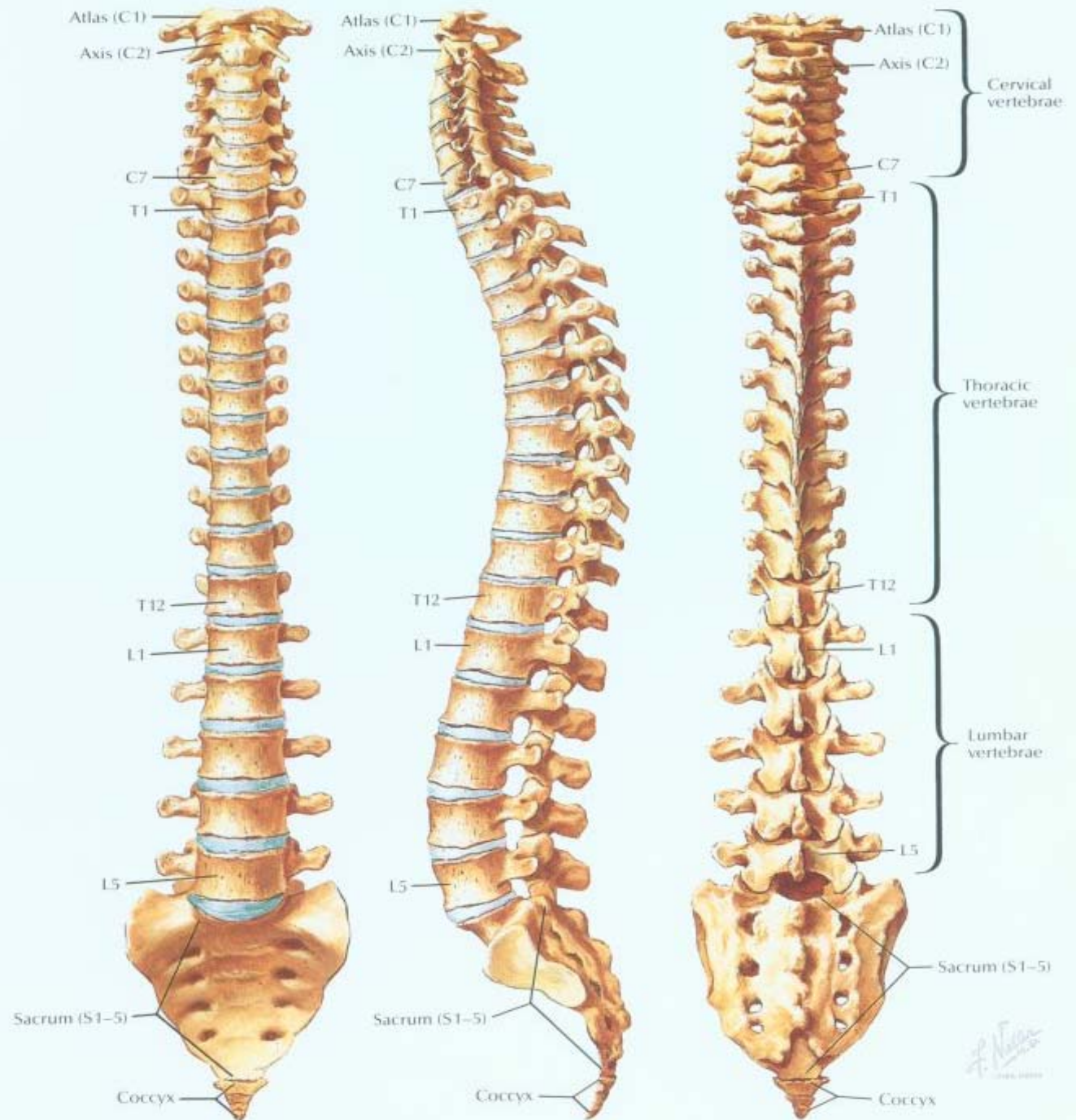
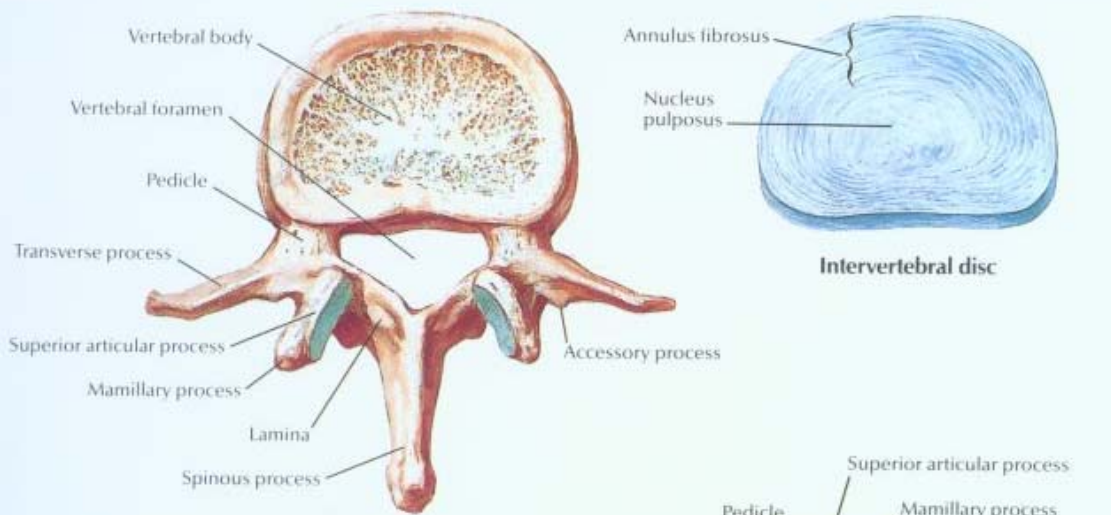


