

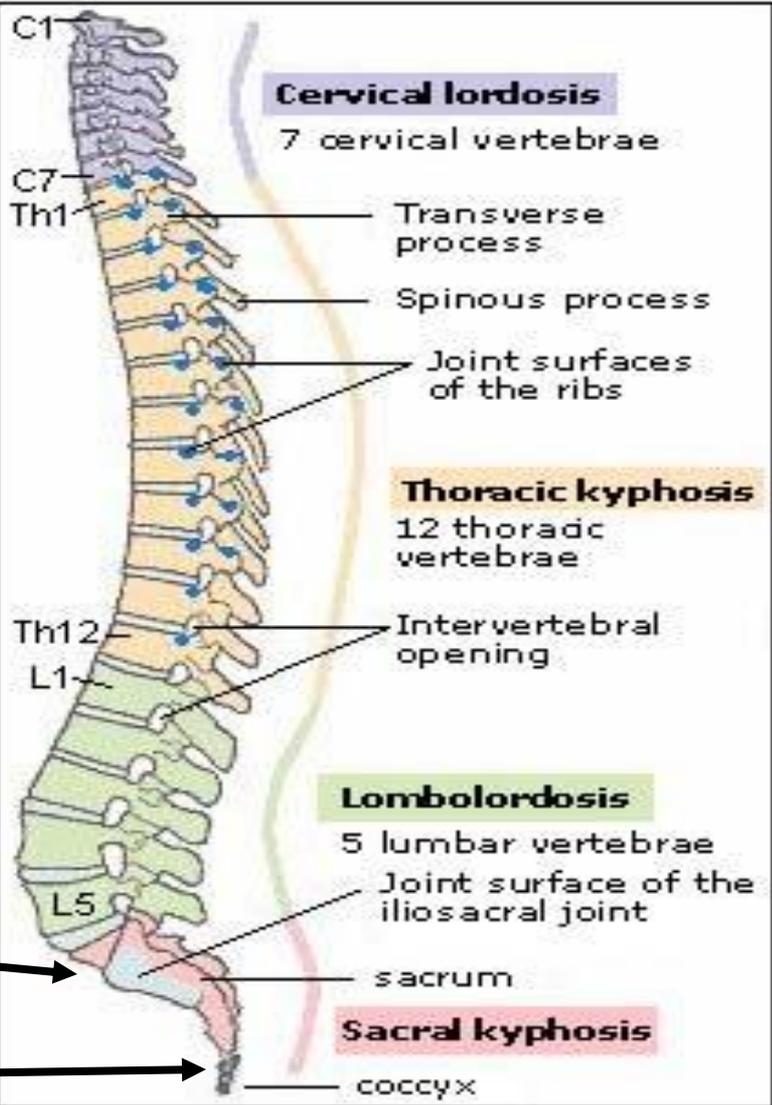
DISC PATHOLOGY

LOW BACK PAIN



THE SPINAL COLUMN

7 cervical (neck) vertebrae



12 thoracic (middle back) vertebrae

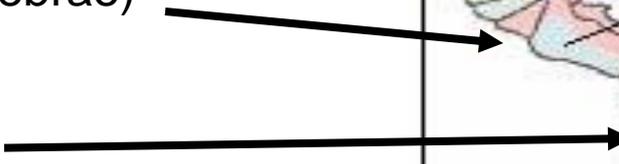


5 lumbar (low back) vertebrae



Sacrum (fused vertebrae)

Coccyx (tailbone)

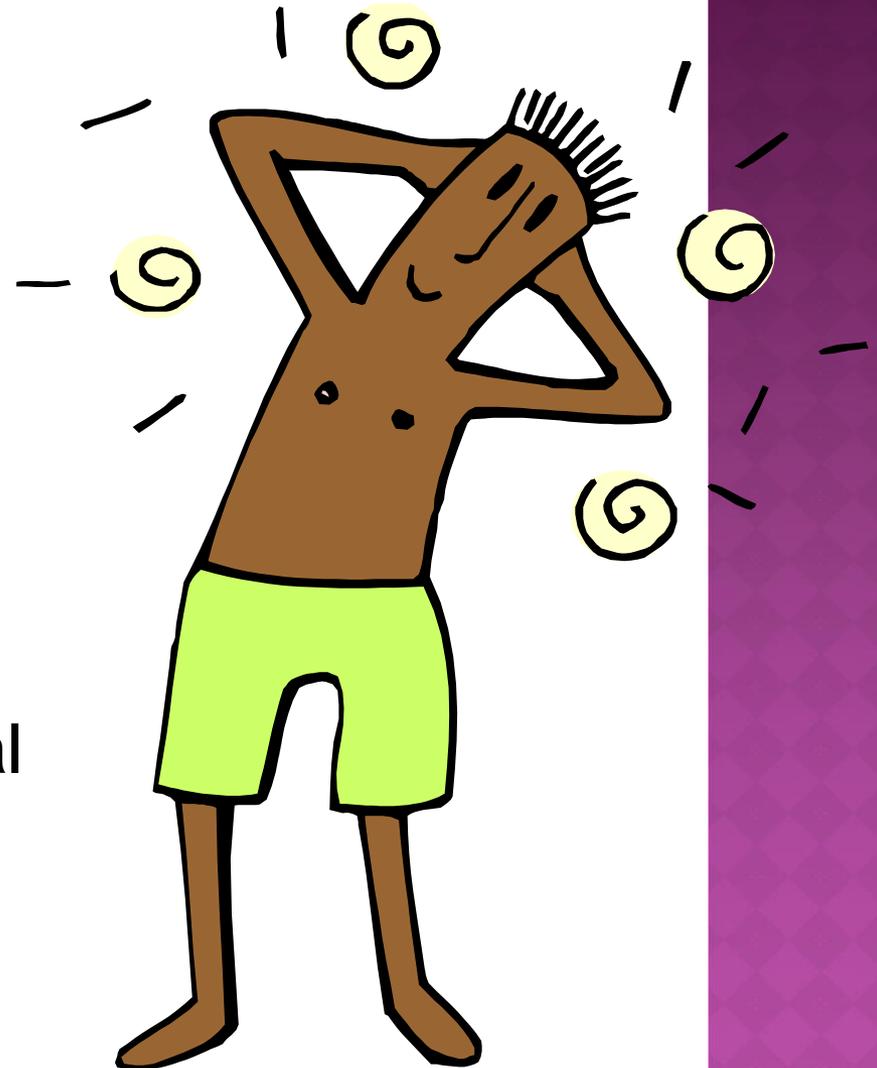


- The human spinal column is **the center of postural control**.
- It is built to provide **stability** and at the same time allow **flexibility**.
- These two seemingly incompatible functions of support (inflexibility) and movement (flexibility) are at opposite ends of a spectrum of movement, and this fact is one reason the spine is so vulnerable to injury.



THE SPINE - DISC NUTRITION

- Located between the vertebrae are **discs** which **act as the shock absorbers** for the spine.
- Discs begin losing blood supply by age 20.
- We feed our discs by moving fluids into and out of them through mechanical **compression** and **decompression**



BACK PAIN SNIPPETS

- About 85% of Americans experience back trouble by age 50.
- Back problems are the most frequent cause of activity limitations in working-age adults.
- In the long run, surgery, chiropractic care, etc., are considered no more effective than *no treatment* in reducing low back pain.



RISK REDUCTION - LIFTING TIPS

When lifting, you can substantially reduce your risk of low back injury and pain by:

1. keeping the object close to you;
2. bending your knees;
3. maintaining your lumbar curve (bend knees and stick buttocks out);
4. not twisting or bending sideways;
5. avoiding rapid, jerky movements; and
6. asking for assistance with heavy and/or bulky loads.



DISC HERNIATION



⦿ Disc herniation is a protrusion of the **nucleus pulposus** through the **ruptured annulus fibrosus**

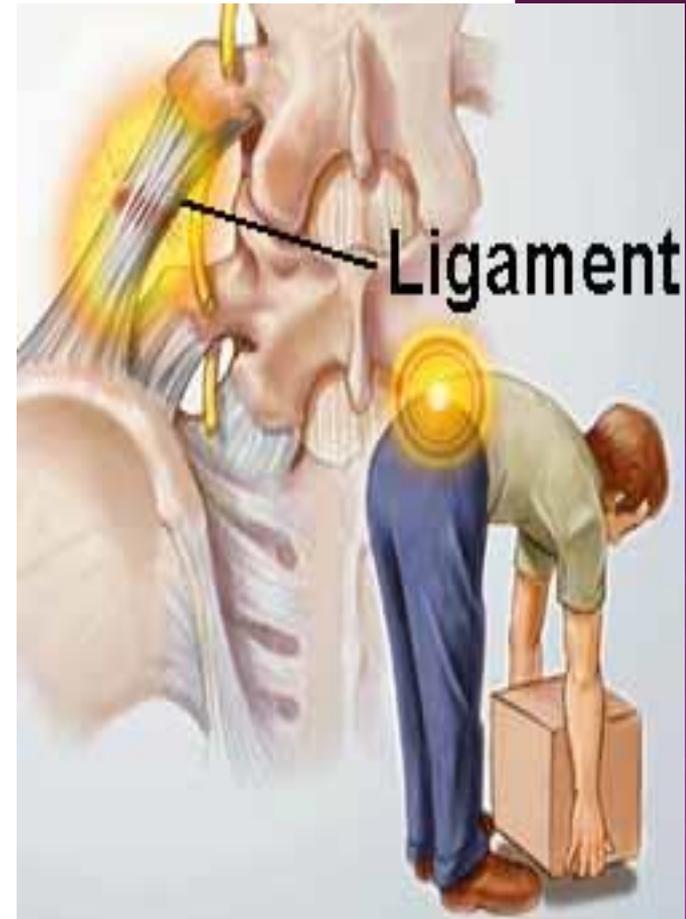
⦿ **Evolution -
4 Stages**



Disc herniation can be caused by intensive physical effort

RISK FACTORS

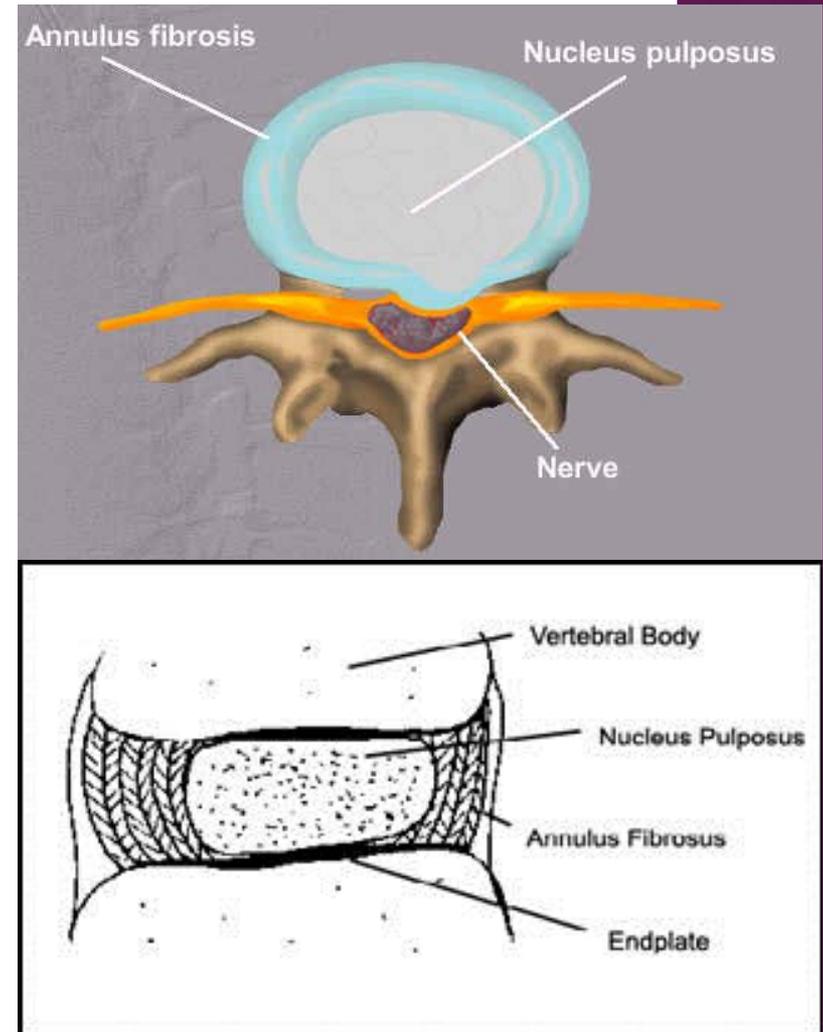
- ⦿ Ponderal excess
- ⦿ Smoke - increase discal “aging” process
- ⦿ Sedentarism - lack of physical activity increase abdominal muscle tonus
- ⦿ Profession – physically demanding jobs and drivers
- ⦿ Vertebral spine “vulnerability” - spinal curve abnormalities (scoliosis)



