



# Role of physical medicine and rehabilitation in diseases of the musculoskeletal system 2

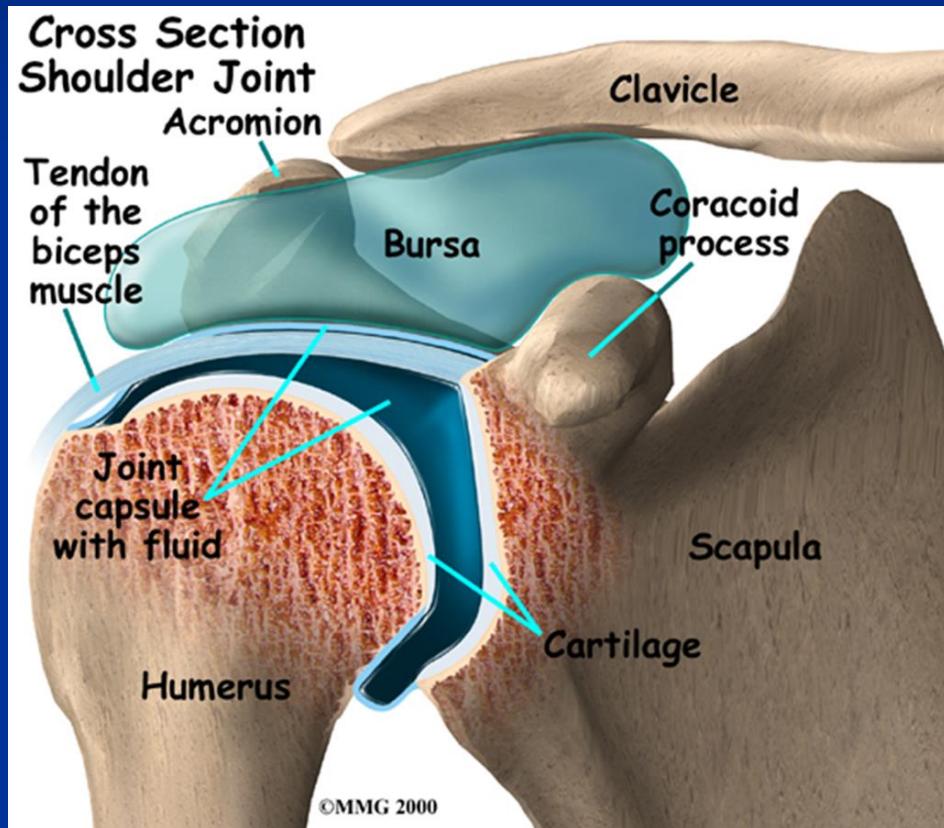
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Department of physical medicine and rehabilitation  
Clinical Hospital Center Split

April, 2016

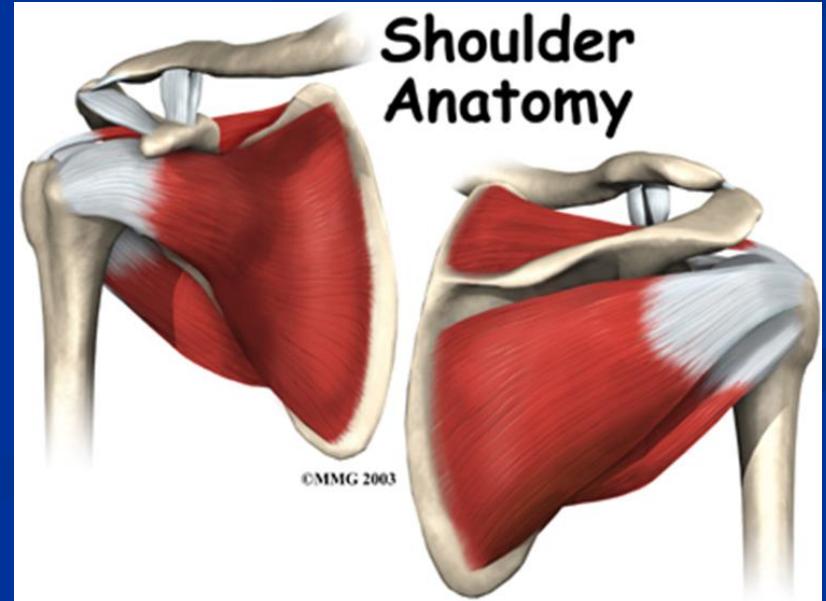
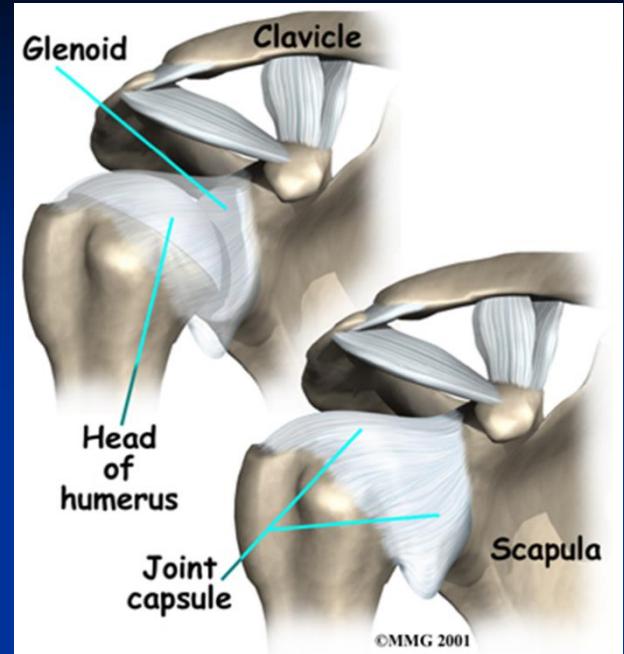
# Shoulder- art. glenohumeralis

- Synovial joint,  
greatest mobility,  
spherical joint
- Convex to concave  
ratio 3:1
- Glenoid labrum
- Structures in  
subacromial space



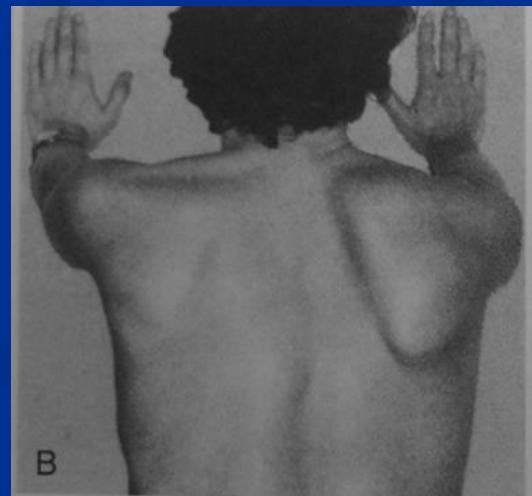
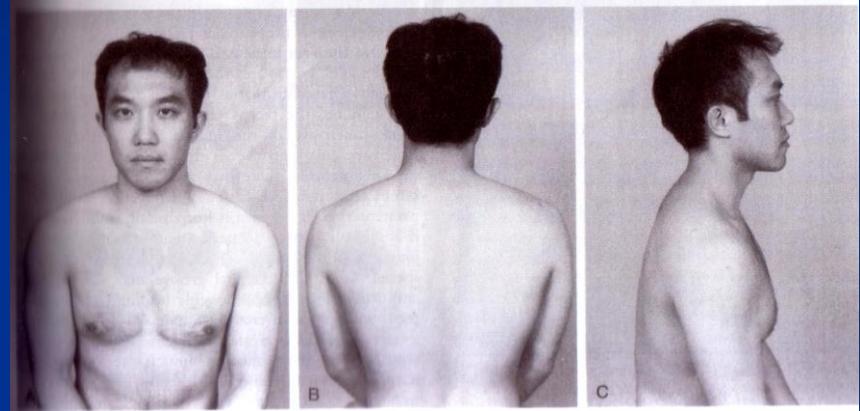
# Shoulder- examination

- Passive stabilization: joint capsule: large with synovial recessus, ligaments:  
glenohumeral, coraco humeral, acromioclavicular (roof of the subacromial space), coracoclavicular.
- Dynamic stabilization: tendon of biceps brachii, cput longum, and rotator cuff muscles: supraspinatus, infraspinatus, subscapularis, teres minor.



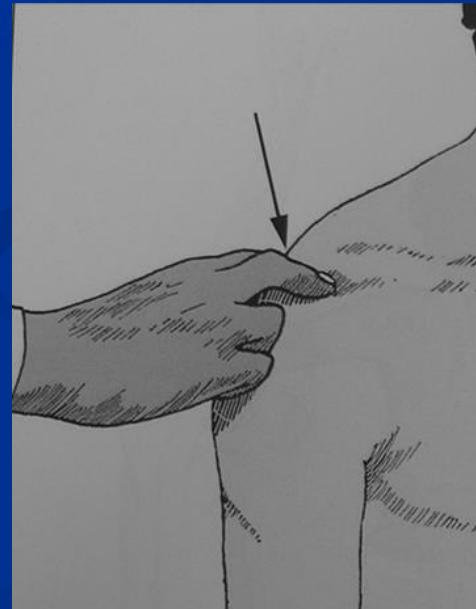
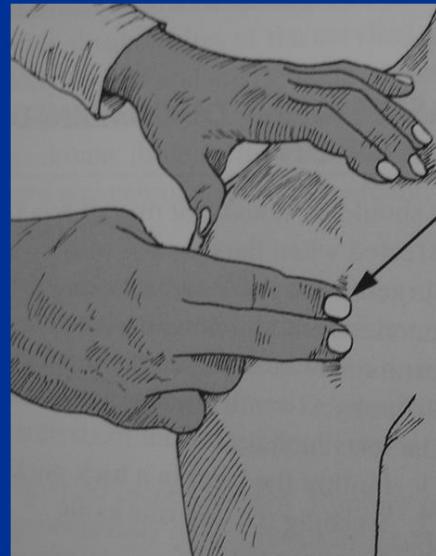
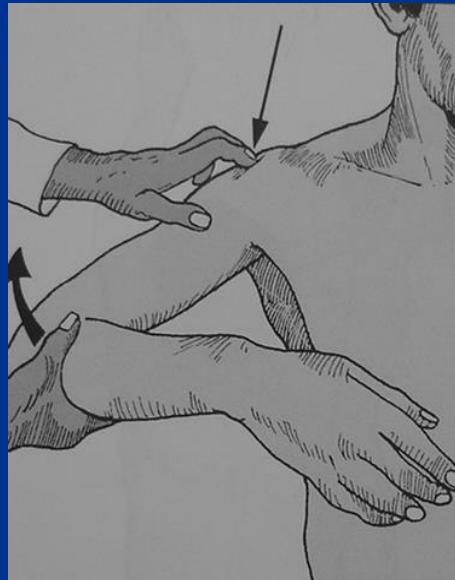
# Shoulder- inspection

- Medical history: trauma, repetitive movement, type of pain, location, stability of joint, functionality
- Inspection: loss of contour (luxation (picture A), atrophy, synovitis)
- For example m deltoideus atrophy laesio of n axillaris, scapula alata – n thoracicus longus (B)