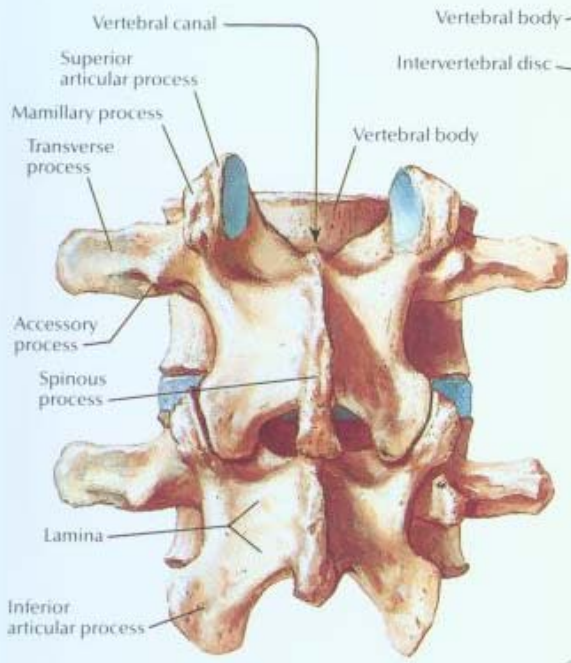
THE SPINE



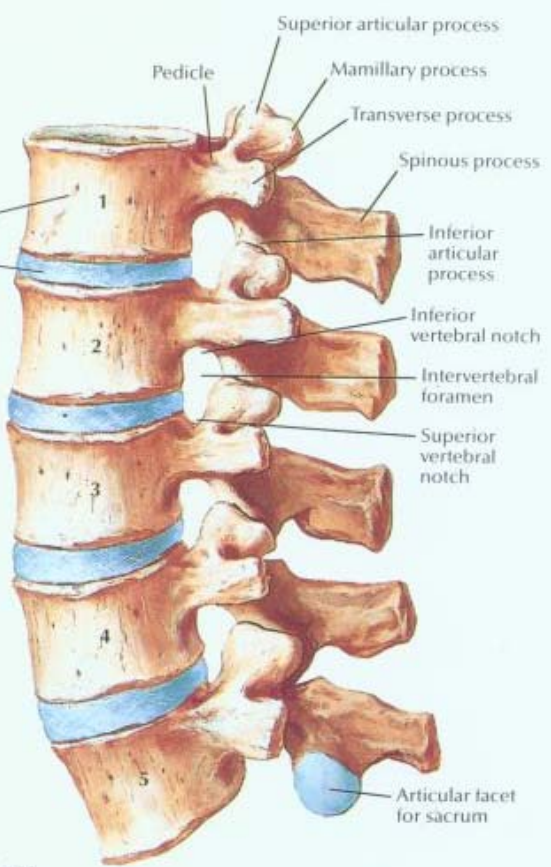
LUMBAR SPINE



