Rehabilitation

includes

assisting the patient to

compensate for deficits

that cannot be reversed

medically

It is prescribed after many types of injury, illness, or disease, including

- **Amputations**
- **orthopedic injuries,**
- **arthritis,**
- **spinal cord injuries,**
- **stroke,**
- **traumatic brain injurie**
- **neurological problems,**

Cancer, cardiac disease,

Definition

Rehabilitation is a treatment or treatments designed to facilitate the **process of recovery** **from injury, illness, or disease to as normal condition as possible.**

GOALS

Minimize functional deficits

Prevent complications

Use remaining function to maximum

Rehabilitation Program

*Developed and delivered by the rehabilitation ***Team*** .

****Patient*** participation is essential .

****Family*** understanding and commitment to the program .

The key to Good Rehabilitation

Team work

- **Rehabilitation should be Comprehensive,with extended care program .**
  - **Patient outcomes should include increased Independence .**

What diagnostic tools are used in phy

- medical history,
- physical examinations,
- X-rays.CT,MRI
- .Electromyography (EMG), nerve conduction studies.
- Musculoskeletal ultrasound

- **Physiatrists utilize**
  - **Medications**
  - **Injections.**
  - **Physical modalities.**
  - **Exercise.**
  - **Education individualized to the patient`s needs.**
- **Assistive Devices**

Physician specialists head Rehabilitation teams including a

****The physical therapist***

****occupational therapist.***

**** The social workers***

- ***Rehabilitation nurse,***
- ***psychological counselor***
- ***Speech&a respiratory therapist .***
- ***Rehabilitation engineer***
-

Definition of stroke

*A cerebrovascular event with rapidly developing clinical signs of focal or global disturbances ,with no apparent cause other than of cerebral function with signs lasting 24 hours or longer or leading to death,with no apparent cause other than vascular origin(WHO).

symptoms less than 24 hours=TIA.

Transient ischemic attack

TYPES OF STROKE

ISCHEMIC(85%)

-thrombotic

--embolic

***HEMORRHAGIC(15%)**

-**interacerebral**(hypertention)

-**subarachnoid**(ruptured aneurysm)

The physical therapist

The physical therapist assists the patient in functional restoration.

Tasks may include the following

ROM.,Muscle Strength ,Sitting , Standing , Balance, Coordination ,Transfers, and Ambulation, Including wheelchair and Bipedal.

****Progressive Gait training.***

OCCUPATIONAL THERAPISTS

Are responsible for those therapeutic activities associated with patient's daily life, (ADL) from simple Household & Personal Activities to Work and Leisure.

Occupational therapy

This may be achieved
by restoring old skills
or **teaching the patient new skills** to adjust to disabilities through
adaptive equipment,
orthotics,&
modification of the patient's home environment.

The social workers

Evaluation of the patient's total Living Situation,

Including

. Lifestyle, Family, Finances, and Community resources

Therapeutic Recreation

implements various interventions

as a form of treatment

to increase physical, cognitive, emotional and social abilities

which may have been altered due to personal trauma or disease.

SPORTS ACTIVITIES

What Are Assistive Devices

Assistive devices can help a person function better and be more independent

Assistive devices can make daily tasks easier.

Flexible Sock Aid

Grip Drink Holder

Types of Mobility Aids

help with
walking or moving
from place to place.

They can help
prevent falls
improve independence.

Orthotist — A health care professional who is skilled in making and fitting orthopedic appliances.

Prosthetist — A health care professional who is skilled in making and fitting artificial parts (prosthetics) for the human body.

Clinical evaluation

ASIA IMPAIRMENT SCALE

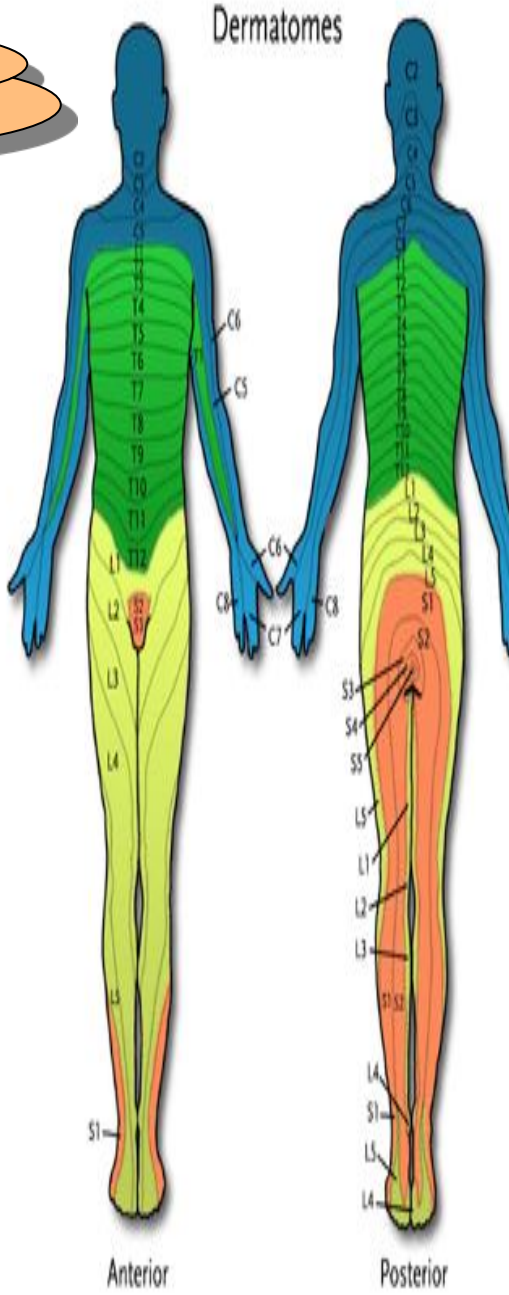
- ☐ **A = Complete:** No motor or sensory function is preserved in the sacral segments S4-S5.
- ☐ **B = Incomplete:** Sensory but not motor function is preserved below the neurological level and includes the sacral segments S4-S5.
- ☐ **C = Incomplete:** Motor function is preserved below the neurological level, and more than half of key muscles below the neurological level have a muscle grade less than 3.
- ☐ **D = Incomplete:** Motor function is preserved below the neurological level, and at least half of key muscles below the neurological level have a muscle grade of 3 or more.
- ☐ **E = Normal:** motor and sensory function are normal

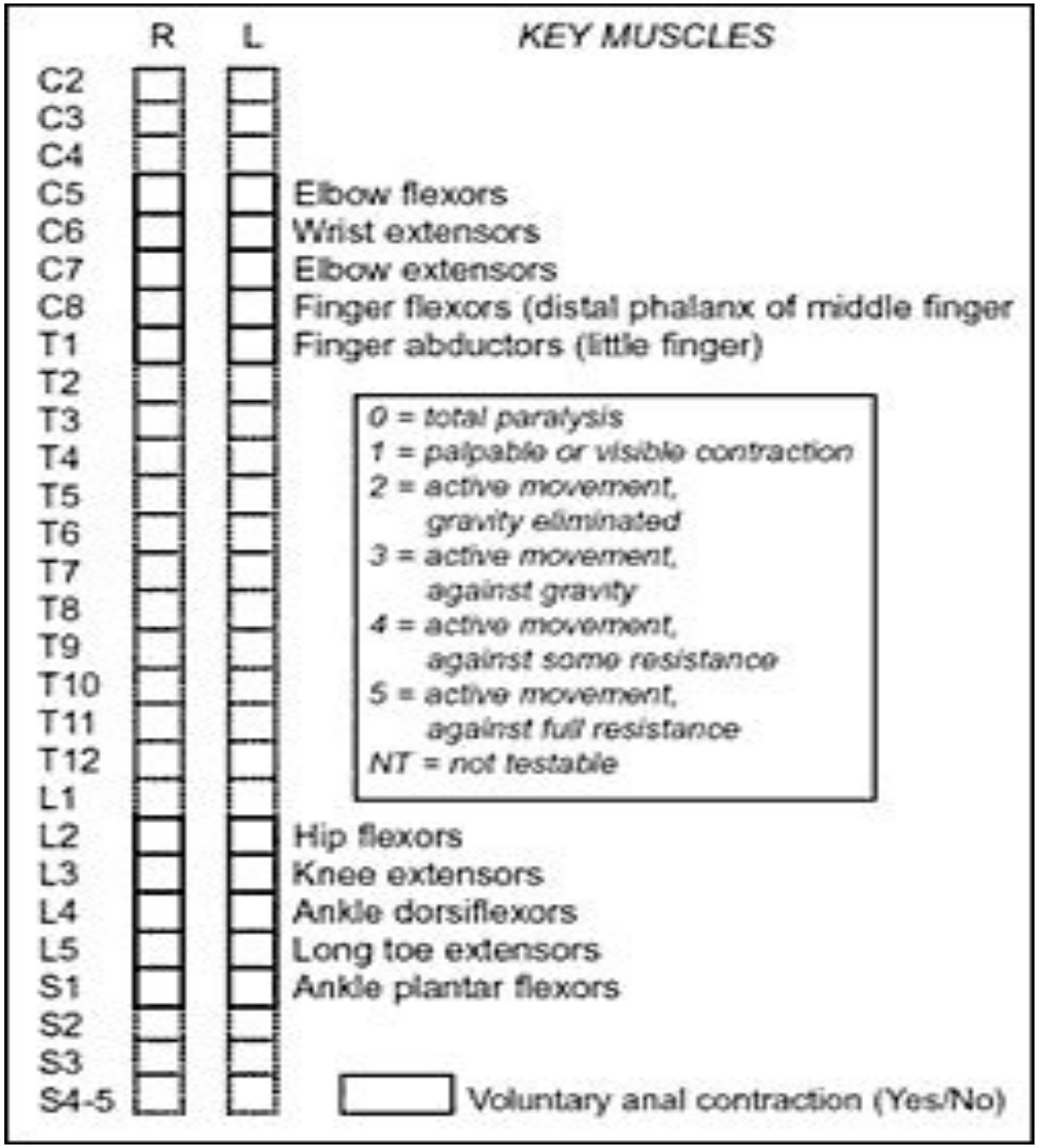
CLINICAL SYNDROMES

- ☐ Central Cord
- ☐ Brown-Sequard
- ☐ Anterior Cord
- ☐ Conus Medullaris
- ☐ Cauda Equina

	R	L	KEY MUSCLES
C2	☐	☐	
C3	☐	☐	
C4	☐	☐	
C5	☐	☐	Elbow flexors
C6	☐	☐	Wrist extensors
C7	☐	☐	Elbow extensors
C8	☐	☐	Finger flexors (distal phalanx of middle finger
T1	☐	☐	Finger abductors (little finger)
T2	☐	☐	
T3	☐	☐	
T4	☐	☐	
T5	☐	☐	
T6	☐	☐	
T7	☐	☐	
T8	☐	☐	
T9	☐	☐	
T10	☐	☐	
T11	☐	☐	
T12	☐	☐	
L1	☐	☐	
L2	☐	☐	Hip flexors
L3	☐	☐	Knee extensors
L4	☐	☐	Ankle dorsiflexors
L5	☐	☐	Long toe extensors
S1	☐	☐	Ankle plantar flexors
S2	☐	☐	
S3	☐	☐	
S4-5	☐	☐	☐ Voluntary anal contraction (Yes/No)

0 = total paralysis
1 = palpable or visible contraction
2 = active movement, gravity eliminated
3 = active movement, against gravity
4 = active movement, against some resistance
5 = active movement, against full resistance
NT = not testable




R
L
KEY MUSCLES
C2
C3
C4
C5
C6
C7
C8
T1
T2
T3
T4
T5
T6
T7
T8
T9
T10
T11
T12
L1
L2
L3
L4
L5
S1
S2
S3
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Elbow flexors
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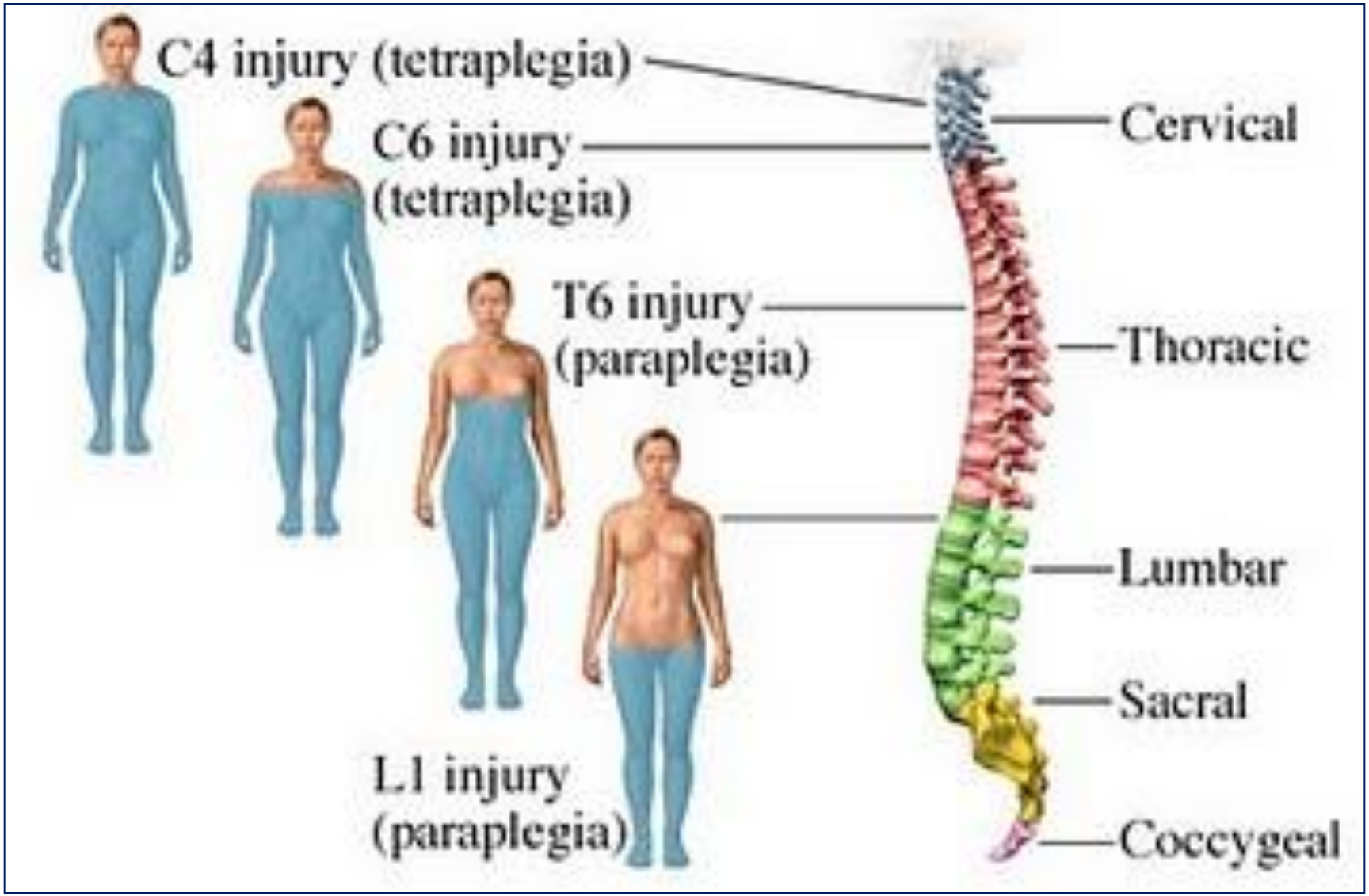

C4 injury (tetraplegia)
C6 injury (tetraplegia)
T6 injury (paraplegia)
L1 injury (paraplegia)
Cervical
Thoracic
Lumbar
Sacral
Coccygeal

Neurologic recovery after a SCI

Occurs over a period of ***18*** *months. The greatest amount of recovery occurs within the first* ***3 - 6*** *months.*

We Begin Our Work With the Spinal Cord Patient by :

- *Early on, the PT' works with the patient to* ***Prevent*** *the terrible* ***Complications*** *of immobility:*

- *Contractures*
- *Pressure sores*
- *Drops in Blood Pressure*
- *The build up of secretions in the lungs*

Vocational Rehabilitation

The Vocational rehabilitation program will assist in training and placing disabled persons in new jobs.

NECK PAIN

لواء
أد
رضا عوض

Anatomy

Head weighing 6:8 1b

7 cervical vertebrae

5 intervertebral discs

12 joints of Luschka

14 apophyseal joints.

System of ligaments

(ant. long, post. long ,lig. flavum , interspinous and ligamentum nuchae)

Muscles

(14 paired anterior lateral & post)

Prevalence

Neck Stiffness

- **25 : 30 % Age 25-29 year**

Up to 50 % Age over 45 year

Neck Stiffness with Brachialgia

- **5 : 10 % Age 25 – 29 year**

25:40 % Age over 50

Causes

Musculosketetal Causes

Osteoarthritis

Diffuse idiopathic skeletal hyperstosis

Cervical spondylosis

Disk disease

Rheumatoid arthritis

Fracture

Neoplasm

Thoracic outlet syndrome (cervical rib, first rib,and clavicular compression syndromes)

Osteomyelitis

Neurological Causes

Nerve root syndromes

Cervical myelopathy

Neuritis (brachial,occipital)

Torticollis

Meningitis

Cord tumors

Soft tissue and muscular pain

Acute cervical strain

Cumulative trauma, overstrain syndromes

Tendinitis, bursitis

Postural disorders

Fibrositis, fibromyalgia, and myofascial syndrome

Pharyngeal infection

Referred Pain

Heart and coronary artery disease

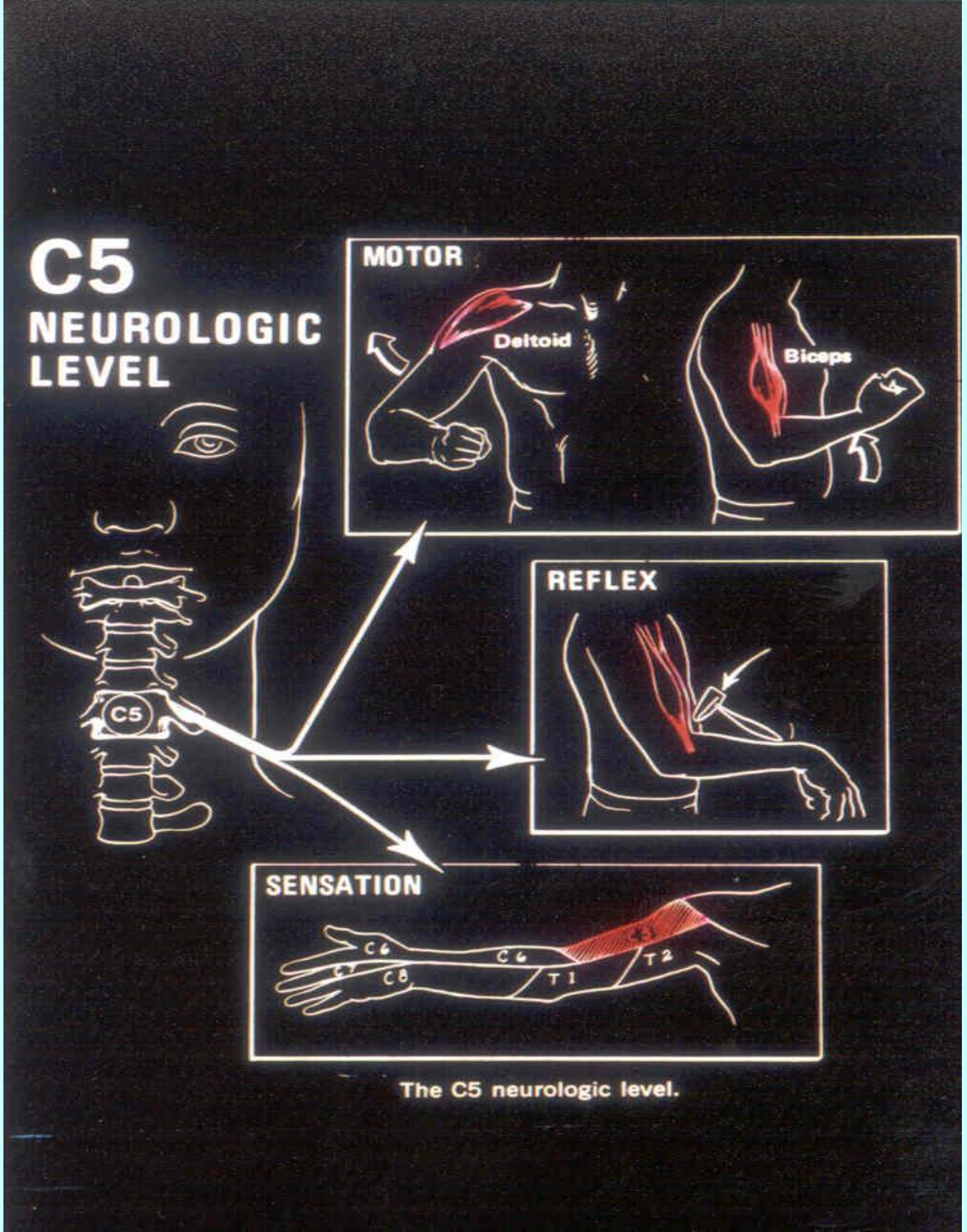
Apex of lung: Pancoast's tumor

Migraine

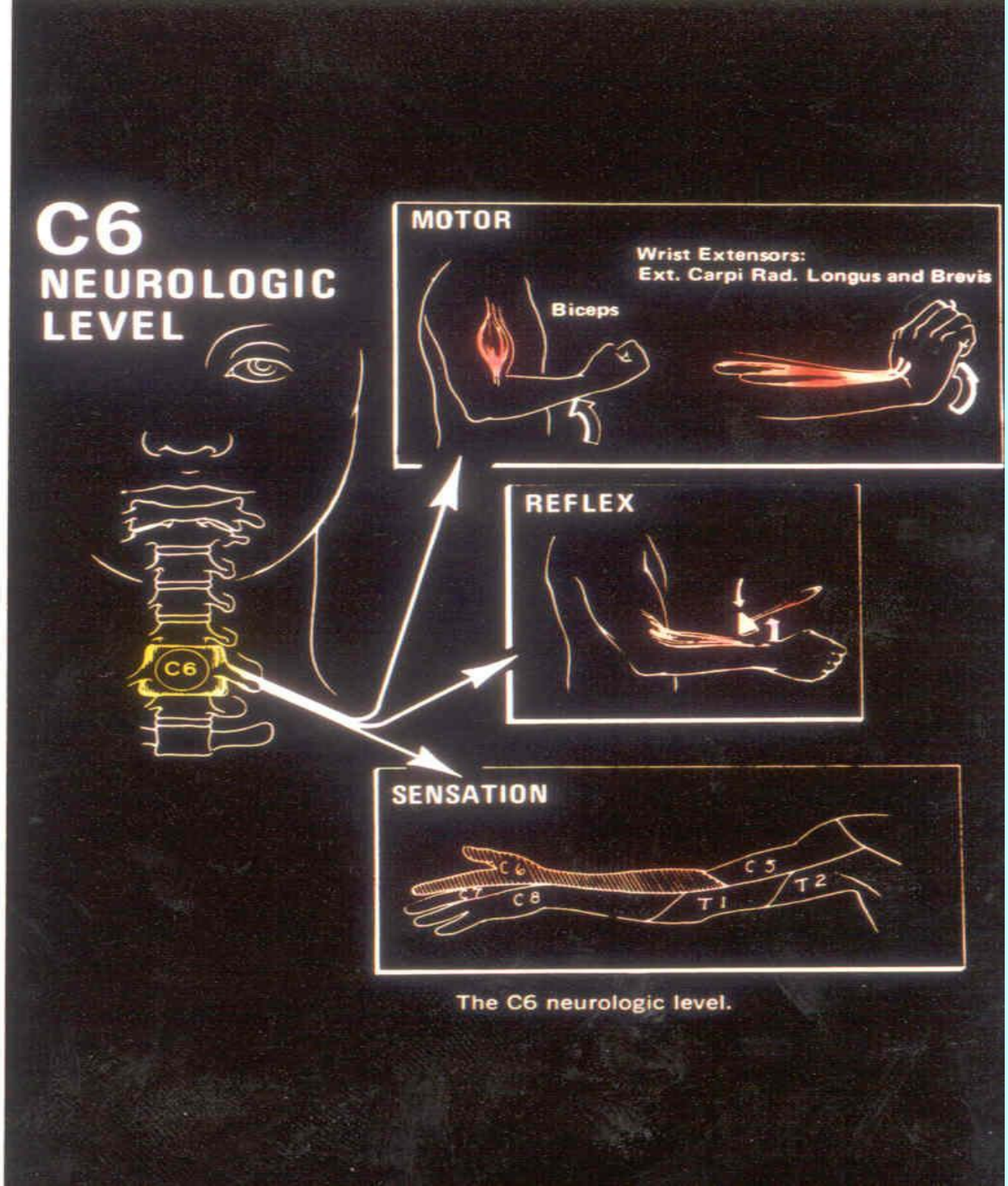
Muscle tension and myofascial pain

TMJ syndrome

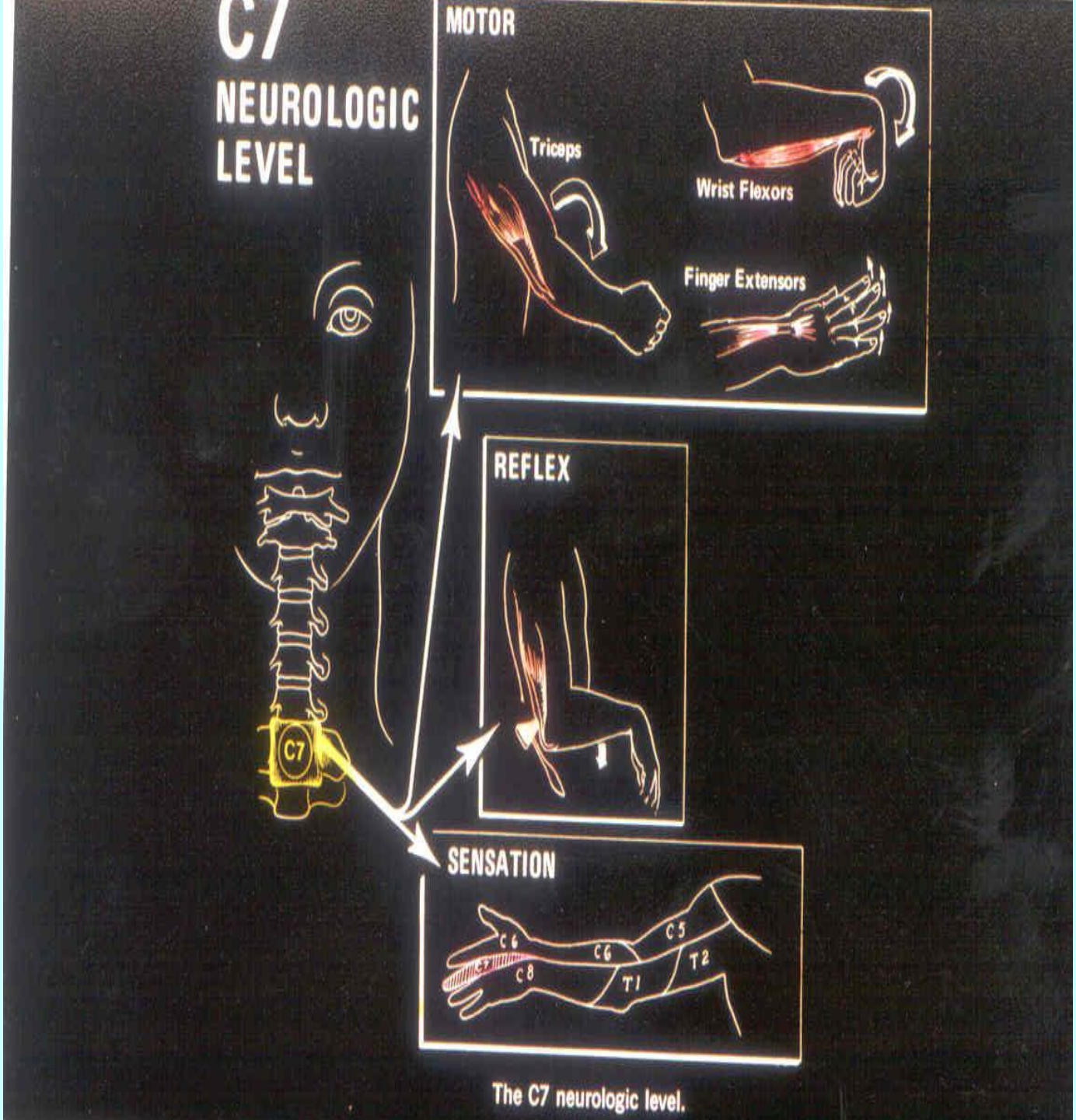
Diaphragm, gallbladder, pancreas, hiatus hernia



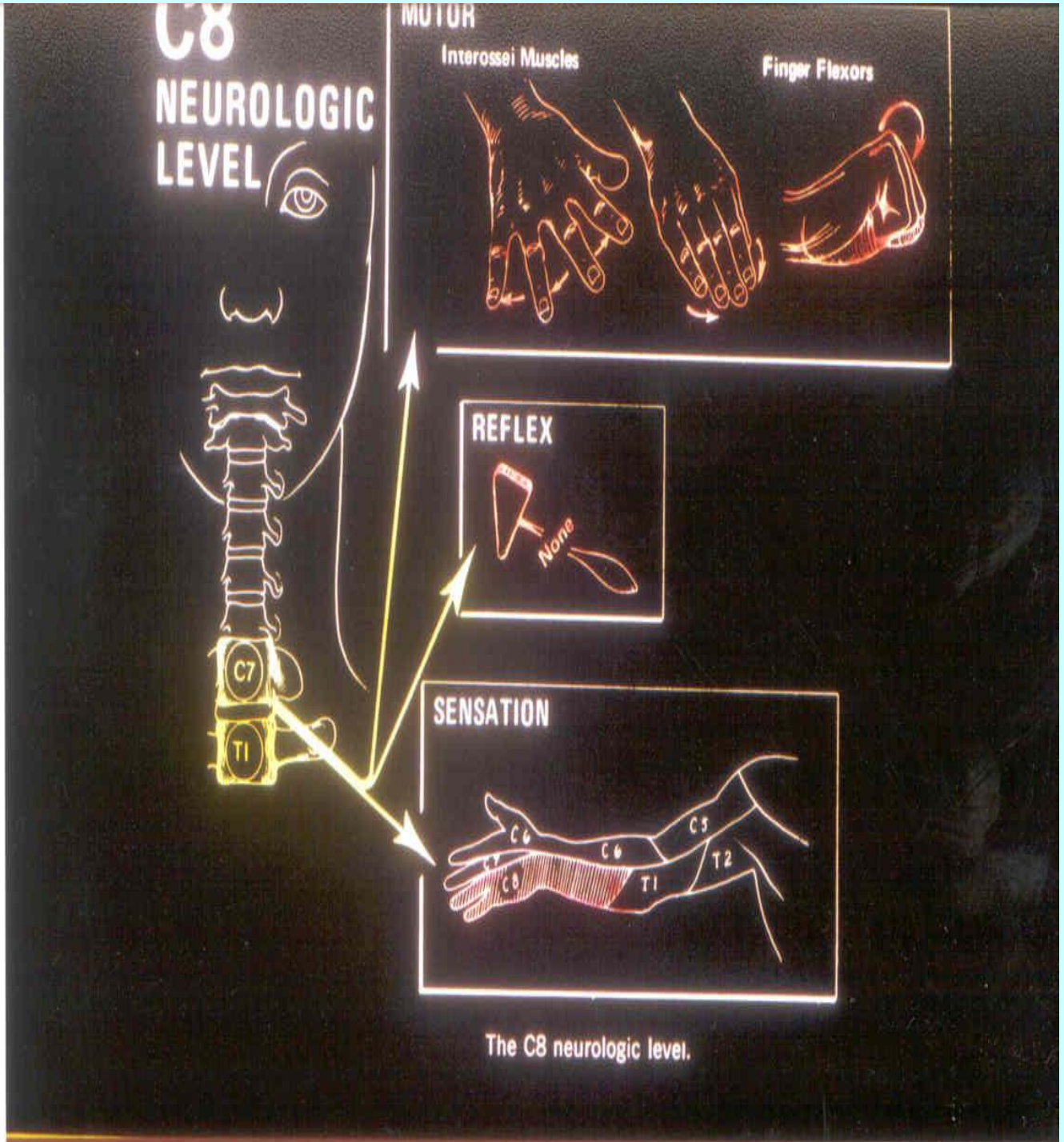
The C5 neurologic level.