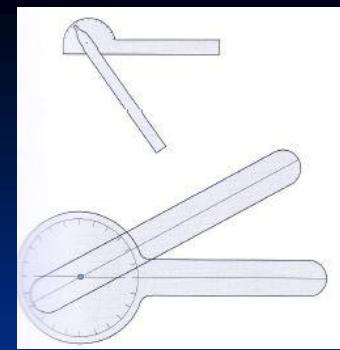


# Shoulder- examination

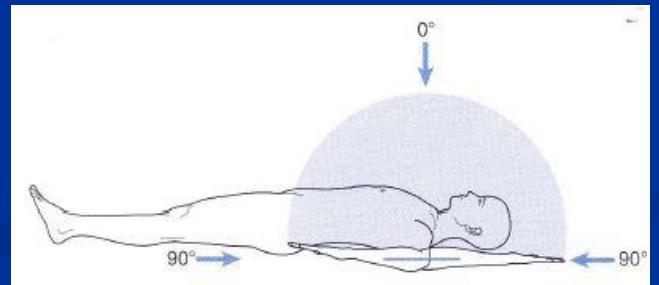
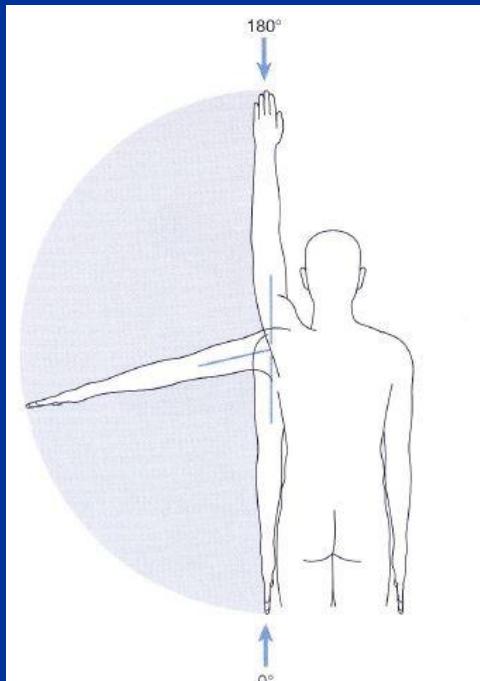
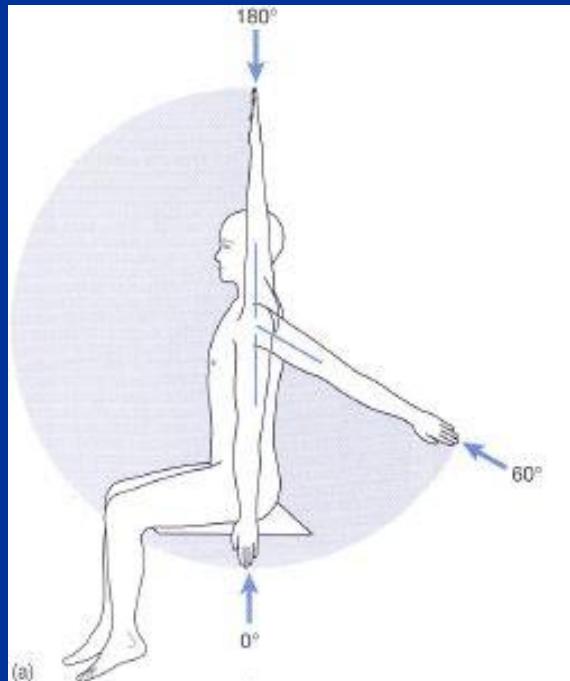
- Palpation of tendons,, m  
supraspinatus, caput longum biceps  
brachii, acromioclavicular joint



# Assessment of joint mobility



## Shoulder



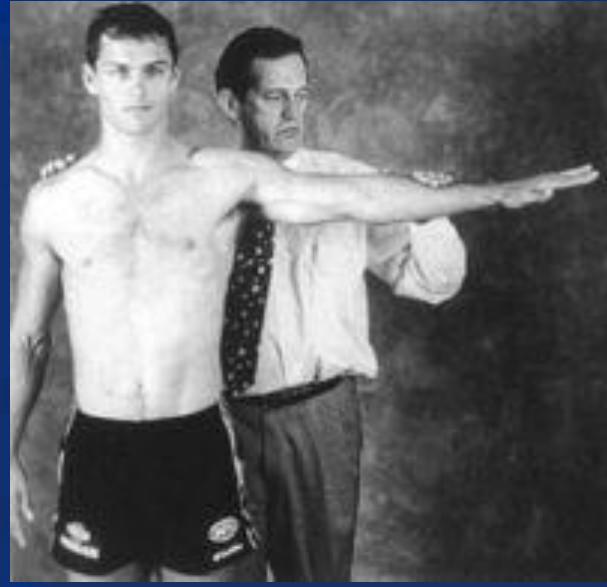
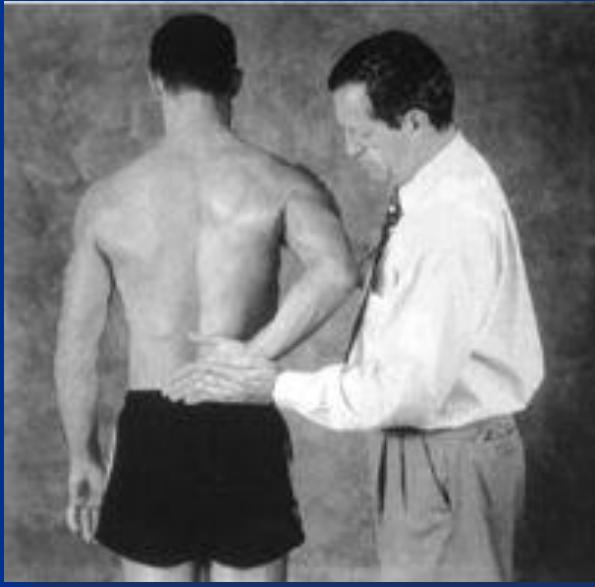
Example:

Normal abduction  $0^\circ/180^\circ$

Contracture  $0^\circ/90^\circ$  or  $10^\circ/110^\circ$

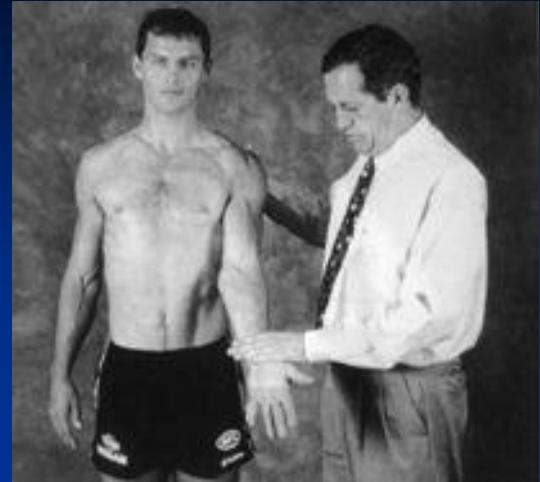
# Shoulder- MMT

- Strength of rotator cuff muscles:  
supraspinatus (a), external rotators  
(delt., infrasp., teres minor-b),  
internal rotators (subscapularis-c),  
and deltoideus-d

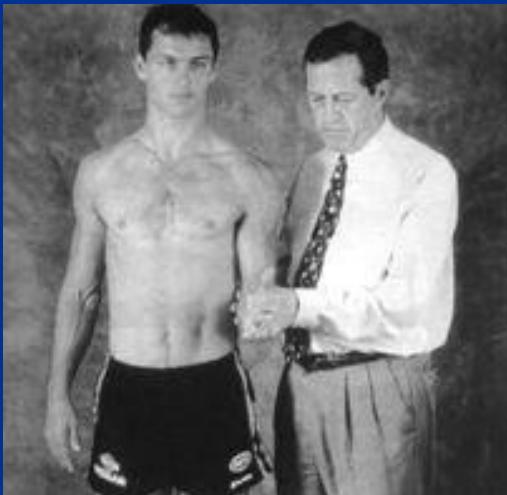


# Shoulder- specific tests

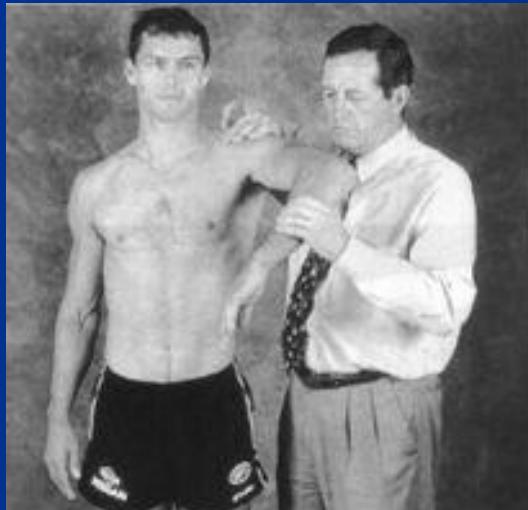
Test for biceps tendon- resistance  
against flexion of forearm- Speed's test



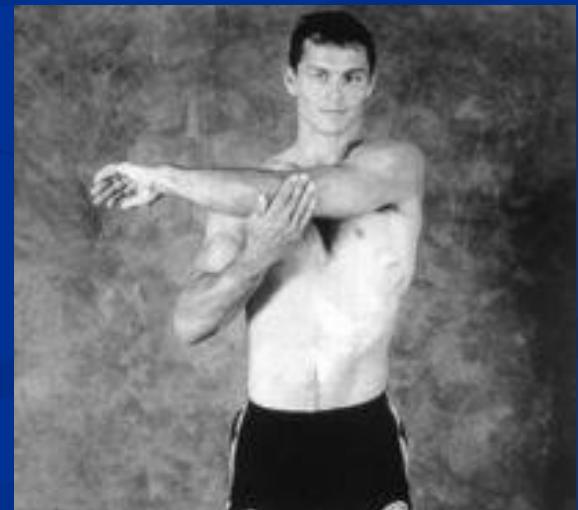
Yergason's test  
supination against  
resistance