2nd lumbar vertebra: superior view



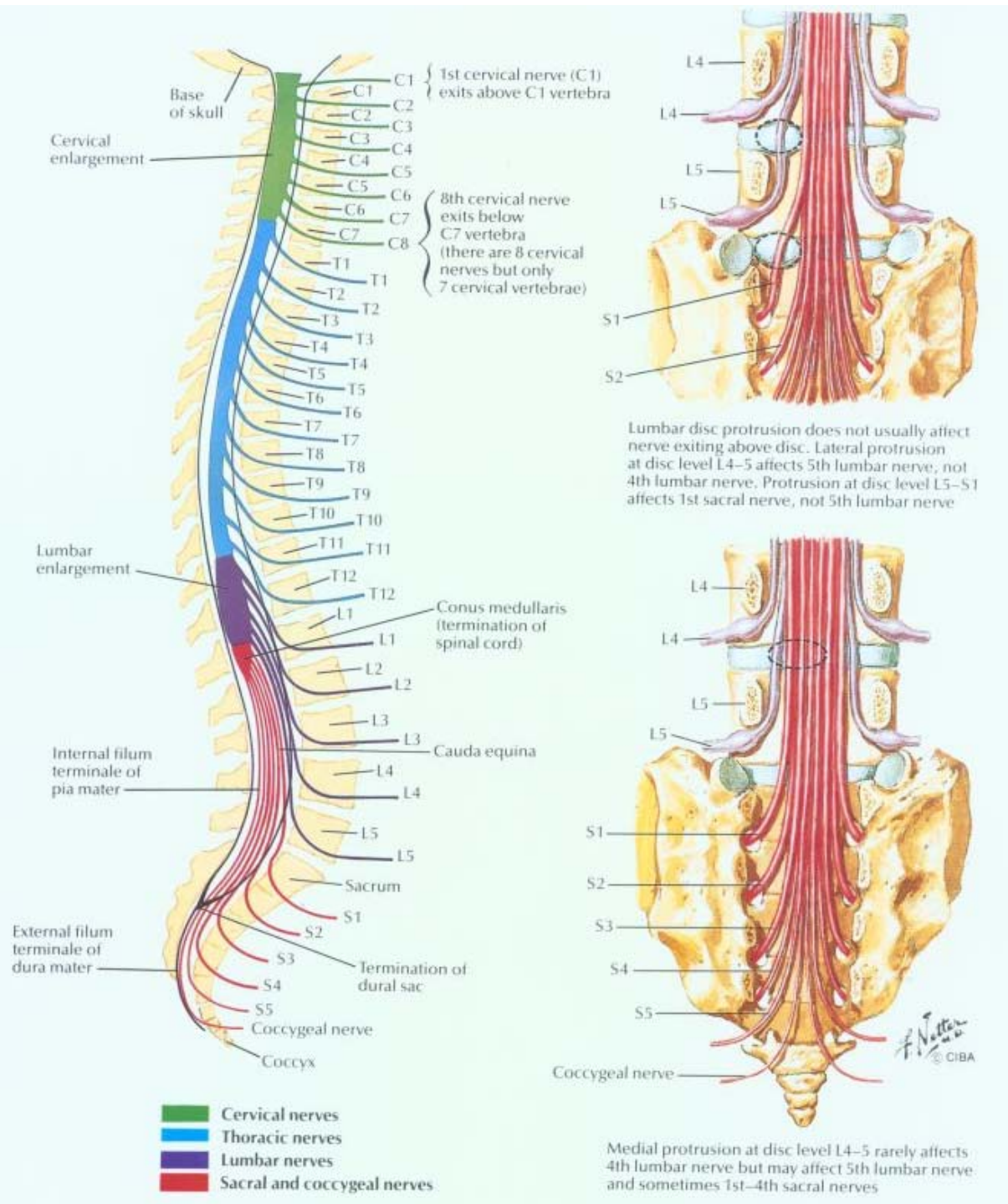
3rd and 4th lumbar vertebrae: posterior view