INTERVERTEBRAL DISCS

The disc is made up of
3 structures:

- (1) Nucleus pulposus,
gelatinous center
- (2) Annulus Fibrosus-
contain the nucleus
- (3) Vertebral end plates
that attach the disc to
the vertebrae

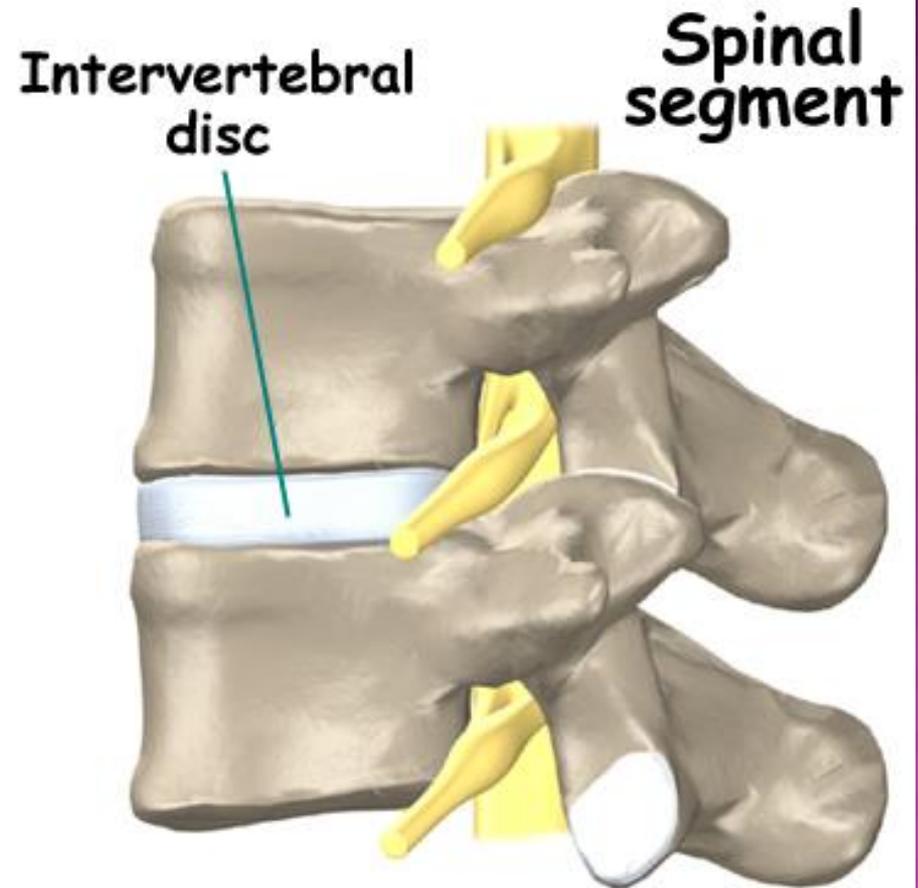


INTERVERTEBRAL DISCS

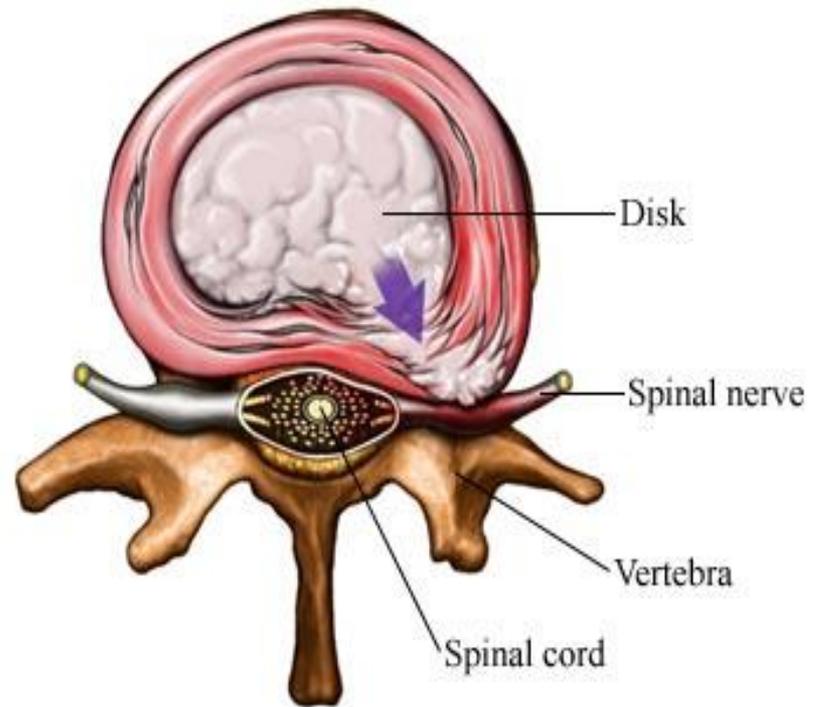
- ◉ Gel like Tissue between each vertebra
- ◉ fibro cartilaginous cushions
- ◉ serve as the spine's shock absorbing system
- ◉ protect the vertebrae, brain, and other structures
- ◉ The discs allow some vertebral motion extension and flexion.

Can Occur when there is enough pressure from the vertebrae above and below

This can force some or all of the nucleus pulposus through a weakened or torn part of the annulus fibrosus.

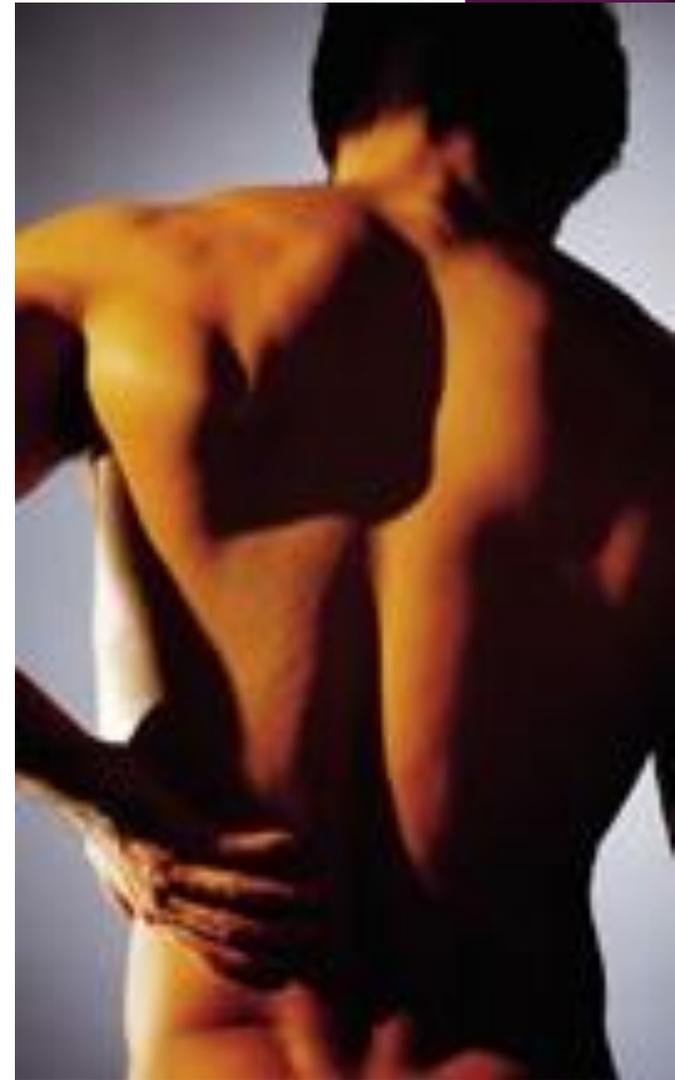


- The ruptured nucleus will often come in contact with and press on nerves near the disc.
- This can result in severe pain
- About 90% of herniated discs occur in the lumbar region. The discs in the cervical region are affected about 8%, those of the thoracic region only about 1-2%
- Herniated discs are one of the most common causes of back pain



CLINIC: LOMBAR SPINE

- Acute low back pain
- Chronic low back pain
- ***Intense low back pain*** increased by mobility and decreased by repause
- ***Clinical examination*** - static deformity of the spine, painful palpation and percussion, muscle contracture, mobility limitation



RADICULAR SYNDROM

- ⊙ compression of the nerve by the nucleus → *radicular syndrome* with one or more clinical features:
 - Positive elongation maneuvers
 - Abolited/decreased OTR
 - sensibility testing: hypoesthesia, anesthesia
 - Muscle strength deficit

Commune sciatica:

- ⊙ 1. lumbar sciatica L5
- ⊙ 2. lumbar sciatica S1

- ⊙ crural neuralgia



LOMBAR SCIATICA L5 AND S1

- 30-40 years
- >95% → L4-5 and L5-S1
- 75% resolve in 6 months
- 5-10% require surgery

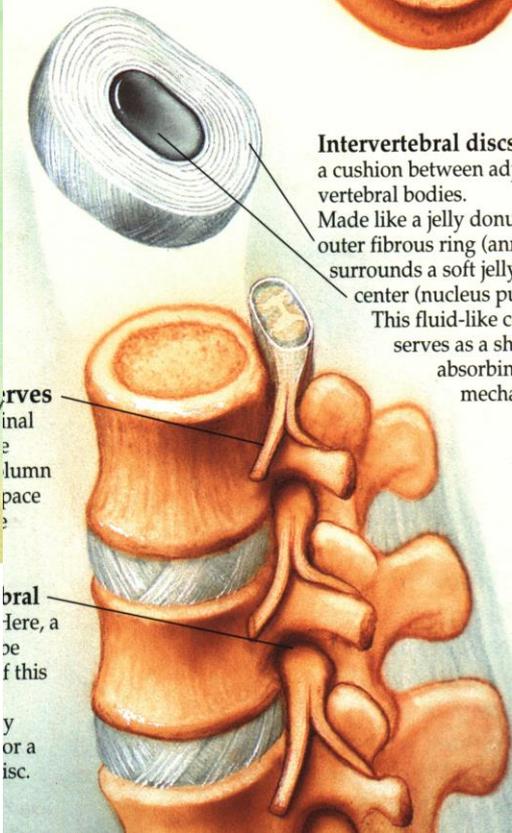
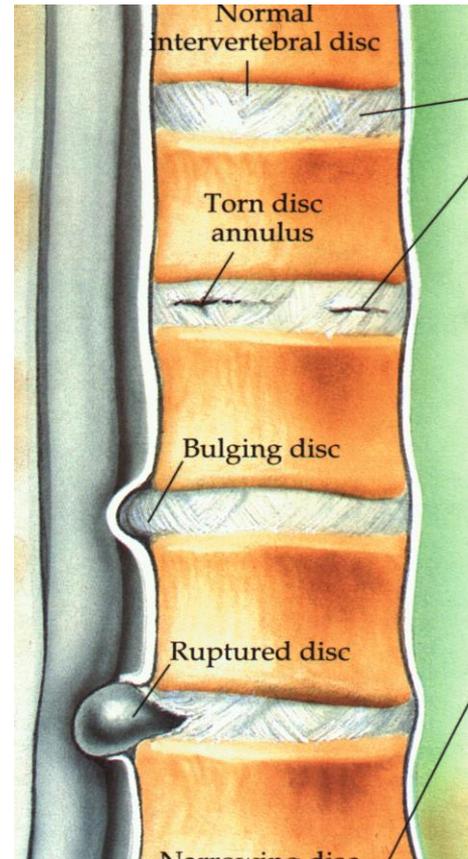
Joints

Facets:

- synovial joint (cartilage, capsule, synovium)
- limit extension/flexion

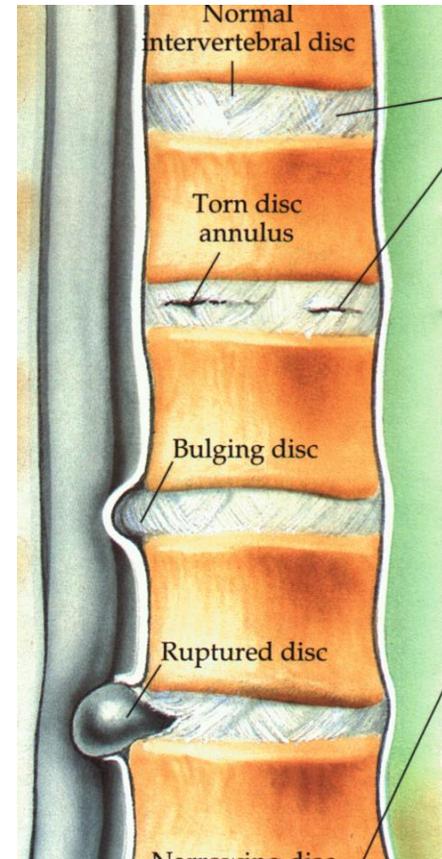
Disc

- nucleus pulposus
- two end plates
- annulus fibrosis



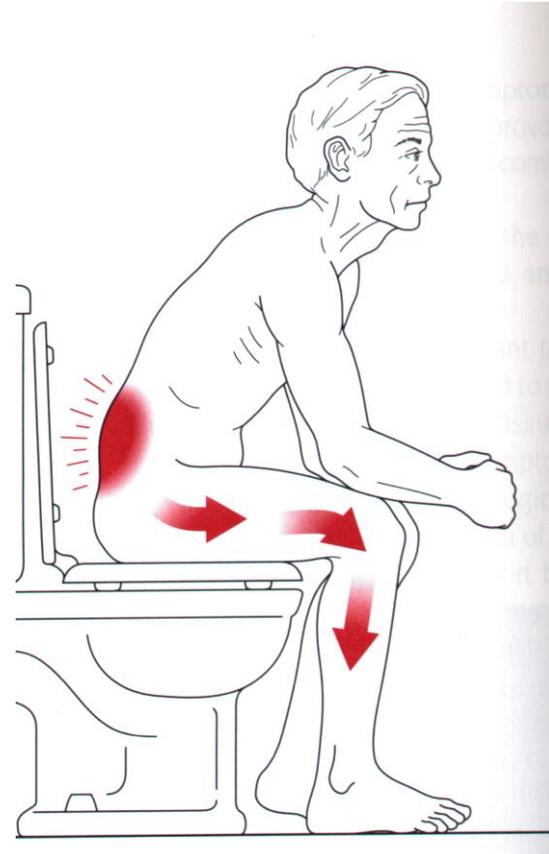
PAIN

- ⦿ Torn annular fibers of disc
- ⦿ Chemical and mechanical irritation of:
 - spinal root
 - soft tissues (posterior longitudinal ligament)



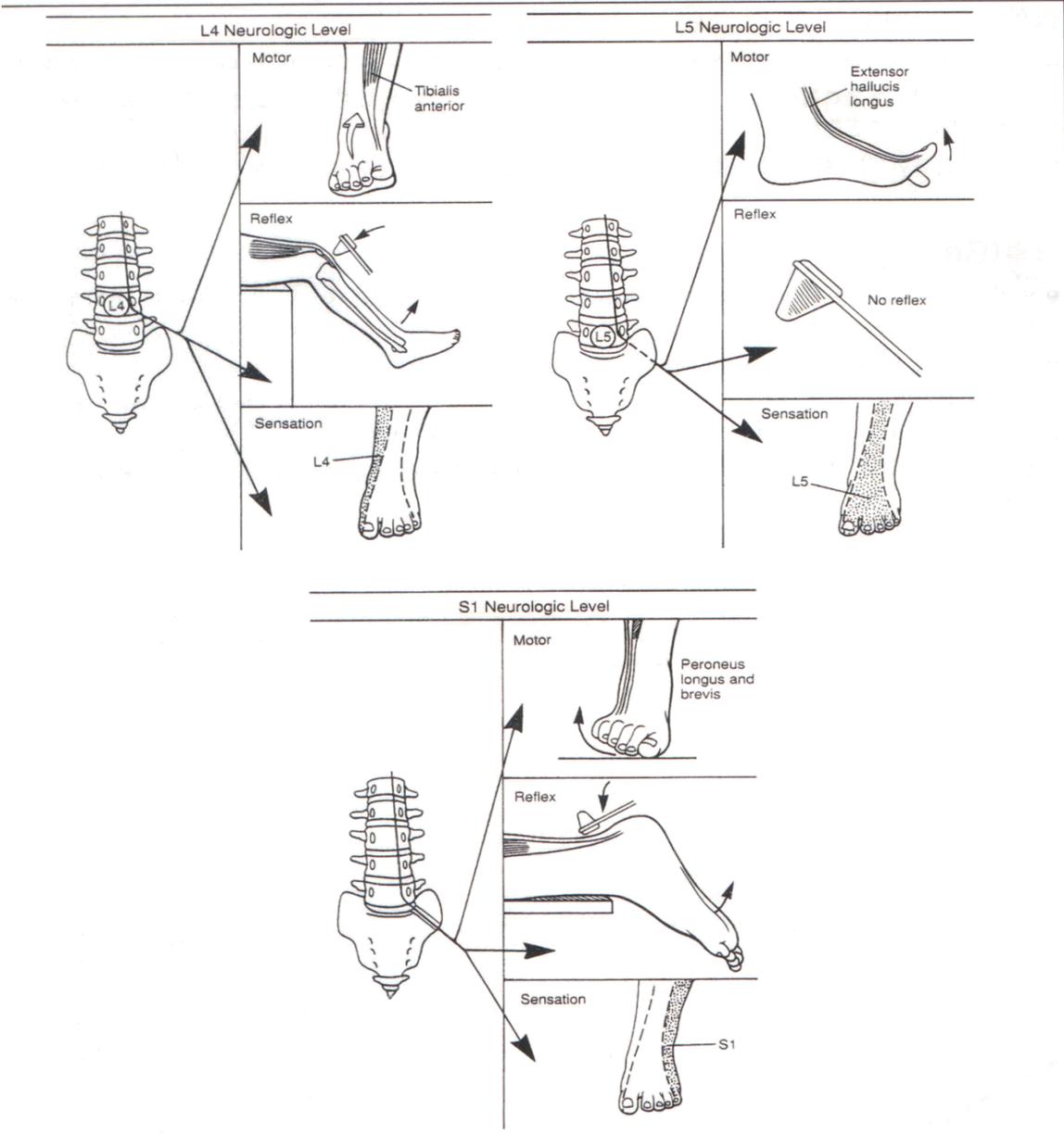
OTHER SYMPTOMS

- Cough/valsalva exacerbation
- Distal neuro sx - weakness/paresthesia
- **Bowel/bladder sx**



NEUROLOGIC EXAMINATION

Root	Sensory	Motor	Reflex
L-1	Groin		—
L-2	Anterior thigh	Iliopsoas	—
L-3	Lateral thigh/knee	Quadriceps	—
L-4	Medial leg (postero-lateral thigh, across patella, anteromedial leg)	Anterior tibialis, quadriceps	Patella
L-5	First dorsal web space; medial foot (posterior thigh, anterolateral leg, medial foot, and great toe)	Extensor hallucis longus; extensor digitorum longus and brevis, gluteus medius	None (post-tibialis)
S-1	Lateral foot (posterior thigh and leg, posterolateral foot, lateral toes)	Gastrocnemius; peroneus longus and brevis, gluteus maximus	Achilles



L4

- Motor- quadriceps and tibialis anterior
- Sensory- anterior foot
- DTR- patellar

L4 NEUROLOGIC LEVEL

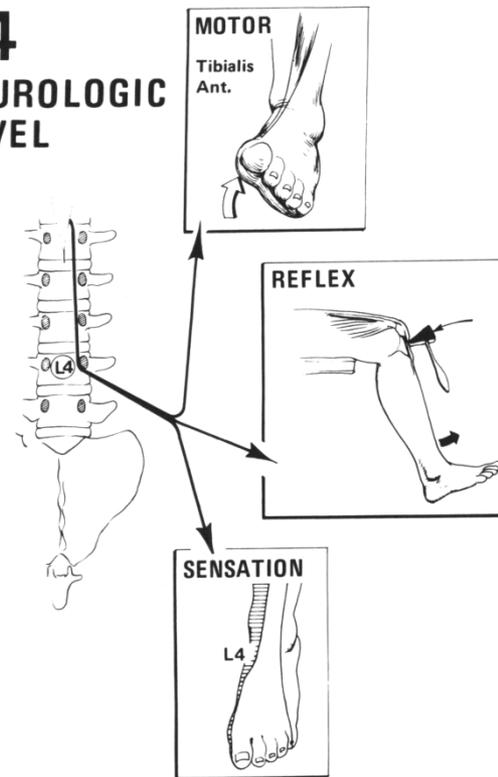
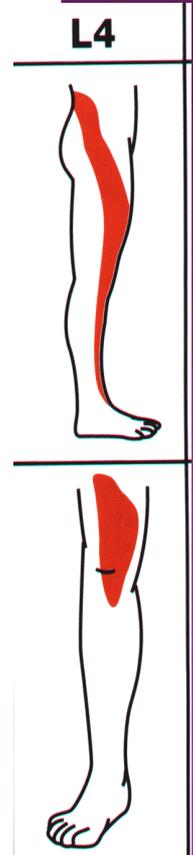
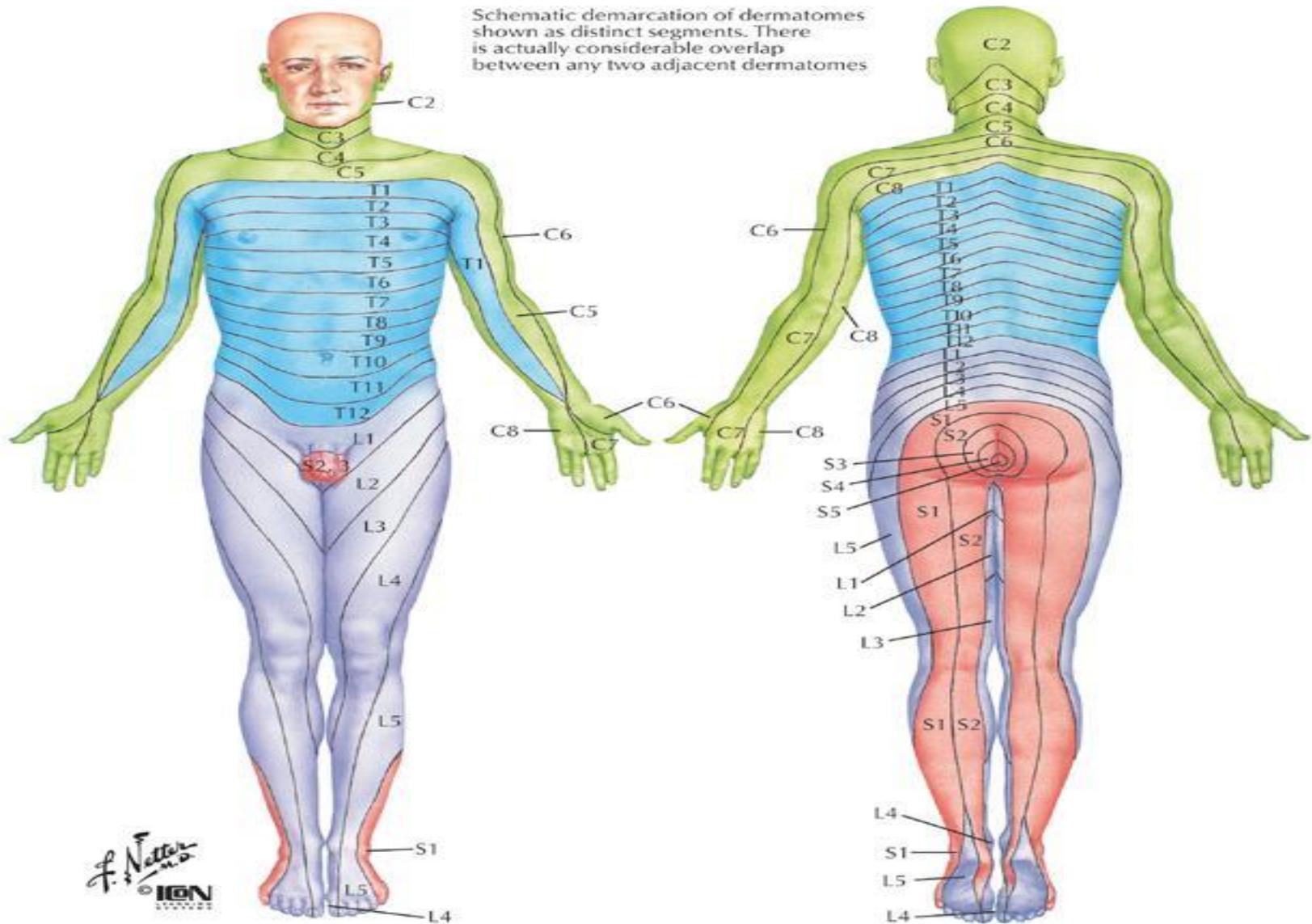


Fig. 30. Neurologic level L4.