Hawkins- Kennedy-  
for sy impigment  
test

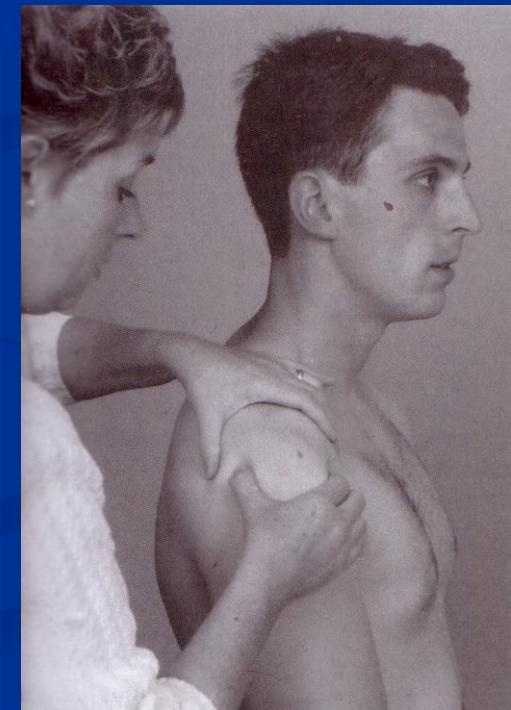


Acromioclavicular joint-  
hyperadduction



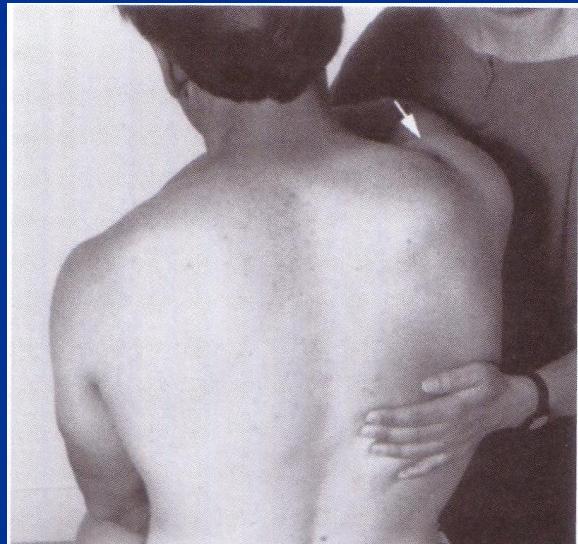
# Shoulder- instability examination

- Anterior dislocation, most common, if occurs in younger age usually reccurent- tests are anterior apprehension test, and sliding of humeral head (a, b, c)

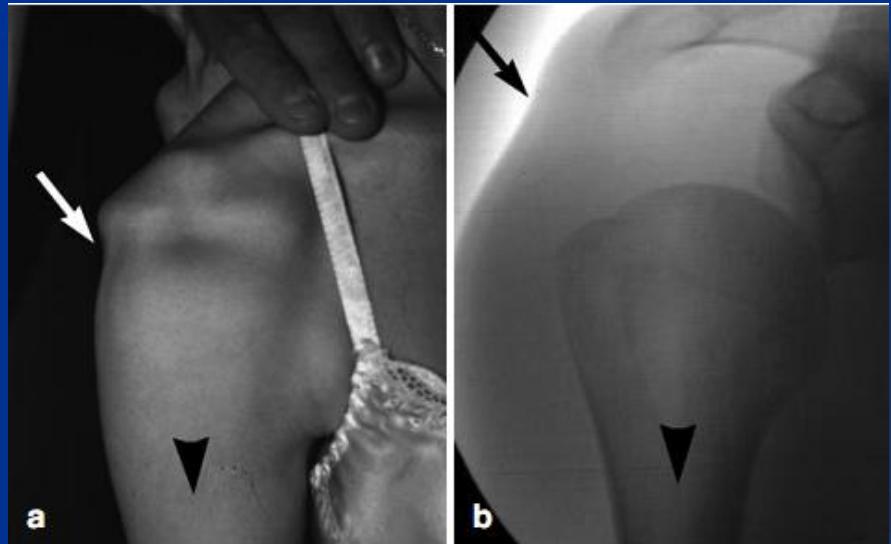


# Shoulder- instability examination

## ■ Posterior dislocation

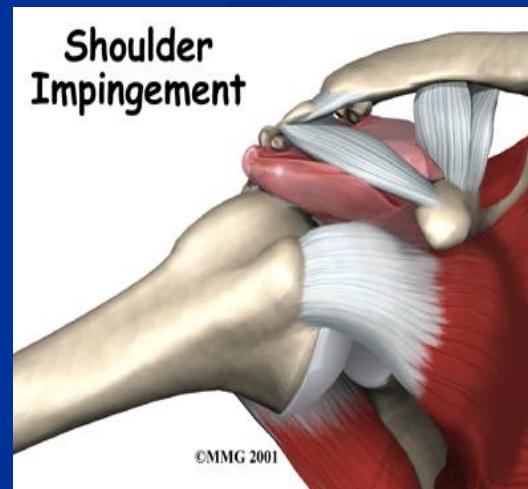
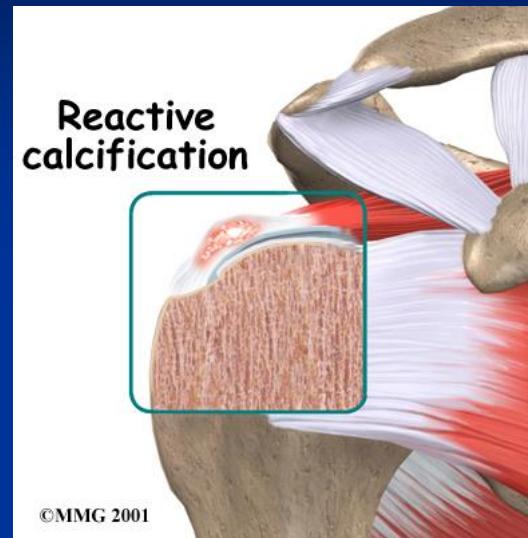
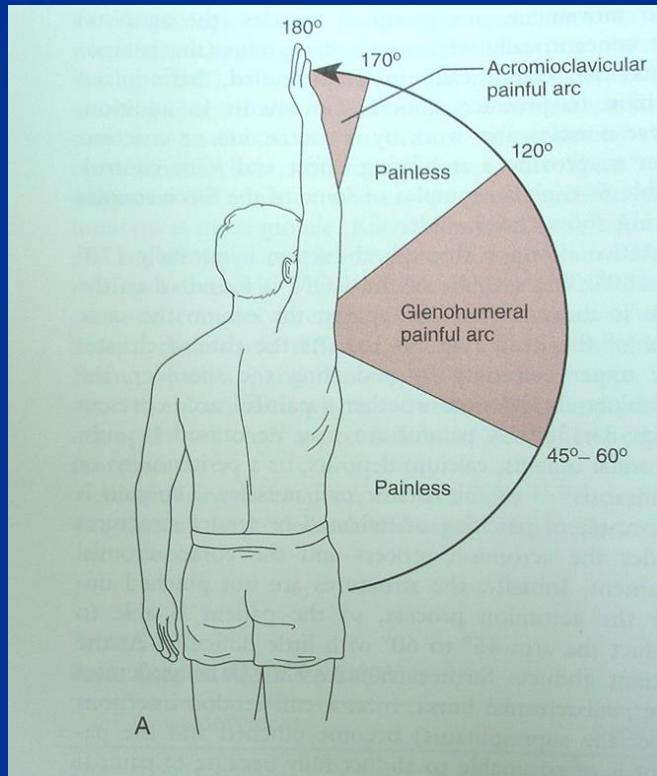


## Inferior disclocation- sulcus sign



# Shoulder- pathology

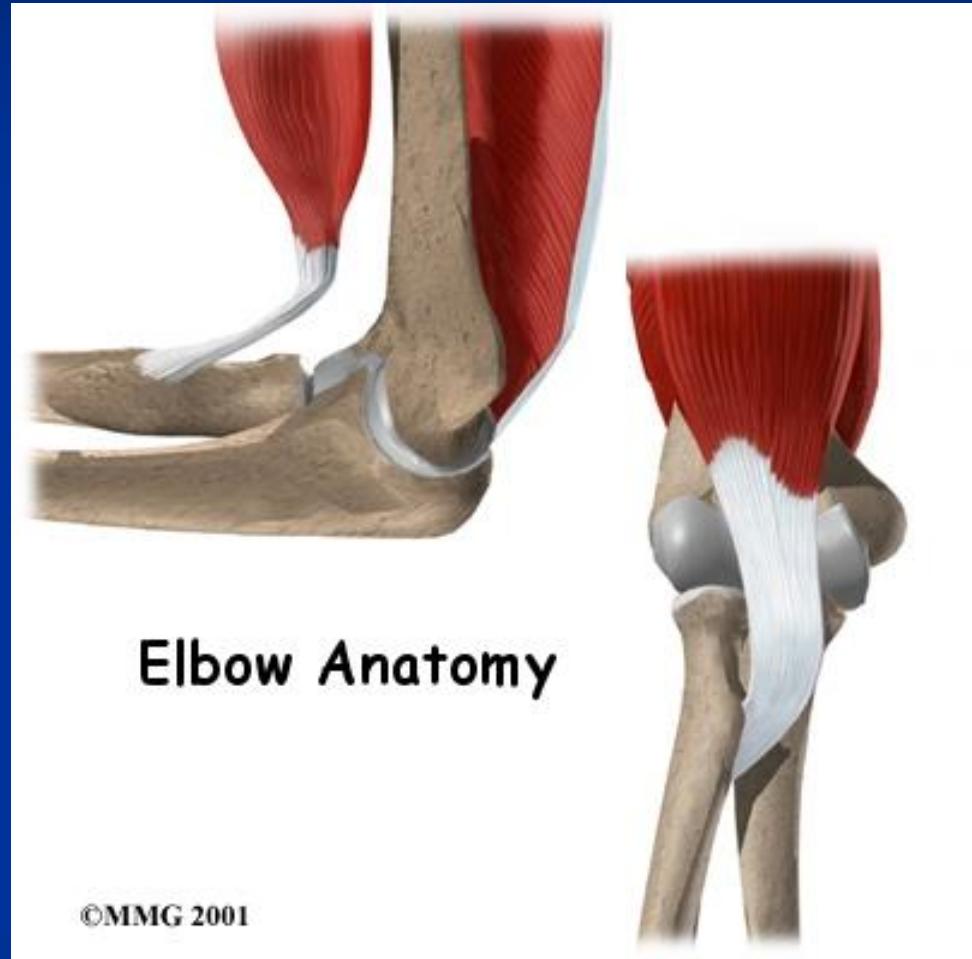
## ■ Sy impigment



- Bursitis  
subacromialis,  
tendinitis  
(tendinosis) m.  
supraspinati, or  
tendinitis caput  
longi m bicipitis  
brachii

# Elbow- art. cubiti

- Synovial joint, humerus, ulna and radius, trochoginglymus
- Flexion, extension- art humeroulnaris, humeroradialis, supination, pronation- proximal radioulnar joint)
- Physiological valgus 5° men, 10-15 ° women



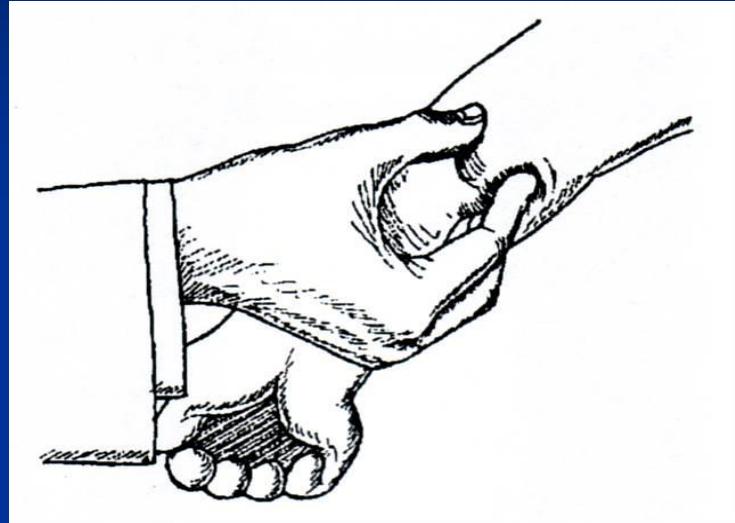
# Elbow- examination

- Swelling, nodules, redness (arthritis rheumatoïdes nodules, inflammation, bursitis)
- Cubitus varus and valgus of elbow joint
- Liparthrosis cubiti