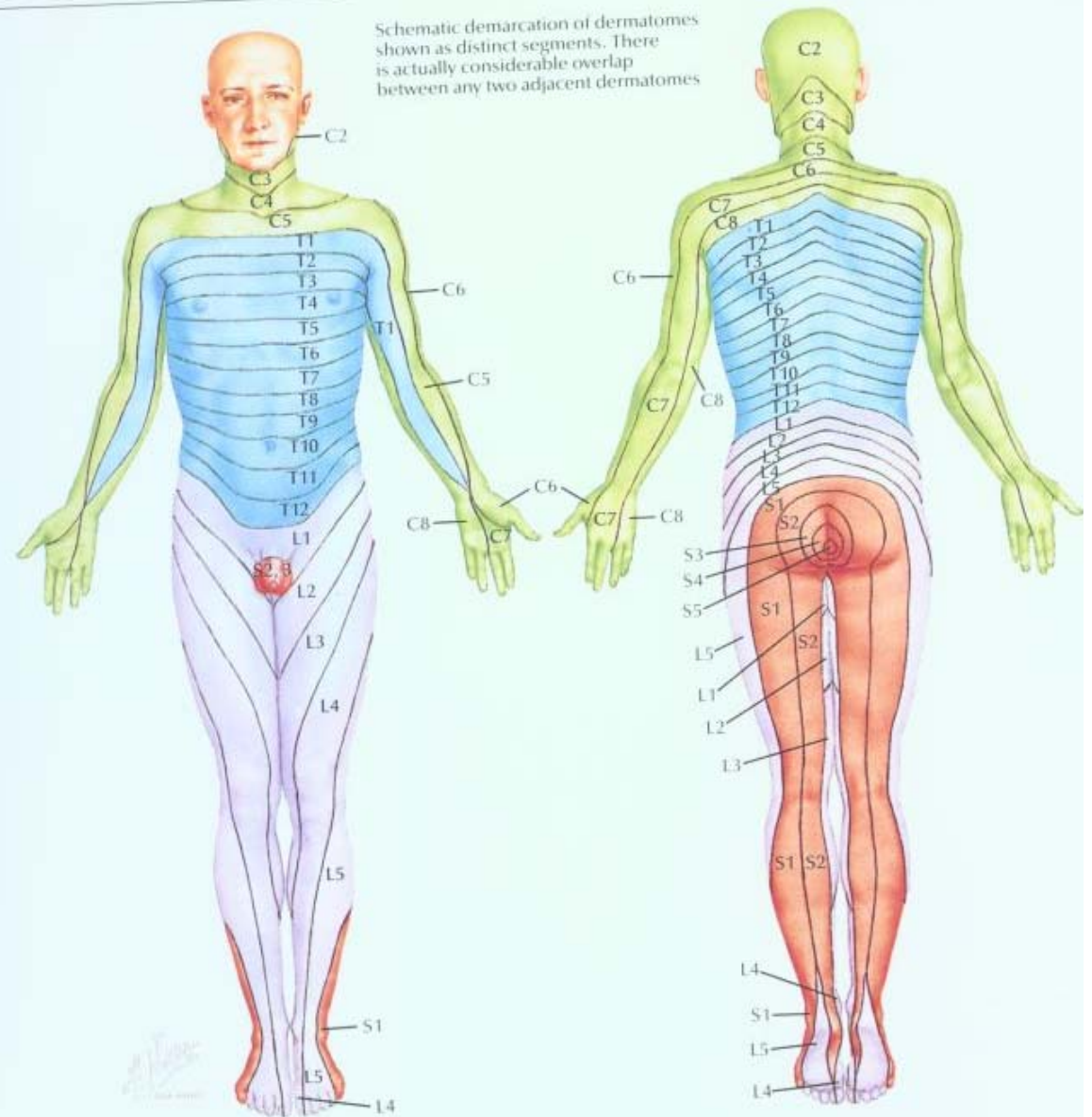
Lumbar vertebrae, assembled: left lateral view