Schematic demarcation of dermatomes shown as distinct segments. There is actually considerable overlap between any two adjacent dermatomes



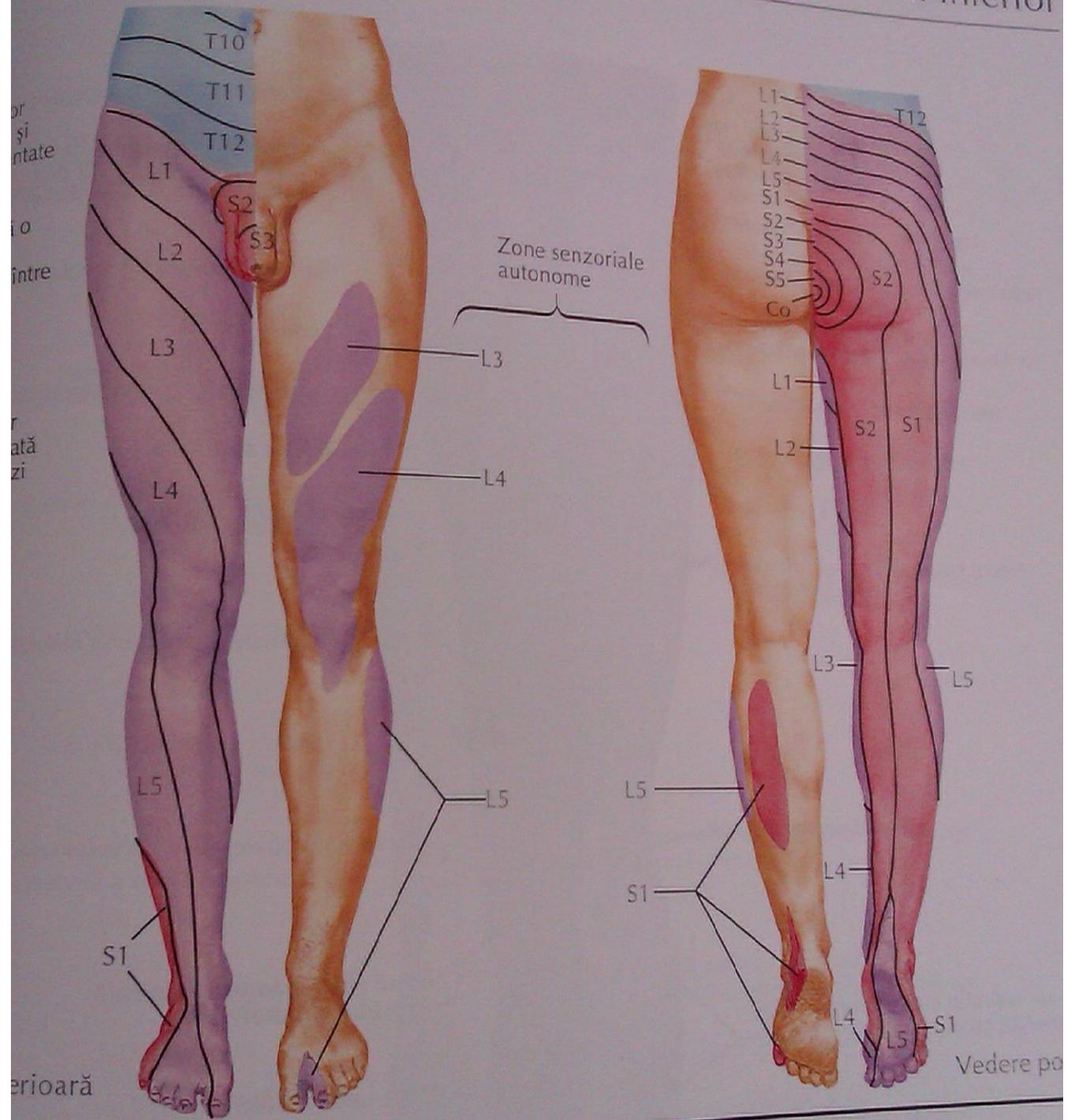
Levels of principal dermatomes

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

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

Level of umbilicus



L5

- Motor- extensor hallicus longus
- Sensory- external thigh, dorsal foot
- DTR- none

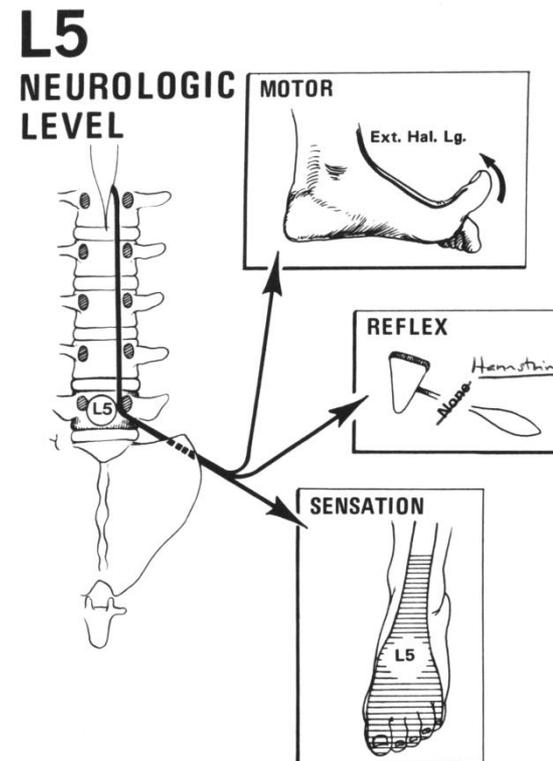
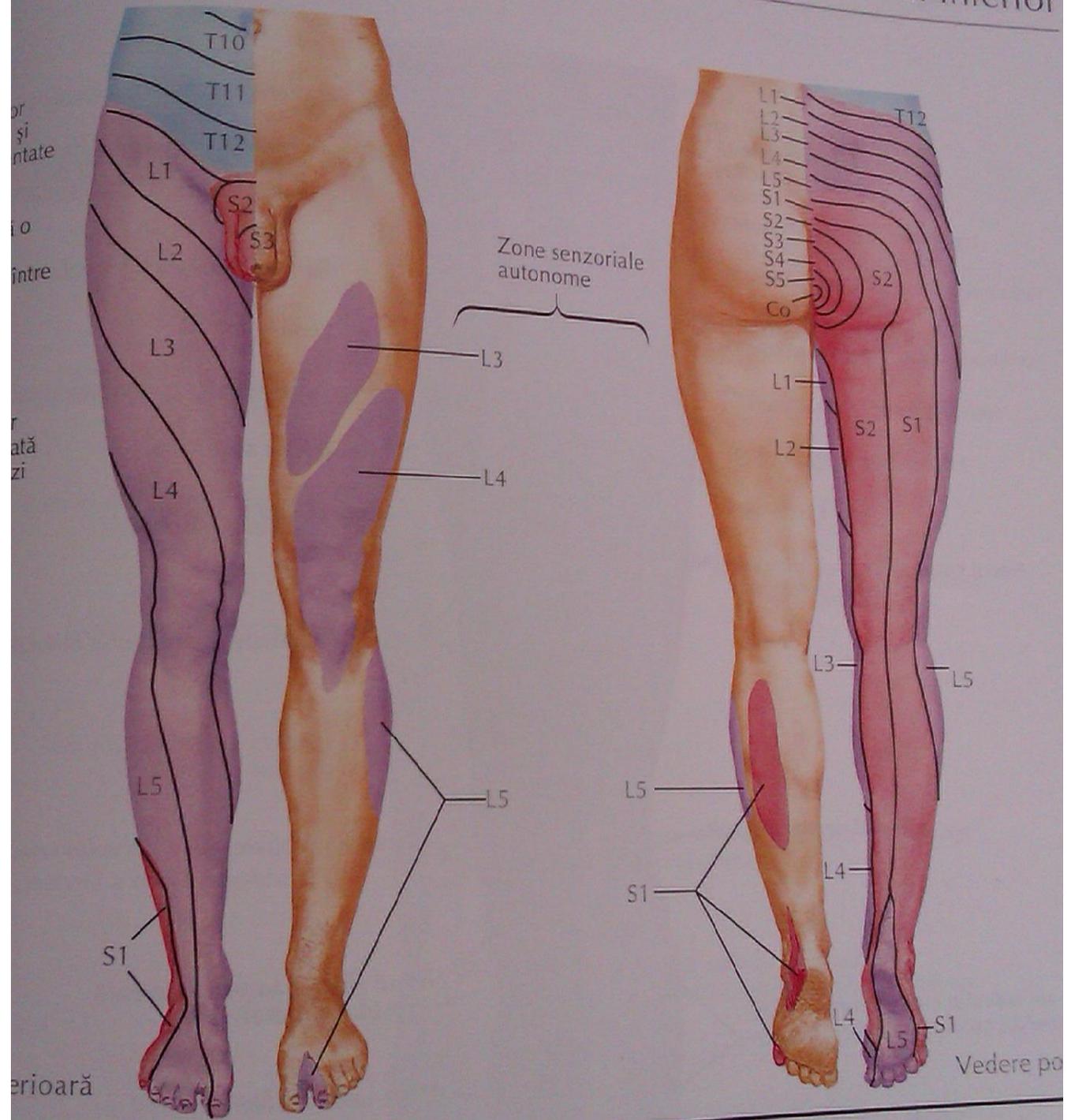


Fig. 31. Neurologic level L5.





S1

- Motor- foot plantar flexion and eversion
- Sensory- posterior foot
- DTR- achilles

S1 NEUROLOGIC LEVEL

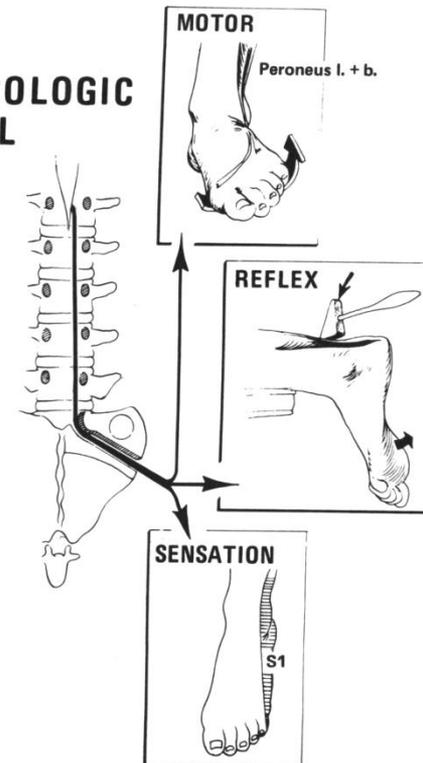
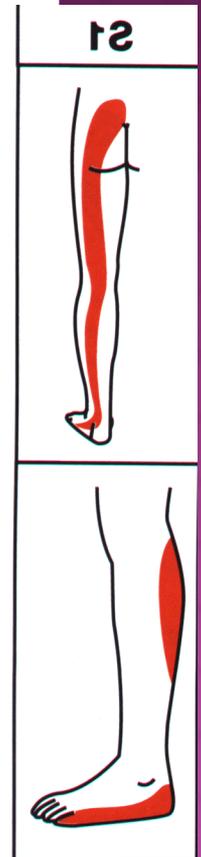


Fig. 32. Neurologic level S1.