# Elbow- palpation

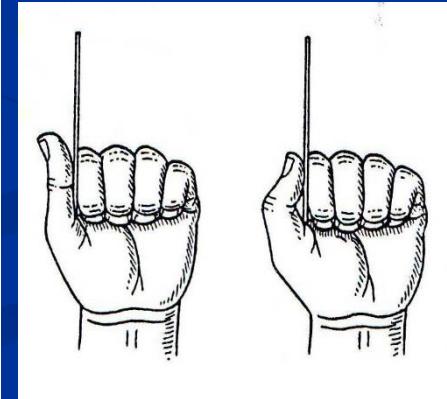
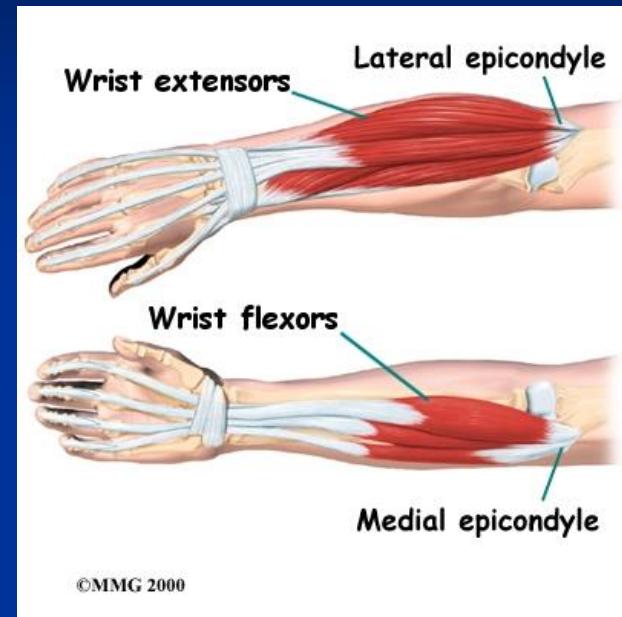
- At 70 ° flexion palpation paraolecranon recessus
- Synovitis- flexion contracture
- Palpation of lateral and medial epicondylus



Bolnost na pritisak i pri pokretima dlana uz otpor

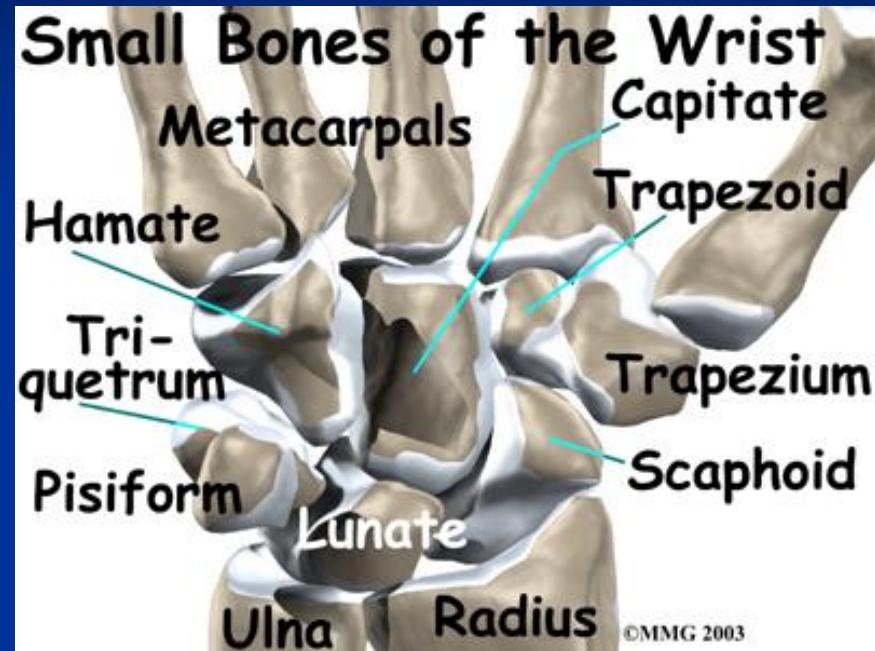
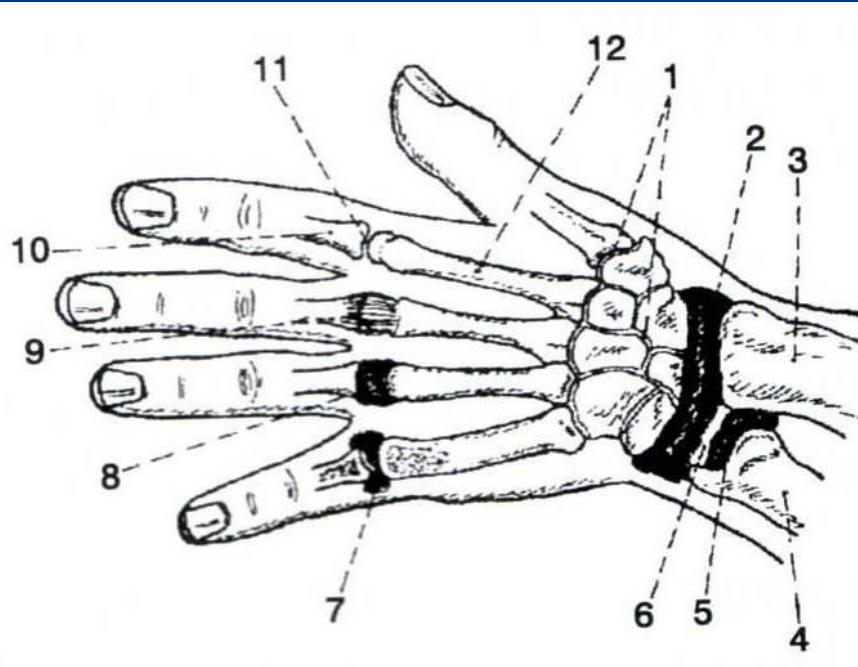
# Elbow- pathology

- Lateral epicondylitis- tennis elbow- extensors of the hand- extensor carpi radialis brevis- most common tendinosis- wrist extension against resistance
- Medial epicondylitis- golfers elbow- flexor muscles of the hand- wrist flexion against resistance test
- Ulnar nerve impingement- I Metacarpal space hypotrophy (adductor pollicis- Froment's sign)- paresthesia IV, V digit



# Radiocarpal, mediocarpal, carpometacarpal joints

- Art radiocarpalis -synovial joint, ellipsoid- flexion-extension, radial and ulnar abduction
- Art trapeziometacarpale- rhizartrosis- osteoarthritis



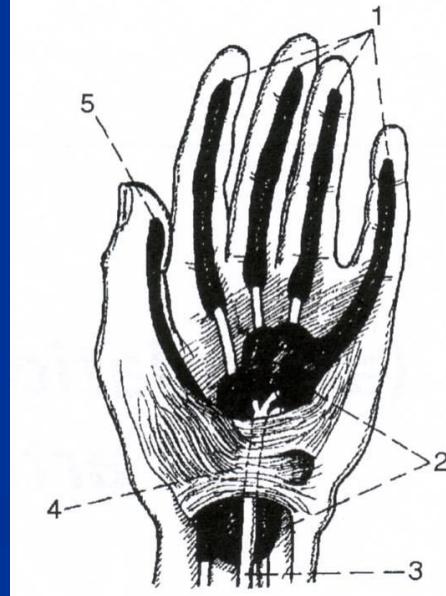
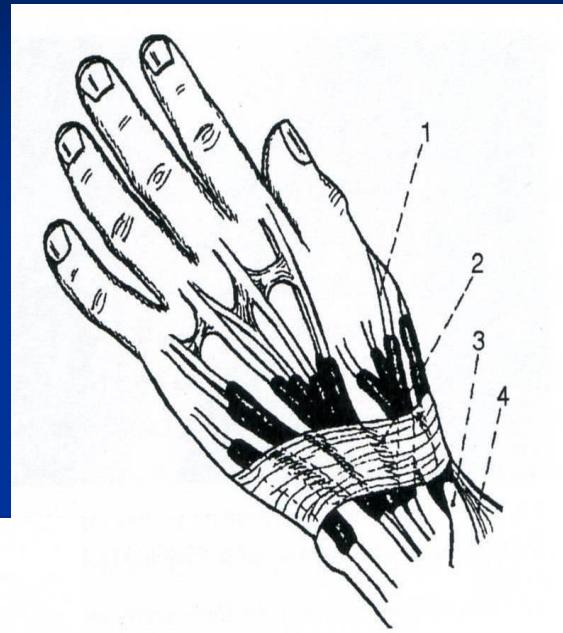
Flexor tendons for the fingers go through the carpal tunnel together with n medianus

Extensor tendons on the dorsal side of wrist through 6 tunnels

N ulnaris goes through the Gyon tunnel

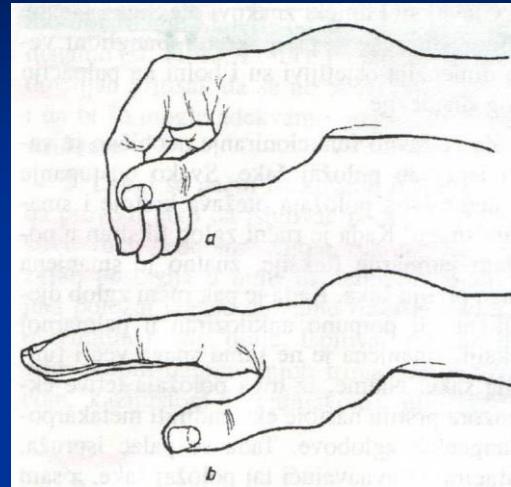
# Hand- inspection

- Swelling, nodules, redness, ganglion cysts,
- skeletal deformation- ulnar deviation, subluxation
- muscle trophic, inflammation
- tenosynovitis

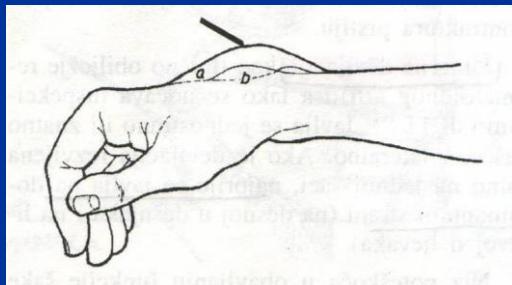


# Hand- inspection

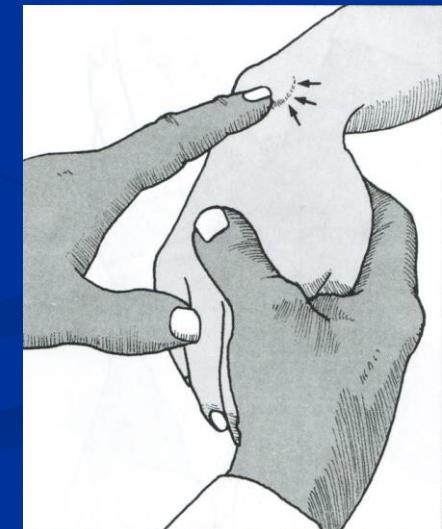
- Swelling of RC joint



- Tenosynovitis



- Ganglion cyst



# Hand- inspection

- Heberden nodules- OA DIP
- Bouchard nodules- OA PIP
- Sclerodermia
- Complex regional pain syndrome type II

