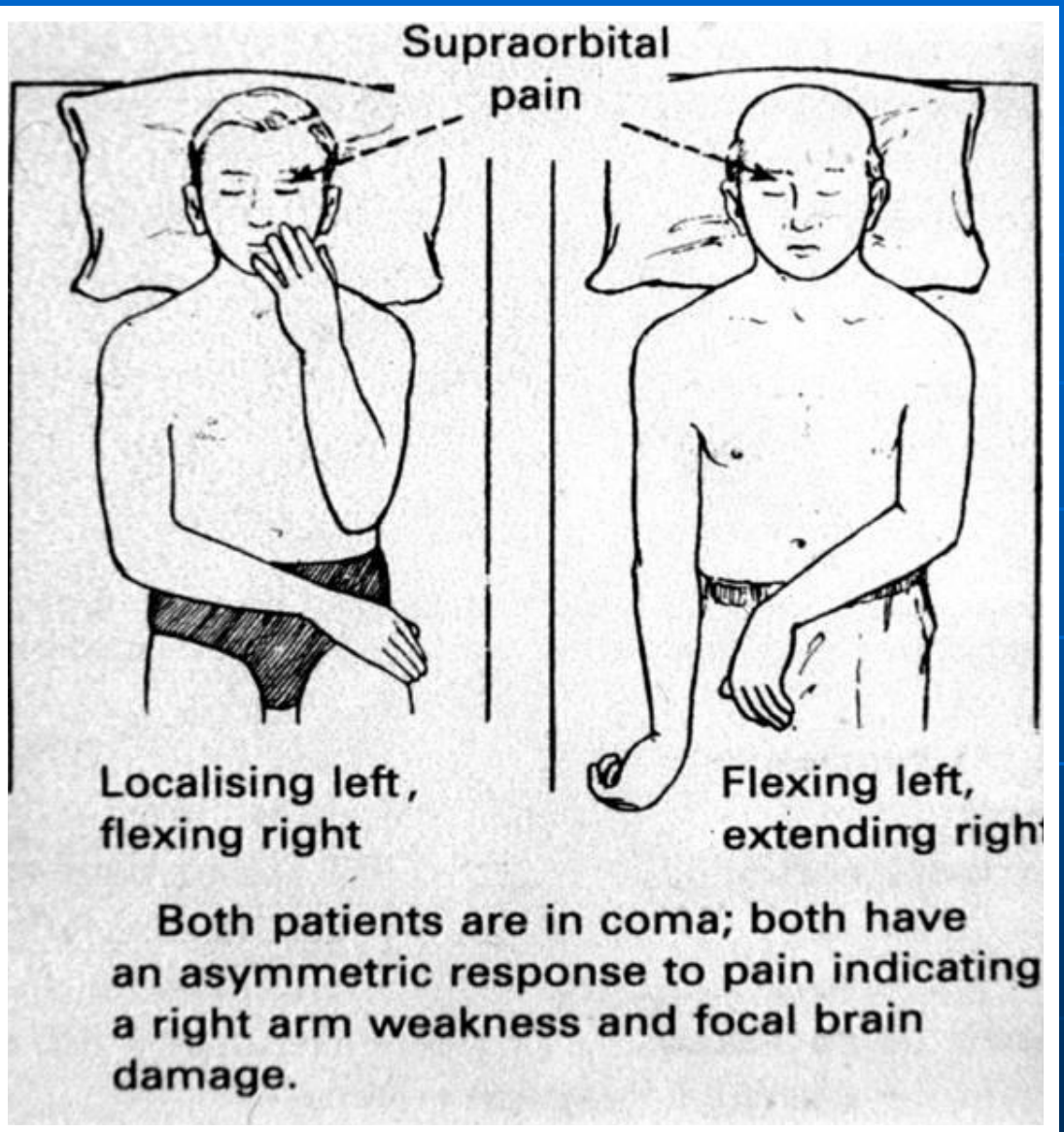
EXAMPLE:

A) **RESPONSE OF UPPER LIMBS TO SUPRAORBITAL PAIN.**

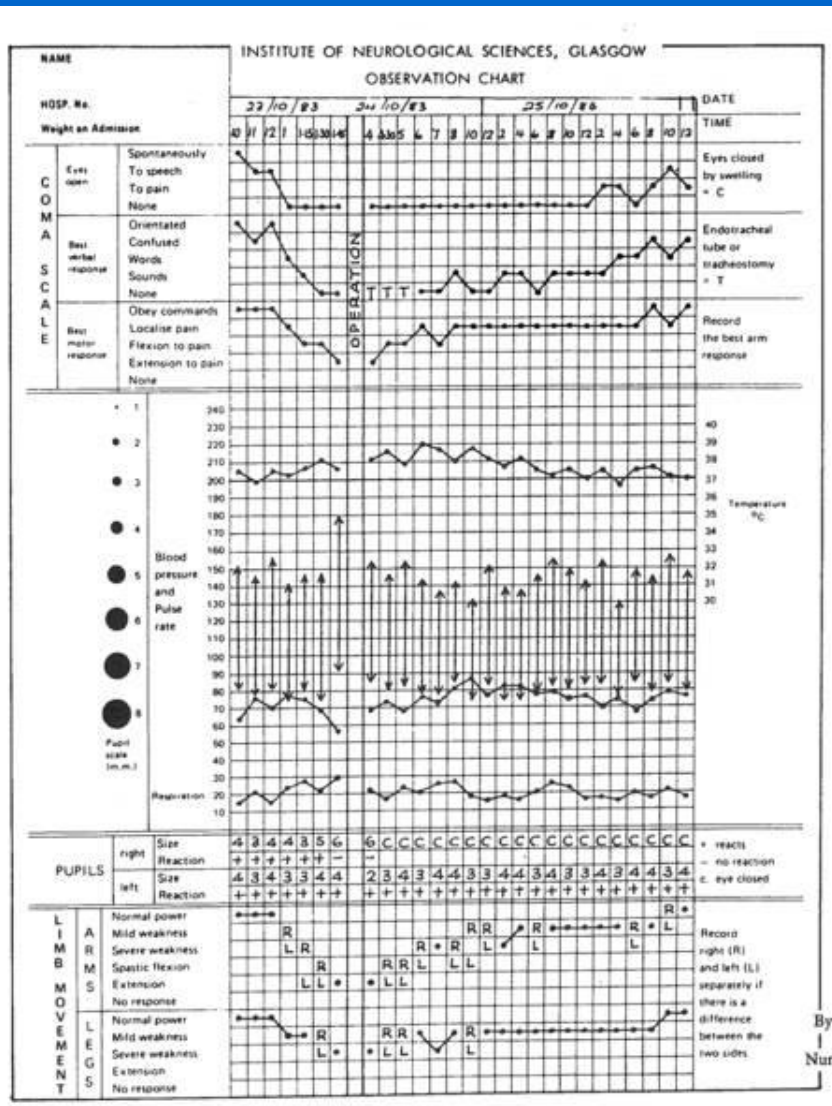
IF PATIENT LOCALISES ON THE LEFT AND FLEXES ON THE RIGHT OR IF PATIENT FLEXES ON THE LEFT AND EXTENDS ON THE RIGHT: BOTH INDICATE A RIGHT ARM WEAKNESS AND FOCAL BRAIN DAMAGE.

B) **RESPONSE OF LL TO PAINFUL**

STIMULI APPLIED TO THE TOE NAILS OR ACHILLES TENDON (ALSO PRESENCE OF UNILATERAL BABINSKI REFLEX).



Both patients are in coma; both have an asymmetric response to pain indicating a right arm weakness and focal brain damage.



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