SPINAL CORD AND NERVES



DERMATOMES



Levels of principal dermatomes

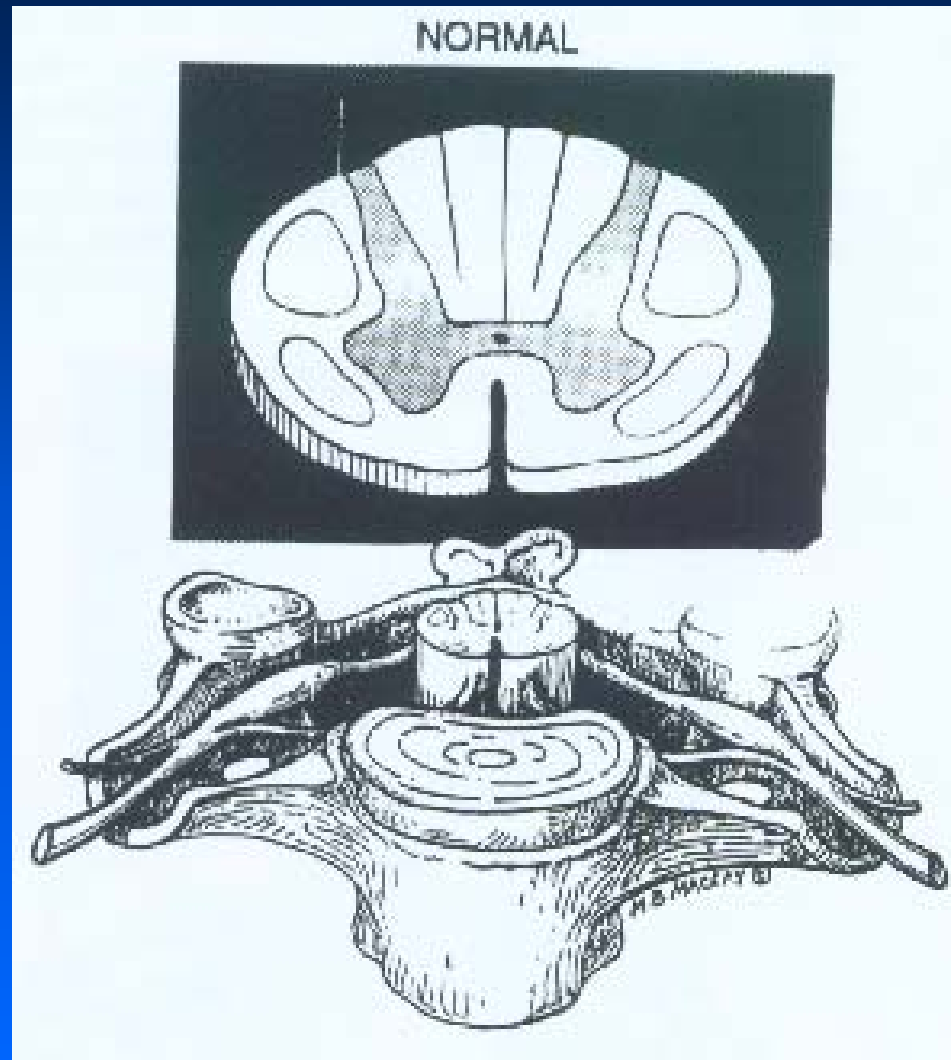
C5	Clavicles
C5, 6, 7	Lateral parts of upper limbs
C8, T1	Medial sides of upper limbs
C6	Thumb
C6, 7, 8	Hand
C8	Ring and little fingers
T4	Level of nipples