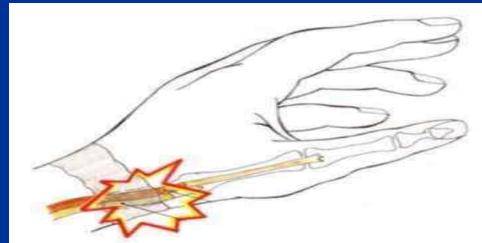


# Hand and wrist pathology

## ■ De Quervain tenosynovitis



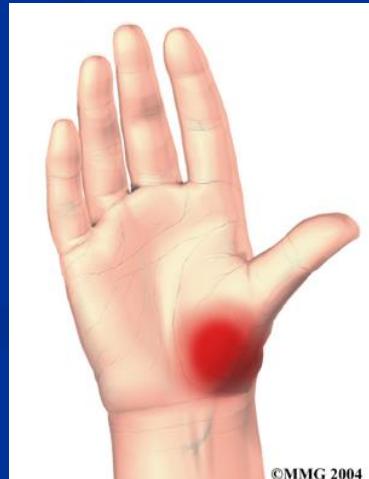
Tenosynovitis of 1st extensor compartment tendons: extensor pollicis brevis, abductor pollicis longus.  
Finkelstein test used make the diagnoses.



## ■ Art carpometacarpea pollicis

Art sellaris: abduction, adduction, opposition, reposition, flexion, extension

Arthrosis is called rhizarthrosis:  
osteophytes, subchondral sclerosis, loss of  
articular space

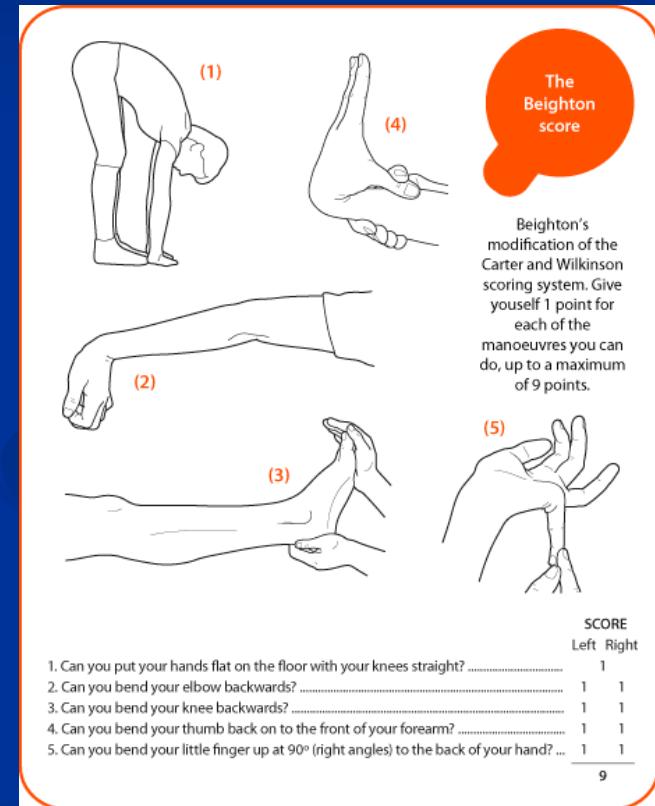


# Wrist-movement

- Dorsal flexion 70° ,
- Palmar flexion 80 – 90 °,
- Ulnar abduction 40-50°,
- Radial abduction 20-30 °,



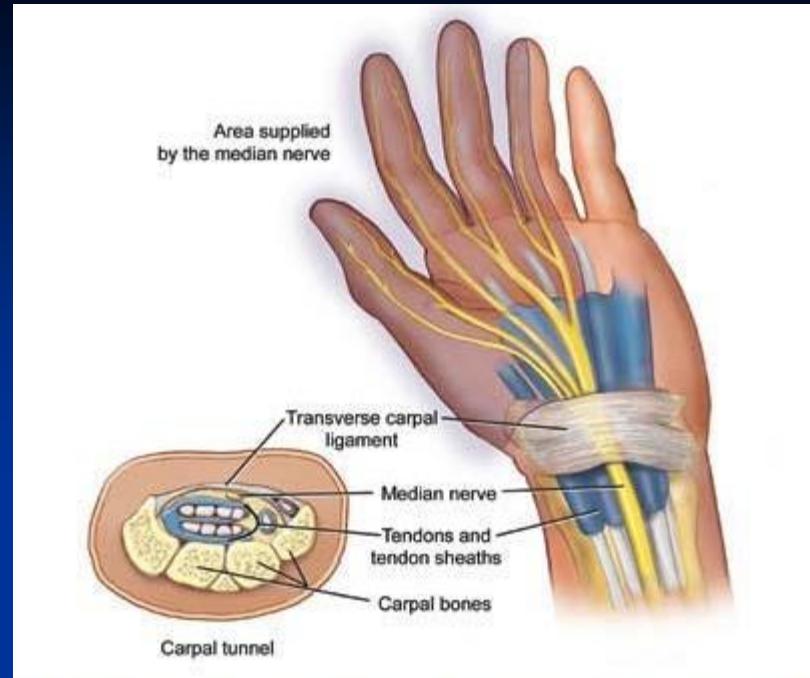
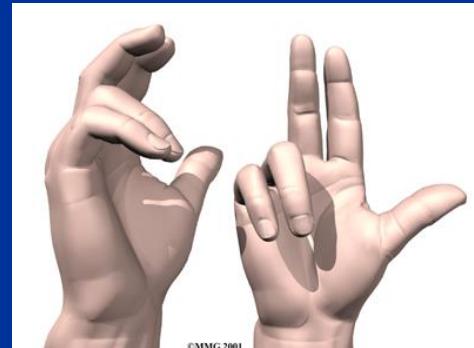
# Hypermobility syndrome



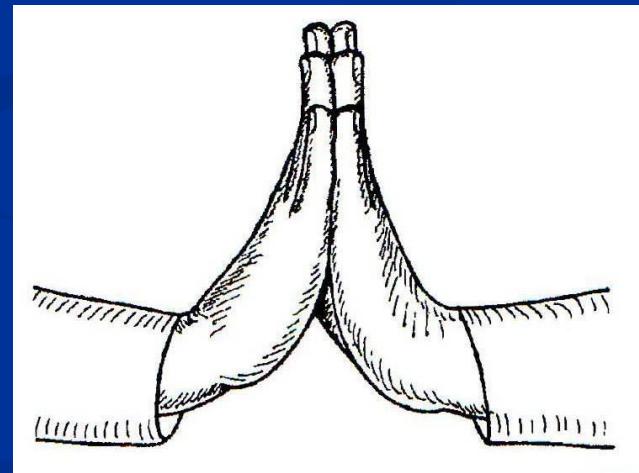
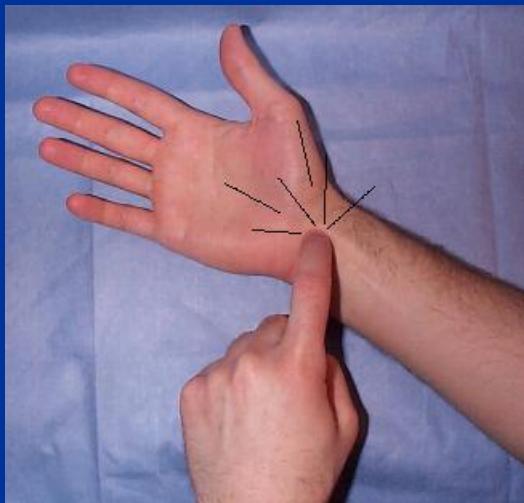
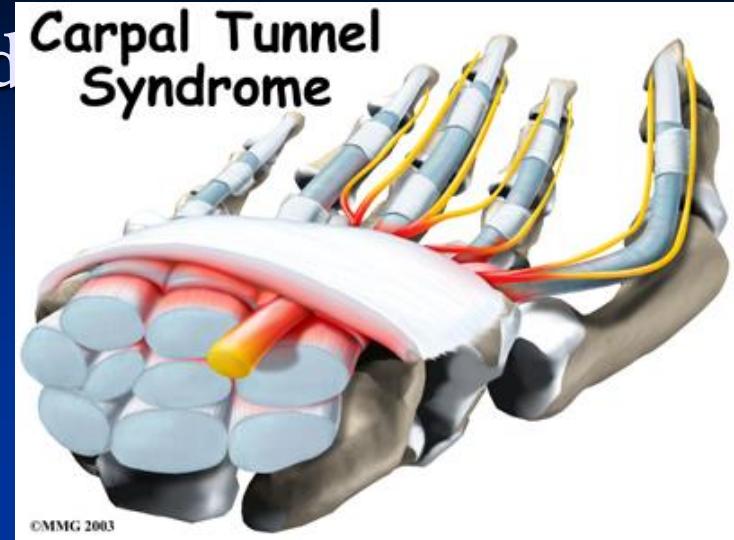
Ehlers-Danlos Sy, Marfan's disease,  
Osteogenesis imperfecta

# Sy canalis carpalis

- Hypoesthesia, paresthesia in n. medianus innervation area. Pain is also possible.
- Thenar wasting
- Tests from Hoffmann-Tinel, Phalen, Wormster
- Nerve conduction test
- Acute form of carpal canal syndrome in pregnant women
- Preacher's hand –in median nerve palsy