The C6 neurologic level.



The C7 neurologic level.



The C8 neurologic level.

Cervical Nerve Roots and Their Corresponding Sensory and Motor Disturbances

	NERVE ROOT AFFECTED	PHYSICAL FINDINGS
C4-5	C5	• Deltoid muscle weakness • Does not usually cause numbness or tingling • Can cause shoulder pain
C5-6	C6	• Biceps weakness • Numbness and tingling along with pain can radiate to thumb side of hand • Most common level for a cervical disc herniation to occur
C6-7	C7	• Triceps and finger extensor weakness • Numbness and tingling along with pain can radiate down triceps and into middle finger • Second most common level for a cervical disc herniation to occur
C7-T1	C8	• Can cause weakness with handgrip • Numbness and tingling and pain can radiate down arm to small finger

AIM

Relief of pain and stiffness in the neck and arms

Restore the function of neck and related structures .

Avoid pain recurrence

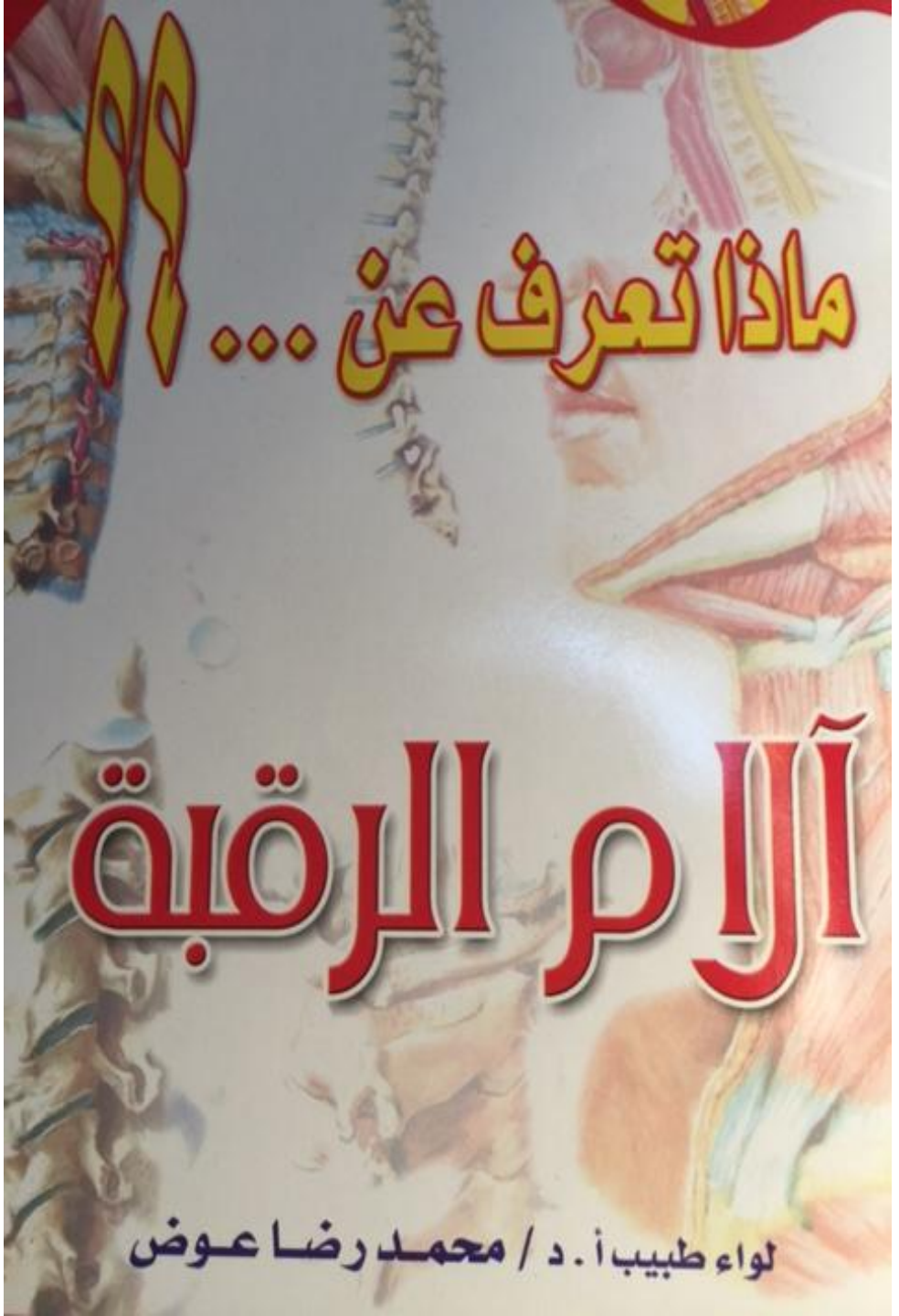
Facts

Early mobilization exercises in patients with acute sprains often improve outcome

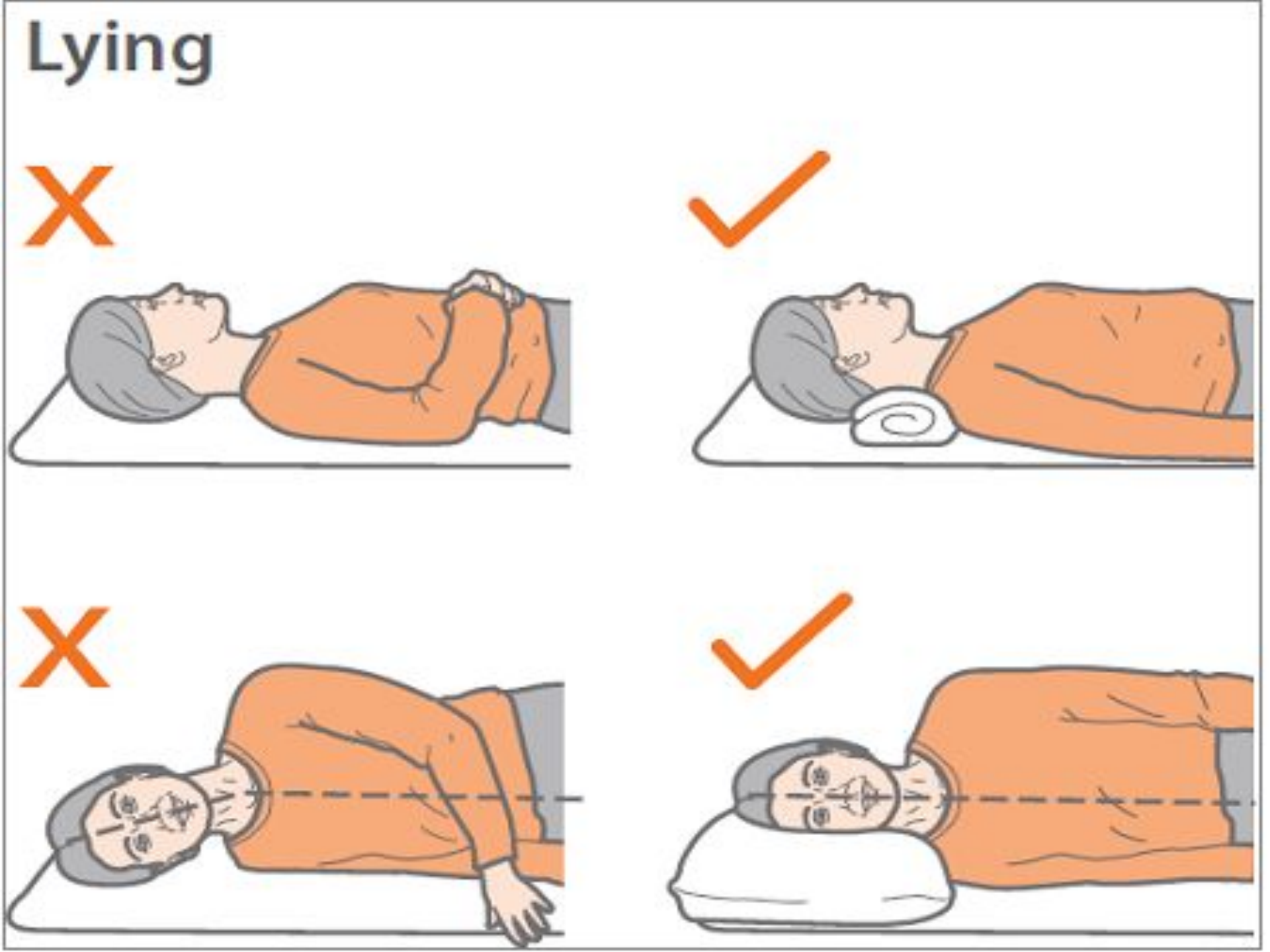
Bed rest should be reserved for severe acute cases

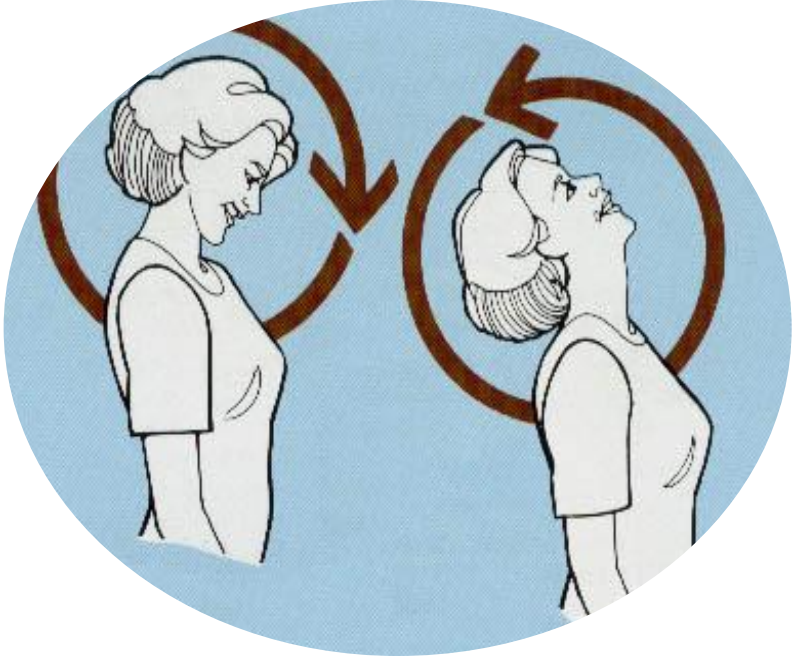
توعيه المريض

HAND BOOK



Lying





التمرينات اليوميه بالمنزل

Traction

- Traction forces over 9kg cause separation of 1- 1.5 mm at each posterior vertebral level
- It is greatest with the neck in flexion
- 9-11 kg flattens the normal lordosis
- Rhythmic traction produces more separation than sustained traction

UP DATE MANAGEMENT OF BACK PAIN

AT AGOUZA SPECIALISED SPINE CENTER (ASSC)

PROF.

REDA AWAD

SUN RISE (SHARM.)

BY

DR /REDA AWAD

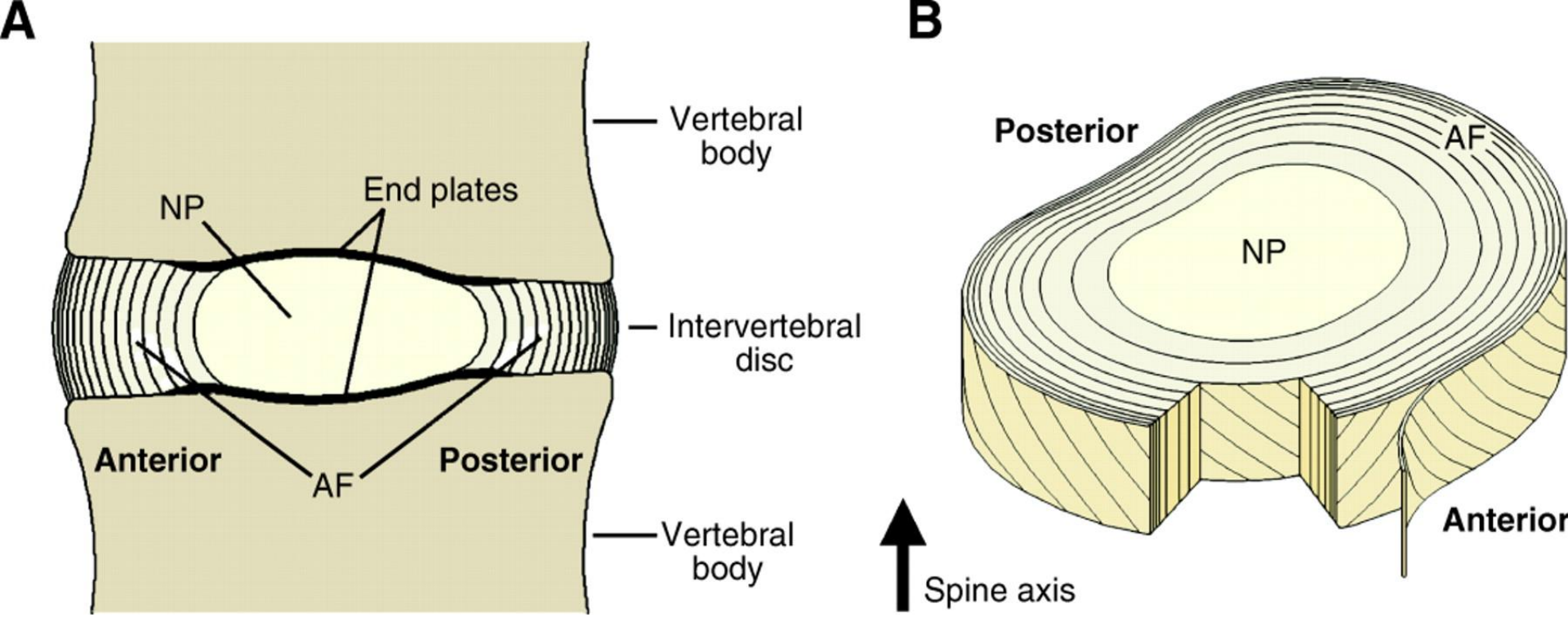
LBP: Statistics

- **Second** only to the common cold in frequency among adult ailments
- **Fifth** **most common reason for an office visit**
- Source of LBP is "**mechanical" in 90%** and the prognosis is good
  - **Acute**: **50%** are better in **1 week**;
  - **90%** have resolved within **8 weeks**
  - **Chronic**: **<5%** of acute low back pain **progresses to chronic pain (6 month)**

- **80%** of all people experience low back pain at some time.

.. Up to **50%** of working adults have back pain each year.

- Lifetime recurrence rates of as high as **85%** have been documented.



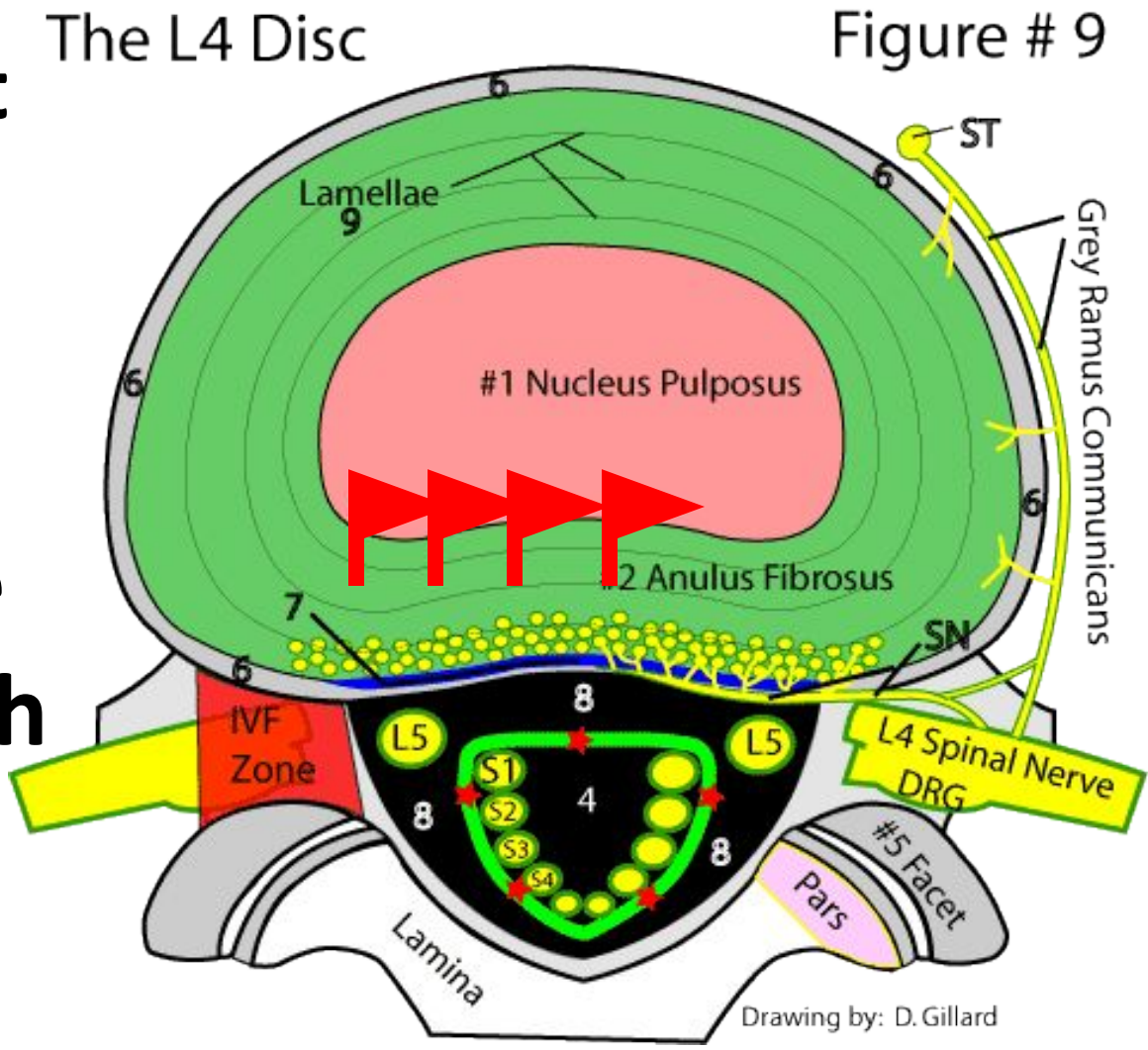
The disc is made up of three basic structures:

the **nucleus pulposus**,
the **annulus fibrosus** and
the **vertebral end-plates**,

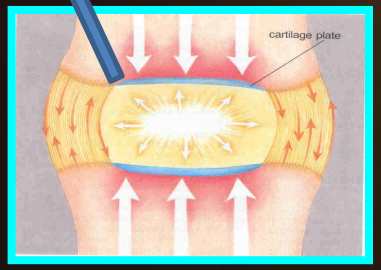
Disc innervation

1981 Australian clinical anatomist and physician Nikoli Bogduk

The outer 1/3 of annulus receive innervation with small afferents.



interadiscal pressure



Body Positions Affecting the Spine

Disc Pressure

Intradiscal Pressure (kg)

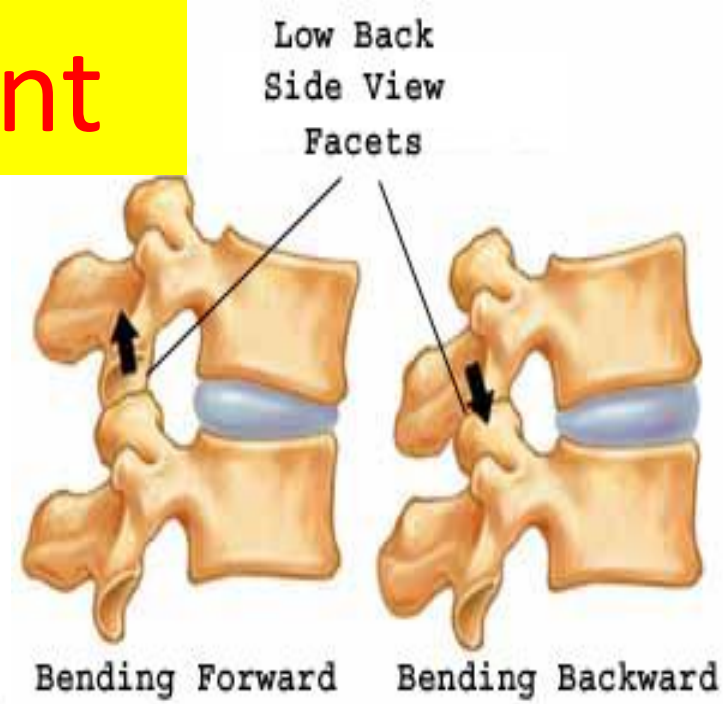
275
250
225
200
175
150
125
100
75
50
25
0

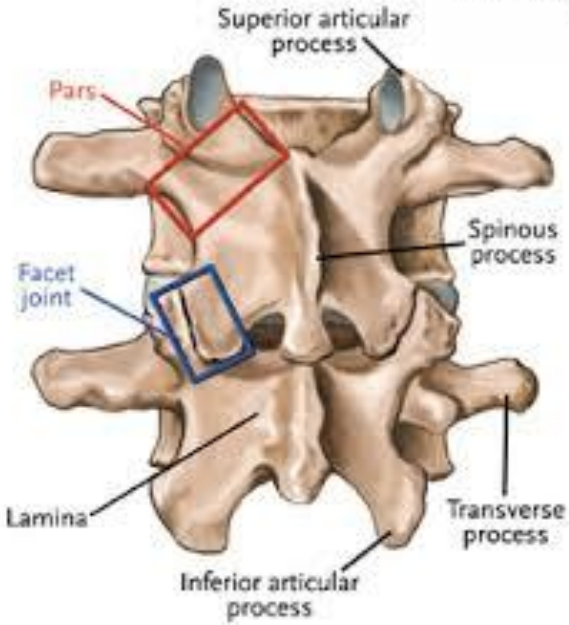
25
75
100
150
220
140
185
275

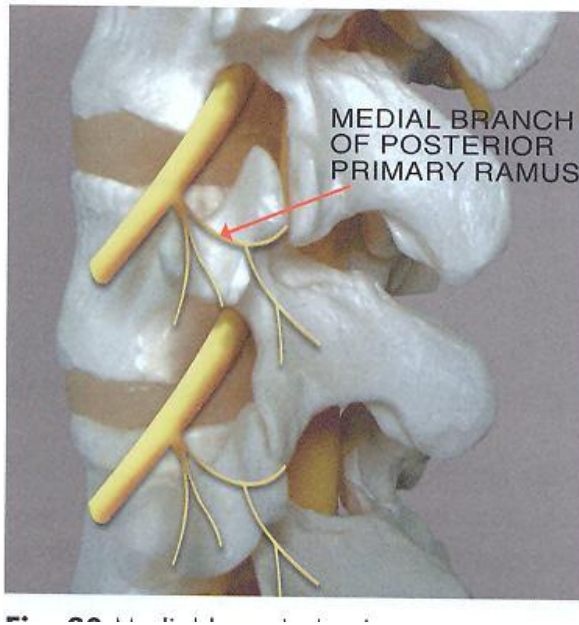
facet joint

is a synovial joint between the superior articular process, of one vertebra and the inferior articular process of the vertebra directly above it.

These joints are in constant motion, providing the spine with both the stability and flexibility







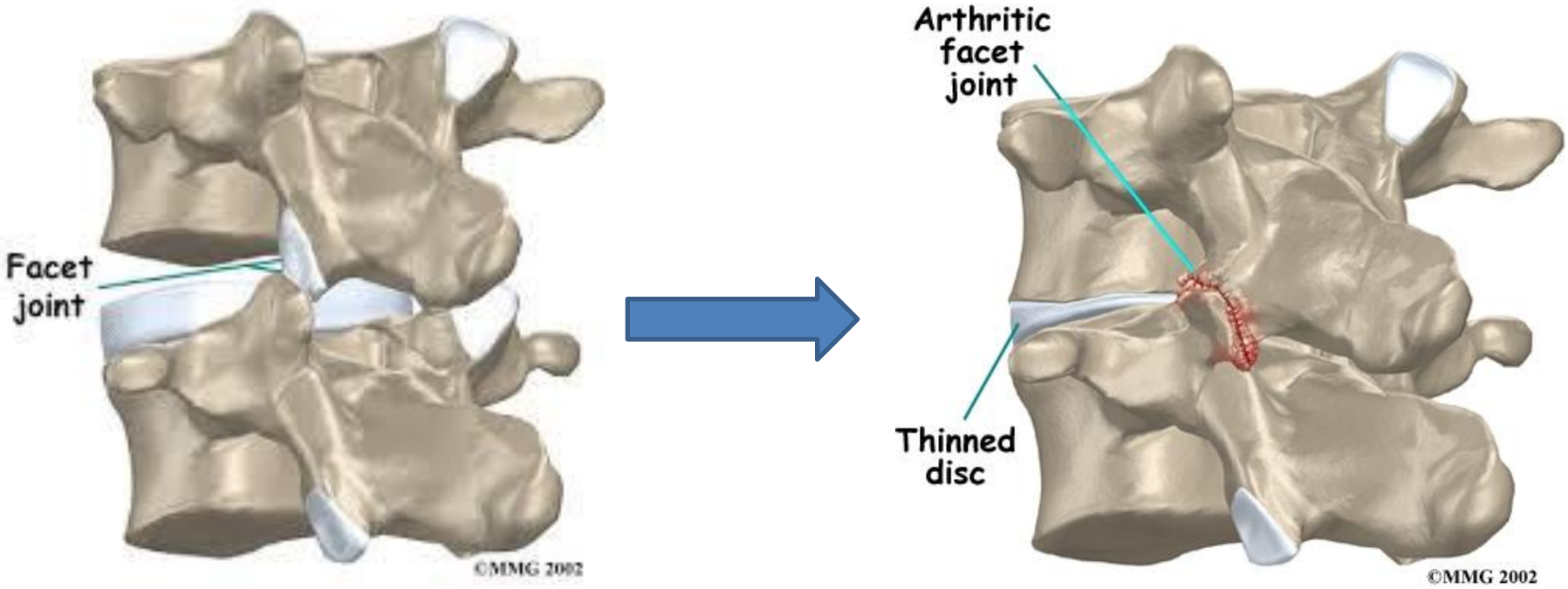
Degeneration

Before age 40 approximately **25%.** Beyond age 40, more than **60%** of people show evidence of disc degeneration at one or more levels on a MRI.

the nucleus pulposus begins to dehydrate and the concentration of proteoglycans in the matrix decreases, thus limiting the ability of the disc to absorb shock.