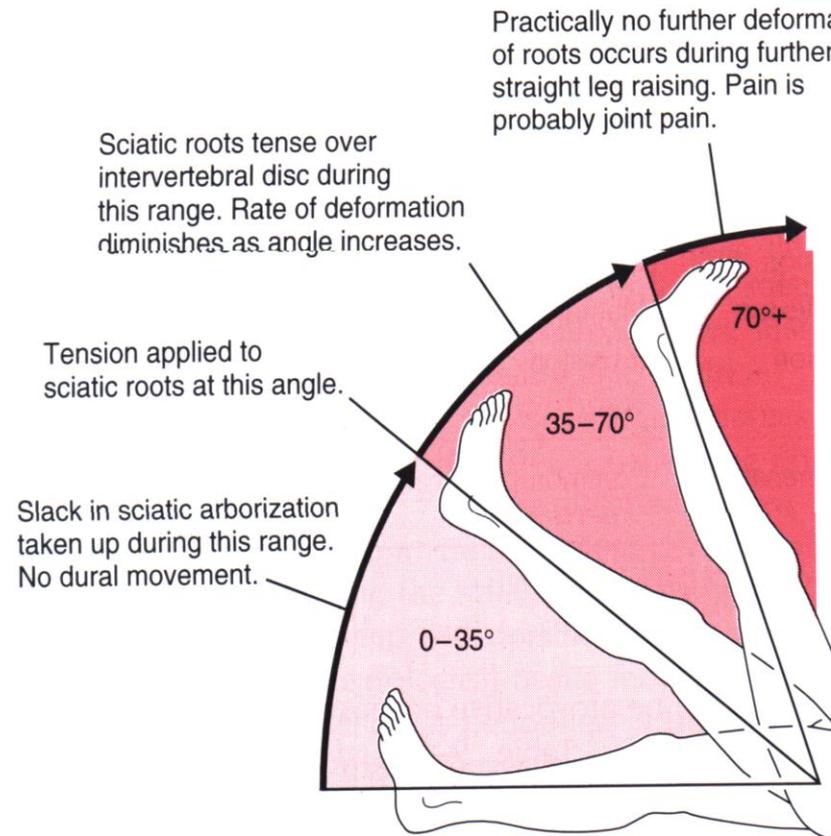
LASEGUE TEST → L5/S1



Fig. 8-52 The patient is supine, with both legs fully extended. The examiner places one hand under the ankle of the affected leg and the other hand at the knee. The hip and knee are flexed to 90 degrees, respectively. The nerve roots are under no tension and pain should not be elicited.



Fig. 8-53 The knee is extended by the examiner. If this maneuver is limited by pain, the Lasègue test is positive. The test suggests sciatica from lumbosacral or sacroiliac lesions, subluxation syndrome, disc lesions, spondylolisthesis, adhesions, or intervertebral foramen (IVF) occlusion.



LASEGUE INVERTED → CRURAL



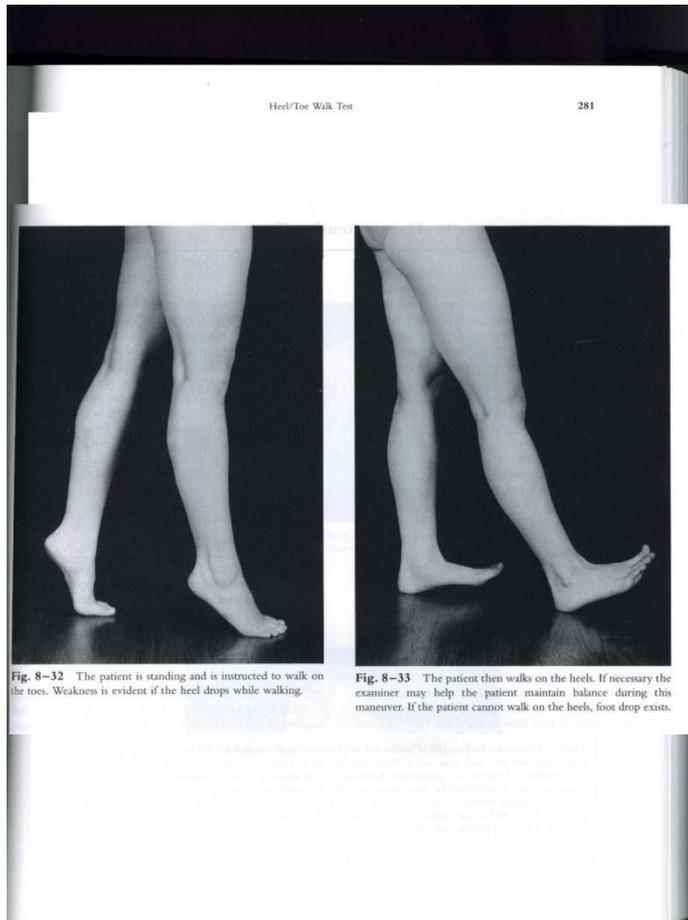
Fig. 10-9 Prime movers in extension of the hip are the gluteus maximus (inferior gluteal nerve, L5, S1, and S2), semitendinosus (tibial branch of sciatic nerve, L4, L5, S1, and S2), and semimembranosus (tibial branch of sciatic nerve, L5, S1, and S2) muscles, and the long head of the biceps femoris (tibial branch of the sciatic nerve, S1, S2, and S3) muscle. To measure the strength of the gluteus maximus, the patient is placed prone on the examining table and is directed to extend the hip against the examiner's hand, which is placed on the thigh and pelvis.

BRAGARD'S → L5/S1



- Dorsiflexes the whole foot

HEEL-TOE WALK



Negative toe walk = S1
Negative heel walk = L5

PLANTAR & DORSIFLEXION

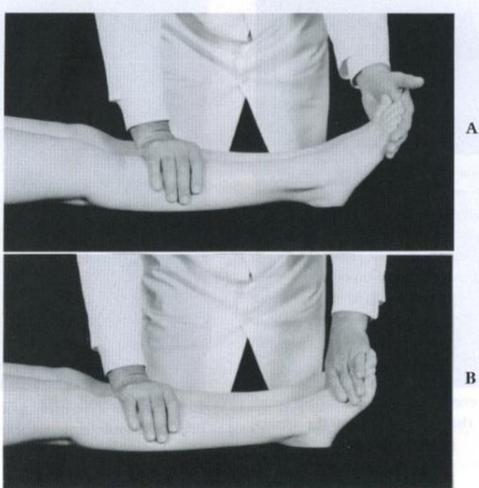


Fig. 12-5 The soleus and gastrocnemius should be evaluated separately. The soleus is evaluated by applying a dorsiflexion force to the foot while the patient plantar flexes the foot (A). The maneuver is performed with the knee in extension to evaluate the muscle power of the gastrocnemius. The tibialis anterior is tested by exerting a counterforce to the dorsiflexion and inversion movement of the foot and ankle (B).

Pain against dorsiflexion = L4
Pain against plantar flexion = S1

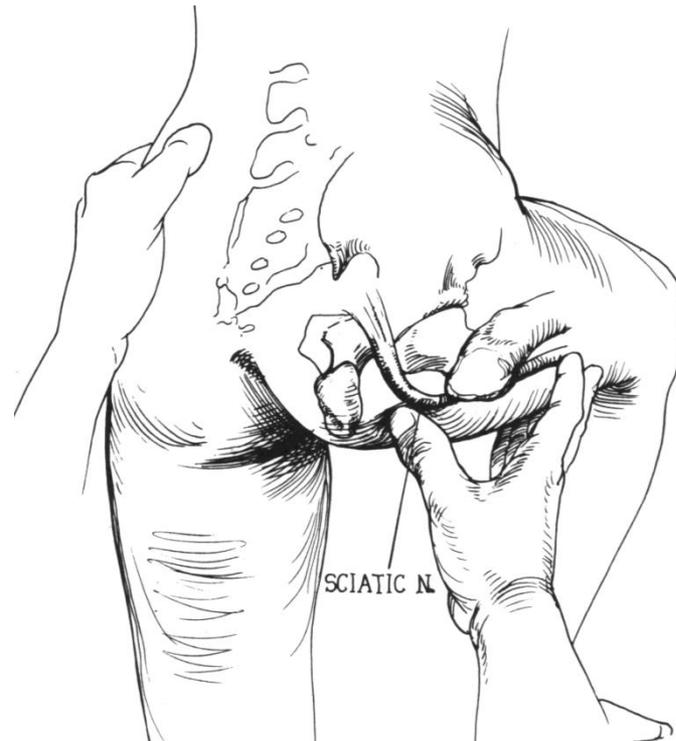
LEG EXTENSION



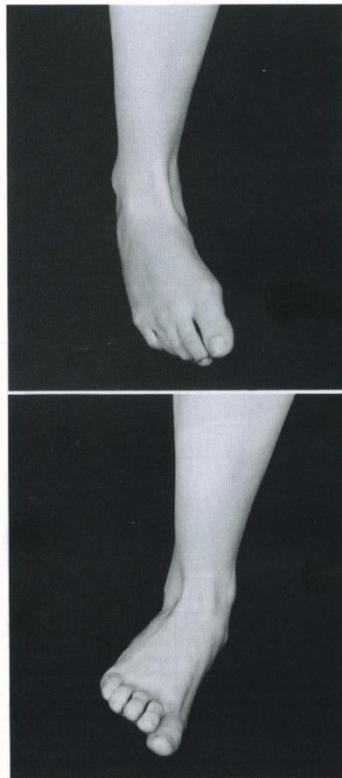
- Femoral nerve
- L2, L3, L4

PALPATION

- ◉ Spinous processes
- ◉ Dorsal lumbar fascia/soft tissues
- ◉ Sacral notch tenderness



INVERSION & EVERSION



- ⊙ Against inversion = L4, L5
- ⊙ Against eversion = S1

CLINICAL: DORSAL SPINE

- 1. Acute dorsalgia***
- 2. Chronic dorsalgia***
- 3. Intercostal neuralgia***

INVESTIGATIONS

- ◉ *Lumbar spine X-Ray*
- ◉ *Myelogram*
- ◉ ***MRI***
- ◉ ***CT***
- ◉ *Nerv Speed Conduction*
- ◉ ***EMG***

DIAGNOSTIC TEST

Simple x-ray

- ◉ Disc space narrowing

MRI(magnetic resonance imaging)

- ◉ Disc pathology, neural structure, musculoligamentous structure
- ◉ Soft tissue edema, hematoma, intrinsic cord abnormality
- ◉ Synovial cyst, neurofibroma, perineural cyst
- ◉ 30% of asymptomatic individual have abnormal MRI

CT, Myelography



TREATMENT OBJECTIVES

1. Pain relief
2. Compression decreasing
3. Recovery of the physical, psychological, and socio-professional potential
4. Efficient prophylaxis by patient education

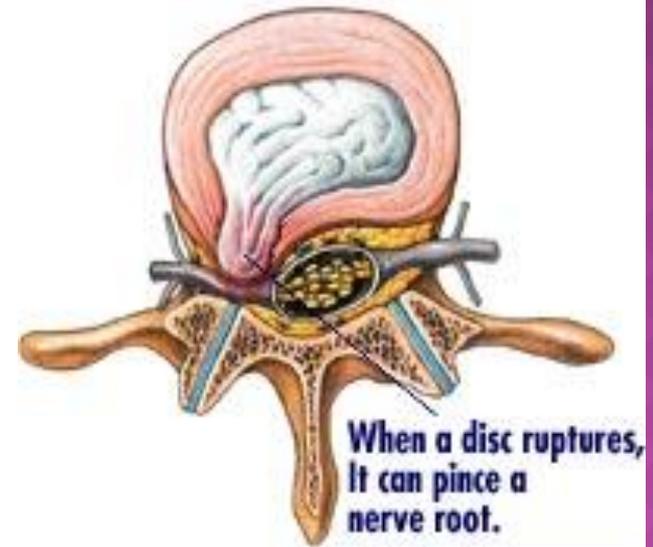
NONOPERATIVE TREATMENT

- ◉ 90% of patient improve with conservative treatment
- ◉ Short-term rest, NSAID, analgesics, antispasmodic medication, exercise
- ◉ Physical therapy
- ◉ Oral corticosteroid