# Tests for carpal tunnel syndrome

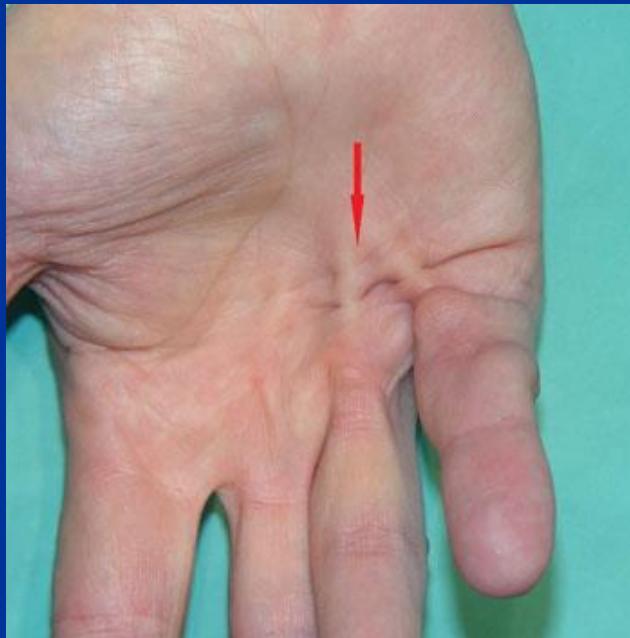


Tinel test

Wormser test- 1 minute  
provocation of symptoms

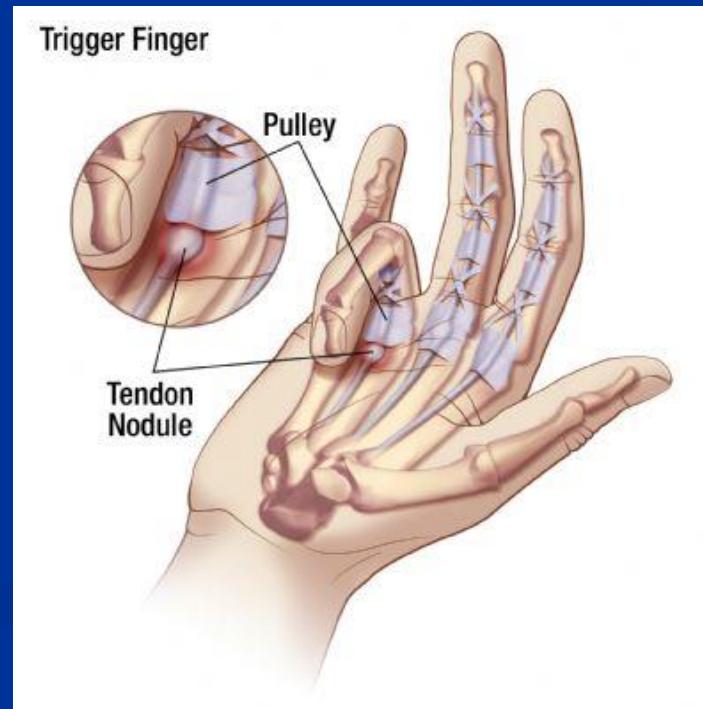
# Contractura Dupuytren

- Palmar fascia fibrosis- common in diabetic patients



# Trigger finger

- Passive and active range of motion decrease, pain around flexor nodule



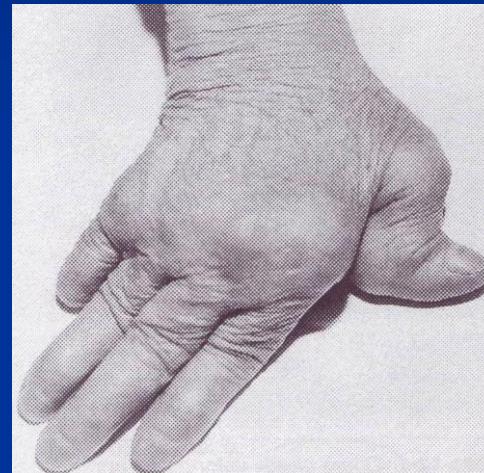
# MCP, PIP and DIP- inspection

## ■ Ulnar deviation of fingers



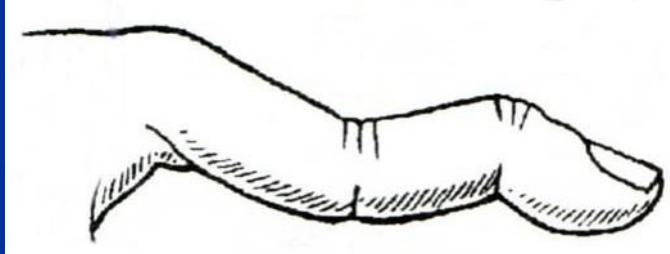
MCP subluxation

## ■ Z thumb



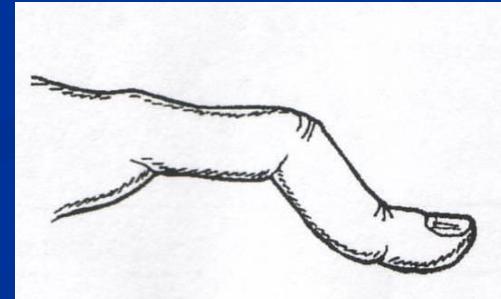
- flexion MCP,  
hyperextension  
IP,
- extensor pollicis  
brevis lesio

## ■ Swan neck deformity



PIP hyperextended  
DIP flexed

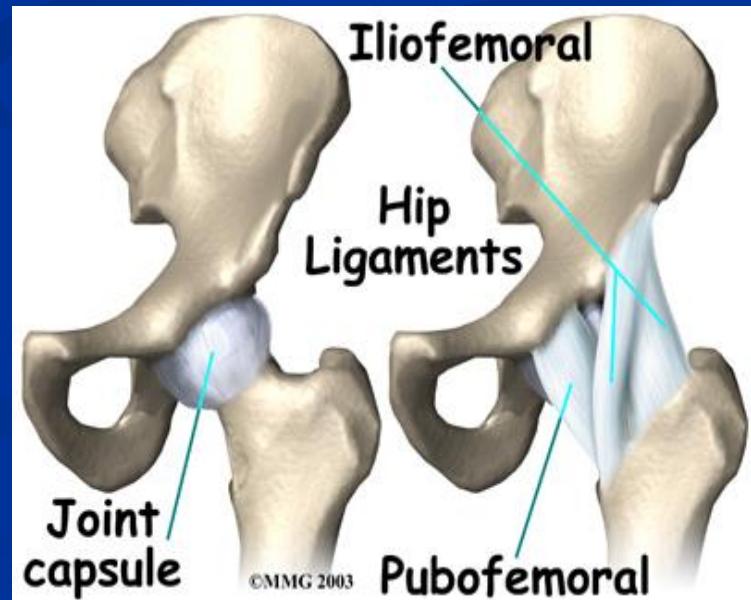
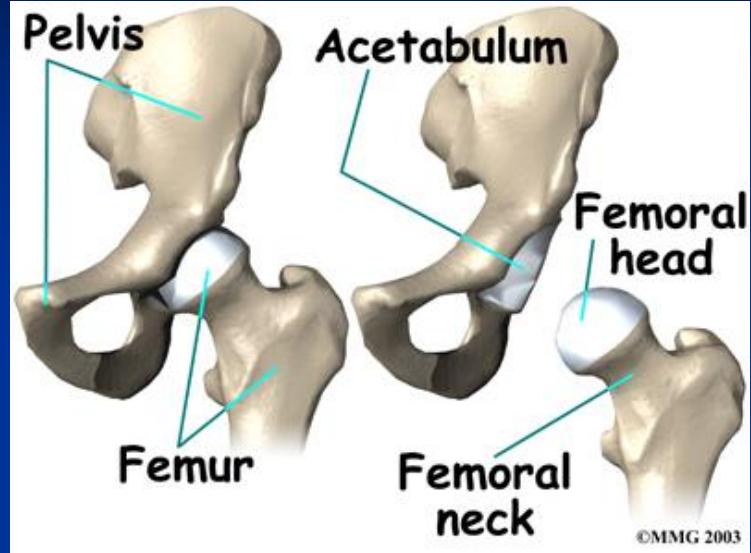
## ■ Boutinniere deformity



PIP flexed  
DIP  
hyperextended

# Hip- articulatio coxae

- Ball and socket synovial joint
- Strong ligaments limit movement:  
iliofemoral-retroflexion, ischiofemoral,  
pubofemoral ligament- abduction
- Inspection starts with walking  
(limping, shortening of limb, flexion  
contracture, **Trendelenburg sign-**  
**weakness of hip abductors**- stand on  
one leg and pelvis drops), swelling,  
redness



# Hip- examination

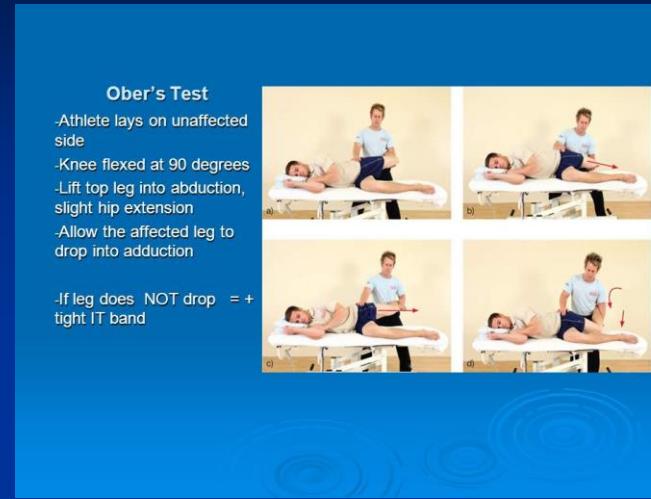
- Movement, manual muscle strength, specific tests