The anulus fibrosus also becomes weaker with age and has an increased risk of tearing.

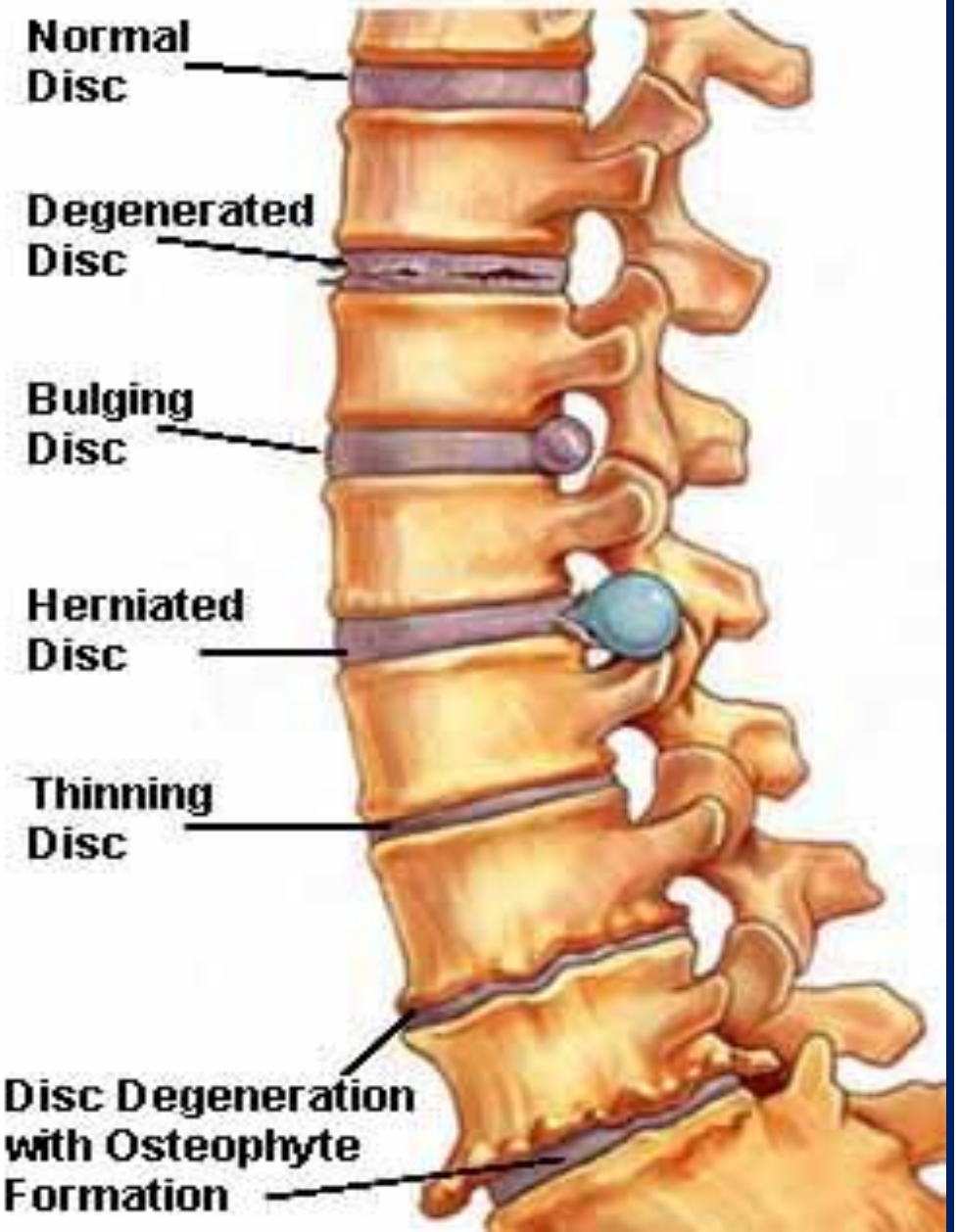
In addition**, the cartilage end plates** begin thinning, fissures begin to form, and there is sclerosis of the subchondral bone



As the disc dehydrates

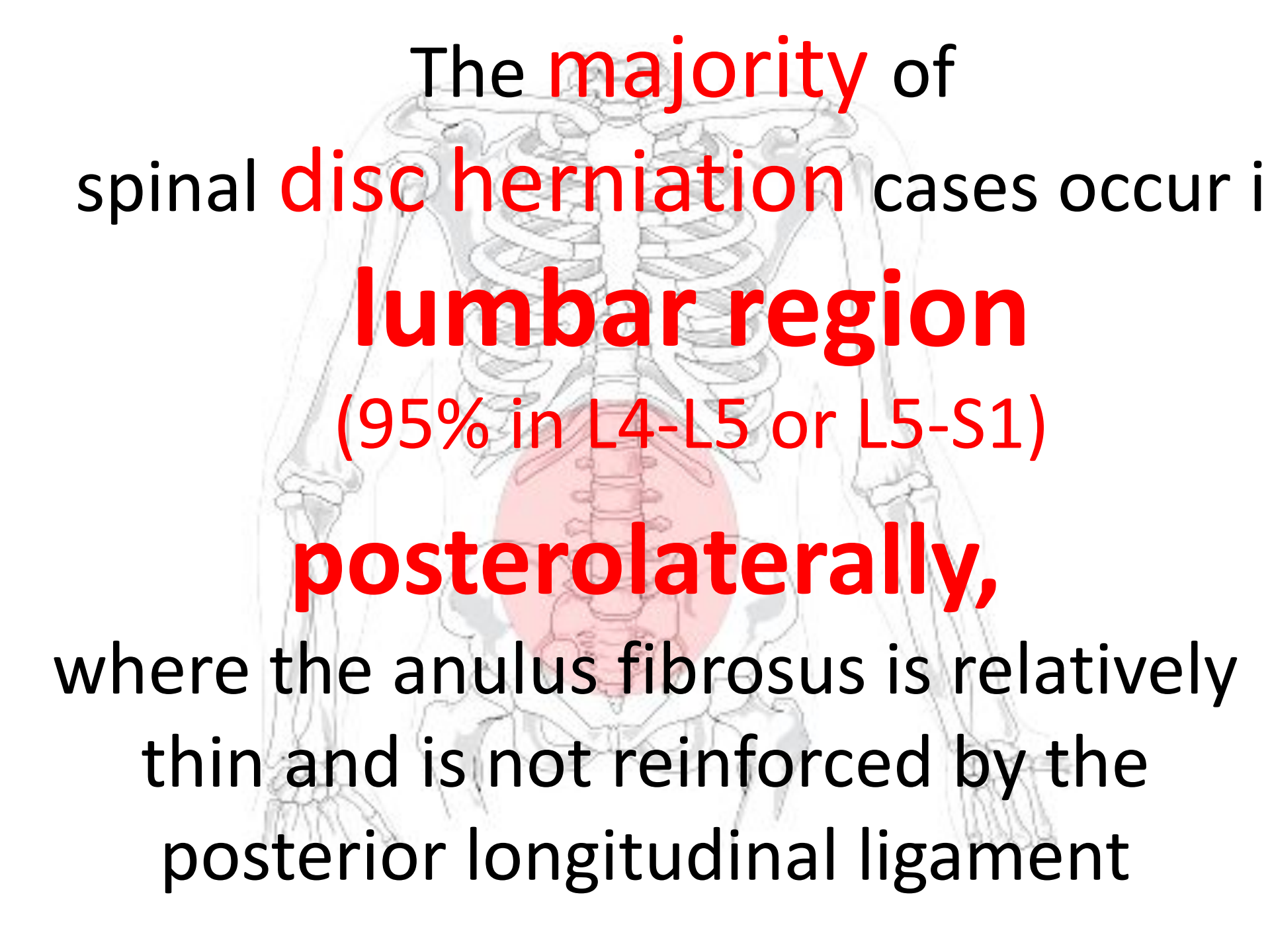
the disc loose ability to support the axial load of the body; this causes a 'weight bearing shift' from the nucleus, outward, onto facet joints .

Examples of Disc Problems



The L4-5 and L5-S1 areas

bear the highest loads and tend to undergo the most motion. Consequently, these areas are found to **sustain the most spinal strain or sprain injuries**



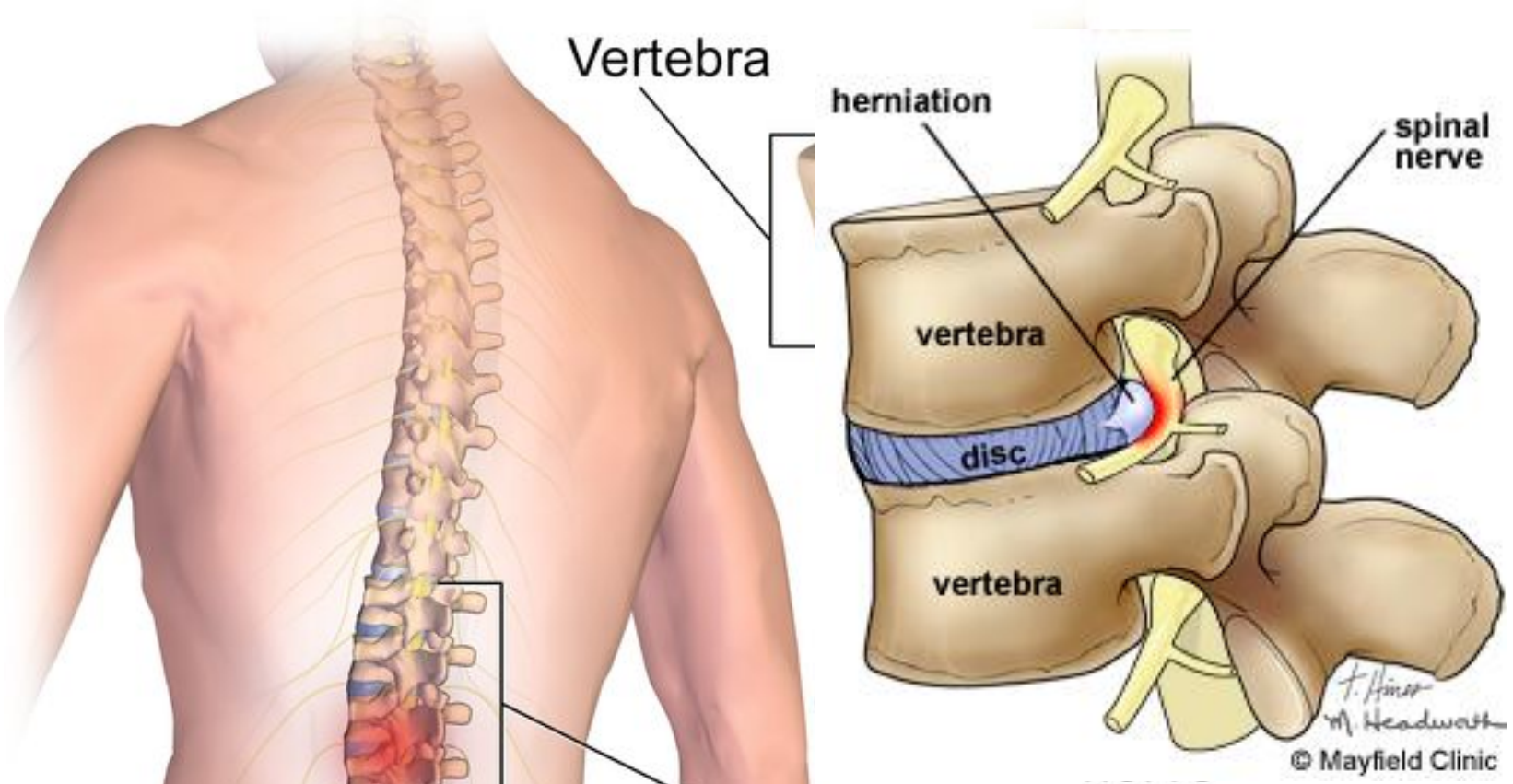
The majority of spinal disc herniation cases occur i

lumbar region

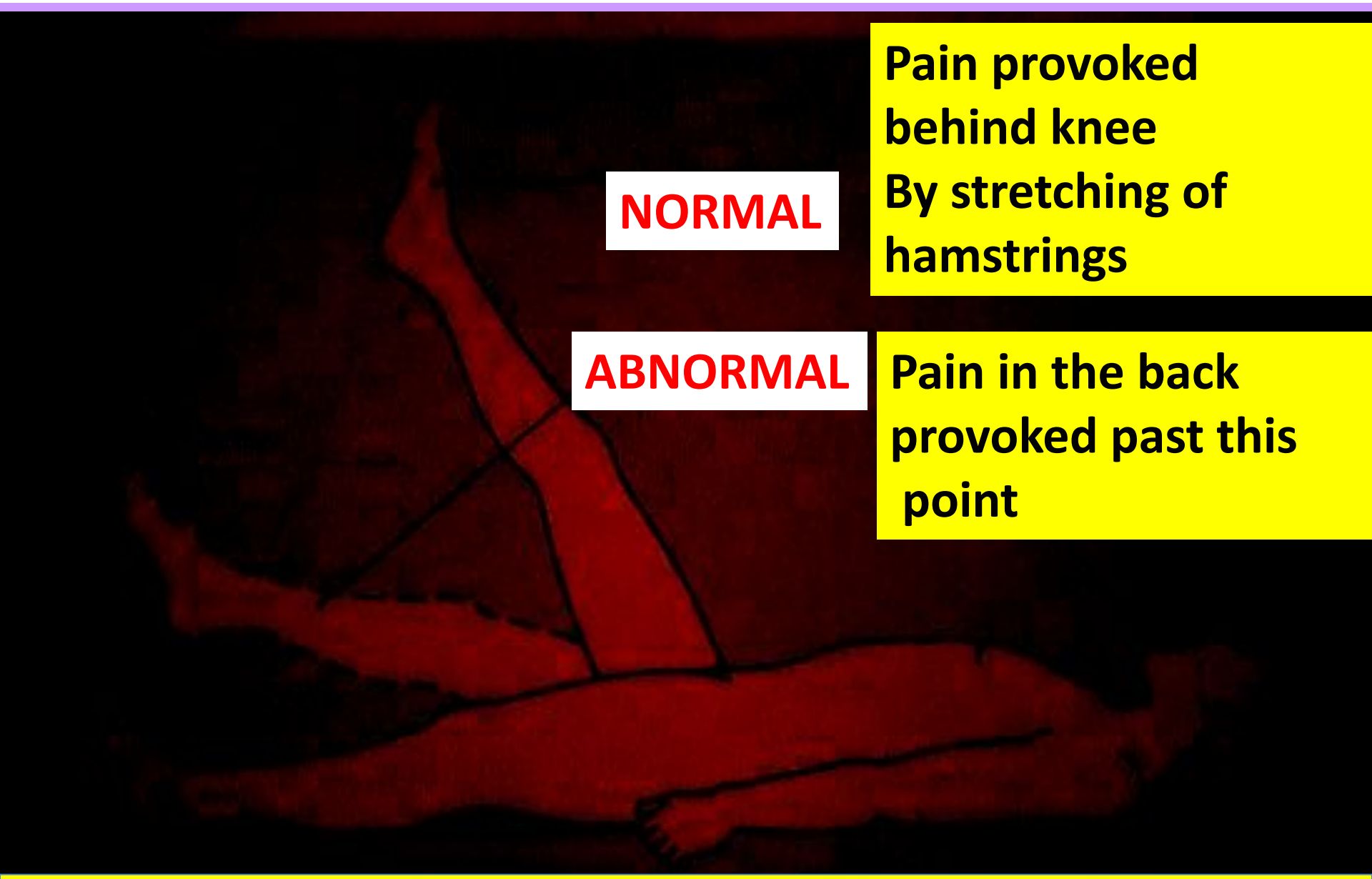
(95% in L4-L5 or L5-S1)

posterolaterally,

where the anulus fibrosus is relatively thin and is not reinforced by the posterior longitudinal ligament



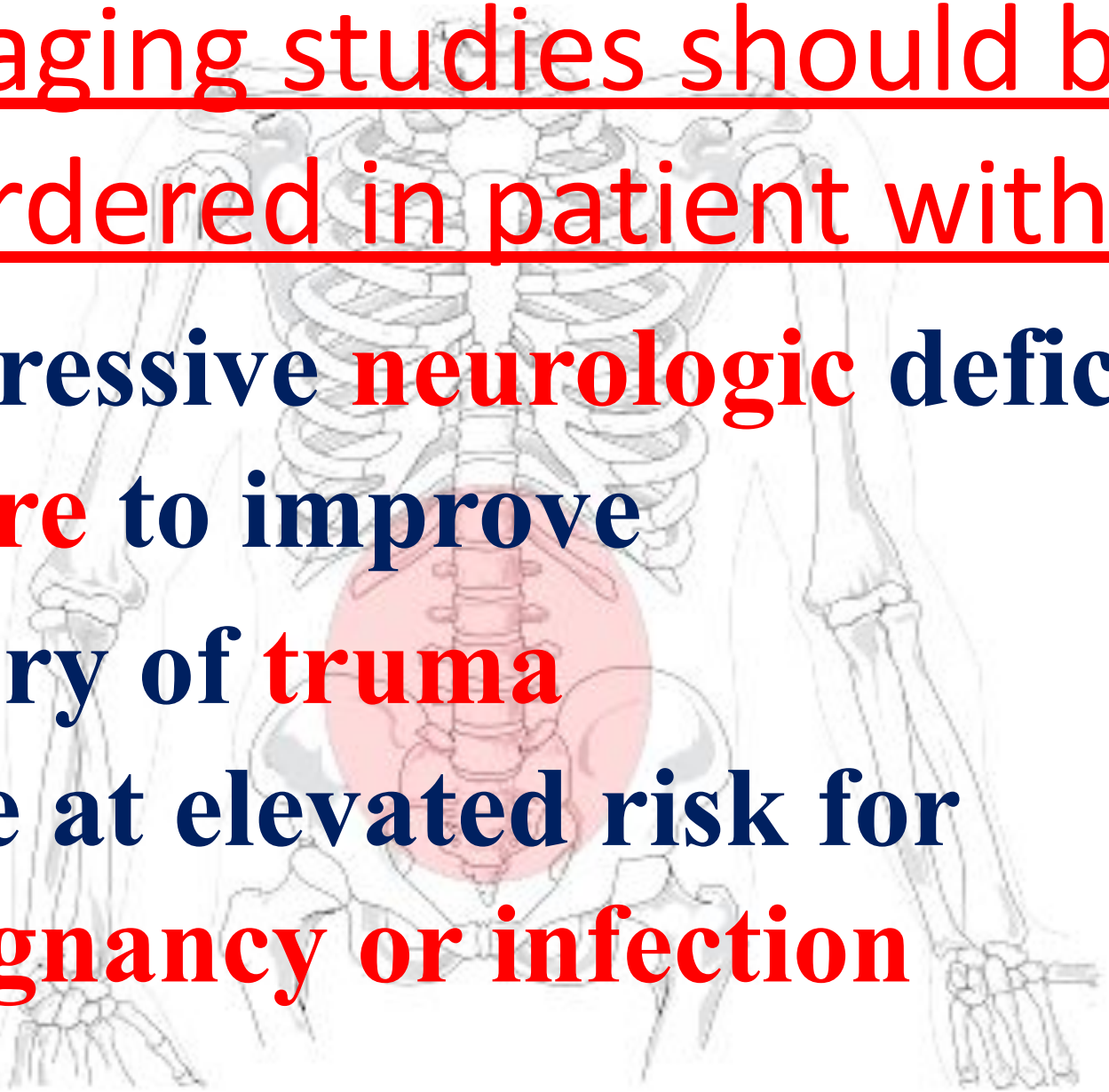
Low Back Pinched Nerve



Thus the finding of a negative SLR sign is important in helping to "rule out" the possibility of a lower lumbar disc herniation

Imaging studies should be ordered in patient with :

- progressive neurologic deficits
- failure to improve
- history of truma
- those at elevated risk for malignancy or infection



herniated disc at the L5-S1

herniation (of the disc between the L4-L5

***The Diagnosis** of back pain should be*

***Based on** a **Good History** and*

*a **Competent Physical examination***

Clinical examination is the most important Diagnostic procedure that will be undertaken

Goals

**Relieve* of pain*

**Restoration*

of physiological movements

Prevention of relapses

Approximately 90%

of acute sciatica

attacks improve with conservative management; such as treatment with

anti-inflammatory medications,

physical therapy, & **lumbar injection**,

unless the patient has

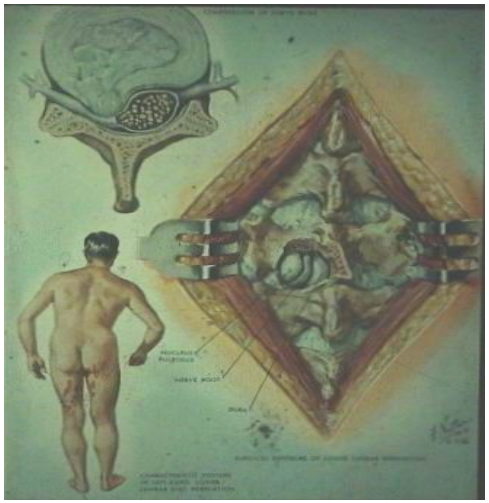
an acute or

progressive neurological deficit.

Surgery should be considered for

- ***Cauda equina syndrome .***
- *Individuals With **Motor Weakness** .*
- ***Persistant** Radicular pain*
- ***Failure of Conservative** therapy*

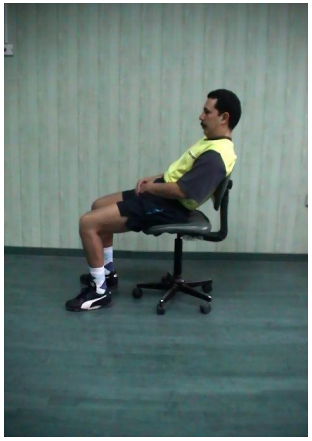
*at **3**or more months .*

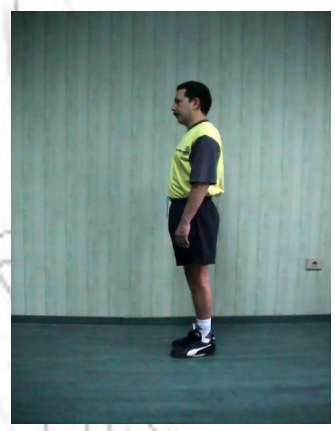


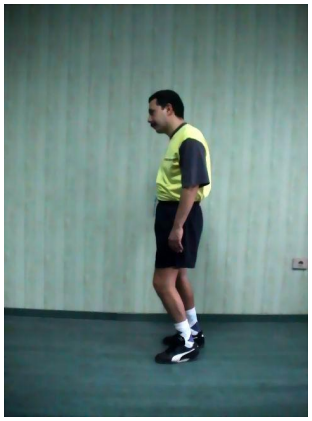
Other Treatment

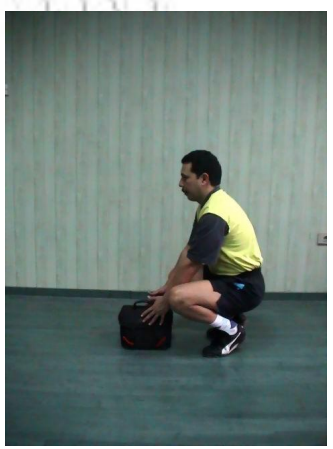
- **muscle relaxants or**
- **nonsteroidal anti-inflammatory drugs** to control muscle spasms.
- A lightweight **lumbosacral corset** may also be used to help control muscle spasms. Use of the corset should be discontinued as soon as the spasms have resolved.