T10	Level of umbilicus
T12	Inguinal or groin regions
L1, 2, 3, 4	Anterior and inner surfaces of lower limbs
L4, 5, S1	Foot
L4	Medial side of great toe
S1, 2, L5	Posterior and outer surfaces of lower limbs
S1	Lateral margin of foot and little toe
S2, 3, 4	Perineum

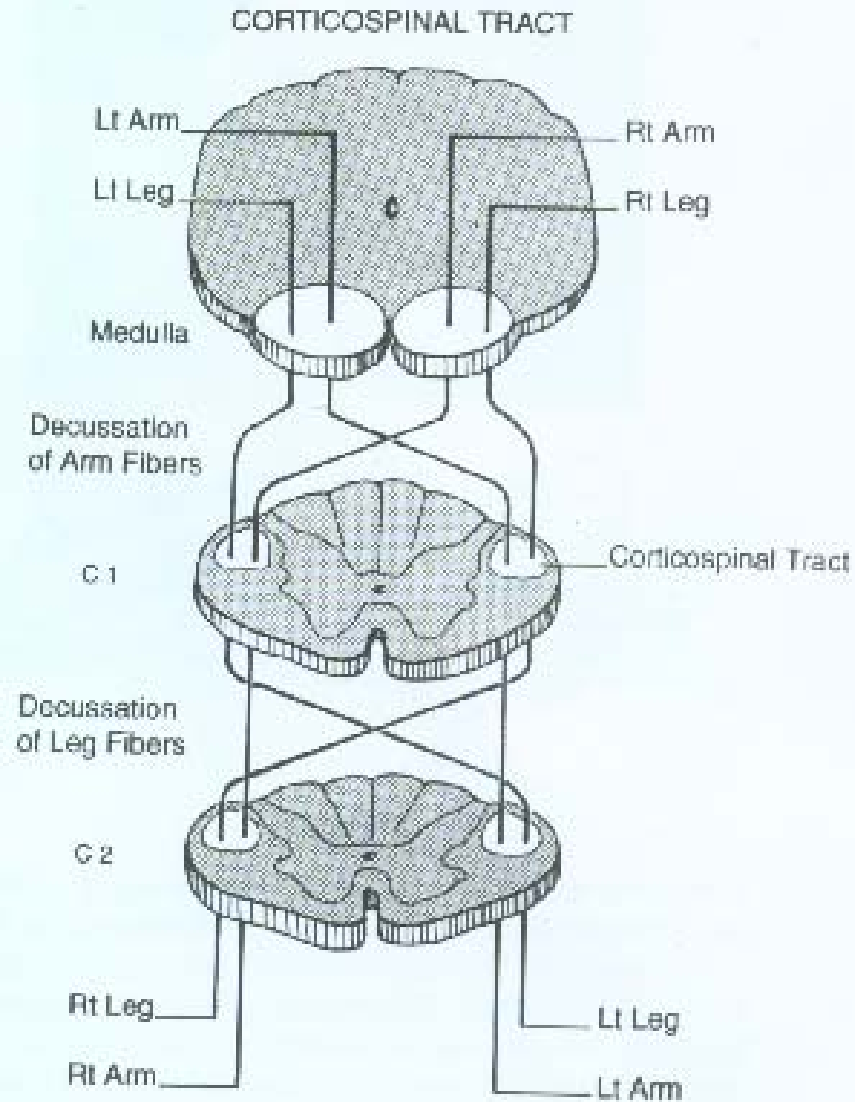


CROSS SECTION VIEW

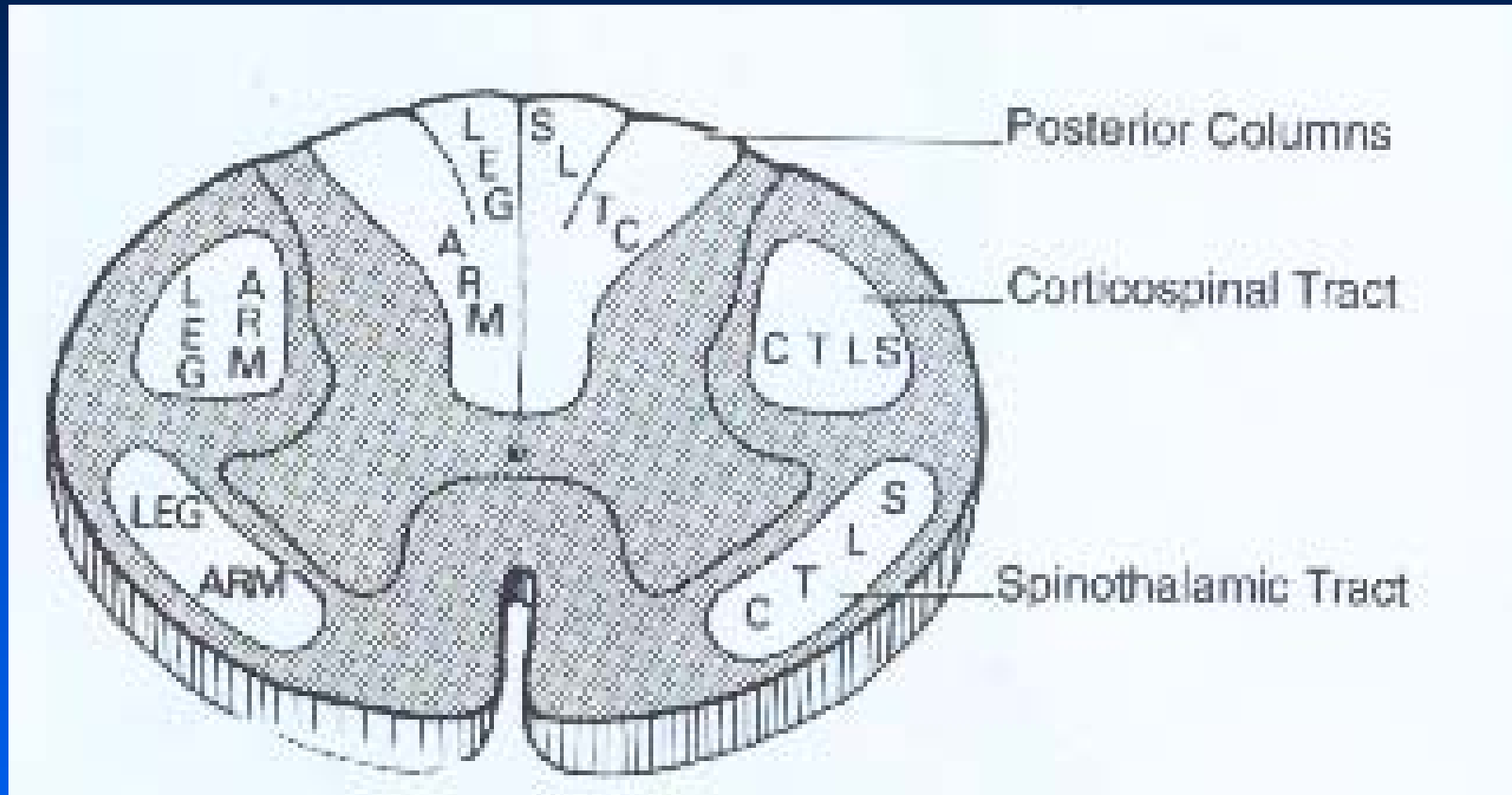
NORMAL



CORTICO-SPINAL TRACTS



ARM AND LEG FIBERS



IMPORTANT ROOT LESIONS

- ❖ C6 root - biceps absent
wasting thenar muscles
- ❖ C7 root – wasting small muscle of hand
absent triceps jerk
- ❖ C8 root- wasting hypothenar muscles
wasting small muscles of hand
- ❖ C4-C5 – absent pectoral jerk



IMPORTANT ROOT LESIONS

- ❖ **S1 root**- hypoesthesia lat side of foot
absent ankle jerk
wasting calf muscles
- ❖ **L5 root** – hypoesthesia lat side
great toe
weakness in EHL + TA
- ❖ **L4 root** -wasting quadriceps
absent knee jerk