** Conservative treatment should continue for **6weeks**, before other measure are attempted

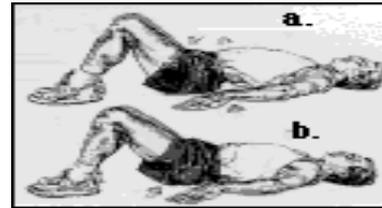
MEDICATION

- **Analgesics** (non-opioids Analgin, Piafen or opioids- Tramadol) for pain relief
- **NSAIDs** (Diclofenac, Piroxicam, etc) or/and **Steroids** (Diprophos) for pain relief and decreasing inflammation
- **Muscle relaxants** (Mydocalm, Neuriplege)
- **Neurotrophics**



PHYSICAL AND KINETIC METHODS

- **medical gymnastics** adapted to acute pain – specially for muscle relaxation
- **physiotherapy** - using different types of electrical currents for pain relief and inflammation decreasing
- **Balneotherapy** (i.e. sulphur baths) indicated after inflammation is decreased



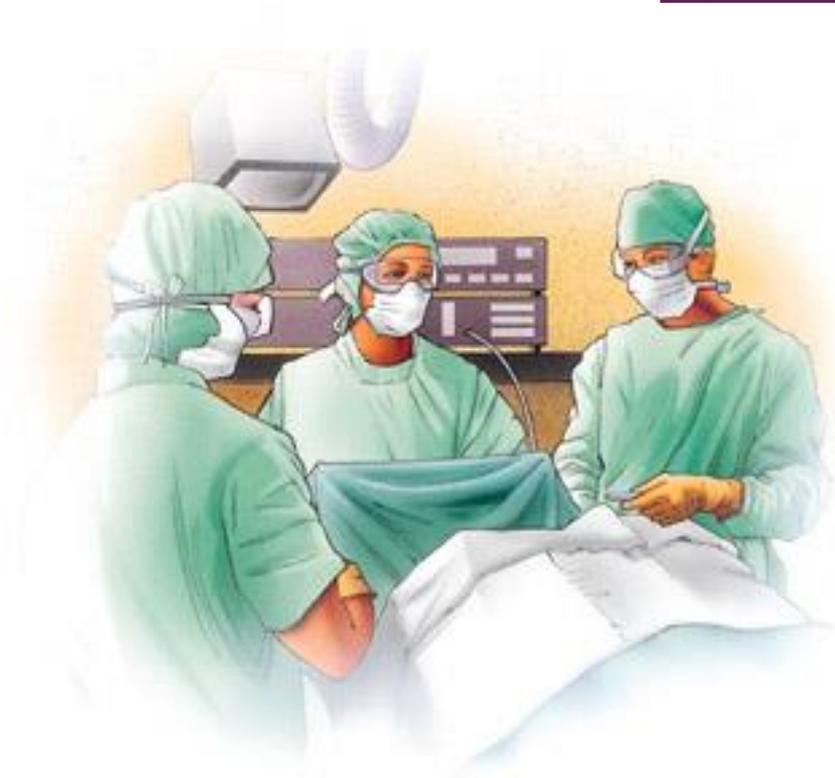
SURGERY

○ *Indication:*

- *Paretic/paralytic radiculitis or with urinary incontinence*
- *Hyperalgesic radiculitis*
- *Non – responsive treatment radiculitis*
- *Cauda equina syndrome*

○ *Methods:*

- Discectomy
- Laminectomy
- Foraminotomy



CERVICOBRACHIAL NEURALGIA

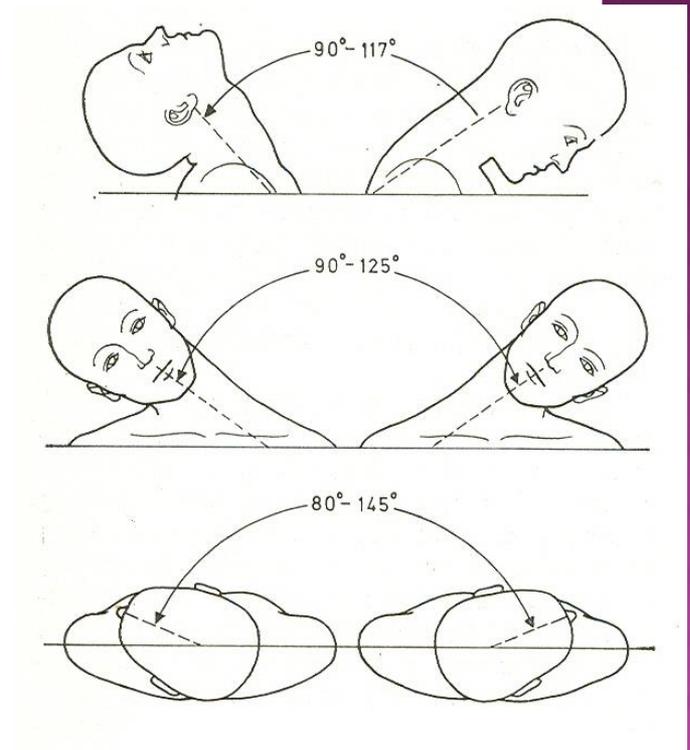


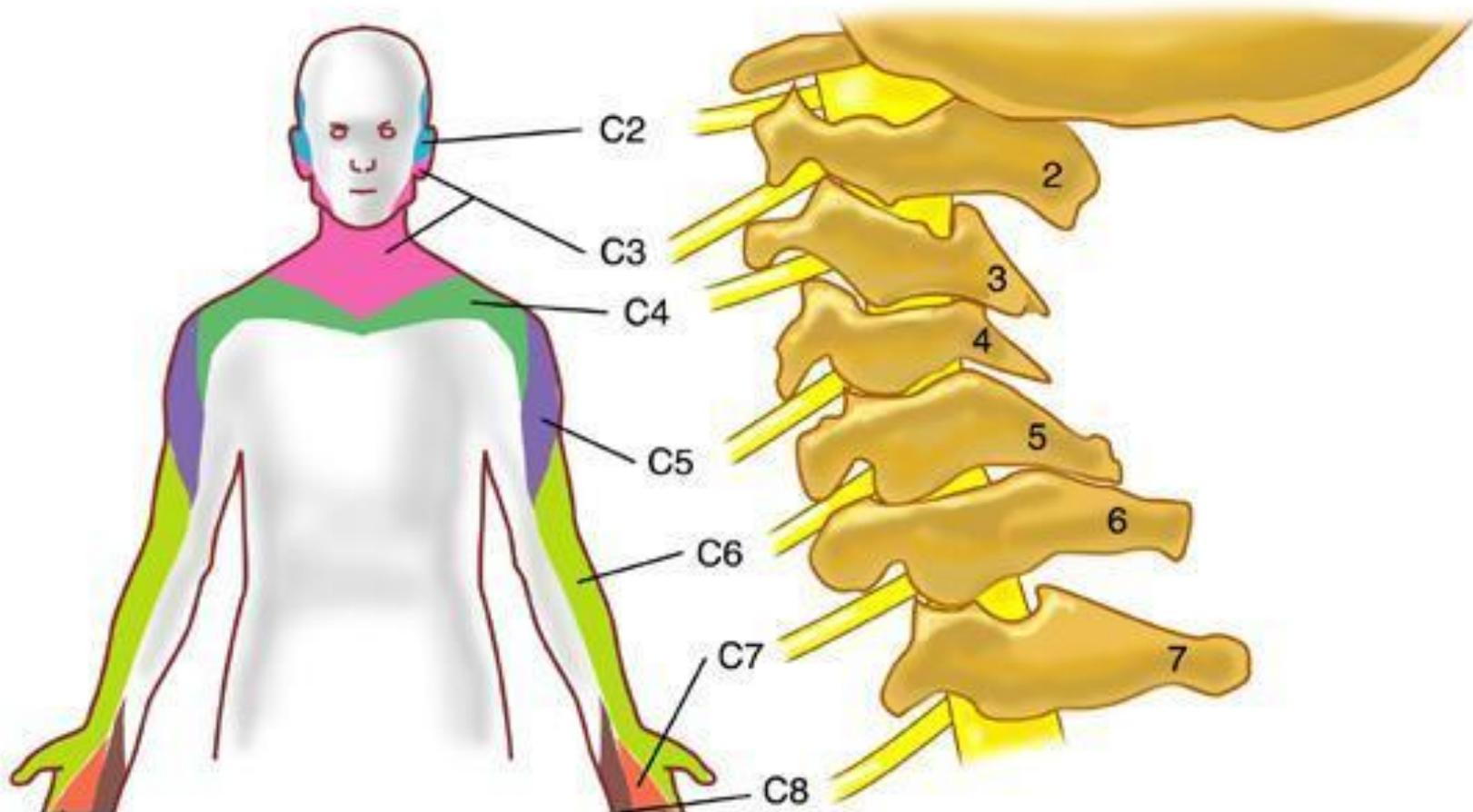
CLINICAL: CERVICAL SPINE

- 1. Acute cervicalgia***
- 2. Chronic cervicalgia***
- 3. Cervicobrachial neuralgia***

:

- Flexion – extension 90° - 117°
- Lateral flexion 90° - 125°
- Rotation 80° - 145°