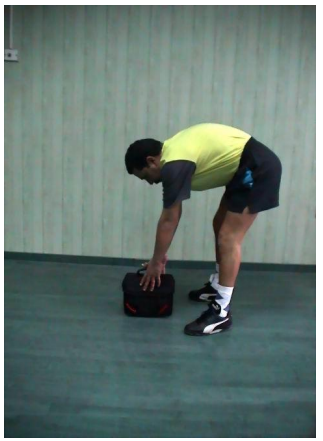
The patient should also be **instructed in the proper body mechanics with everyday tasks**

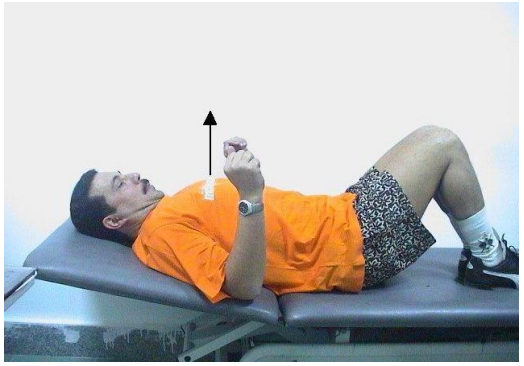


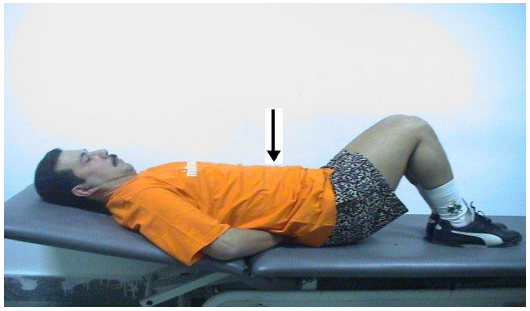


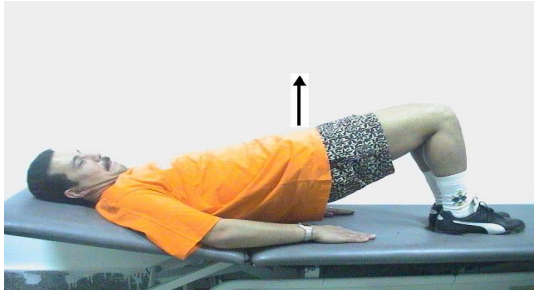






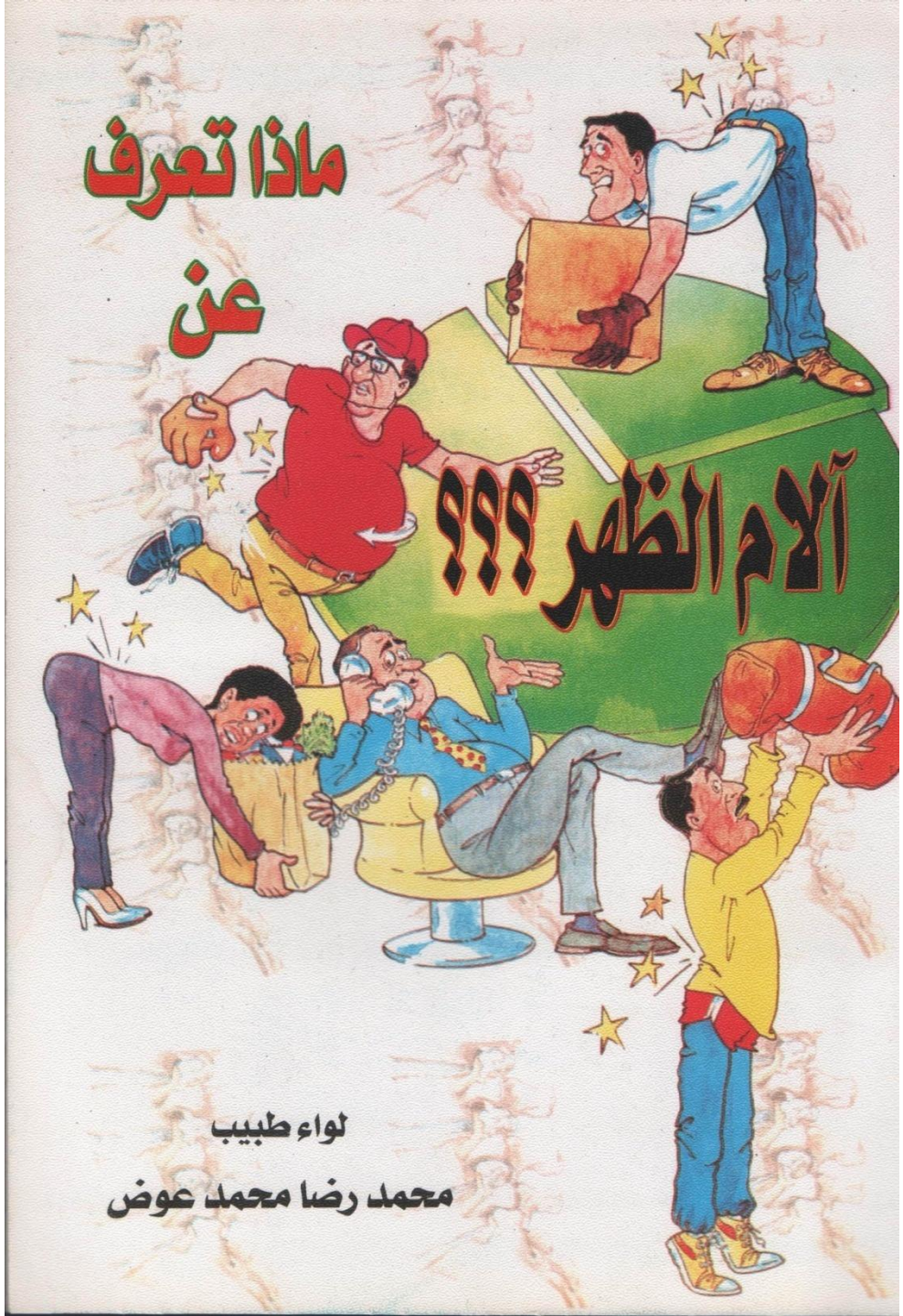


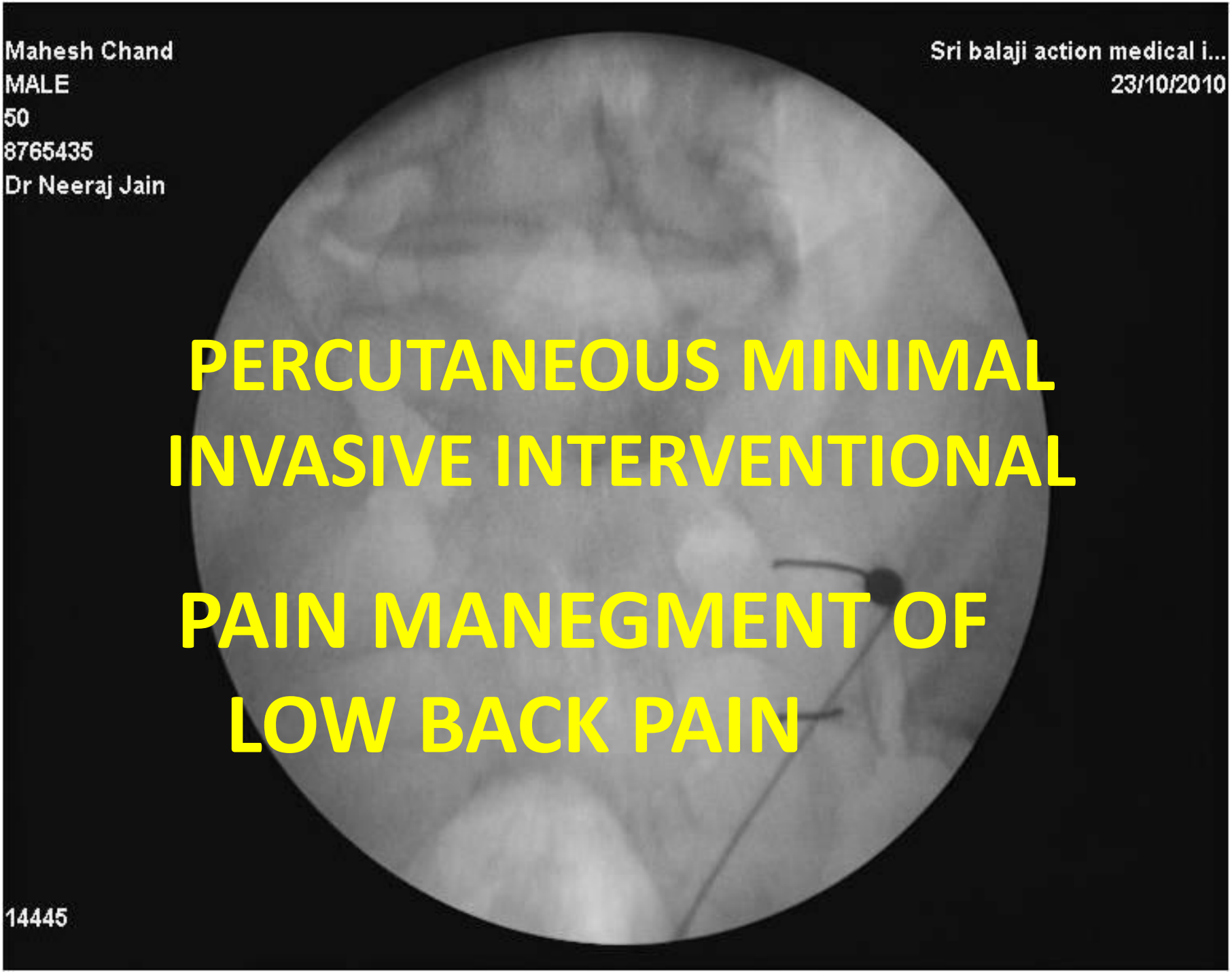




modalities

HAND BOOK





PERCUTANEOUS MINIMAL INVASIVE INTERVENTIONAL

PAIN MANEGMENT OF LOW BACK PAIN


CT


fluoroscopy


LightSpeed QX/i SYS#CT01_OC0
EX: 105
Se: 3
SN I168.26
Im: 2
DFOV 36.0cm
STND/P
P 184
Agouza Military Hosp.
SAEED A.ELAZEM ATTA ALLHA
M 60 105
05 Apr 2009
512
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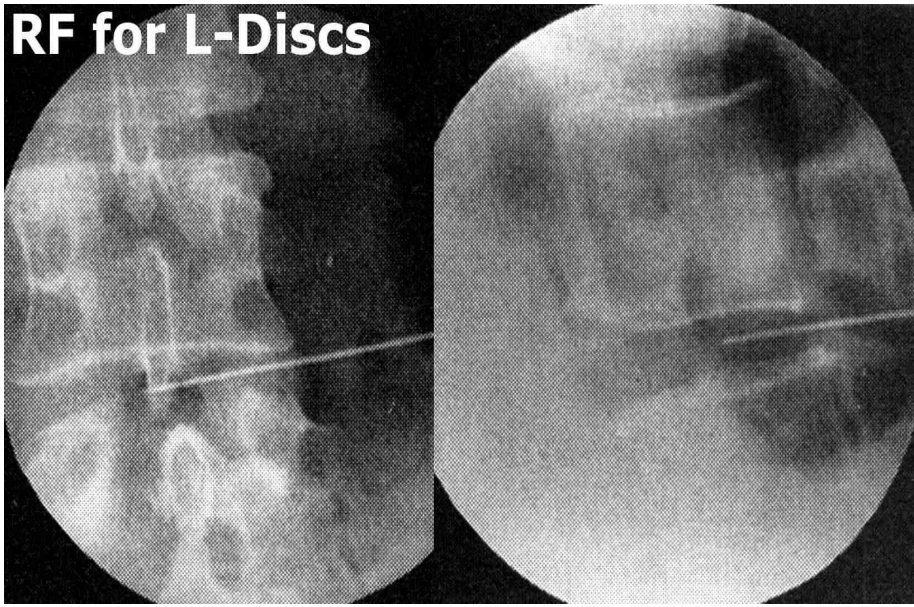
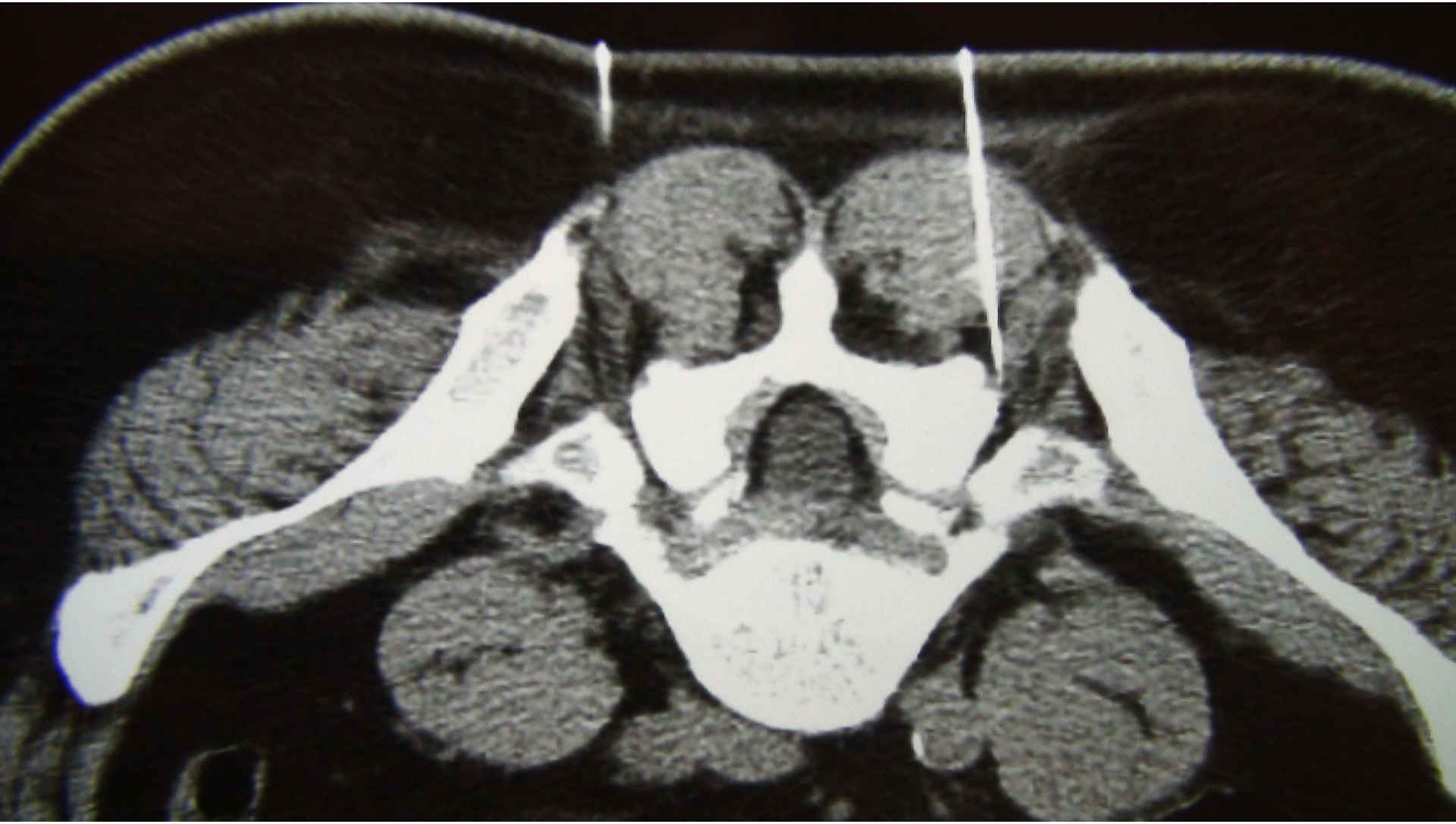
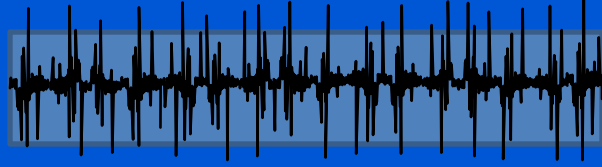
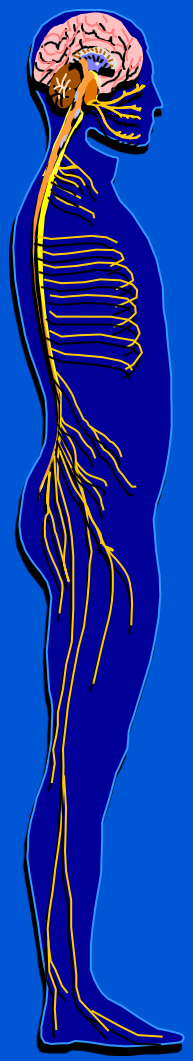

RF for L-Discs

DISCECTOMY



AGOUZA SPECIALISED SPINE CENTER (ASSC)





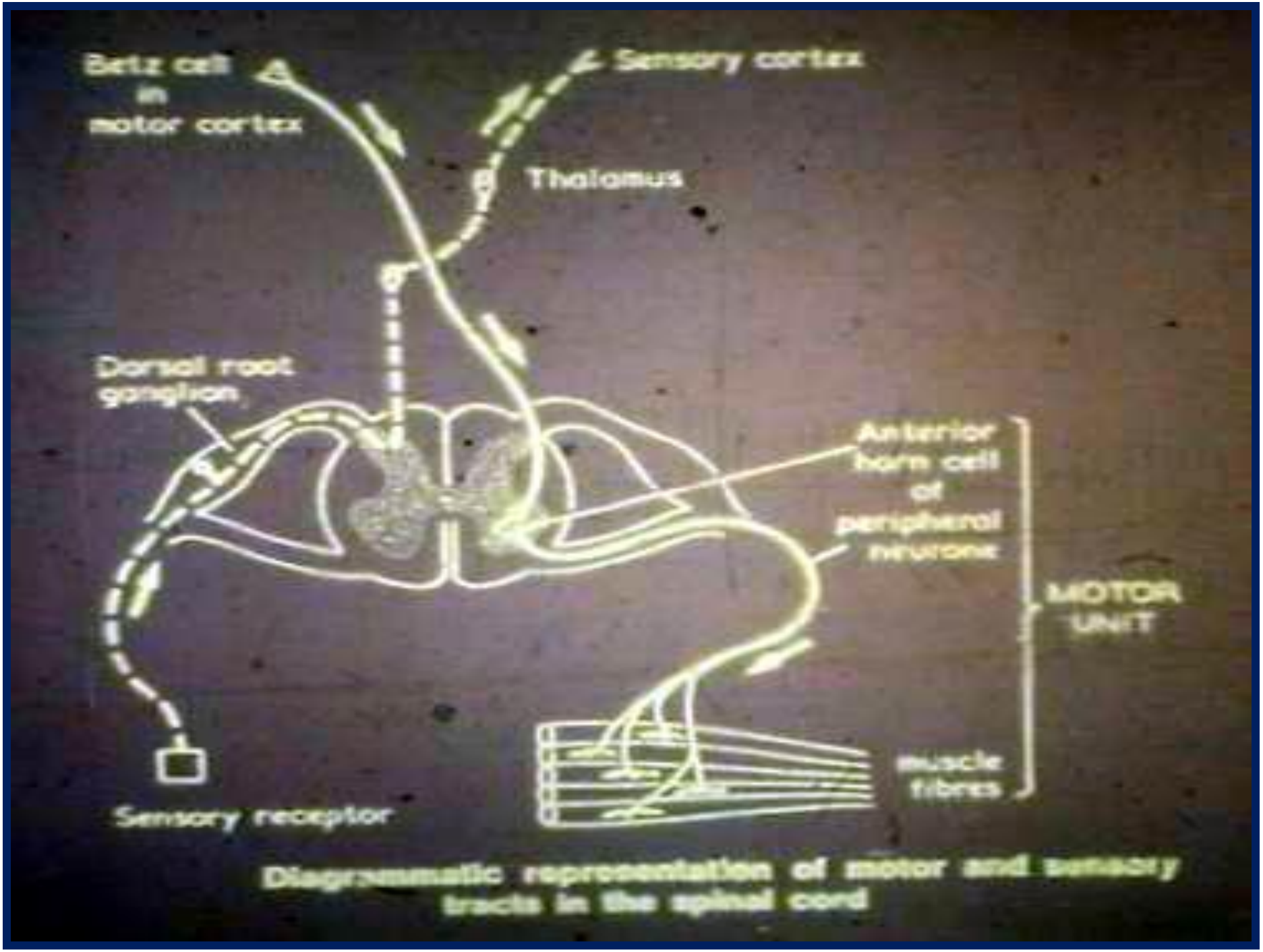
Electromyography

Prof. Dr. Reda Awad

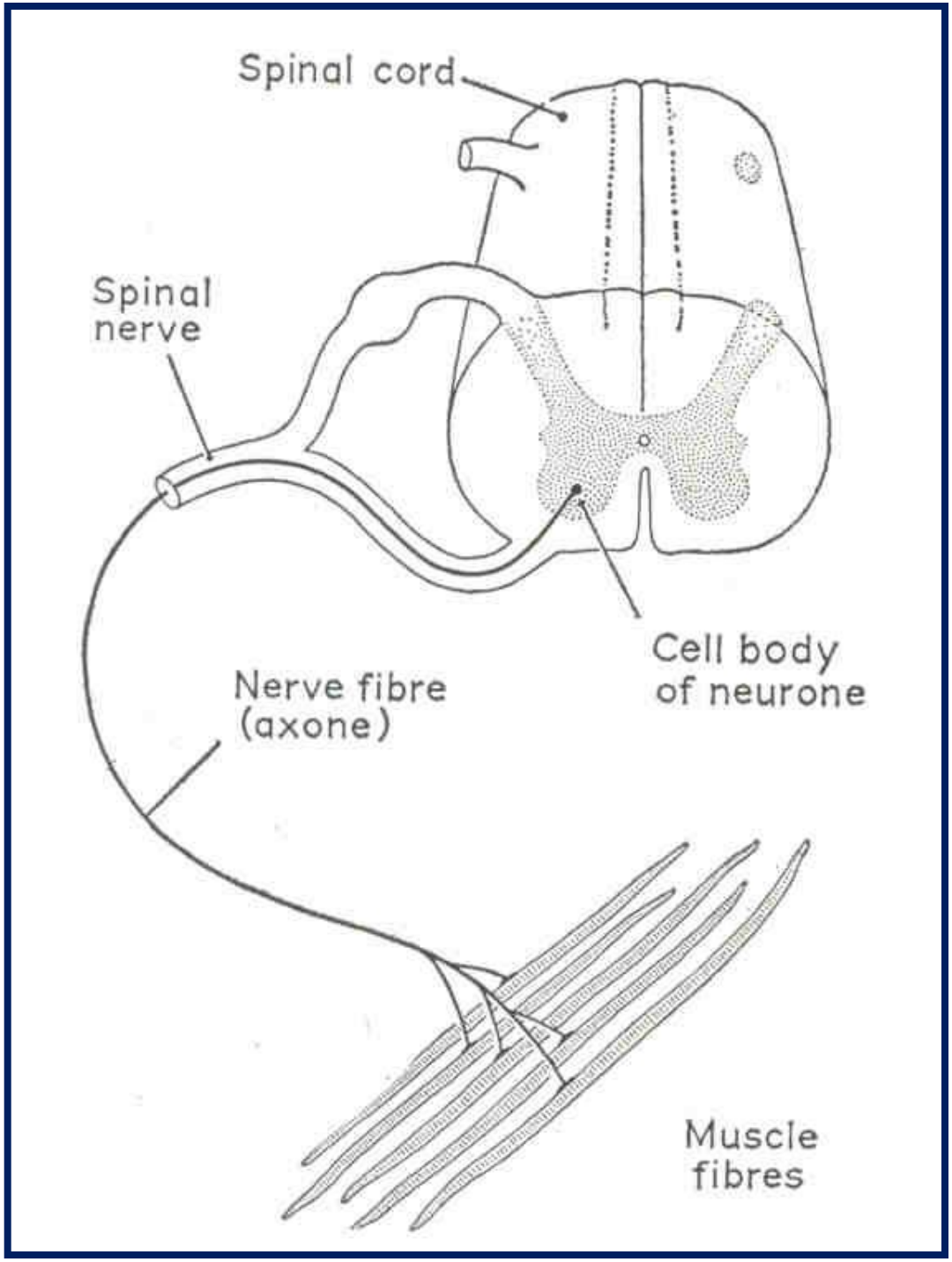
the normal neurophysiologic function of the nervous system.

Electrical signals are generated in the **brain**, pass through the **spinal cord**, and travel into the **peripheral nervous system**.

These signals are carried down the nerve to the **synaptic cleft**, where a chemical release of **acetylcholine** crosses the synaptic cleft to create an electrical discharge in the muscle. **This electrical signal causes the muscle to contract**



Diagrammatic representation of motor and sensory tracts in the spinal cord


Spinal cord
Spinal nerve
Cell body of neurone
Nerve fibre (axone)
Muscle fibres

Why It Is Done

To help in the diagnosis&assessment of the diseases that damage muscle tissue, nerves, or the junctions between nerve and muscle.

,.

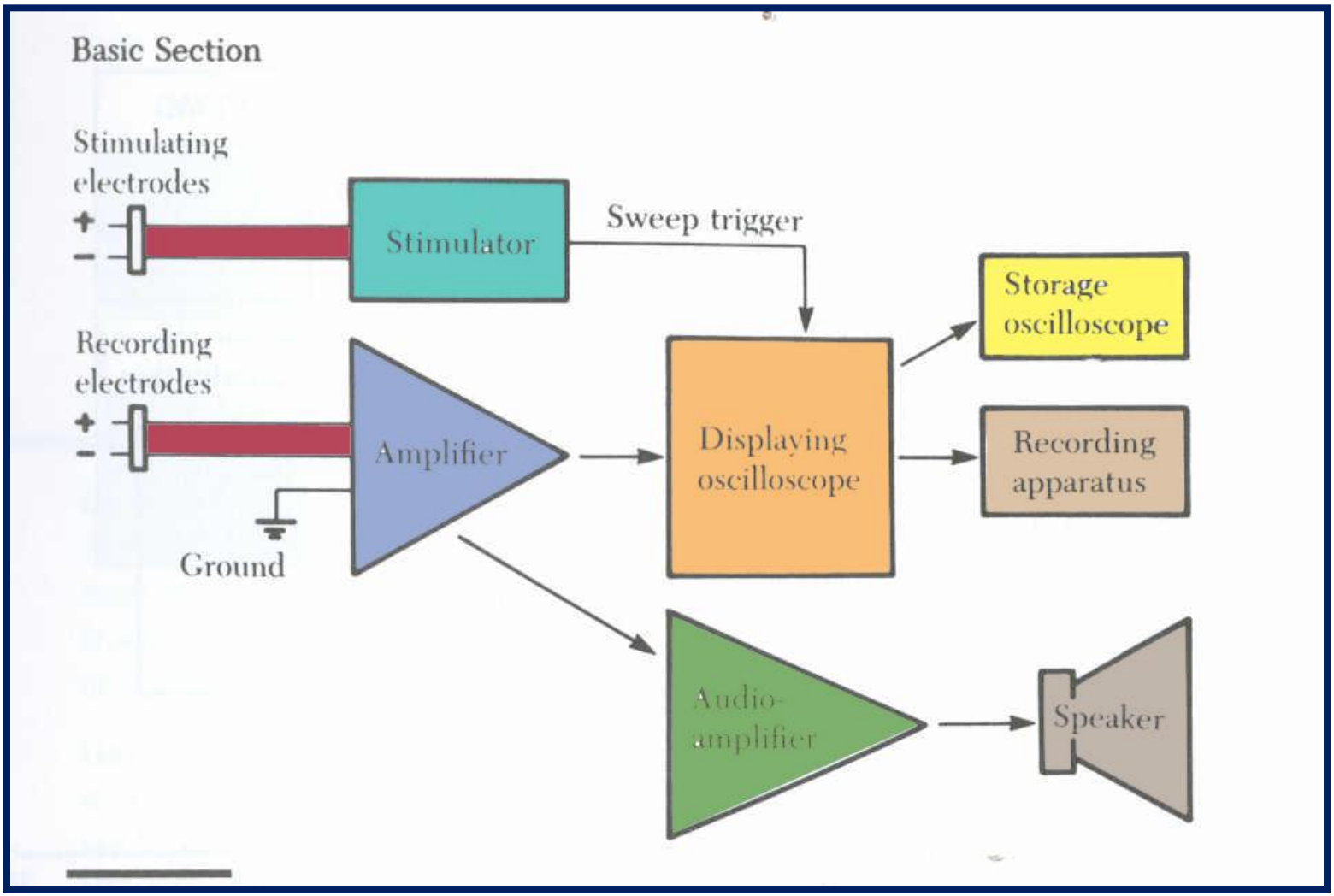
Electromyogram (EMG) and Nerve Conduction Studies

An electromyogram (EMG) measures the electrical activity of muscles at rest and during contraction.

Nerve conduction studies measure how well and how fast the nerves can send electrical signals.

Electromography and nerve conduction studies is an important and helpful Extension of the physical examination and can detect minor abnormalities when physical examination cannot

In the assessment of the peripheral nervous system injuries.


Basic Section
Stimulating electrodes
+
−
Stimulator
Sweep trigger
Storage oscilloscope
Recording electrodes
+
−
Amplifier
Displaying oscilloscope
Recording apparatus
Ground
Audio-amplifier
Speaker

Key steps

Review of referral materials

Eliciting the patient's history

Performing a physical examination

Developing a differential diagnosis

Putting together a plan for electrodiagnostic evaluation

Electromyography

This procedure involves the placement of a needle into various muscles to record different stages of muscle activity,including

rest,

minimal contraction,

and maximal activity.

At rest, normal muscle is **electrically silent**.

Damaged muscle tissue may result in **spontaneous depolarization** of individual muscle fibers.

EMG of normal muscle

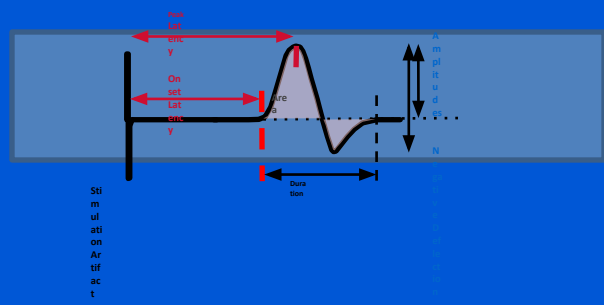
- At rest: no activity.
- On minimal volition : MUAPs are of average amplitude and duration. The polyphasic potentials are less than 10%.
- On maximum volition : full interference pattern.

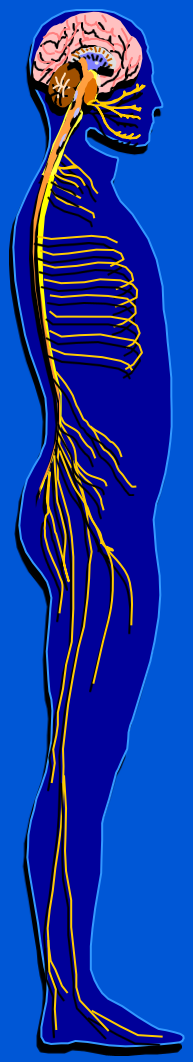
- **The normal MUAP**

is usually biphasic or triphasic with amplitude range of 0.5 to 3 mV ,and a duration between 2 and 10 ms.