Patrick's test-  
FABER- for hip  
or SI pain



FADIR test-  
flexion, adduction,  
internal rotation-  
labral injury

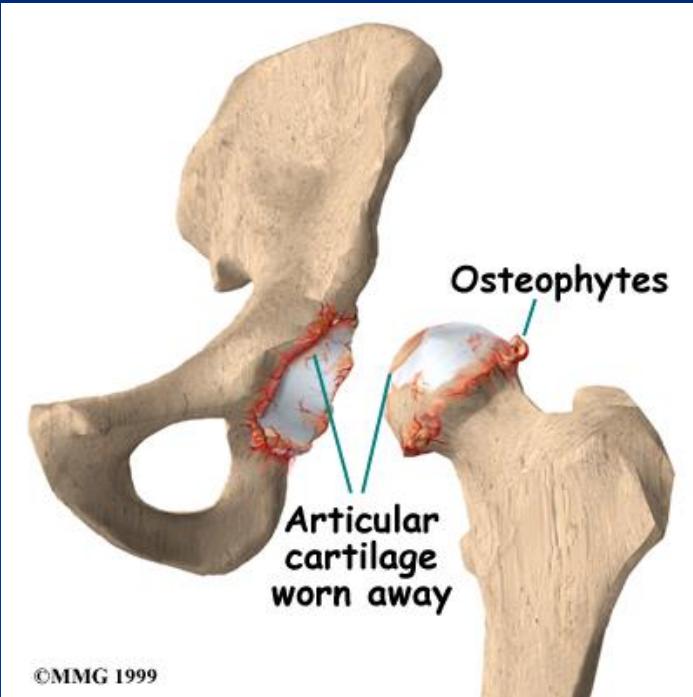


Ober's test- tractus iliotibialis tightness



Hip rotations test

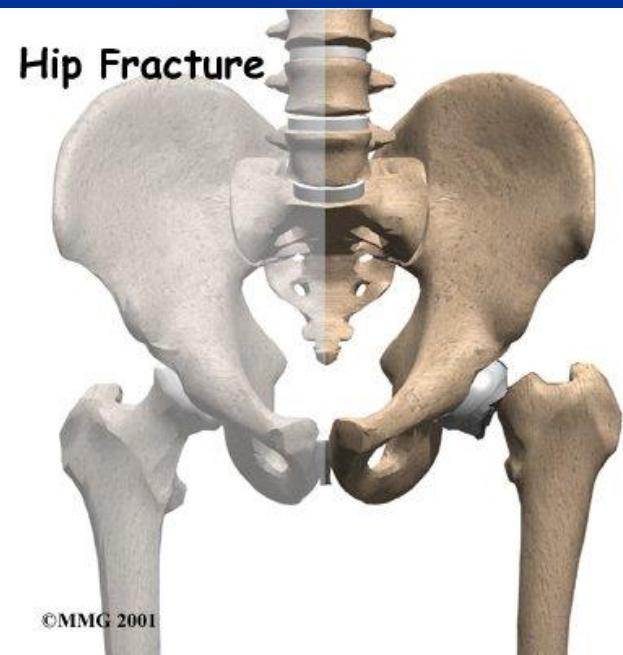
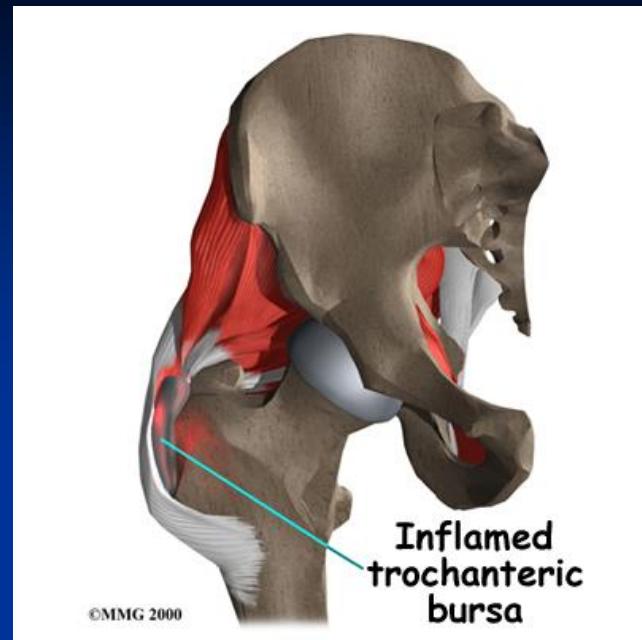
# Hip- pathology



Hip Osteoarthritis

Impingement- due to  
osteophytes

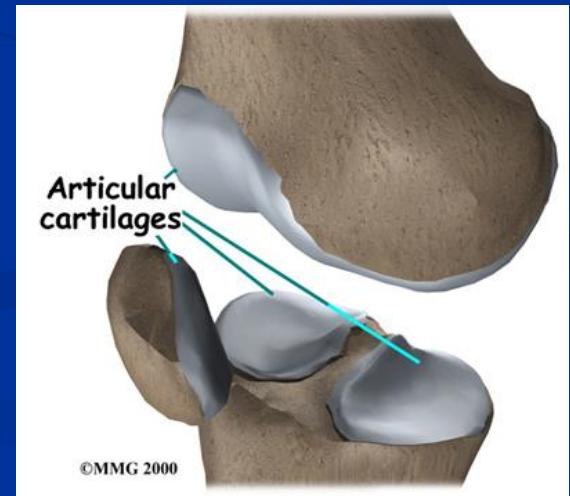
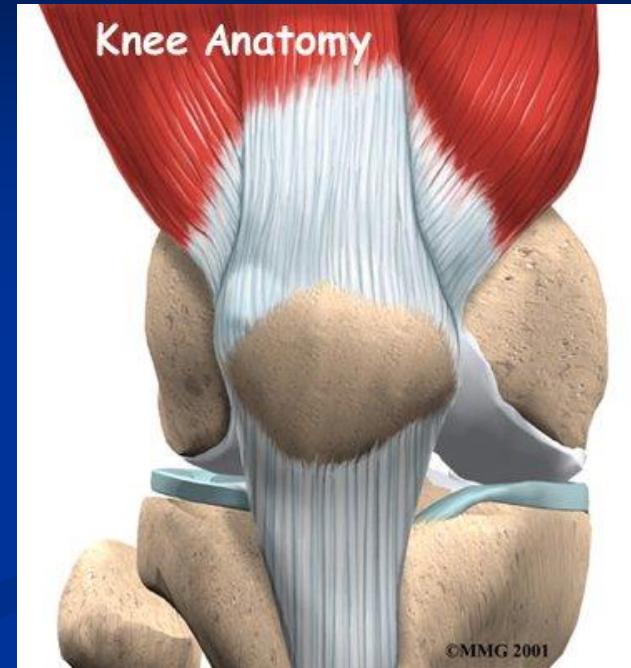
Trochanteric  
bursitis- could  
be ischial and  
iliopsoatic bursa



Femoral fracture

# Knee- articulatio genus

- Trochogynglymus- flekxion and extension in all positions and rotation only in semiflexion (collateral lig)
- Femorotibial medial, femorotibial lateral and patelofemoral part of joint
- Inspection: swelling, redness, muscles, deformity (varus, valgus)
- Ligaments: collateral, cruciate. Medial and lateral meniscus.
- Q-angle men  $10-15^\circ$ , women  $10-19^\circ$
- Popliteal or Baker cyst, postero-medial oedema of the popliteal fossa
- Medical history taking: localization, duration of pain, limitations, aggravating factors, recent trauma...



# Knee- anatomy

- Movement, manual muscle strength, specific tests

M. quadriceps femoris- main extensor , important for knee stability; m. rectus femoris, m. vastus medialis (last 10° of extension, locks the knee) , m. vastus lateralis i m. vastus intermedius

M. biceps femoris

M. semimembranosus – knee flexors

M. semitendinosus

M. biceps femoris- external rotator of lower leg

M. popliteus- initial internal rotation- unlocks the knee for extension

M. semitendinosus- internal rotators of lower leg

M. gastrocnemius- limits hyperextension of the knee

Movement: 0/135° , internal rotation 10 °, external 40°

# Knee- inspection



Knee  
inspection



Genus varus



Effusio

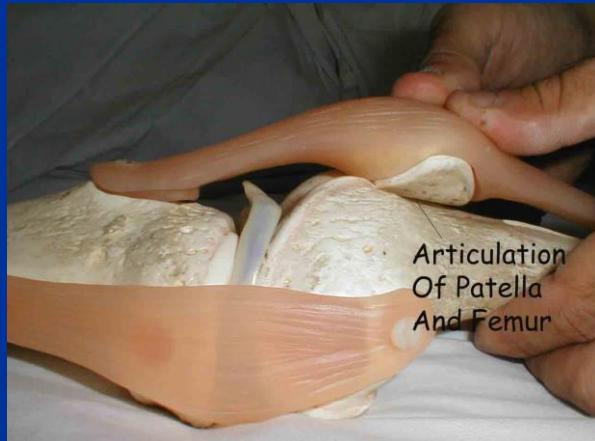


# Knee- palpation

Fries sign- patella colder than 5 cm above for 1°C



Ballotment of patellae-  
for effusion detection



Patella grinding test:

Pain below patella:  
chondromalatio  
patellae, on the patella  
osteochondritis,  
above prepatellar  
bursitis



# Differential diagnoses of knee pain

## Anterior knee pain

Patellofemoral osteoarthritis

Malalignment of extensor tendon (quadriceps femoris)

Hondromalatio patellae

Morbus Osgood-Schlatter (apophysitis tibiae)

Jumper's knee (tendinitis patellaris, enthesitis apicis patellae)

Morbus Hoffa – infrapatellar fat tissue inflammation

Prepatellar and infrapatellar bursitis



## Medial knee pain

Medial collateral ligament lesion

Medial meniscus lesion

Osteoarthritis

Bursitis pes anserinus

Plicca syndrome

## Lateral knee pain

Medial collateral ligament lesion

Medial meniscus lesion

Iliotibial band syndrome

Osteoarthritis

## Posterior knee pain

Baker's cyst

Fabelitis

Medial head of the gastrocnemius syndrome

Lesio of lig cruciatum posterius

Deep vein thrombosis (Homman sign)

# Tests for meniscal damage



Appley test-  
compression  
and rotation-  
pain;  
distraction  
relief



McMurray test

←medial meniscus

→lateral meniscus



# Tests for ligament damage



Anterior  
cruciate  
ligament

←Anterior  
drawer test

→Lachmann



Collateral lig

←medial collateral

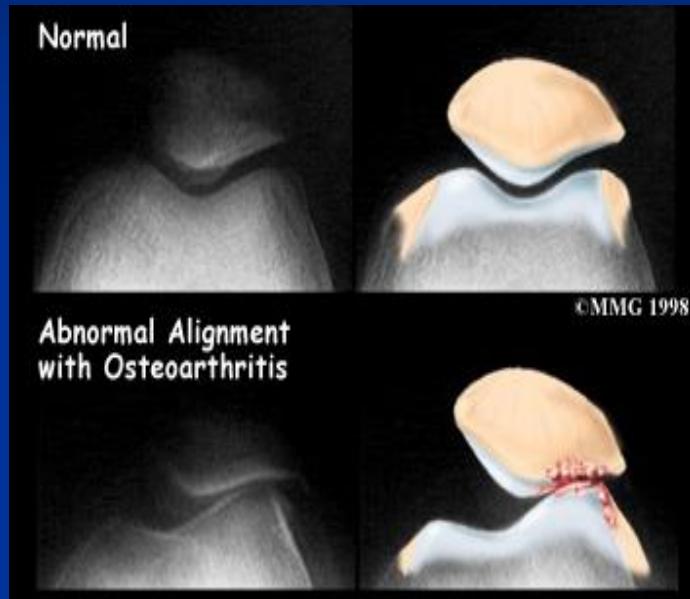
Valgus test

→lateral collateral

Varus test



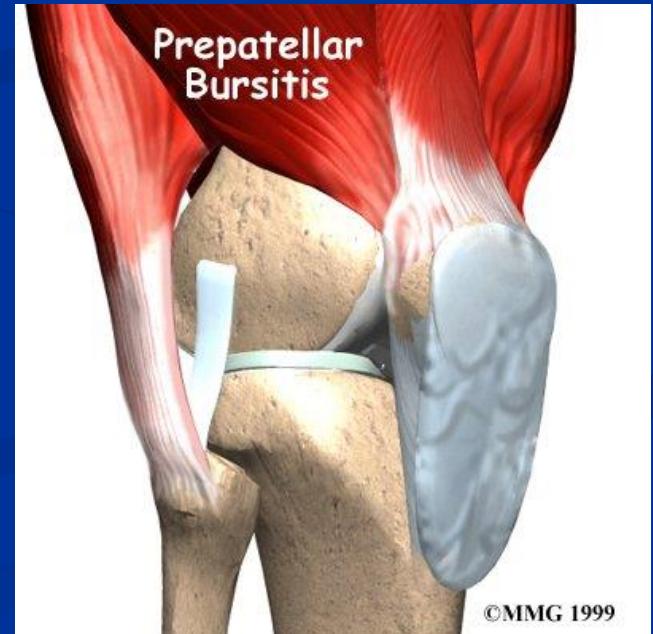
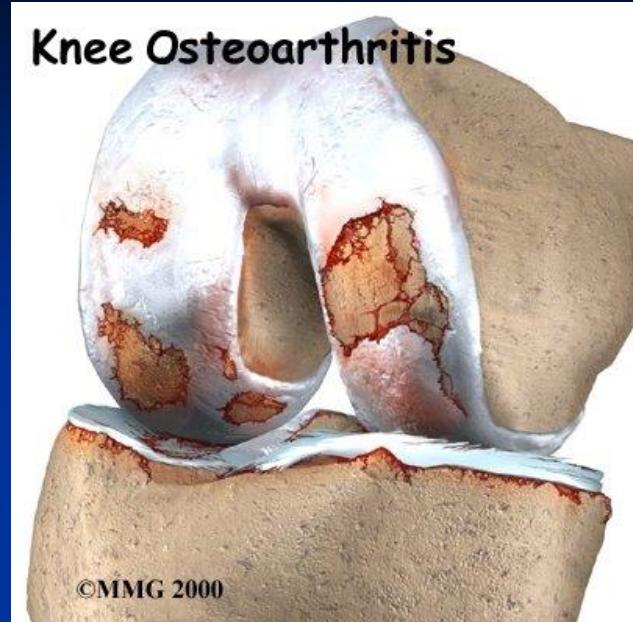
# Knee - pathology