Cervical Radiculopathy: Hand and Arm Pain



A. Healthy Cervical Spine



B. Central Stenosis



C. Foraminal Stenosis

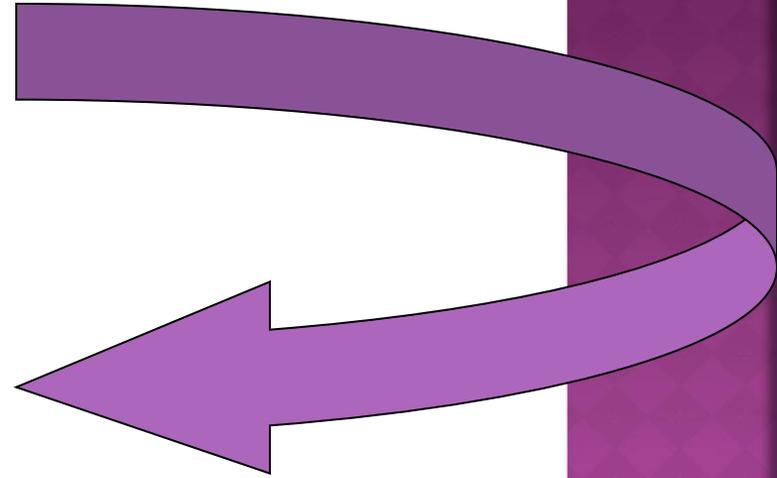


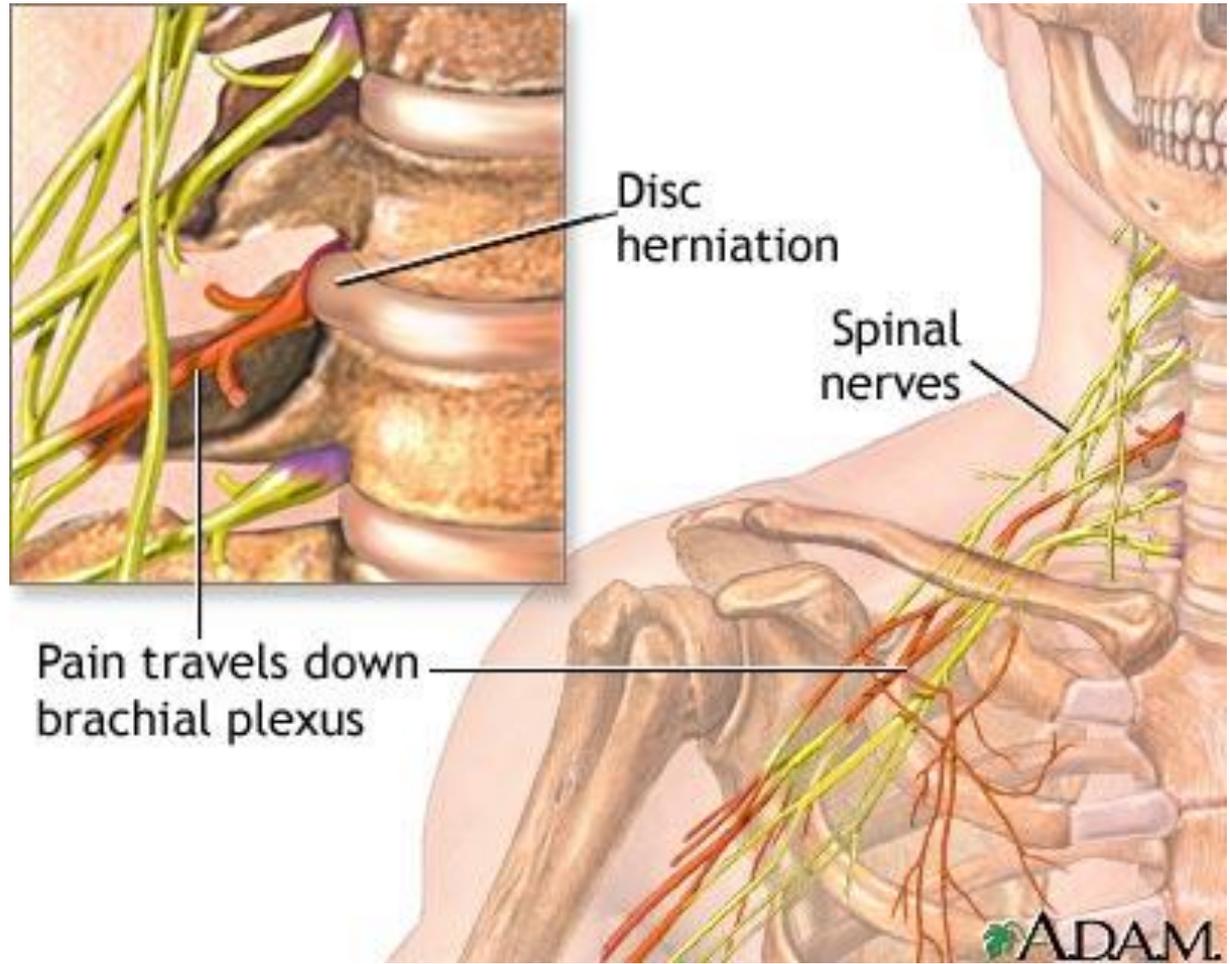
D. Herniated Disk

Types of Cervical Spine Problems

DEGENERATIVE CHANGES

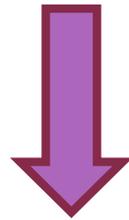
- Osteophytes
 - Discus prolaps
- }
- On spinal roots
 - On the spinal cord
 - On the vertebro basilar arthery





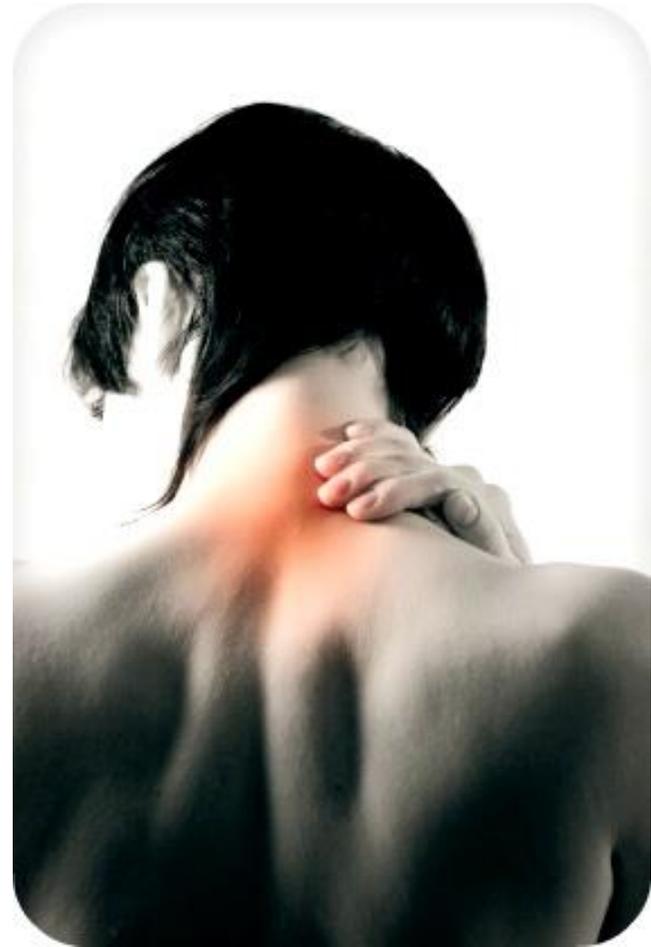
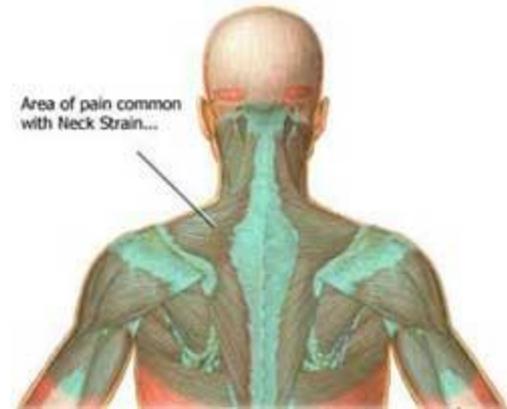
- Pain in the back part of the neck that gets worst with the movement
- Compression of the roots of the spinal nerves

Sensitive and motor disturbance on the affected nerve path



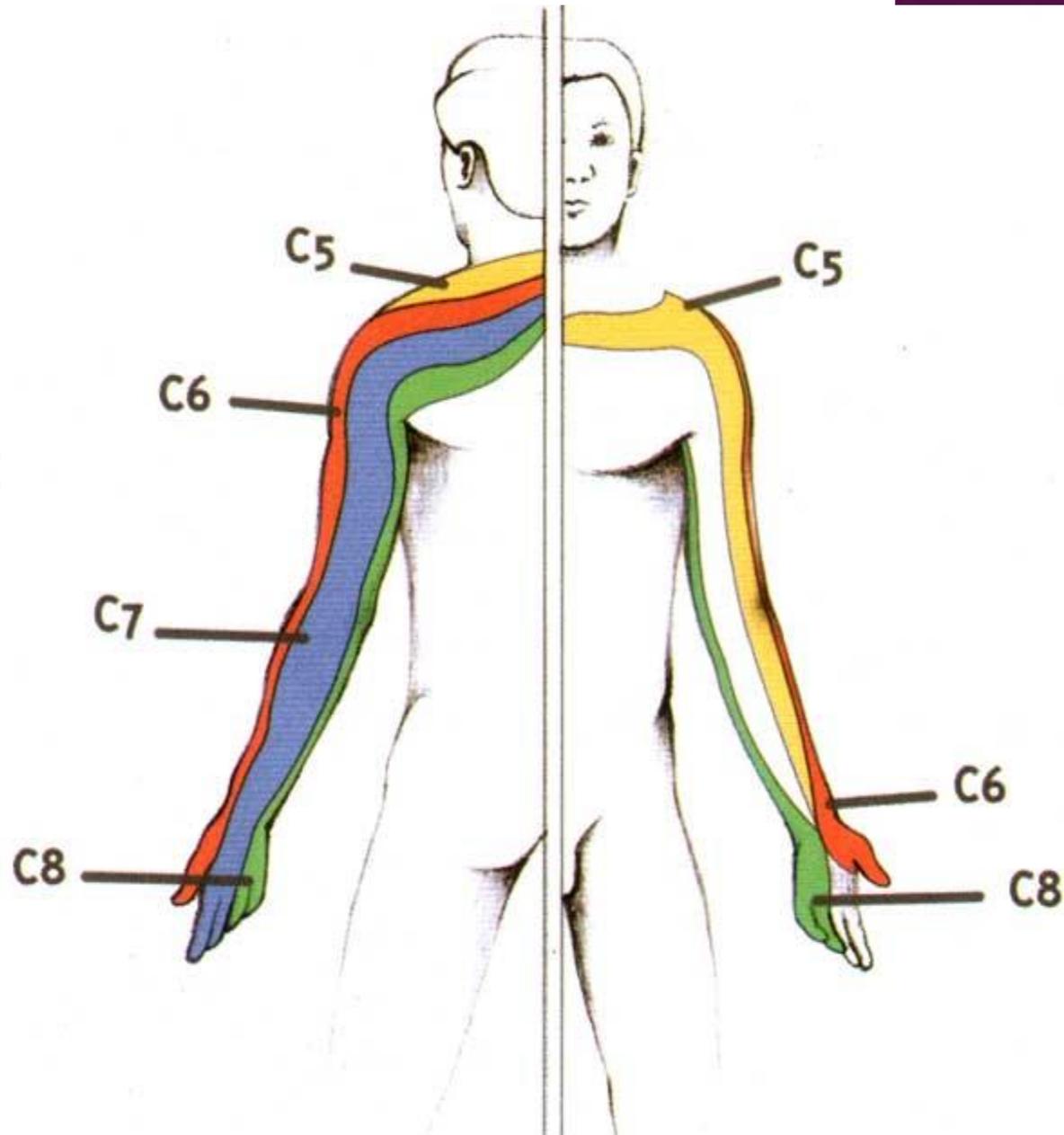
LONG LASTING SIMPTOMS

- Reduced muscular strength
- Muscle atrophy



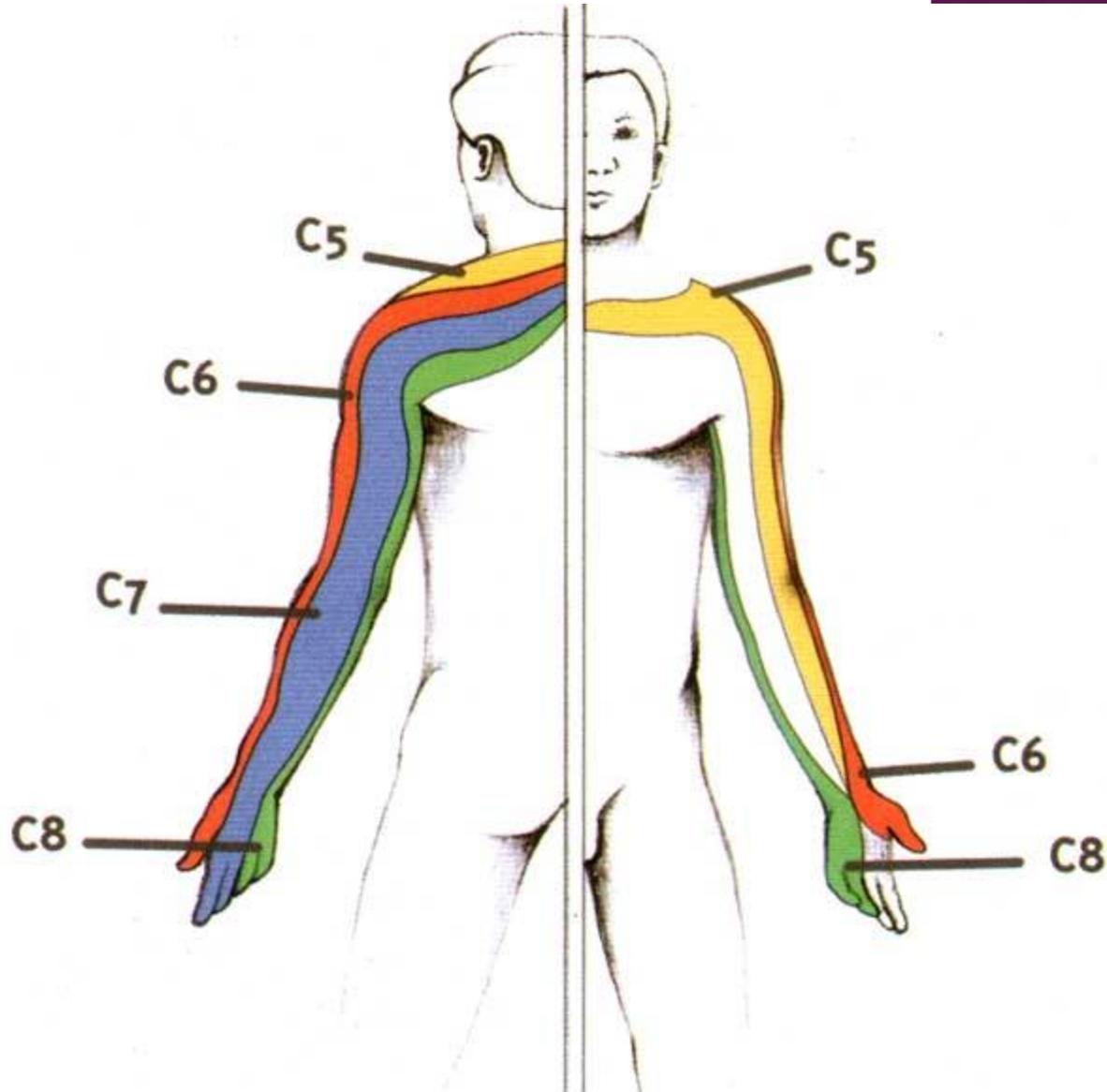
C5

- ⦿ Motor area: arm abduction
- ⦿ Sensitive territory: upper part of the shoulders
- ⦿ Reflex: bicipital