Anatomical sites of involvement including possible aetiology

Site	Aetiology
Anterior horn cell	**poliomyelitis** **motor neurone disease** **Spinal muscular dystrophies**
Nereve root	**Prolapsed intervertebral disc** **Traction injury.**
Plexus	**penetrating wounds** **Traction injury.**
Peripheral n.	**Neuropathies including compression neuropathies**
Neuromuscular jun.	**Myasthenia Gravis.** **Myasthenic syndrome**.
Muscle fibre	**Myopathies** **Polymyositis** **Myotonias**



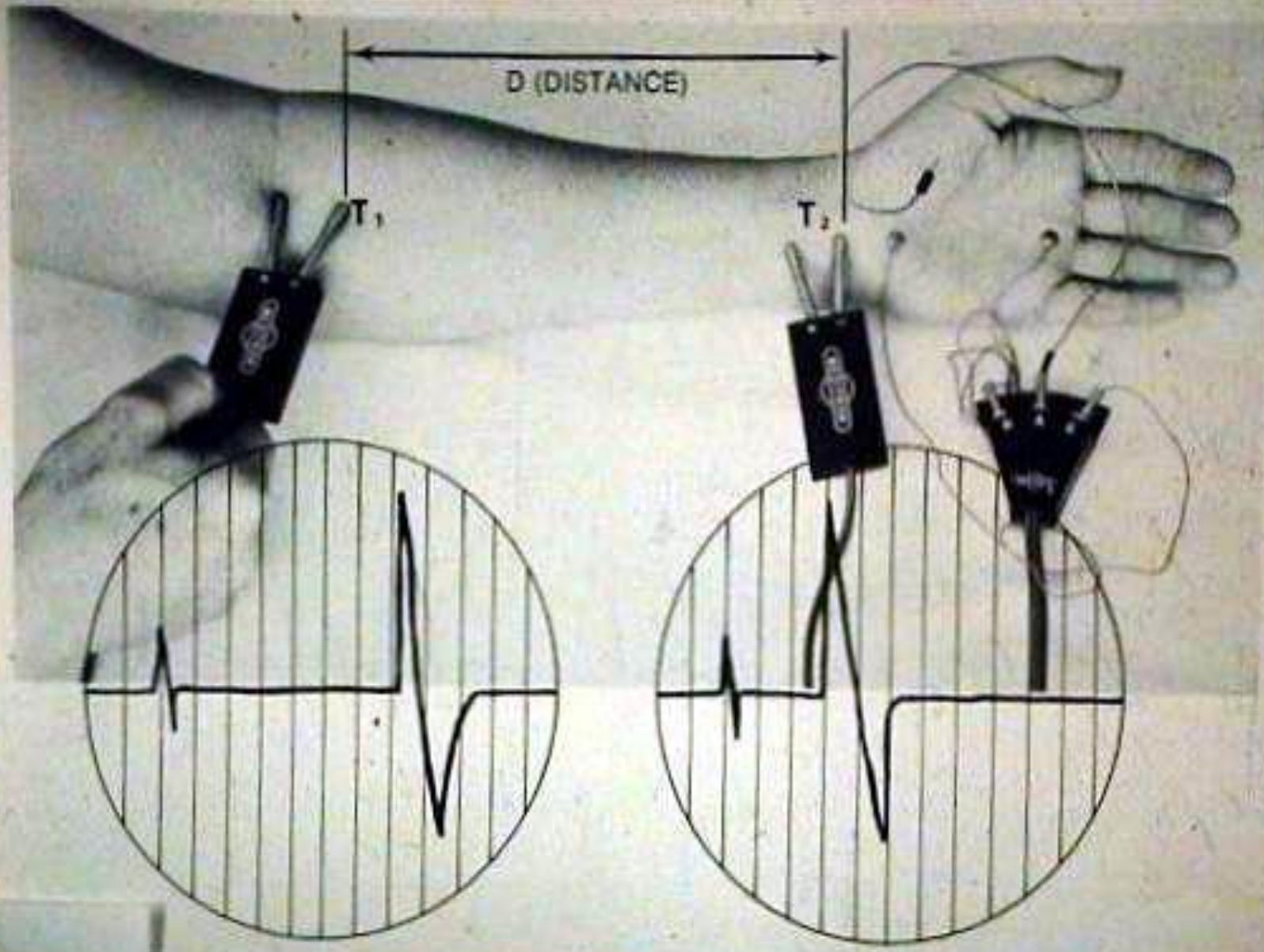


Nerve Conduction Studies

Prof. Dr. Reda Awad

Motor nerve conduction studies

- Almost any nerve that has motor fibers and is placed superficially along a portion of its course can be stimulated with a surface electrode , and the distal muscle response can be recorded using another recording surface electrode.



Technique for performing a motor nerve conduction velocity study, showing different oscilloscope patterns when stimulator is applied to elbow (T_1) or wrist (T_2).

The Term Entrapment describes the mechanical irritation by which a specific peripheral nerve becomes locally injured in a vulnerable anatomic site

Familiarity with the Anatomy of the peripheral Nerves is essential.

Nerve compression Can Occur at any point where a peripheral nerve passes through

An opening In fibrous tissue or through

An Osseo fibrous Canal.

In addition to a neurologic examination, the evaluation of every patient with an entrapment neuropathy should include electromyography (EMG) motor and sensory nerve conduction velocity studies, and appropriate radiographs

EMG and nerve conduction velocity measurements provide localizing information often necessary in the early diagnosis of a compressive neuropathy and reliably document the severity and extent of nerve entrapment

Classification of nerve injuries

- ***Neurapraxia:*** *It is a comparatively mild injury with motor and sensory loss with no evidence of Wallerian degeneration. The nerve distally conducts normally. Focal demyelination and/or ischemia are thought to be the aetiology of the conduction block.*
- ***Recovery*** *may occur within hours, days, weeks, or up to a few months.*

Axonotmesis:

It is commonly seen in ***crush injuries*** *The* ***axon and their myelin sheaths are broken****, yet the surrounding stroma remains partially or fully intact.*

Wallerian degeneration occurs, but subsequent axonal regrowth may proceed along the intact endoneurial tubes.

Neurotemesis

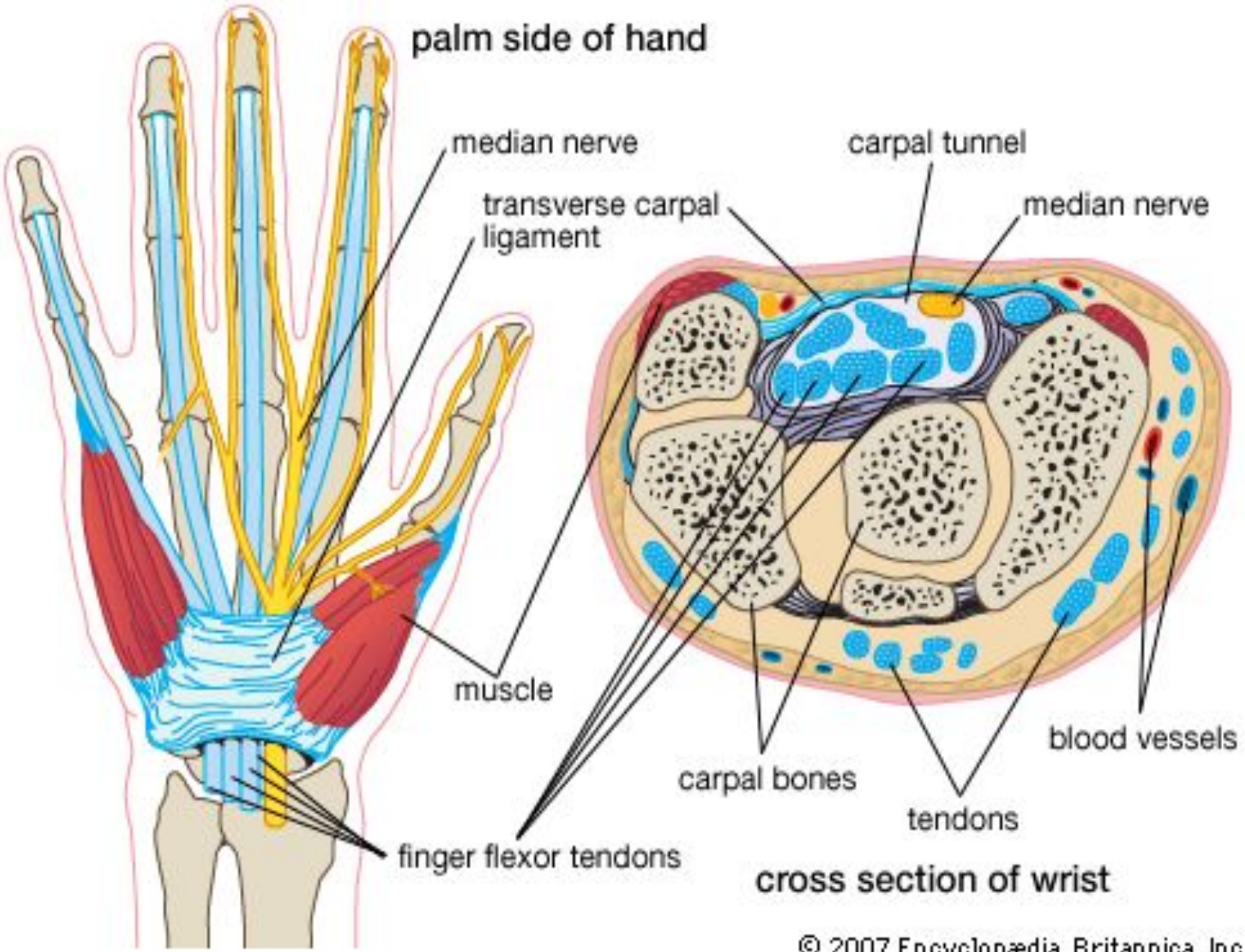
It describes a nerve that has been ***either completely served or is so markedly disorganized by scar tissue*** *that* ***axonal regrowth is impossible****.*

Prognosis *for spontaneous recovery is extremely poor without surgical intervention.*

Characteristic features associated with Various nerve compressions

Nerve	Clinical involvement
Median	Thumb and thenar eminence
Anterior interosseous	Flexor pollicis longus, pronator Quadratus, flexor digitorum Profundus to index and middle Fingers; normal sensation
Ulnar	Small finger and hypothenar Eminence
Musculocutaneous	Biceps
Radial	Wrist drop; sensory loss in dorsum Of thumb
Post.inter osseous	Wrist drop; normal sensation
Femoral	Absent knee jerk; weak knee Extension and hip flexion
Peroneal	Foot drop; sensory loss in dorsum of Foot
Posterior tibial	Sensory loss in medial heel; Weakness in intrinsic muscles of foot
Sciatic	Pain down lateral thigh ;often absent Ankles jerk; foot drop
Sural	Sensory loss over lateral foot

What Is Carpal Tunnel Syndrome?



Causes

* *R . A*
* *Hypothyroidism*
* *Amyloidosis*
* *Gout*
* *Acromegaly*
* *Pregnancy*
* *Teno synovitis*

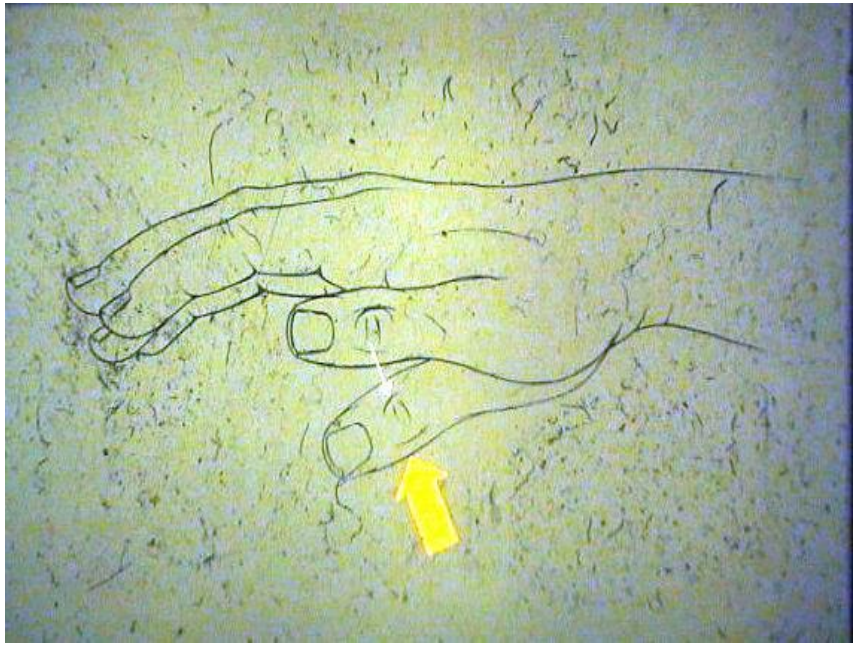
* ***Mixed*** *sensor motor N.*

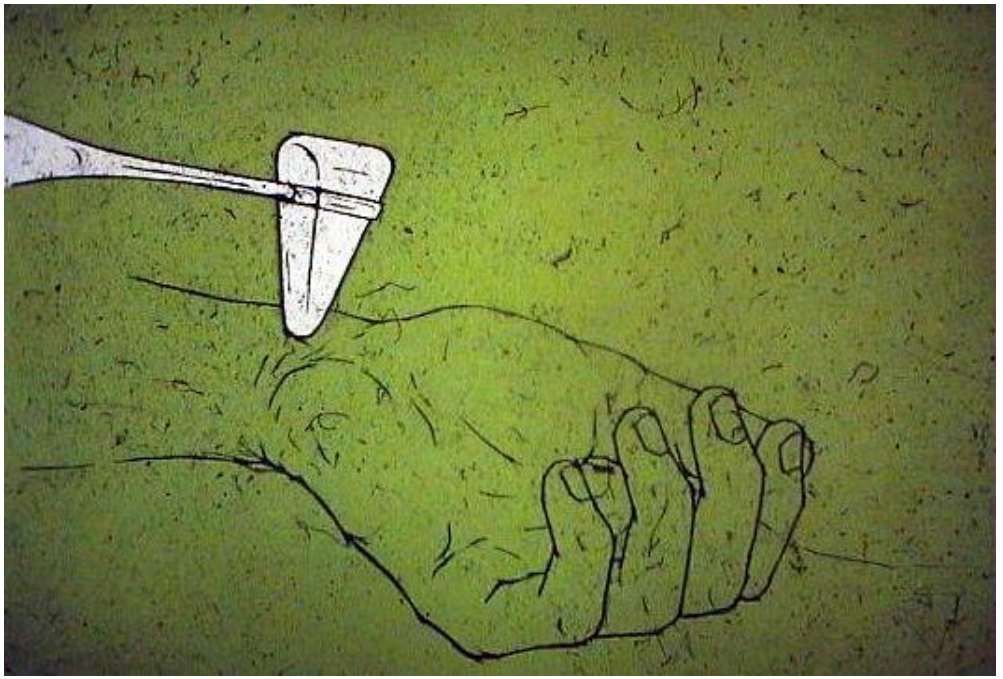
* ***Sensory*** *- paresthesias*

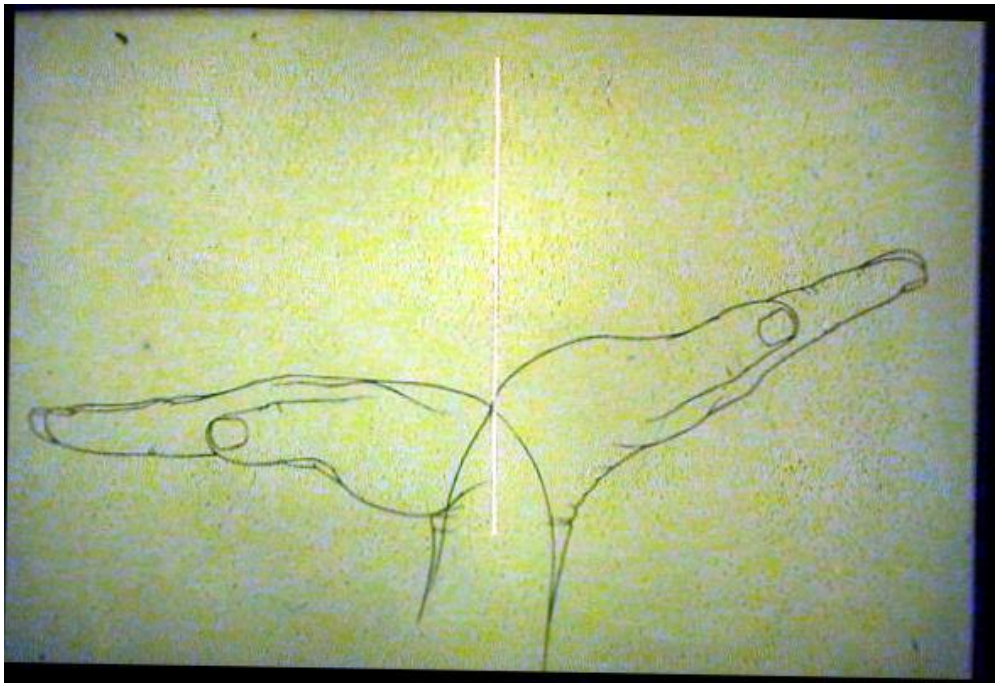
* ***Motor*** *- weakness and atrophy of the theanr muscles*

* *The discomfort worsens at* ***night*** *and often awakens her from sleep.*

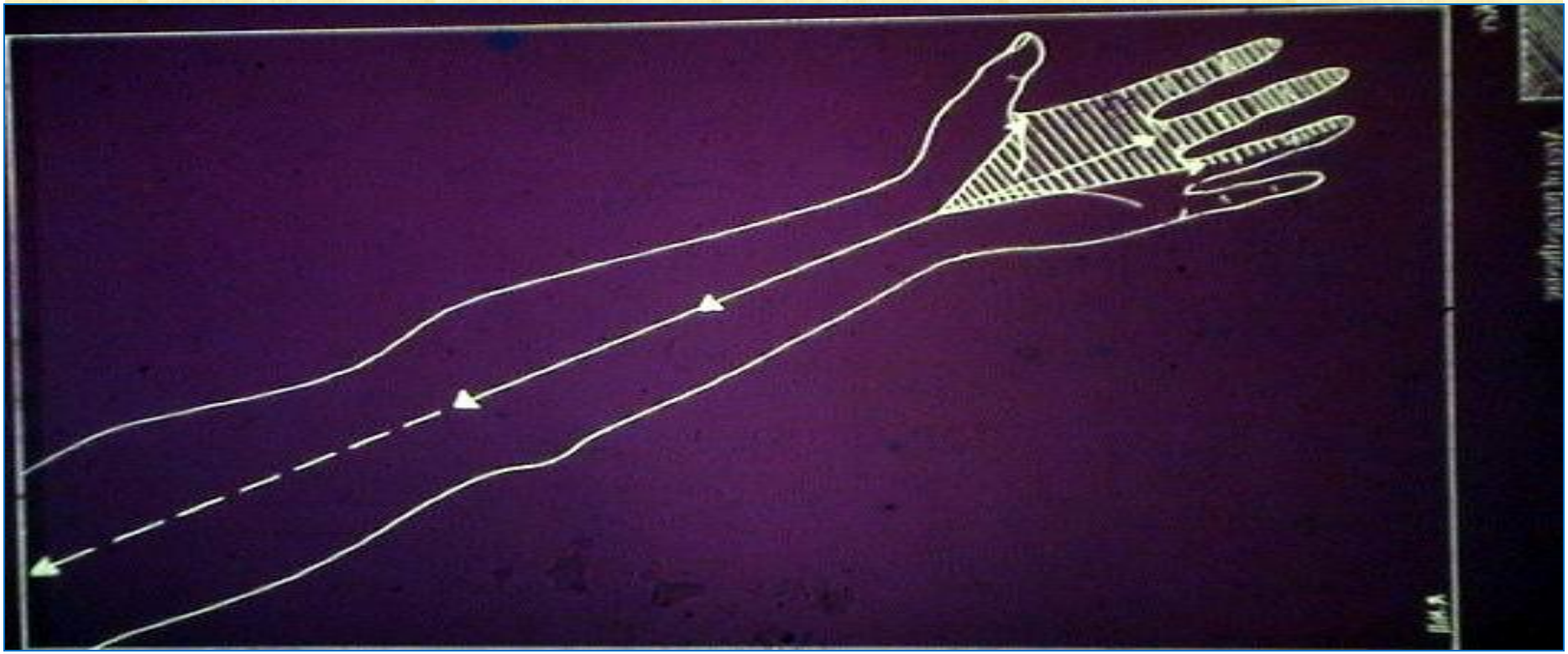
* *Frequently* ***bilateral.***



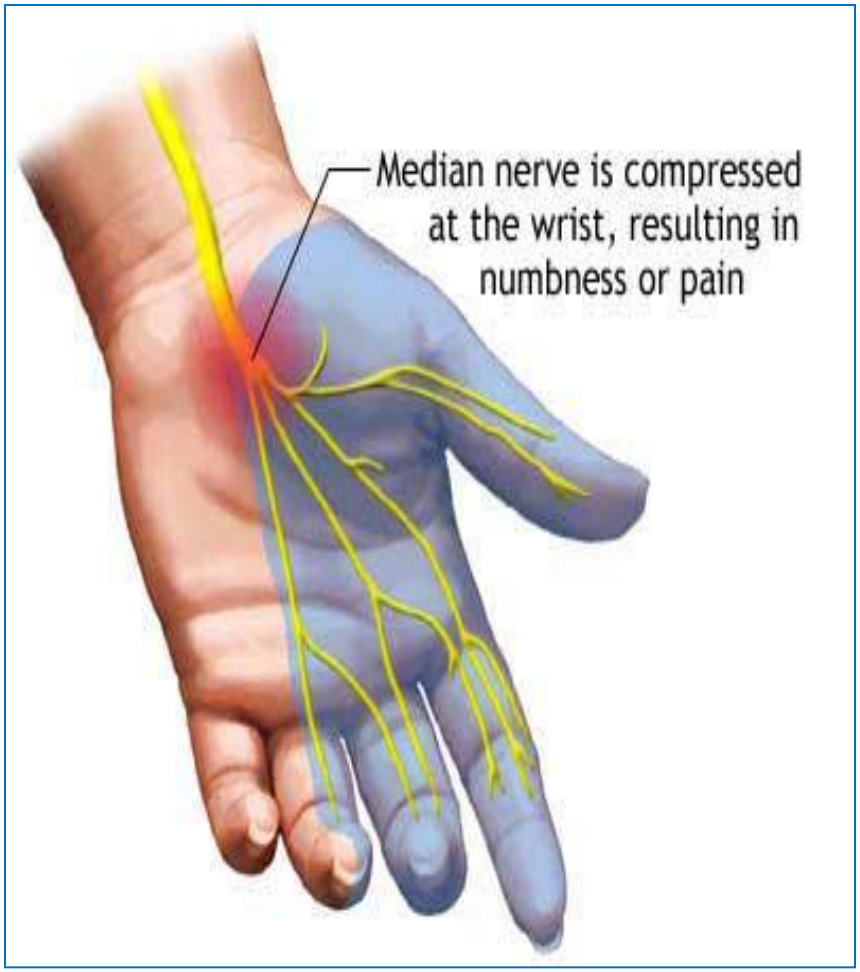


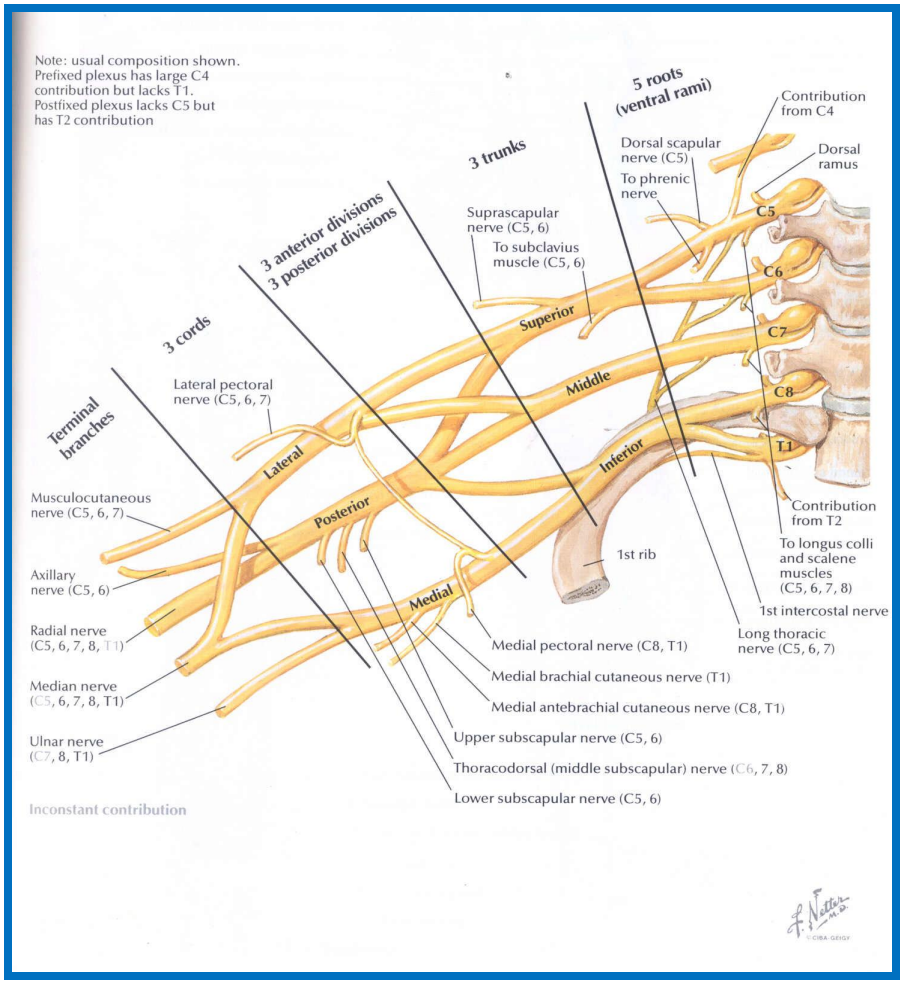


If sever , the CTS may produce retro grade pain to the forearm and less commonly to the shoulder and neck regions .

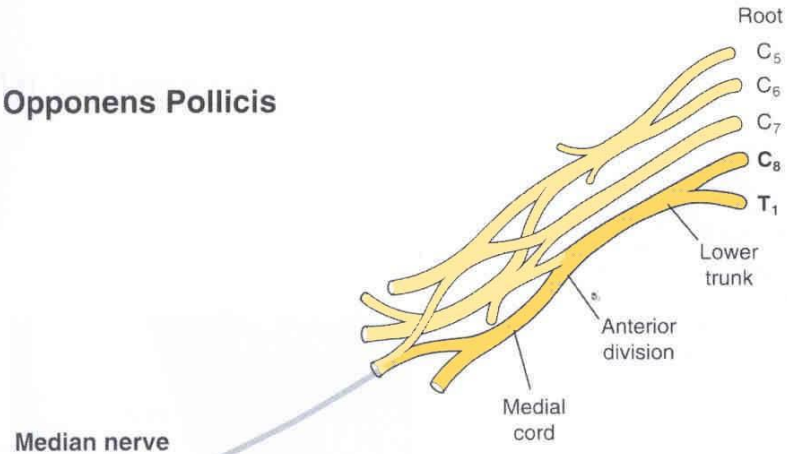


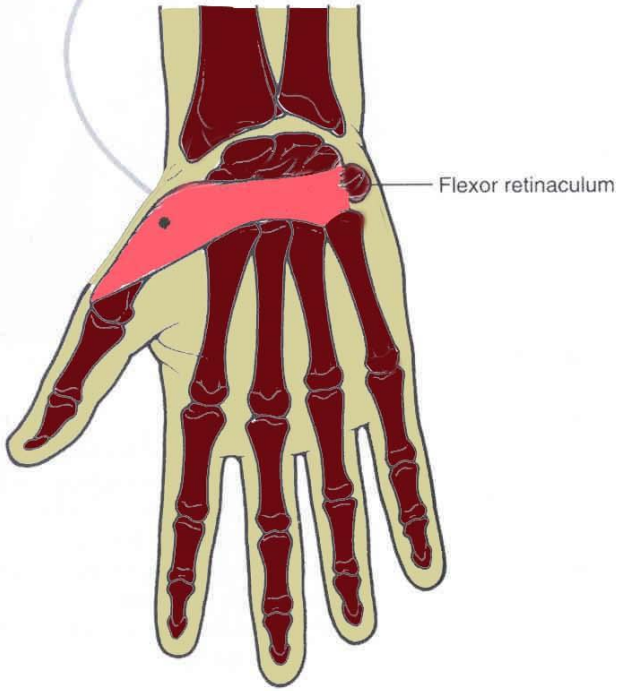
Double crush syndrome of the MEDIAN nerve

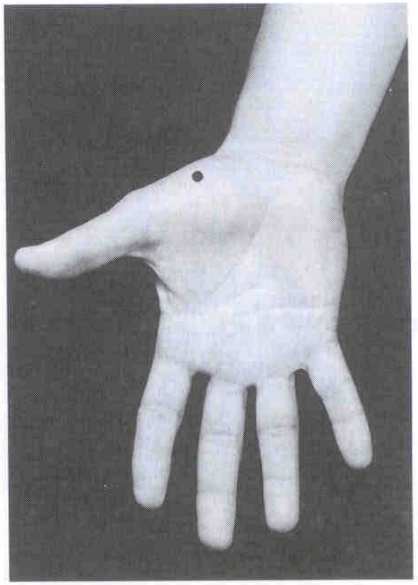


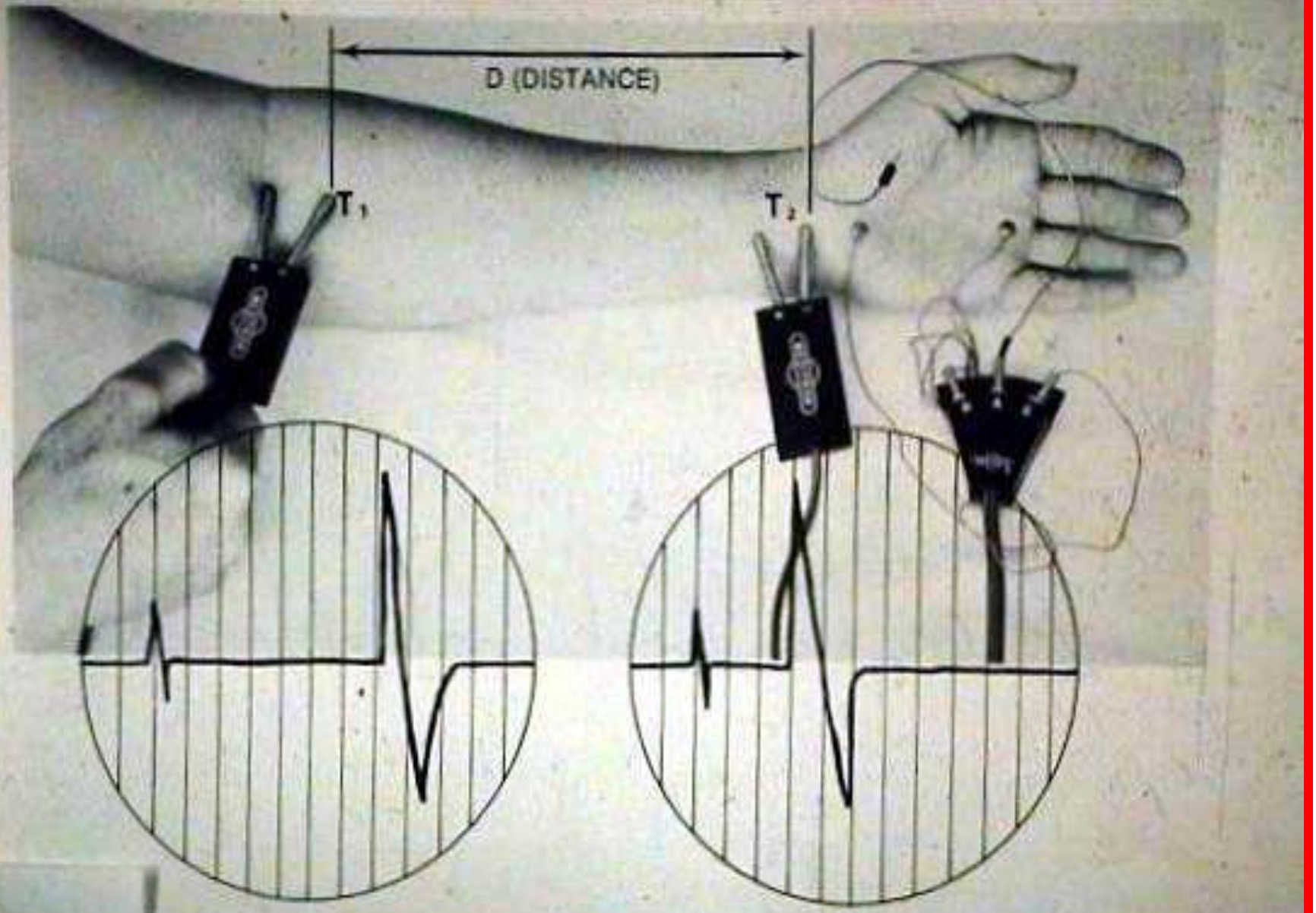


Opponens Pollicis









Technique for performing a motor nerve conduction velocity study, showing different oscilloscope patterns when stimulator is applied to elbow (T_1) or wrist (T_2).