LEVEL OF SPINAL CORD INJURY

- ✚ Neurological level
- ✚ Sensory level
- ✚ Skeletal level
- ✚ Zone of partial preservation



NEUROLOGICAL LEVEL

- Most caudal segment of spinal cord with normal motor and sensory functions on both sides.
- Normal segment may differ on two sides and may differ in motor and sensory function



NEUROLOGICAL LEVEL

4 different segment

- R & L sensory levels
- R & L motor levels



SENSORY & MOTOR LEVELS

- ◆ Most caudal segment with normal sensory and motor segment respectively on both sides



NEUROLOGICAL EXAMINATION

- **Sensory** – 28 dermatomes in each side
- **Motor** - key muscle in each of 10 dermatomes on each side



TYPICAL MUSCLES TESTED

1. Elbow flexion
2. Elbow extension
3. Wrist extension
4. Finger flexion (distal phalanx of middle finger)
5. Finger abduction-little finger

6. Hip flexion
7. Knee extension
8. Ankle dorsiflexion
9. Ankle plantar flexion
10. Long toe extension.



ZONE OF PARTIAL PRESERVATION

- ❖ Dermatomes caudal to neurological level with partial function in complete injuries



THE SKELETAL LEVEL

- ✚ Level of greatest vertebral damage on radiological examination

Skeletal levels and neurological levels may be similar or differ by one or two segments.



IMP. DERMATOME LEVELS

- ➔ C5- Clavicle
- ➔ C6,7,8 – Hand
- ➔ T4 – Nipples
- ➔ T10 – Umbilicus
- ➔ T12 - Groin
- ➔ S2 S3 S4 – Perineum
- ➔ S5 – Anus
- ➔ S2 S3- Genitalia.



MRC Classification

1943

▣ Essentially motor

- Total paralysis0
- Visible contraction1
- Movement without gravity2
- Movement with gravity3
- Movement against some
resistence4
- Normal...5



FRANKEL'S CLASSIFICATION

- A. Complete loss both motor and sensory function
- B. Complete motor loss, preservation of some sensations
- C. Motor function preserved but useless
- D. Motor function useful but weak
- E. Neurologically intact.



ASIA / IMSOP CLASSIFICATION

- ASIA = American Spinal Injury Association
1991
- IMSOP = International Medical Society of
Paraplegia 1992
- NASCIS = North American Spinal Cord Injury
Study



INTERNATIONAL STANDARDS CLASSIFICATIONS

- ❖ Grade A – complete : no motor and sensory function. no function in S4 and S5.
- ❖ Grade B – incomplete : no motor. some sensations preserved. sensations preserved in S4 and S5.
- ❖ Grade C – incomplete : muscle power less than 3 .



INTERNATIONAL STANDARDS CLASSIFICATIONS

- ❖ Grade D – incomplete : muscle power 3 or more.
- ❖ Grade E - normal : motor and sensory functions.



IMMEDIATE ASSESSMENT

NASCIS

- ➔ Motor = 0 to 5.
- ➔ No, Flicker, mov. without gravity, mov. with gravity, mov. against resistance, normal.
- ➔ 14 muscle groups on each side
- ➔ Score 0 to 70 points on each side.



ASSESSMENT SENSORY

NASCIS

- ❖ Pinprick and light touch
- ❖ 29 segments on each sides
 - No sensation 1
 - Hypoesthesia 2
 - Normal 3

Score varies from 29 to 87.

Deep pain on 6 parts: thumb, little finger and wrist with toe, ankle and knee.

Absent = 1: Diminished = 2: Normal = 3



ADL

- Self care
- Sph. control
- Mobility
- Locomotion



FIM: 6 CATEGORIES

- Self care
- Sph. control
- Mobility
- Locomotion
- Communication
- Social integration



NASCIS ASSESSMENT

- ❖ Immediately on admission
- ❖ Assessment at one year (includes FIM)





THANK YOU