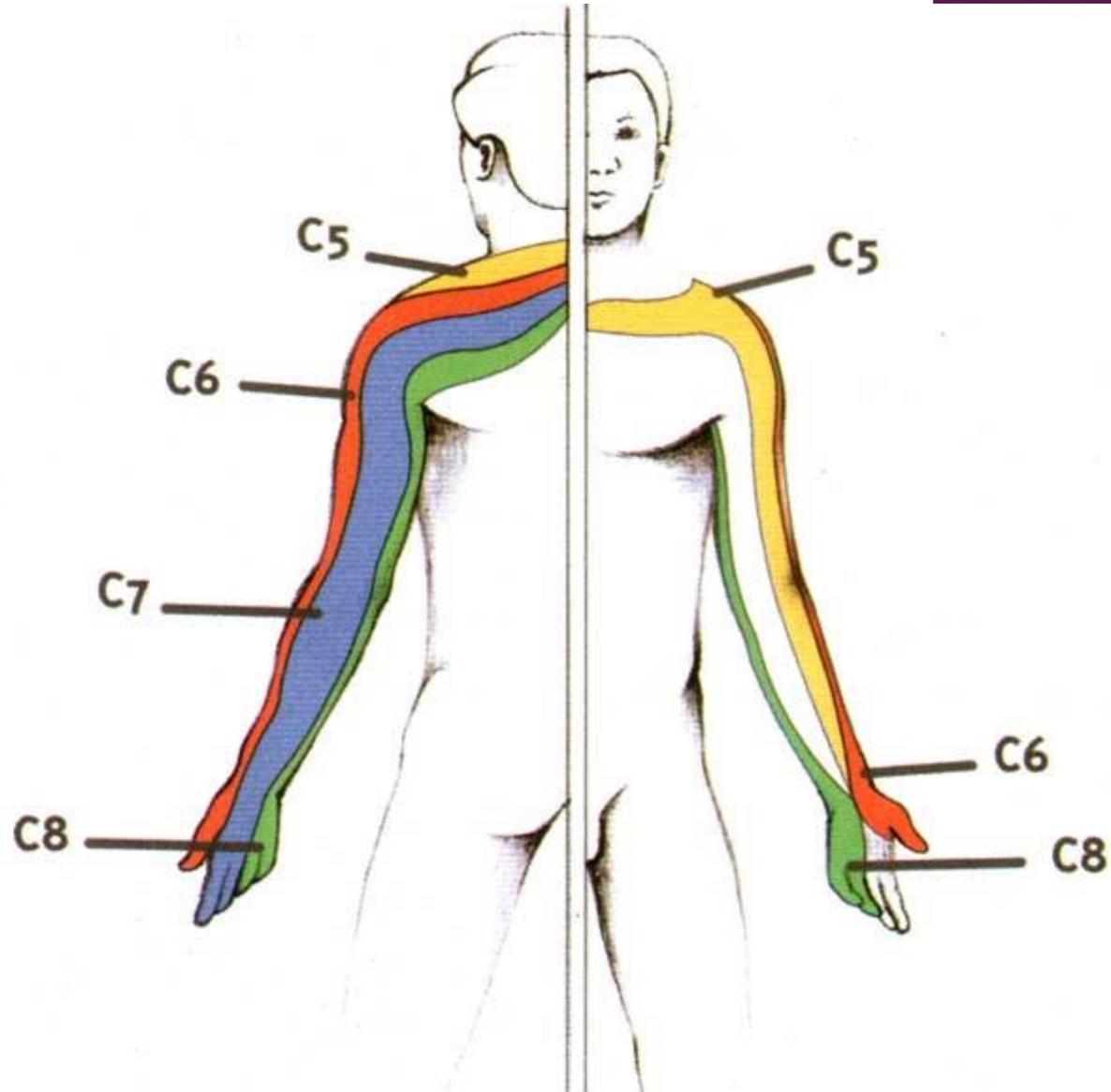
C6

- ⦿ Motor area:
flexors of the forearm
- ⦿ Sensitive territory:
external part of the arm, forearm and thumb
- ⦿ Reflex: bicipital and stiloradial



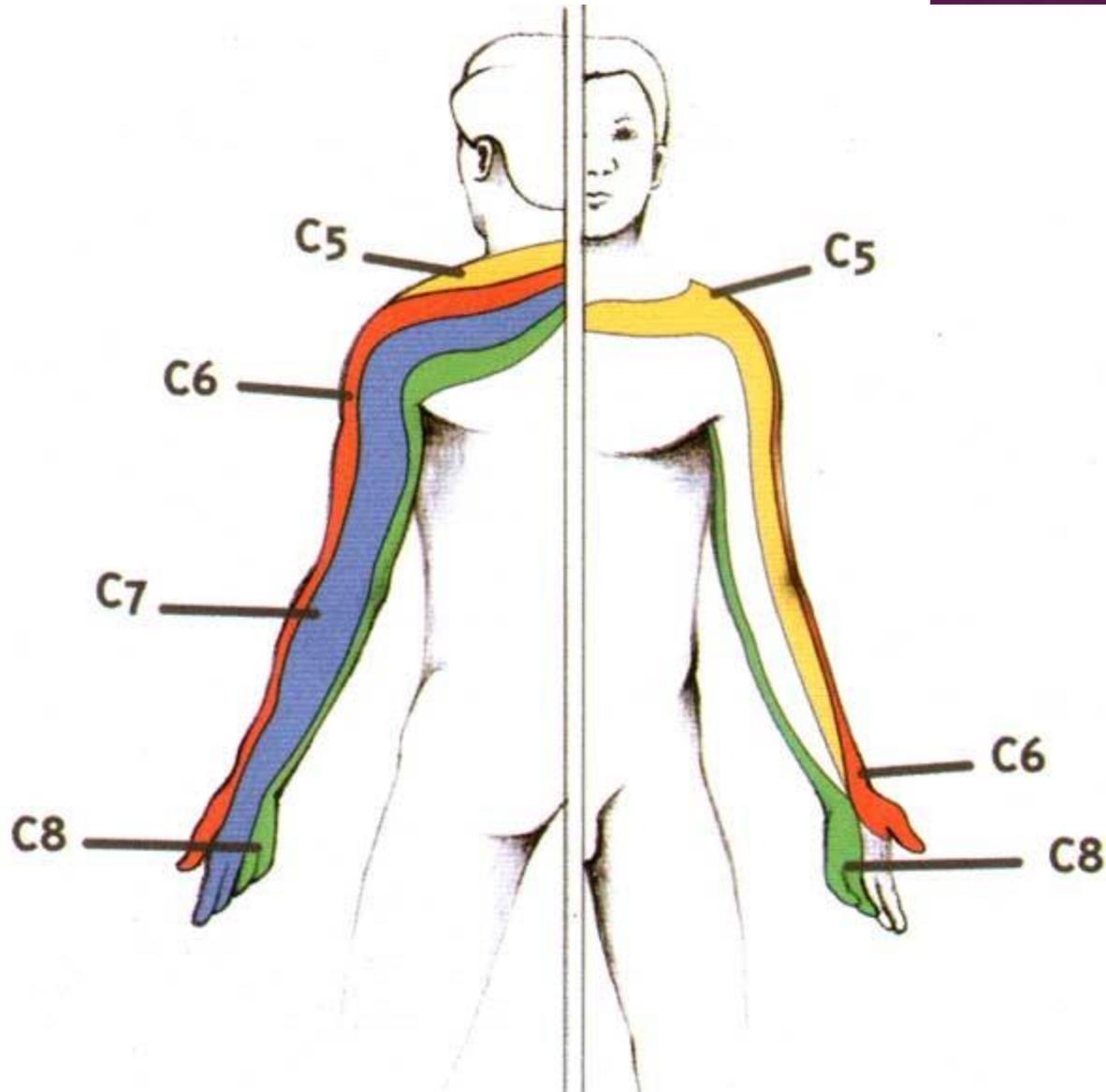
C7

- Motor area:
extensors of the forearm
- Sensitive territory:
posterior part of the arm and forearm
- Reflex: tricipital



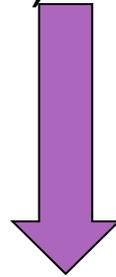
C8- D1

- ⦿ Motor area: arm abduction
- ⦿ Sensitive territory: internal part of the arm and forearm
- ⦿ Reflex: cubitopronator



TREATMENT

- **Acute stage** – Resting
- **Chronic stage** – different kinds of individual therapy (thermotherapy, ultrasound)



Kinesitherapy



Passive

Active



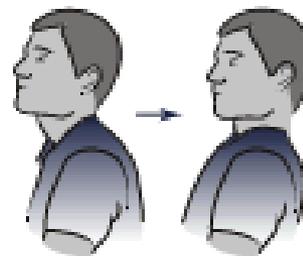
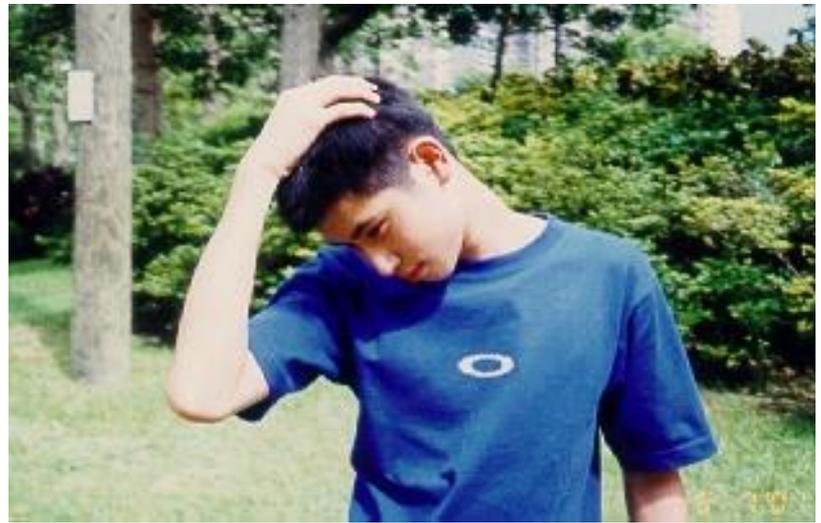
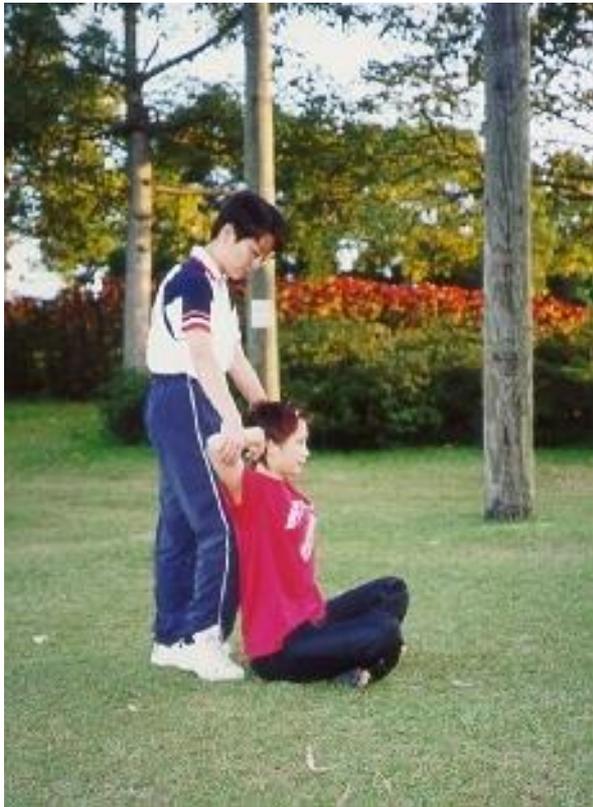


Figure 4. Stretching and strengthening exercises for the neck





THANK YOU