Treatment:

Nonoperative:

Splint the limb in the neutral position that maximize space for the entrapped nerve.

Maintain good blood flow to the limb and reduce swellings and oedema in order to prevent the compression

- **Rest the Wrist**

Wrist rests help to avoid carpal tunnel syndrome by keeping the wrists elevated above the keyboard.

An Ergonomic Glove

IMAK Products' Smart Glove uses a removable splint (upper cutout) to keep the wrist in the proper position. The ergoBeads (bottom cutout) massage the area to increase blood circulation and promote healthy muscle tissue.
(Image courtesy of IMAK Products Corporation, www.imakproducts.com)

Modify activity

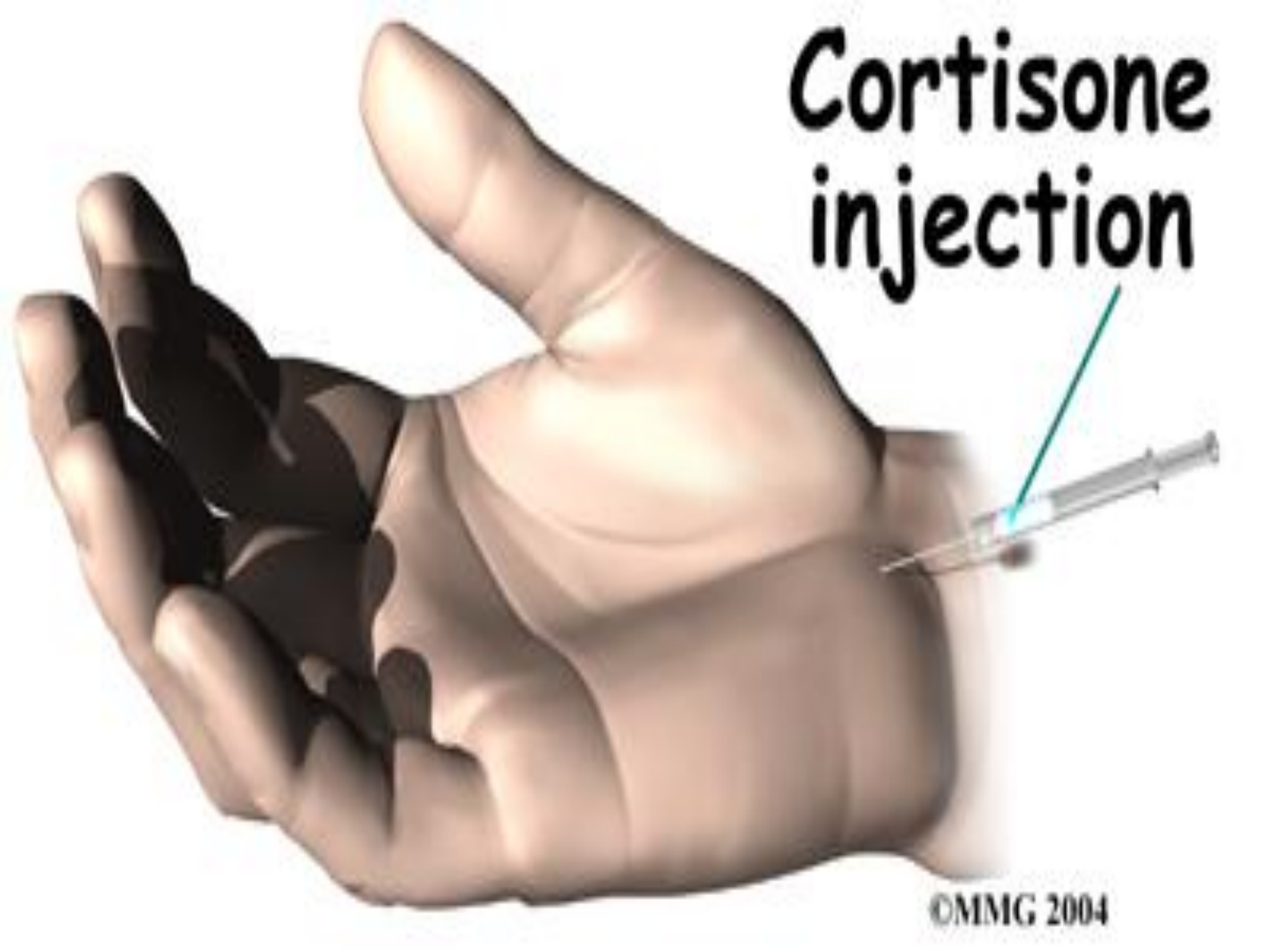
and avoid positions that can be a source of trauma.

Reduce inflammation

and consider the use of ice,NSAIDs **and**

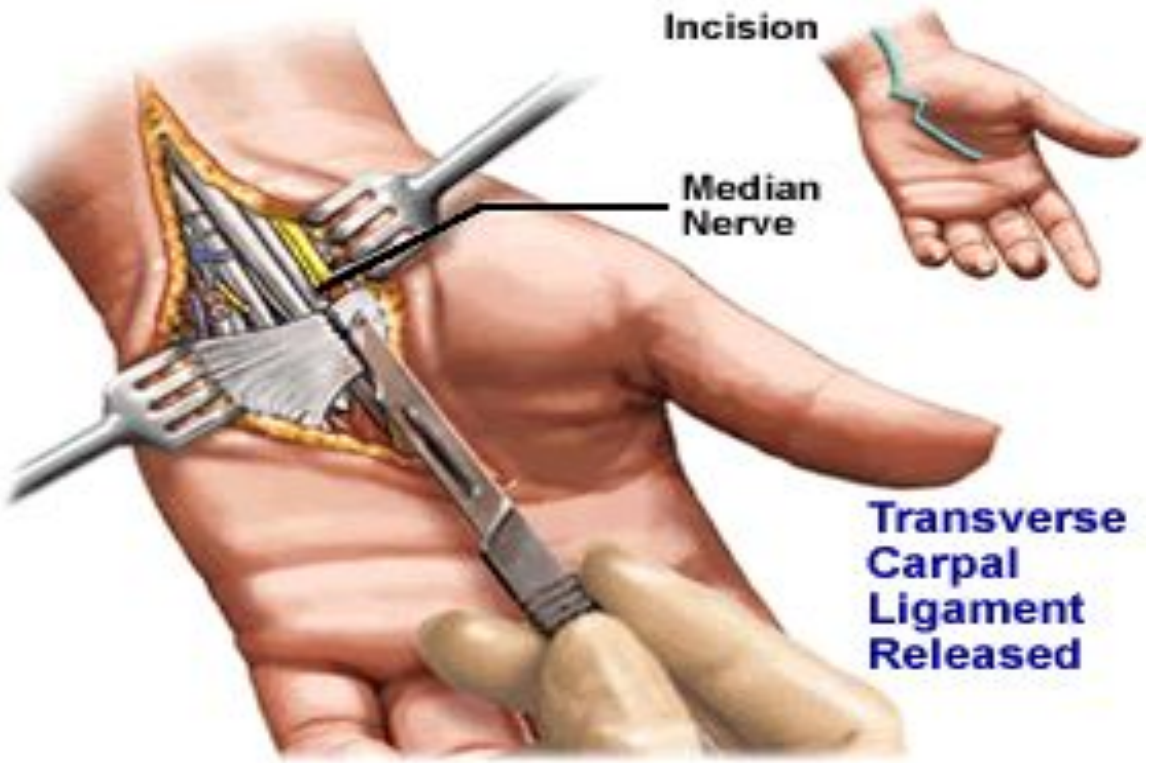
corticosteroid injection

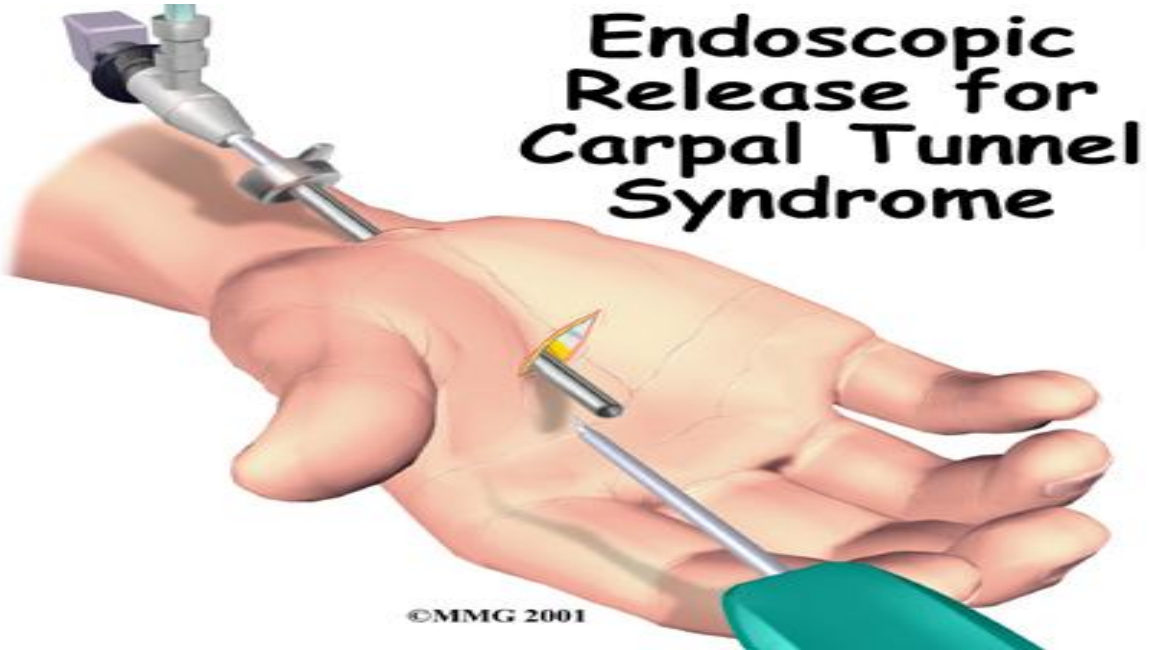
in structures around the nerves that may be inflammed


Cortisone injection
©MMG 2004

Operative:

If despite of nonoperative treatment,there is evidence of continuing axonal degeneration in the entrapped nerve,surgical decompression of the nerve is considered


Incision
Median Nerve
Transverse Carpal Ligament Released


Endoscopic Release for Carpal Tunnel Syndrome
©MMG 2001

*surgery

produces good results in cases caused by ganglion , some selected causes of truma and R .A .

Ankylosing spondylitis

Is a chronic systemic inflammatory disorder of undetermined etiology

Usually beginning in early adulthood

Primarily affecting the axial skeleton

often with enthesopathy

generally begins in the sacroiliac joint

Extra articular features can also exhibit

The disease prevalence in adult population is close to 0.2%

male to female ratio is 3 : 1

Axial SpA/AS and Associated Manifestations/Extra-articular

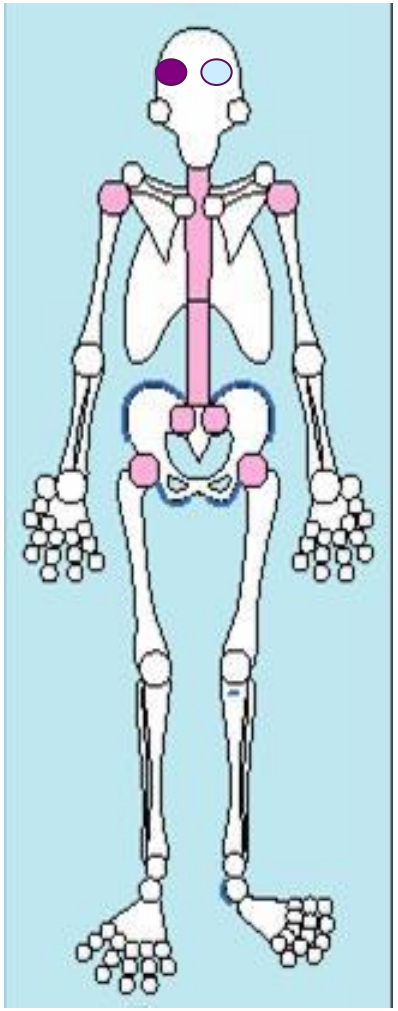
Axial Disease, Peripheral Arthritis, Enthesitis, Dactylitis

Osteopenia/Osteoporosis
19 – 62 %

Eyes
Acute Anterior Uveitis
25 – 45 %

Skin
Psoriasis & Nail Changes
5 – 16 %

Gut
IBD 5 – 8 %,
(Microscopic lesion 22 – 69 %)



Lungs
Restrictive Lung Disease,
Apical Fibrocystic Disease 1 – 1.3 %

Heart
Aortic Insufficiency, Heart Block
2 – 3 %

Kidneys
IgA nephropathy, Amyloidosis 0.3– 1.2 %

Cauda Equina Syndrome
0.5 %

Spinal Ankylosis

Fracture

Khan MA. Spondyloarthropathies: clinical features of AS. In: Hochberg M, et al., eds. *Rheumatology* 3rd ed. Edinburgh, Scotland: Mosby;2003:1161–1170; Khan MA. *Ankylosing Spondylitis.* New York. OUP. 2009; Lautermann D, Braun J. *Clin Exp Rheum.* 2002;6(suppl 28):S11–S15; Magrey M, Khan MA. Osteoporosis in AS. *Curr Rheumatol Rep*. 2010 Aug 3. [Epub ahead of print]; Arends S. *Arthritis Res Ther*. 2012 Apr 30;14(2):R98. doi: 10.1186/ar3823; Smale S, et al.*Arthritis Rheum*. 2001;44(12):2728–2736; Rodrigues CE, et al. *Rev Bras Rheumatol*. 2012 Jun;52(3):379-383.

ETIOLOGY, PATHOGENESIS AND PATHOLOGY

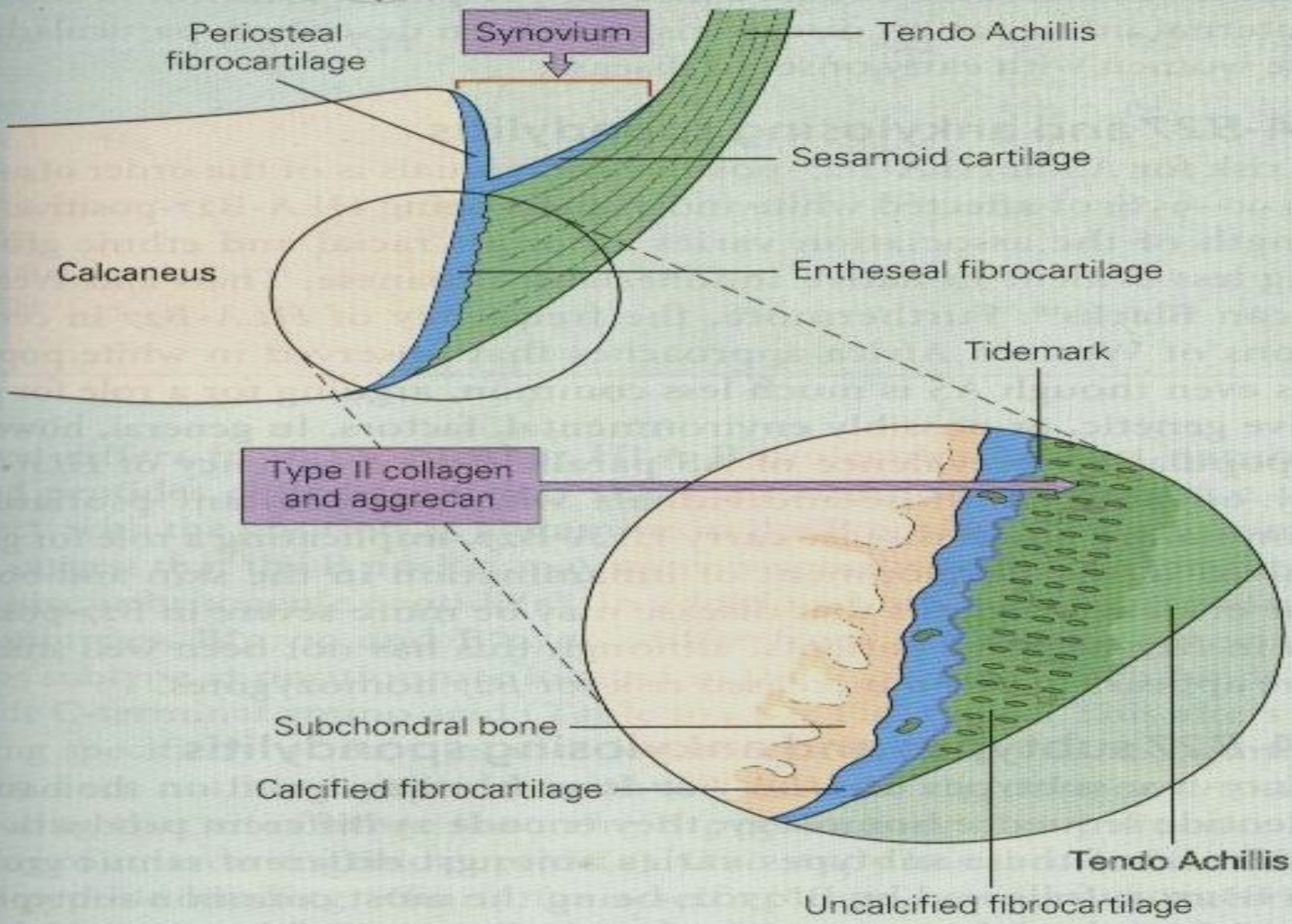
- **Key initial inflammatory lesions occur at**

***FIBROCARTILAGINOUS ENTHESES* rich in**

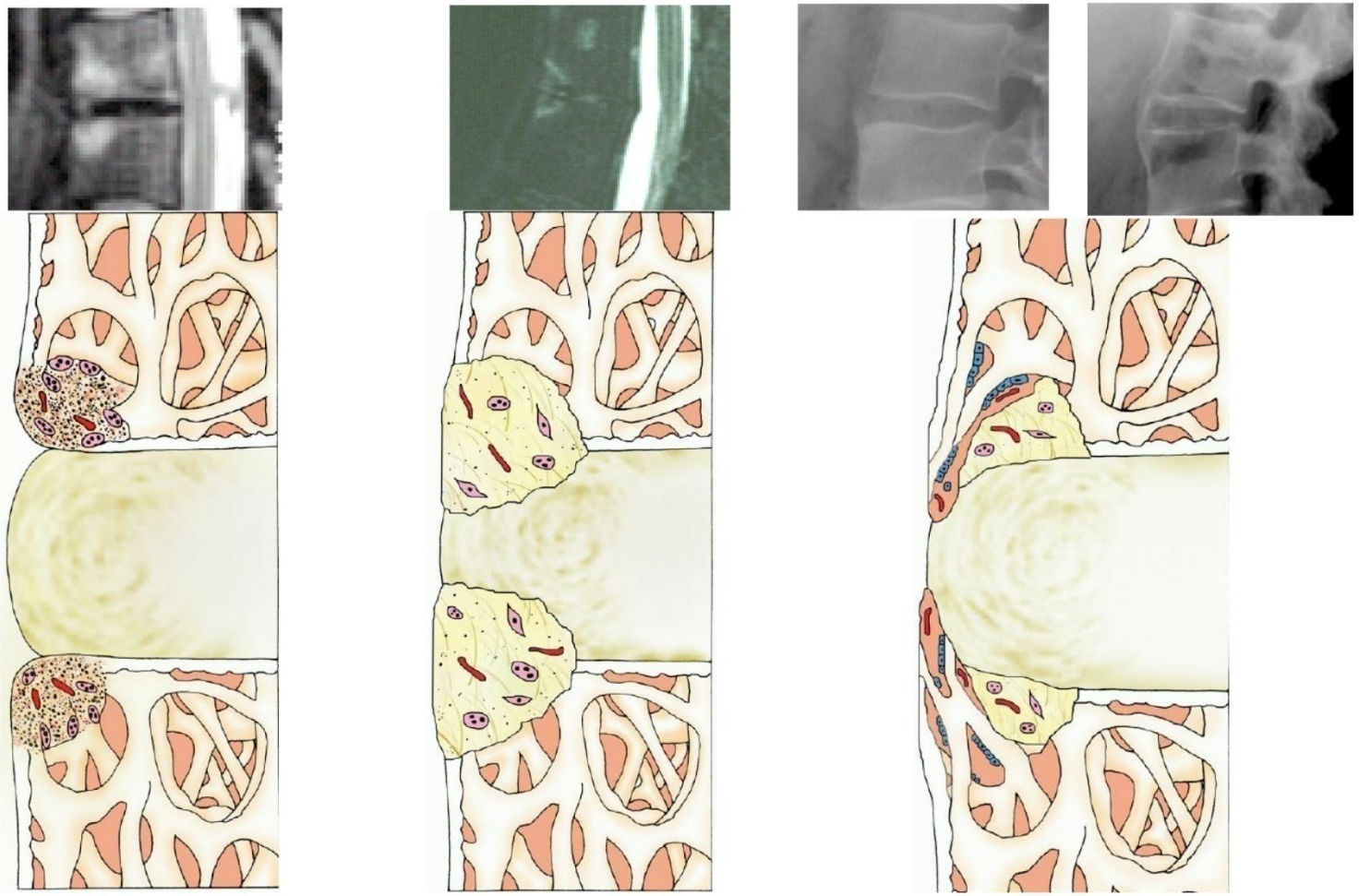
aggrecans and type II collagen

(e.g. intervertebral disc, sacroiliac joint, symphysis pubis and root of aorta)

THE TENDO ACHILLIS ENTHESIS: AN EXAMPLE OF A FIBROCARTILAGINOUS ENTHESIS



Proposed Sequence of Structural Damage in Ankylosing Spondylitis



Inflammation

Erosive damage
Repair

New bone formation

Appel H & Sieper J et al. Curr Rheumatol Rep. 2008;10:356-63 (with permission)

Disease Progression in AS

- Obliteration of lumbar lordosis with atrophy of buttocks
- Accentuation of thoracic kyphosis
- Forward stoop of neck if the cervical spine is involved
- Hip involvement
  - Flexion contractures
  - Compensated
  - for by knee flexion

Ankylosing Spondylitis

Differentiating *Inflammatory* versus *Mechanical* Back Pain

Features	*Inflammatory*	*Mechanical*
Morning stiffness	*Usually prolonged*	*Usually minor*
Max. pain/stiffness	*After midnight & early morning*	*Late in day*
Exercise/activity	*Improves symptoms*	*Worsens symptoms*
Duration	*Chronic*	*Acute or chronic*
Age at onset	*12-40 yrs (peak 26 yrs)*	*20-65 yrs.*
Radiographs	*Sacroiliitis, Syndesmophytes Spinal ankylosis*	*Osteophytes, Disc space narrowing Vertebral malalignment*

Courtesy of J. Cush, MD

Inflammatory Back Pain according to experts*

- Insidious ons
- Pain at ni
- Age at
- Improv
- No impr

getting up

N"© or "iPAIN"©

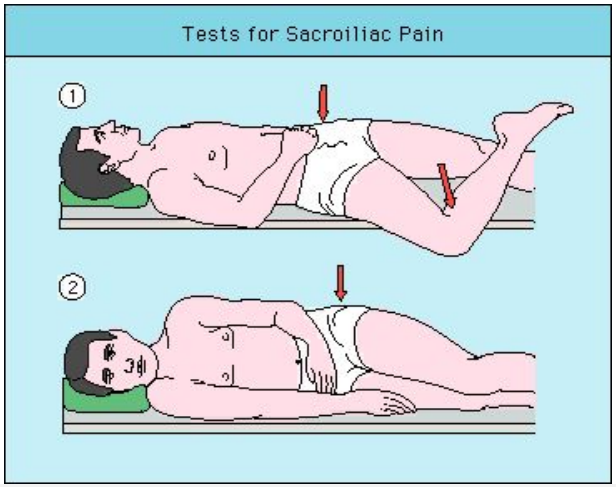
In fact, the confirmation of IBP is the most widely accepted starting point for assessing the potential presence of an axial spondyloarthritis such as AS.[1]

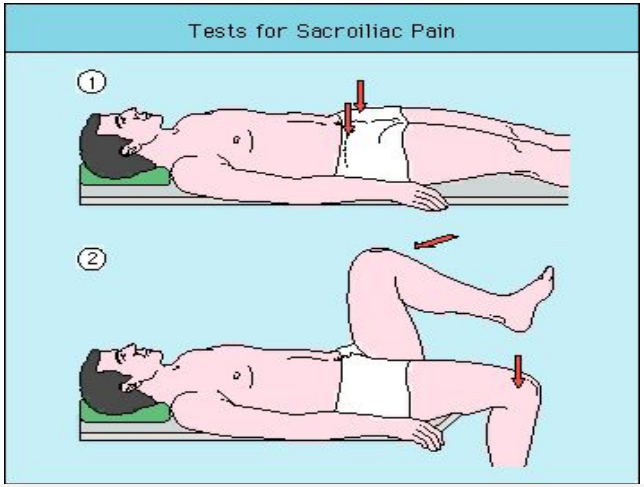
1
2
3

Spinal Mobility - Occiput to Wall (black arrow) and Tragus to Wall (white arrow)

- Heels and back rest against the wall
- Chin at usual carrying level
- Maximal effort to move the head (occiput) against the wall
- Report the best of two tries (in cm) for the occiput to wall distance and the mean of left and right for the tragus to wall distance

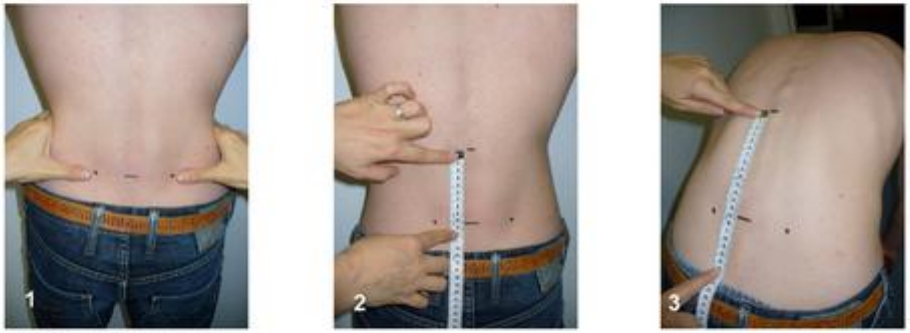
Adapted from: ASAS handbook, Ann Rheum Dis 2009; 68 (Suppl II)





Signs painful sacro-iliac tests * limited spinal movements

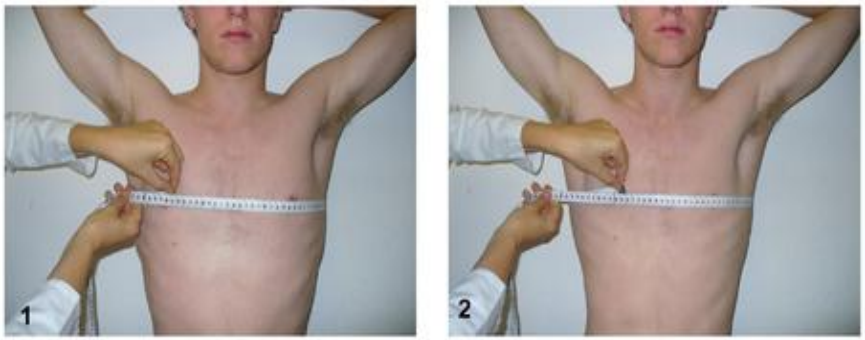
Spinal Mobility – Modified Schober



- Patient standing erect
- Mark an imaginary line connecting both posterior superior iliac spines (close to the dimples of Venus) (1)
- A next mark is placed 10 cm above (2)
- The patient bends forward maximally, measure the difference between the two marks (3)
- Report the increase (in cm to the nearest 0.1 cm)
- The best of two tries is recorded.

ASAS handbook, Ann Rheum Dis 2009; 68 (Suppl II) (with permission)

Spinal Mobility – Chest Expansion



- Hands resting on - or behind the head
- Measure at 4th intercostal level anteriorly
- Difference between maximal inspiration (1) and exspiration (2) in cm (eg. 4.3 cm) is recorded
- Report the best of two tries

ASAS handbook, Ann Rheum Dis 2009; 68 (Suppl II) (with permission)

Ankylosing Spondylitis

– *Low*

stiffness

mproves

sacroiliitis

Ensethopathy

Family

Modified New York Criteria for AS (1984)

Clinical criteria:

- Low back pain and *stiffness for more than 3 months* that improves with exercise, but is not relieved by rest
- Limitation of motion of *the lumbar spine* in both the sagittal and frontal planes
- *Limitation of chest expansion* relative to normal values correlated for age and sex

Radiological criterion:

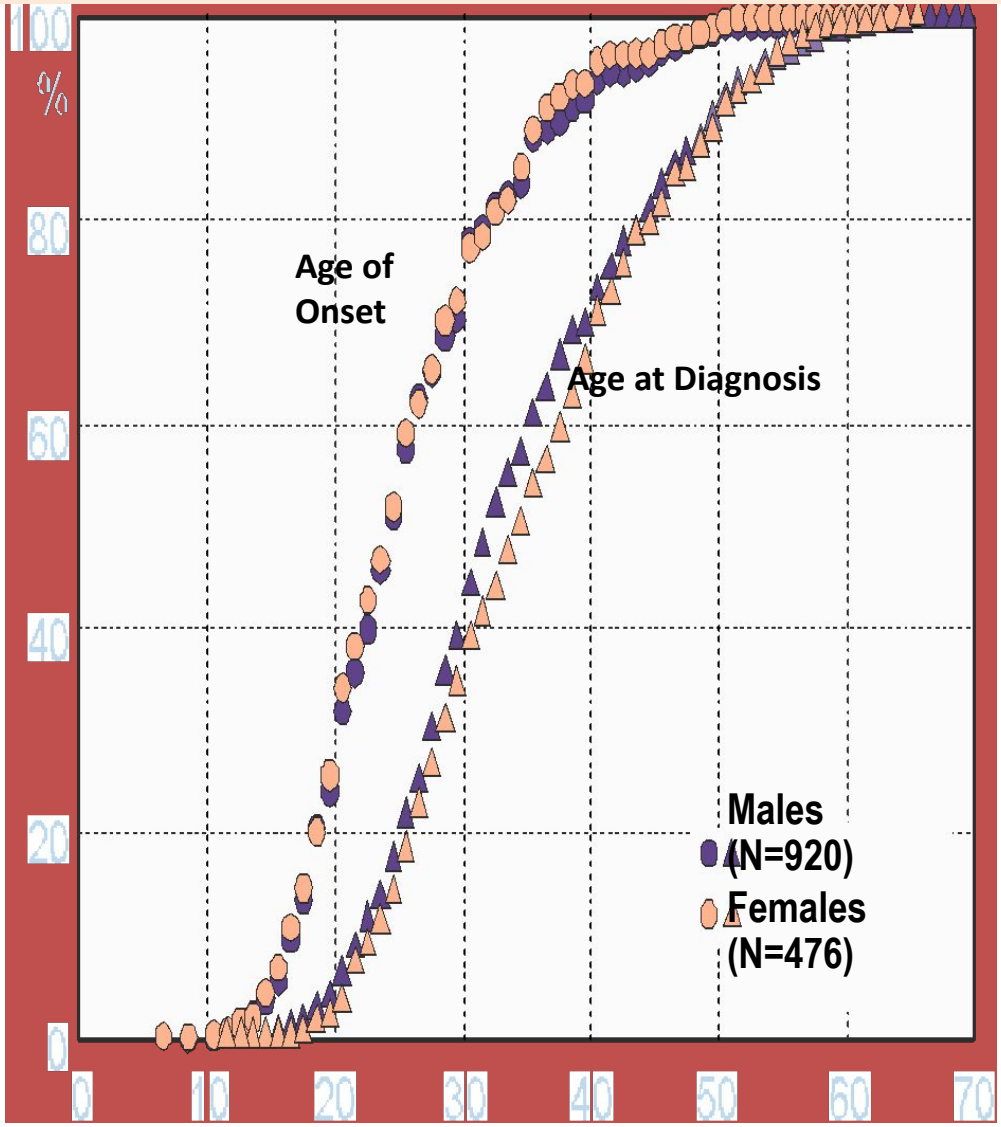
Sacroiliitis grade ≥ 2 bilaterally or grade 3-4 unilaterally

Definite AS:

If the radiological criterion is associated with at least 1 clinical criterion

van der Linden S, *Arthritis Rheum* 1984;27:361.

Age of Onset and Diagnosis in AS



Feldtkeller E, et al. *Rheumatol Int*. 2003;23:61-6

Ankylosing Spondylitis is a disease ***charactrized by***

early onset&

delayed diagnosis

Clearly there is a ***significant gap between***

Onset and diagnosis

(8-9 years)

Khan M Arthritis Rheum Dis 2000;61(Suppl III):iii3-iii7.

Why is Early Diagnosis of AS Important?

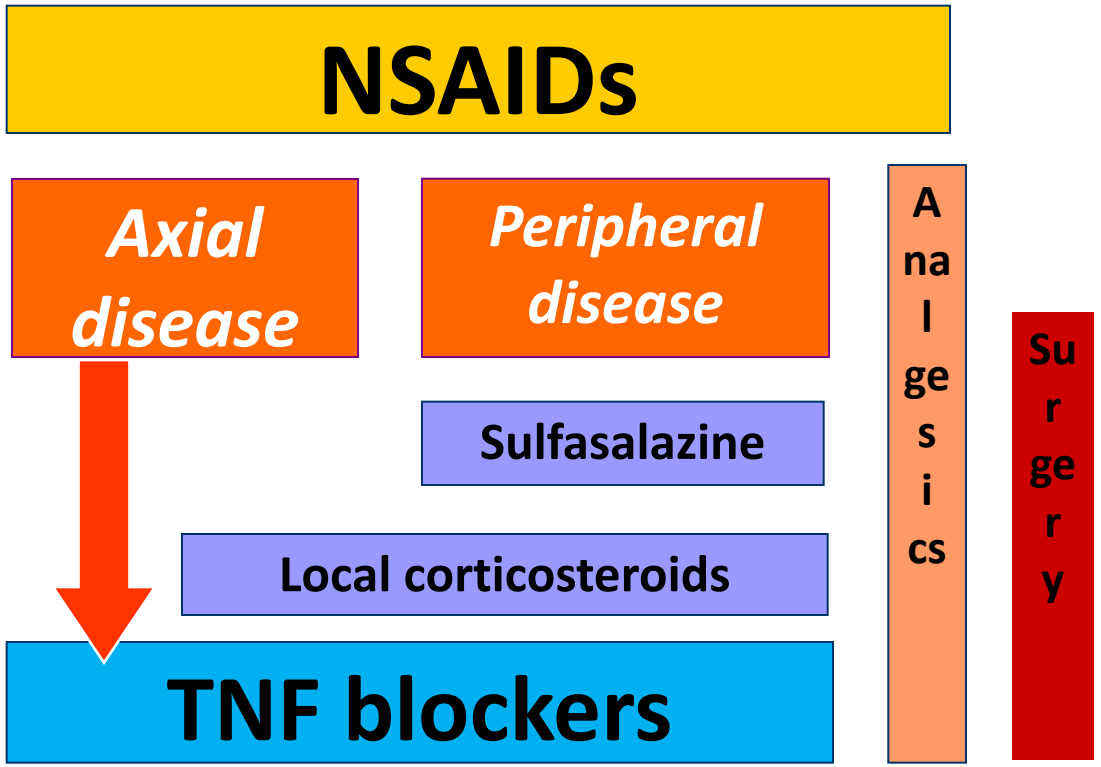
Spinal damage is cumulative, irreversible&, independent of symptoms.

81% of AS patients lose spinal mobility in the first 10 years of disease

- ***Improved diagnostic tools (MRI) and advances in genetic screening make early diagnosis more reliable***
- ***New effective treatments are available***

ASAS/EULAR recommendations for the management of AS

Education, exercise, physical therapy, rehabilitation, patient associations, self help groups



Zochling J et al. Ann Rheum Dis 2005 Aug 26; [Epub ahead of print]

Ankylosing spondylitis use NSAIDs

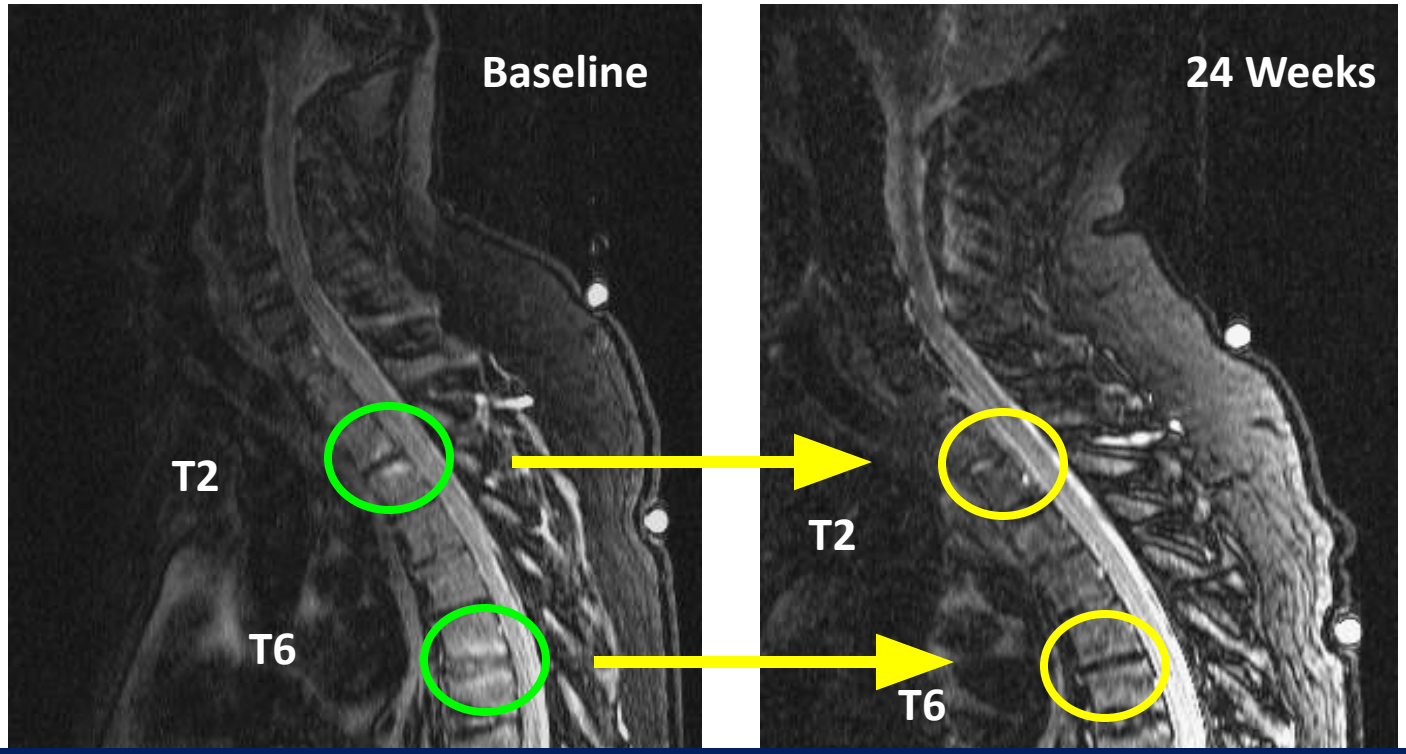
- *About 60-75% of patients with AS show good to very good response to full dose NSAIDs in 48 hours in contrast with only 15% of patients with mechanical back pain*

- *Recent study has shown that patients with AS treated continuously over two years with a daily dose of NSAIDs has*
- *less radiological progression compare to those who took NSAIDs on demand*

Arth Rheum 2005;52-1756-65

- **20-50%** of AS patients still have active disease despite treatment with **NSAID.**
- For those patients , **Anti-TNF** have meant **a breakthrough** in treatment

Spinal Inflammation in AS Before and After Treatment With TNF blockers



Almost complete resolution of spinal inflammation was seen in most patients

PRINCIPLES OF MANGEMENT OF AS

1- No cure , but most patients can be well managed

2- Early diagnosis is very important

3- Education to increase compliance

4- Appropriate use of antirheumatic drugs ,primarily (NSAIDs)and appropriate use of biologic therapy

5- Continuity of care

*6- **Daily exercise** very important (e.g., swimming)*

*7- **Sleep** on firm mattress*

*8-**Avoidance** of smoking & trauma*

A full explanation *of the disease , its course , possible complications, its manegment& prognosis is essential to achieve appropriate compliance by the patient*

* ***Lying prone for 15 to 30 minutes once or several times a day*** *is useful to reverse the tendency toward kyphosis , and flexion contractures of the hip joints*

PHYSIOTHERAPY

* ***In a randomized controlled trial , a program of supervised physiotherapy in groups was found to be superior to individualized programs in improving thoracolumbar mobility and fitness***

A New Therapeutic Approach Is Needed for AS

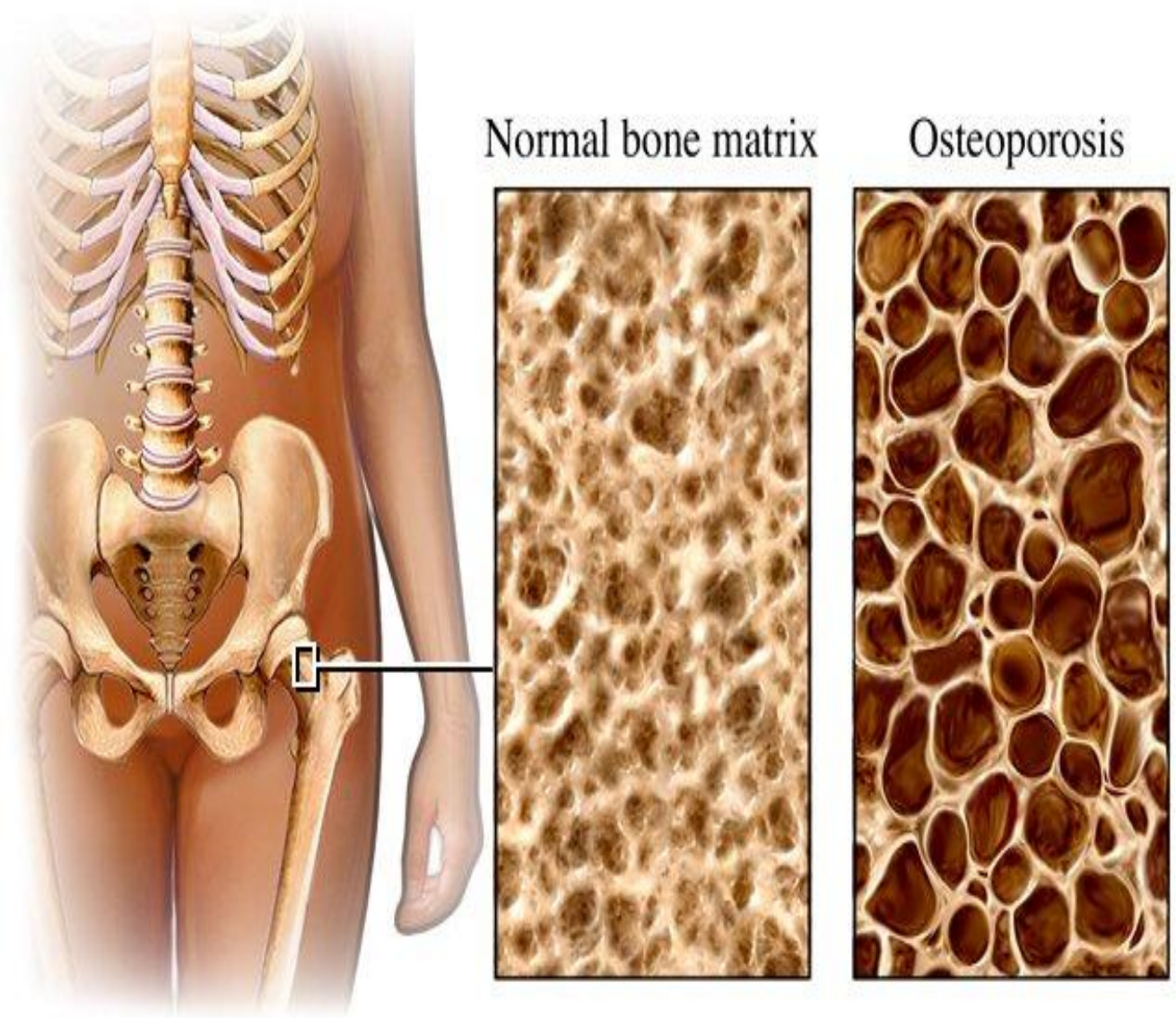
Early diagnosis is critical!

Early use `of biologic

Lead to:

- *Less structural damage*
- *Better function*
- *Remission*

Osteoporosis



PROF/
REDA AWAD

Osteoporosis

("porous bones",

from Greek: ὀστέον/

osteon meaning "*bone*" and

πόρος/*poros* meaning

"...")

بسم الله الرحمن الرحيم

" قال رب إني وهن العظم مني و اشتعل الرأس شيباً و لم أكن بدعائِك رب شقياً "

صدق الله العظيم

سورة مريم(4)

International statistics

Osteoporosis is by far the most common metabolic bone disease in the world and is estimated to affect *over 200 million* people worldwide.

One in 3 women older than 50 years will eventually experience osteoporotic fractures, as will 1 in 5 Men

Composition of bone

Mineral ~65%	Hydroxyapatite
Matrix ~35%	Collagen ~90% Other proteins Lipids
Cells	Osteoblasts Lining cells Osteocytes Osteoclasts
Water	

أن العظم **نسيج حيّ**.

يتكون في معظمه من

الكولاجين وهو **البروتين**

الذي

يشكل الهيكل اللين للعظم،

ومن **فوسفات الكالسيوم**

الذي يمنح هذا الهيكل **صلابته**

المعروفة.

65 %املاح

35 %بروتين

خلايا

تزيل * تبنى

العظم نسيج حى فى حركه نشطه دائمه فيتم
ازاله العظم القديم ليحل مكانه عظم جديد.
تواصل عظامنا
عملية ترميم دائمة تستمر مدى الحياة.

& تشكيل ***Modeling***

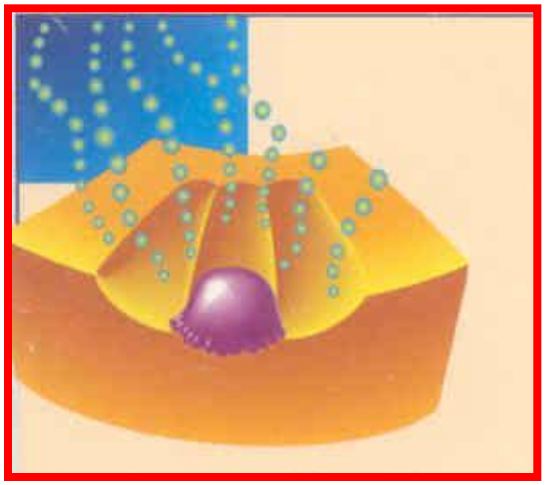
اعاده تشكيل ***Remodeling***

تتاثر هذه العمليه بالهرمونات وبعض العوامل الاخرى

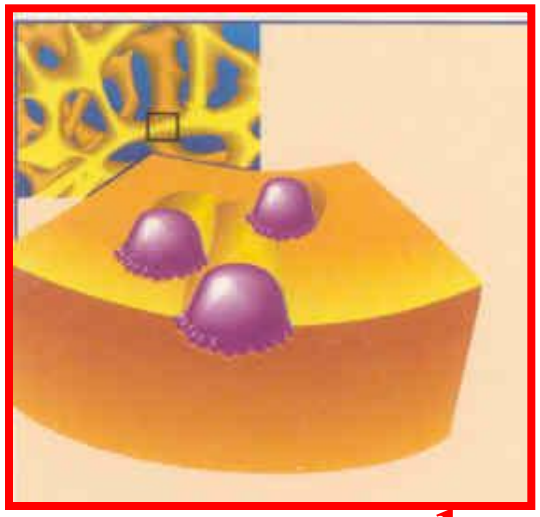
Bone is continuously turned over by

Modeling & Remodeling

The rates of which are under hormonal, cytokines, & mechanical influence

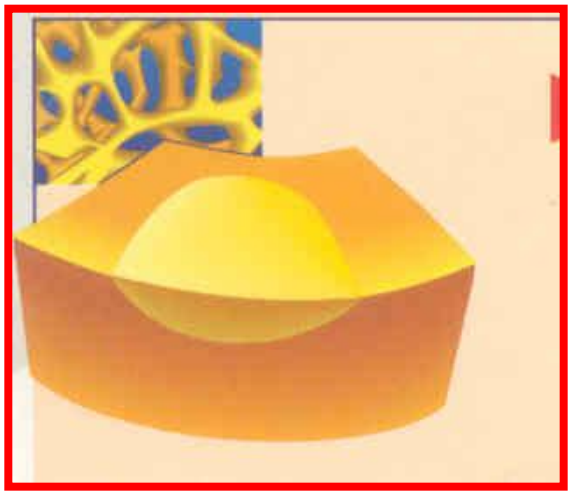


عمليه ترميم العظام

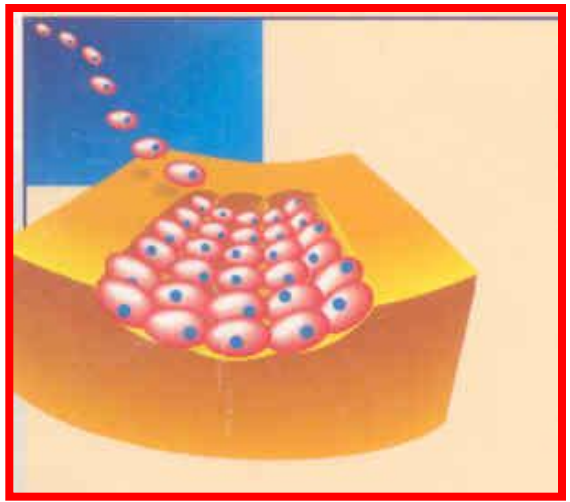


عمر الخليه الهدامه اسبوعين - osteoclasts

عمر الخليه البنائه ثلاث اشهر **osteoblasts** .



عمليه مستمره مدى الحياه



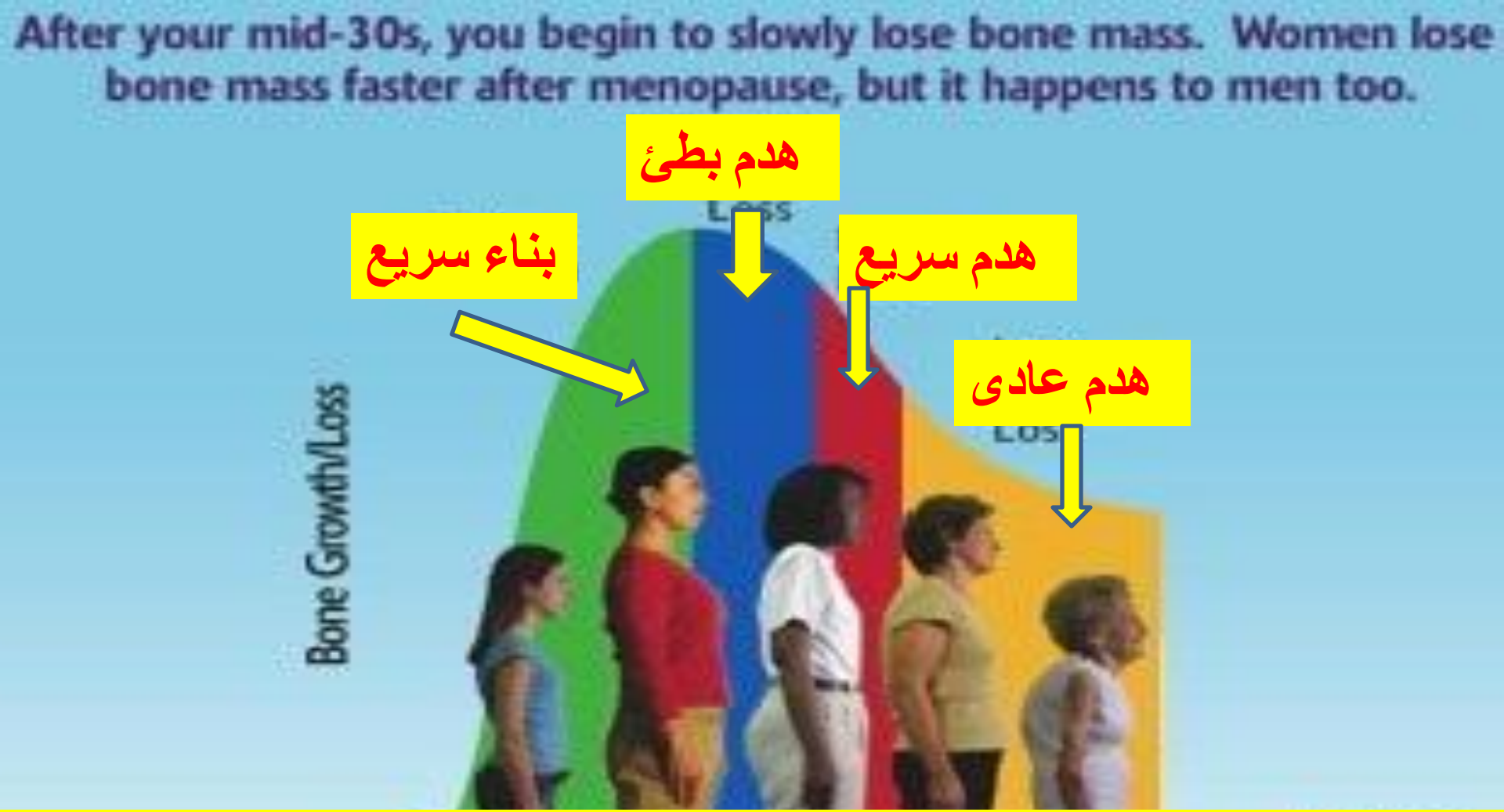
Bone Modeling and Remodeling

Bone modeling

involves both the growth and shaping of bones. It occurs during the first two decades of life while growth plates remain open.

It involves both bone formation and resorption, the former exceeds the latter and is not coupled to it, as in bone remodeling.

[Compston., 2001]



إن الفرد الذي لا يحصل على كتلة عظم مثالية في فترة بناء العظم القصوى التي تبدأ منذ الولادة وحتى سن الثلاثين تقريبا قد يتعرض لهشاشه العظام

Once the skeleton has reached **maturity**, regeneration continues in the form of a **periodic replacement of old bone with new at the same location.** This process is called **remodeling**, and is responsible for the

((complete regeneration of the adult skeleton every 10 years)).

[Compston, 2001]

In the uninjured adult skeleton, all osteoclasts and osteoblasts belong to a unique temporary structure, known as:

Basic Multicellular Unit (BMU)

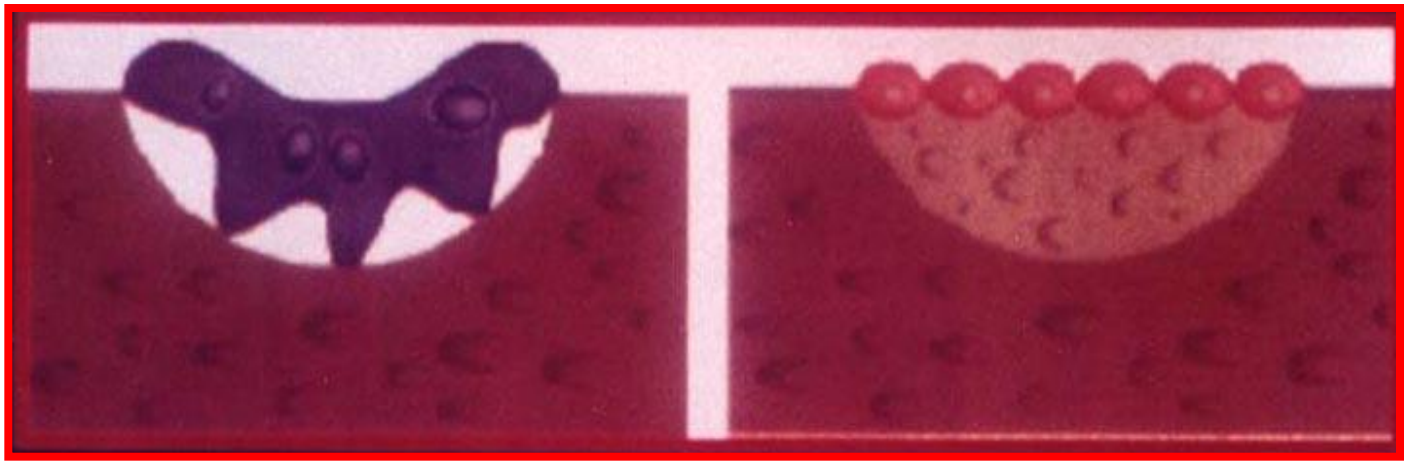
The BMU, approximately 1–2 mm long and 0.2 – 0.4 mm wide, comprises a team of osteoclasts in the front, a team of osteoblasts in the rear, a central vascular capillary, a nerve supply, and associated connective tissue .

In healthy human adults, 3–4 million BMUs are initiated per year and at least *One million are operating at any moment*.

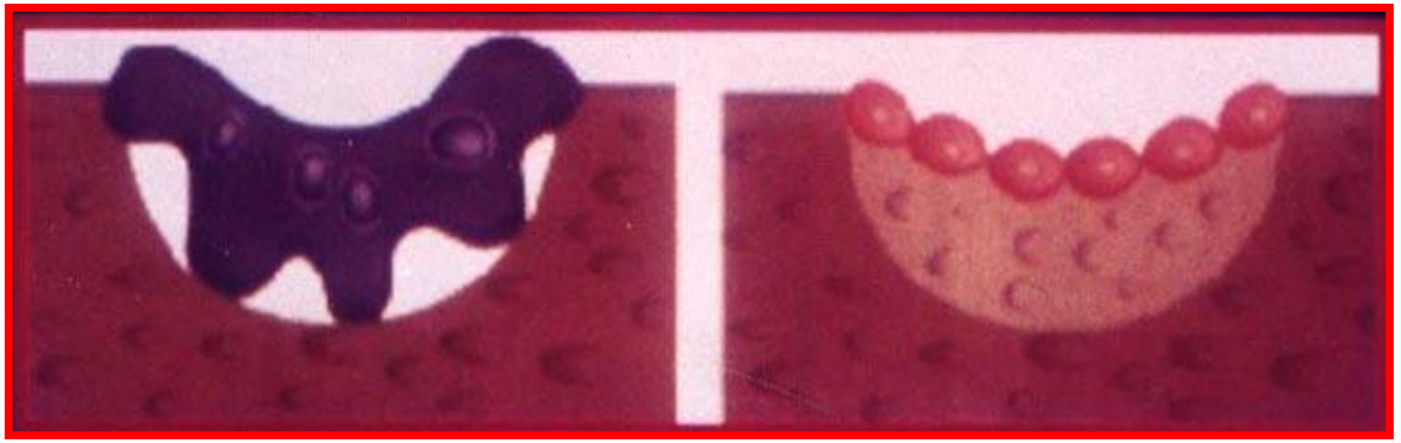
Each BMU begins at a particular place and time toward a target, which is a region of bone in need of replacement.

[Manolagas., 2000]

الحاله الطبيعيه



حاله الهشاشه



Osteoporosis - Definition

A condition characterized by reduced bone mineral density and increased bone fragility, resulting in bone fractures.

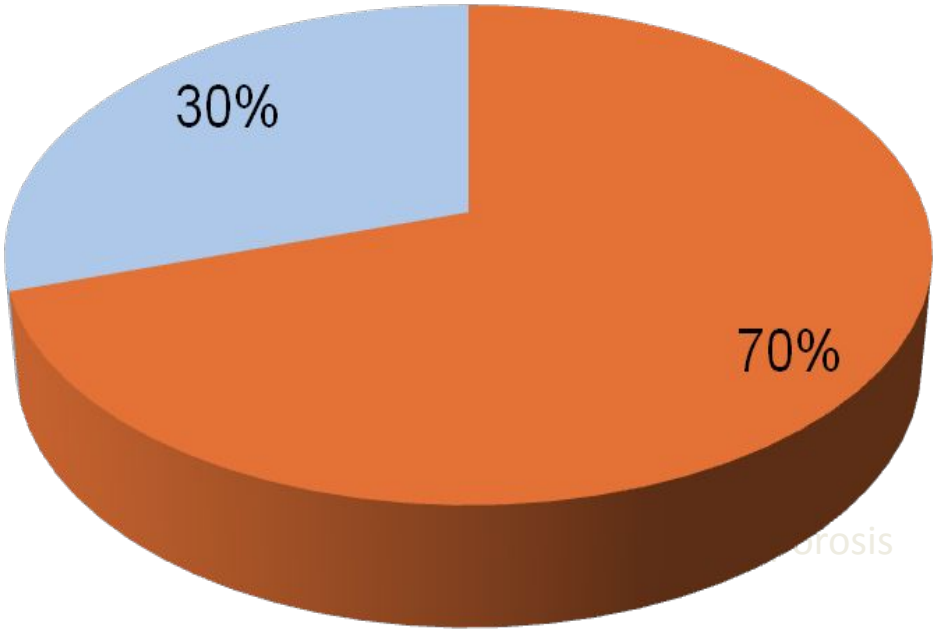
Normal trabecular bone

Osteoporotic bone

1. Feskanich et al. JAMA. 2002, 288:2300-2306.

In 70 % of patients with osteoporosis the cause is primary [1]

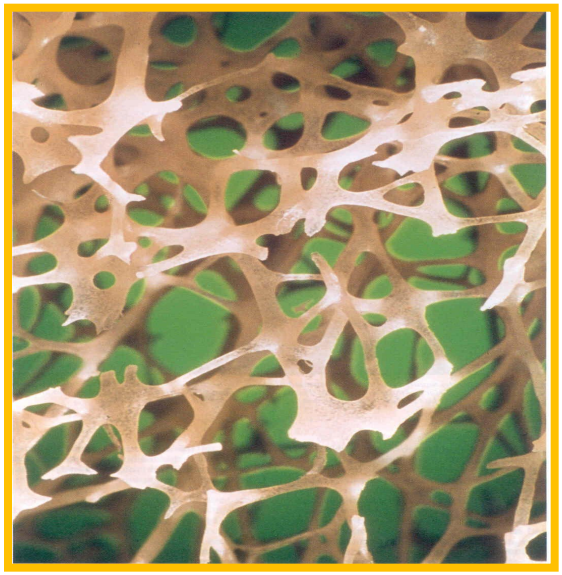
Primary osteoporosis is caused by post-menopausal bone loss or age-related bone loss [2]

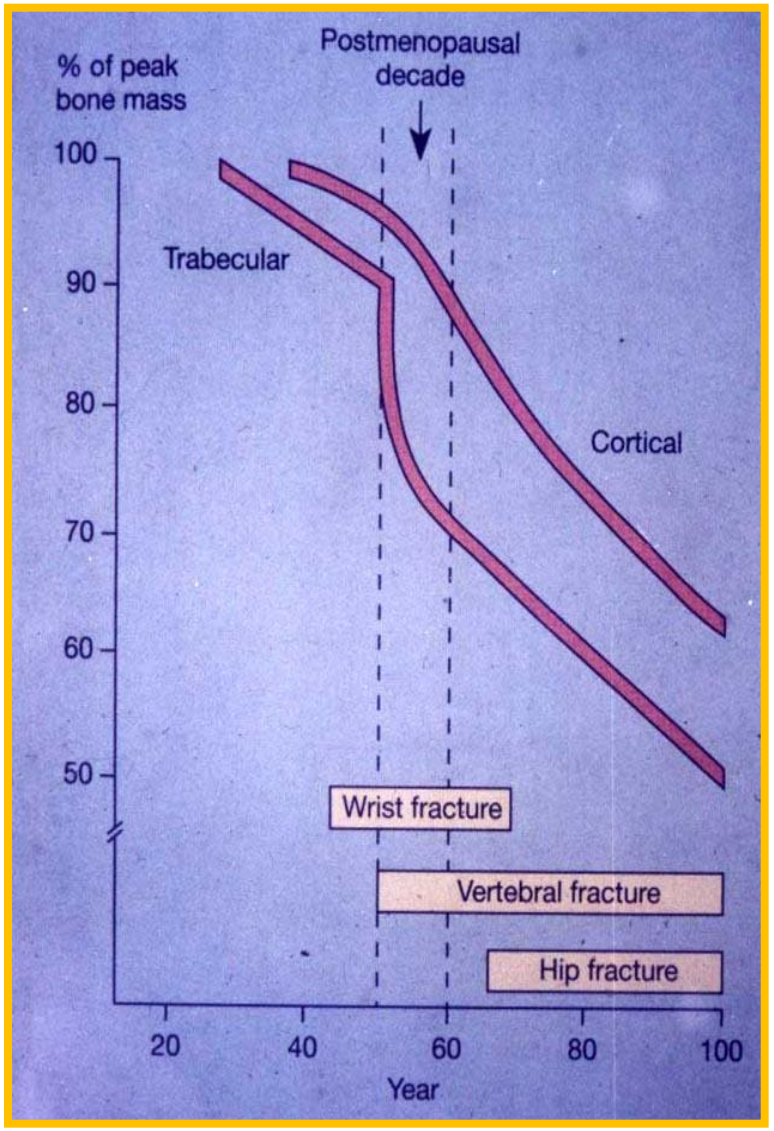


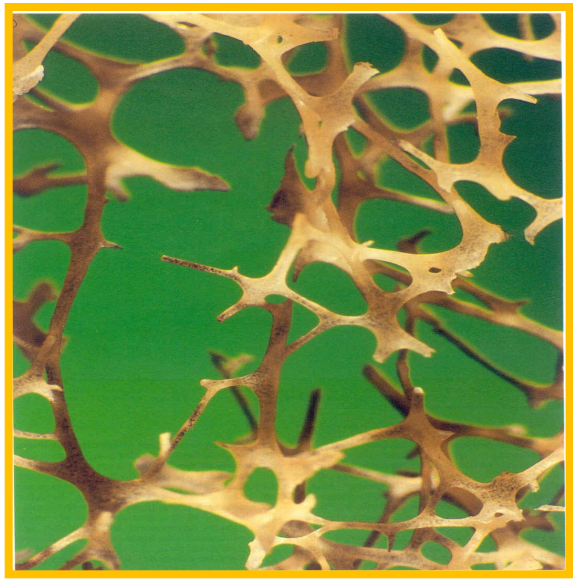
1. Caplan et al. J Royal Soc Med. 1994, 87:200-202.
2. Kok C. & Sambrook P.N. Best Practice & Research Clinical Rheumatology. 2009, 23:769-779.

Postmenopausal bone loss

Curves of bone loss with progress of age







(Remagen W, 1990)

Causes of Secondary Osteoporosis

1

Endocrine disease

- Glucocorticoid excess Hypogonadism Hyperthyroidism

Altered activity

- Cerebrovascular accident Spinal cord injury

Environmental factors

- Alcoholism Coeliac disease Drugs

Inflammation

- Rheumatoid arthritis Inflammatory bowel disease

High Risk Factors for Fractures

- Low intake of Calcium + Vitamin D_3
- Low intake of Protein
- Lack of exposure to sunlight
- Low physical activity

- Smoking
- Alcohol
- Coffee

Shape of a normal spine Shape of a severely osteoporotic spine

Osteoporosis Risk Factors & Prevention

Fixed Risk Factors:

1. Age
2. Female gender
3. Family history
4. Previous fracture
5. Race/ethnicity
6. Menopause/ hysterectomy
7. Long term glucocorticoid therapy

Modifiable Risk Factors:

1. Low calcium intake
2. Vitamin D deficiency
3. Poor nutrition
4. Eating disorders
5. Lack of exercise
6. Frequent falls
7. Low body mass index
8. Smoking
9. Alcohol

" A diet rich in calcium and vitamin D and weight-bearing exercise help promote bone mineral density."

http://www.iofbonehealth.org/ [accessed 2008]

Most common fracture sites

Vertebra

Wrist

Hip

Diagnostic methods

- **Osteoporosis is diagnosed using:**

- **DXA**
- **x-ray**
- **Bone biopsy**

1. Kanis. Osteoporos Int. 1997, 7:390-406.

The most common way to diagnose osteoporosis is through a bone density scan

- **Dual energy x-ray absorptiometry (DXA) :**
  - used for the whole body, spine, hip, heel and/or forearm
  - Measurement of BMD by DXA is currently the cornerstone for diagnosis of osteoporosis
  - today's gold standard of osteoporosis detection

T-score

T-score is useful for the expression of BMD

(bone mineral density)

$$= \frac{\text{measured BMD} - \text{mean young adult BMD}}{\text{young adult SD}}$$

- **T-score indicates the difference between a patient's BMD and the ideal BM achieved by a young adult**

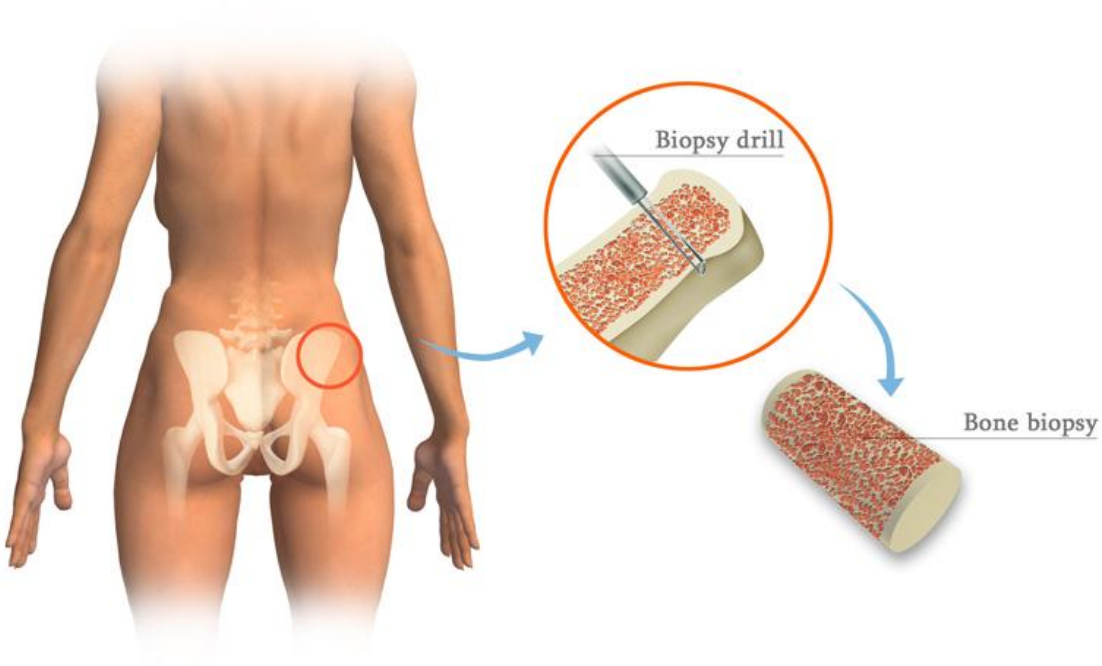
1. Blake & Fogelman. Curr Pharm Des. 2002, 8:1885-1905.

Osteoporosis: BMD of < -2,5

A BMD of < -2,5 is officially classified as Osteoporosis

	BMD (T-score)
Normal	- 1 SD ≤ T ≤ + 1 SD
Osteopenia (low bone mass)	- 2.5 SD ≤ T ≤ - 1 SD
Osteoporosis	T ≤ - 2.5 SD
Established (severe) osteoporosis	T ≤ - 2.5 SD + fracture

Bone Biopsy



- Bone biopsy can be used to identify osteoporosis.
- A small sample of bone is removed from the iliac crest.

Quick Osteoporosis Risk Test for Women >50

1. Menopause before age 45 — Yes ☐ No ☐

2. Family History of Osteoporosis — Yes ☐ No ☐

3. Any Fractures after age 50 — Yes ☐ No ☐

4. Treated with Corticosteroids or for Rheumatoid Arthritis — Yes ☐ No ☐

5. Thin/ Underweigh t — Yes ☐ No ☐

6. Loss of height or change of posture within last 5 years — Yes ☐ No ☐

7. Regulary Smoker — Yes ☐ No ☐

8. Low Calcium Intake* — Yes ☐ No ☐

If you have answered Yes to 3 or more of the above, you may be at risk of Osteoporosis

* Recommended daily intake of 1000-1500 mg of calcium = 4-6 glasses of milk (www.iofbonehealth.org/patients-public/calcium-calculator.html)

Diagnosing osteoporosis is usually a combination of

BMD,

Age,

previous fractures & history of falls

Osteoporosis:

Underdiagnosis

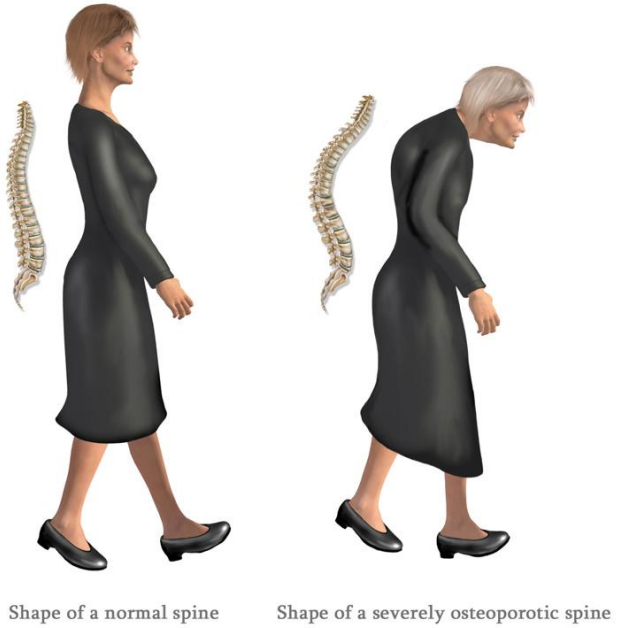
Osteoporosis: 'the silent epidemic'

- **Half of all patients:**
  - **may be asymptomatic**
  - **are not aware that they are suffering from osteoporosis before they suffer a fracture**
- **Only 1/3 vertebral fractures come to medical attention[1,2]**

1. Cooper C. In: Reid (ed). Baillière's clinical rheumatology. 1993, 7:459-477.
2. Delmas PD, Fraser M. European Union challenges member states to fight the 'silent epidemic' of osteoporosis. Eurohealth 1998, 4:1-4.

Most Common Symptoms of Osteoporosis

- Low back pain
- Loss of height
- Stooped posture



Shape of a normal spine Shape of a severely osteoporotic spine

If calcium is subnormal for long periods of time (many months or years) then problems with dry skin and hair, brittle nails and chronic tiredness may occur

Osteoporosis - Clinical Consequences

- Kyphosis (stooped posture)
- Loss of height
- Bulging abdomen (for some the ribcage rides on the iliac crest)
- Acute and chronic pain
- Breathing difficulties, reflux and other GI symptoms
- Fear of falls
- Depression

REDUCED QUALITY OF LIFE

Osteoporosis:

Treatment Options & Guidelines

Management of osteoporosis

Ways to reduce fracture risk

- calcium and vitamin D rich diet

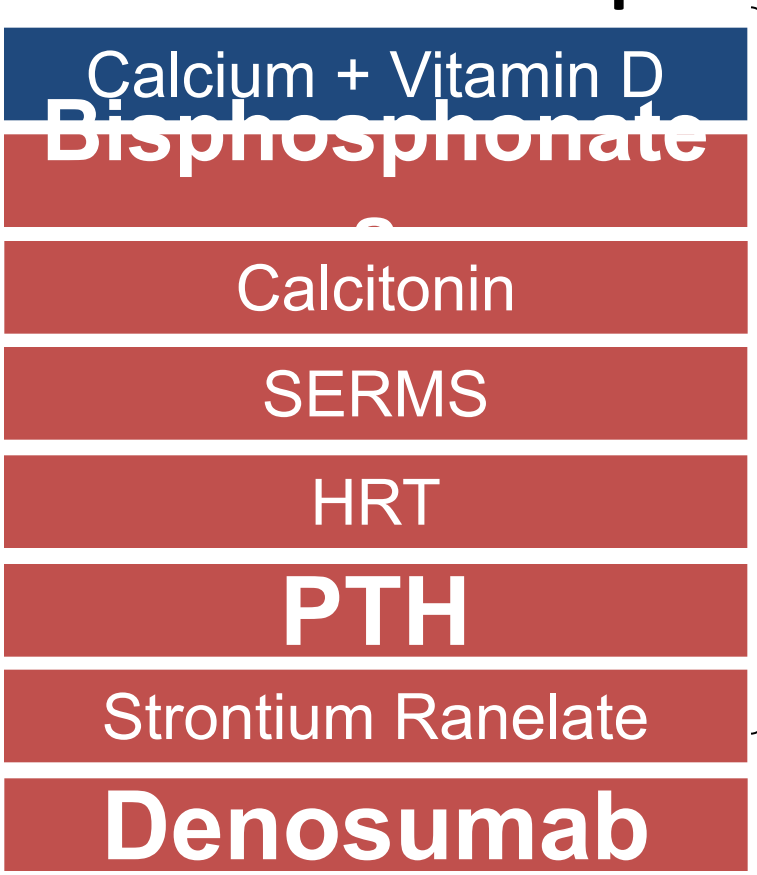
- medication
- less alcohol

- exposure to sunlight
- exercise

- stop smoking
- hip protectors

Calcium + Vitamin D

is the fundamental part of any Osteoporosis Treatment



→ Baseline Treatment

Calcium + Vitamin D_3 is normally used as **first-line treatment** either **alone** or in **combination** with other Osteoporosis medicines

IOF online:
http://www.iofbonehealth.org/health-professionals/about-osteoporosis/treatment/calcium-vitamin-d.html

الجرعه اليوميه للكالسيوم

--(1,500-1,200 mg غذاء وادويه

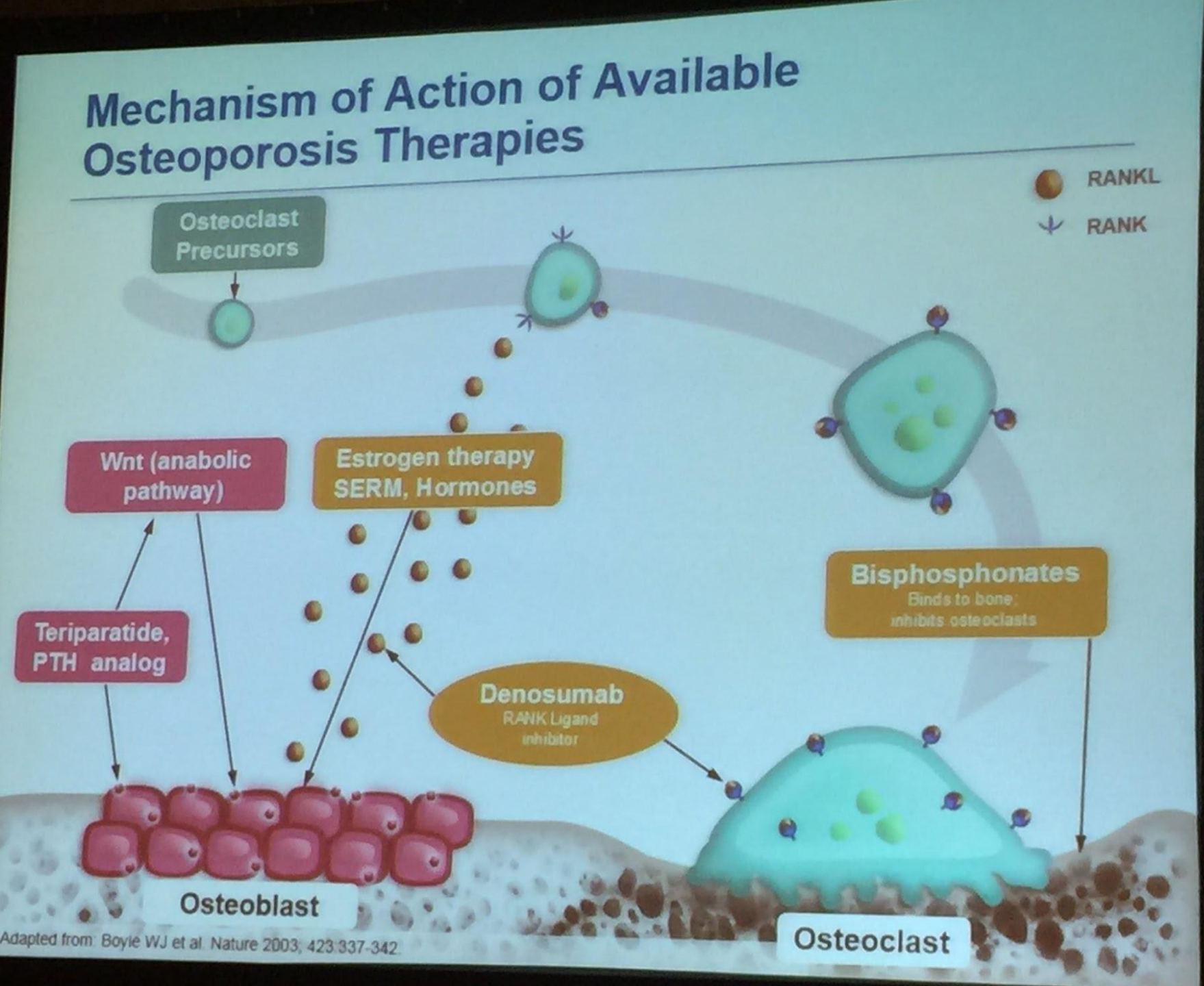
Take calcium supplements in doses of less than 600 mg. the body can only absorb so much at one time قرص بعد الفطار والغذاء.

الجرعه اليوميه لفيتامين D

800-1,000 IU

فيتامين D ضروري للحصول على الامتصاص المثالي للكالسيوم.

Mechanism of Action of Available Osteoporosis Therapies



Adapted from: Boyle WJ et al. Nature 2003; 423:337-342.

برنامج الوقايه من مرض هشاشه العظام

غذاء متوازن غنى بالكالسيوم وفيتامين د

برنامج رياضى(المشى والتمرينات)

لا تدخين ولا كحول

دواء لعلاج الهشاشه عند الاحتياج

منع السقوط

تاكد من الابصار الجيد (تصحيح النظر)1

---- والاضاءه جيده

تجنب الادويه المنومه 2

ازاله معوقات المشى من المنزل(السجاد –الاثاث) 3

الحذاء مريح ومثبت جيدا بالقدم4

استعمال سواند الحائط عند اللزوم5

Top 10 Calcium rich foods - for Building strong bones.

Milk

Yogurt

Soya Beans

Orange

Lady's Finger

Cheese

Turnip Greens

Sesame Seeds

Almonds

Cinnamon

- ***weight – bearing aerobic activity***