Extensor tendon  
malalignment

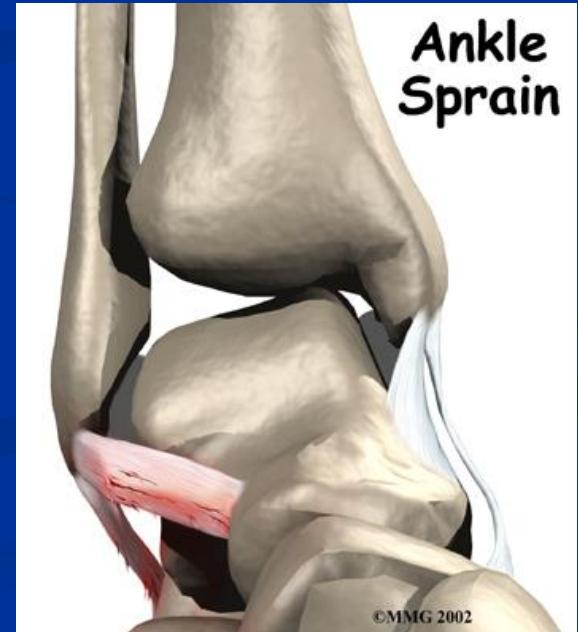
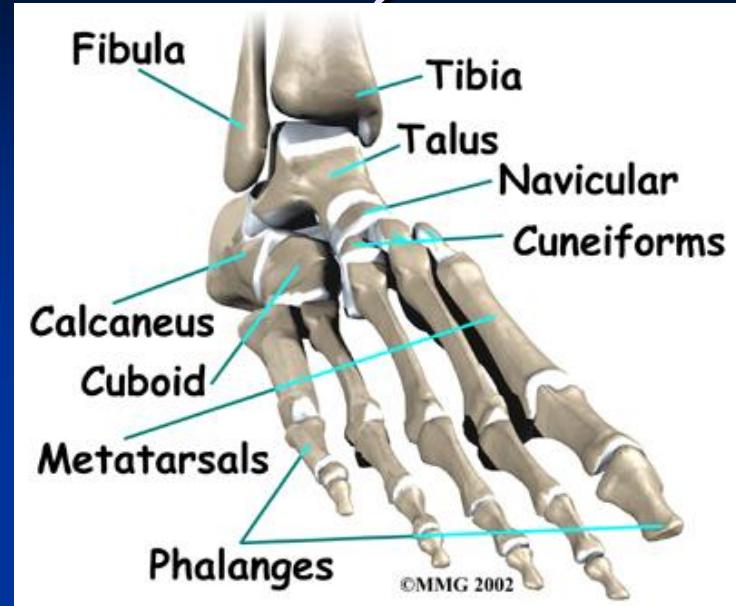
Extraarticular pain,  
includes bursitis like:  
Prepatellar bursitis

Knee  
osteoarthritis



# Ankle and foot- talocrural joint

- Synovial joint formed by tibia, fibula and talus
- Hinge joint: dorsiflexion ( $20^\circ$ ) and planatar flexion ( $45^\circ$ )
- Strong ligaments: medial ligament is called lig deltoideum: lig tibionaviculare, tibiotalare and tibiocalcaneare
- Lateral ligament, often damaged in distorsions of ankle: anterior talofibular, posterior talofibular and calcaneofibular- 85% inversion injury
- Three compartments of tendons: anterior, medial and lateral stabilizing the joint



# Dynamic stabilization of the ankle

## Anterior compartment

- M. tibialis anterior
- M. extensor digitorum longus
- M. peroneus tertius
- M. extensor hallucis longus

## Medial compartment

- M. tibialis posterior
- M. flexor digitorum longus
- M. flexor hallucis longus

Plantar flexors and supinators

## Posterior compartment: Tendo Achilles



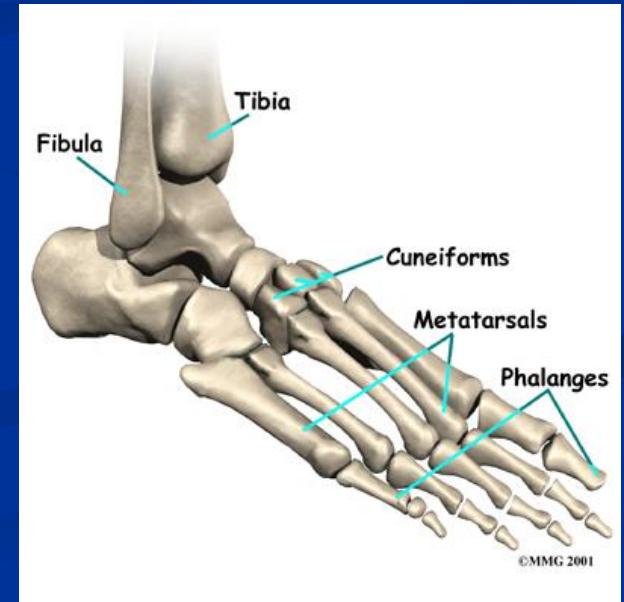
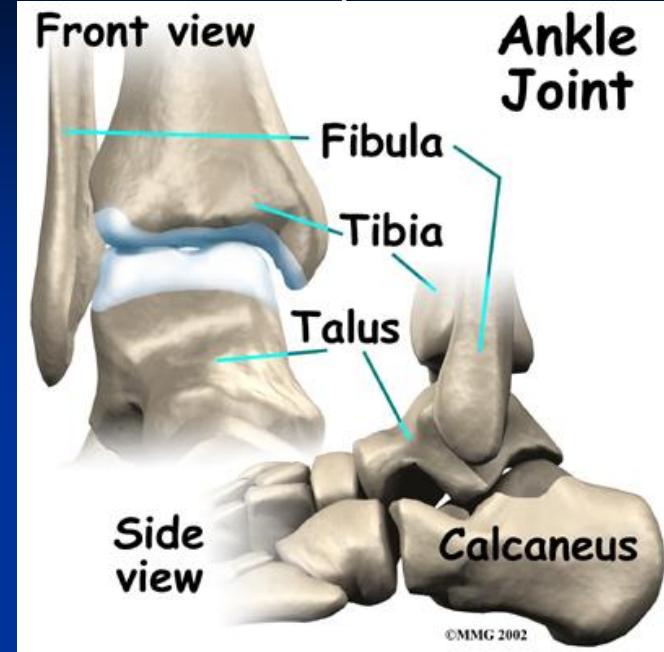
## Lateral compartment

- M. peroneus longus
- M. peroneus brevis

Dorsal flexors and pronators

# Ankle and foot- anatomy

- Subtalar (talocalcaneal) joint formed between talus and calcaneus
- Movement: eversion and inversion
- Main ligament is talocalcaneal interosseal ligament
- Metatarsophalangeal joint between heads of MT bones and proximal phalanges are condyloid by mechanics: flexion, extension, abduction, adhesion and circumduction
- Plantar and two collateral ligaments
- Dynamic stabilization from tendon of extensor digitorum muscle
- Interphalangeal joint- flexion/extension



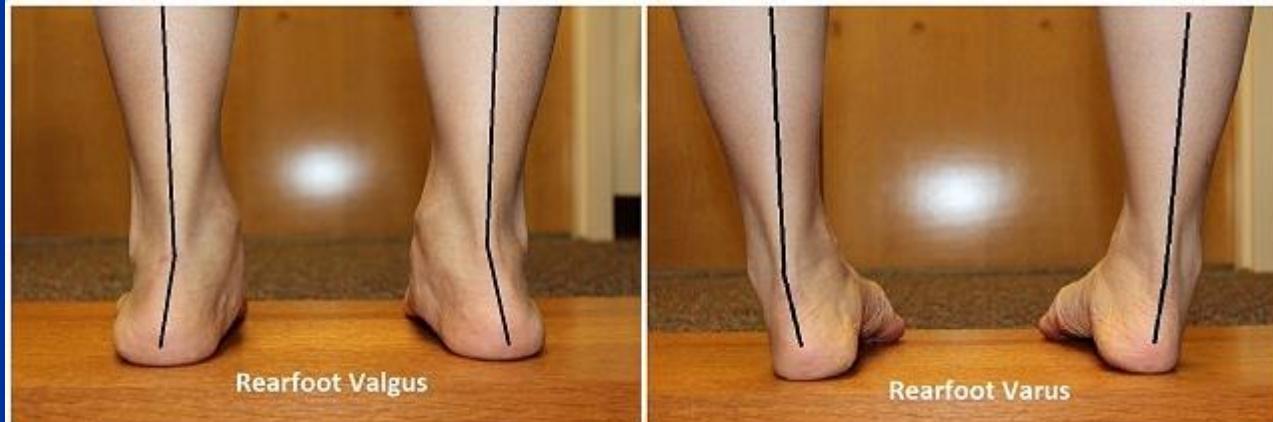
# Pain in the foot

Fascitis plantaris

Static deformation (pes planovalgus, pes equinovarus), bursitis and metatarsalgia, worsens with standing or walking

Anterior foot pain: RA, PsA, metatarsalgia, hallux valgus. Sudden onset of pain in gout (arthritis urica)

Calcaneal pain: Reiter's syndrome, AS, colitis ulcerosa, fascitis plantaris



Pes equinus- shortening of tendo Achilles- neuromuscular, trauma, inflammation- limited dorsal flexion

# Foot pathology

Foot deformities- pes planus, pes cavus, pes calcaneus



Normal Arch



High Arch

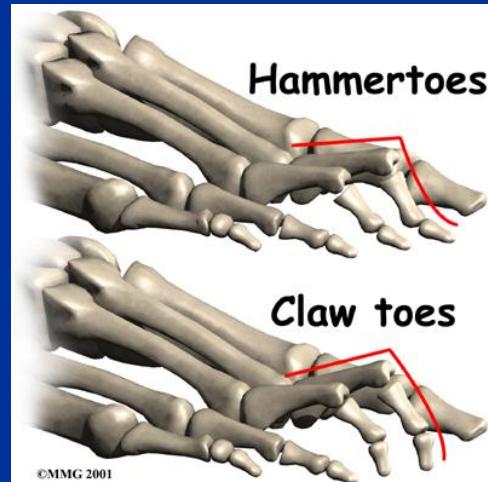


Flat Arch



Pes calcaneus

Toe deformities  
Hammer toe MTP  
hyperextension  
PIP and DIP flexion  
Claw toe- cock up  
toe, MTP  
subluxation,  
proximal phalanx  
dorsal flexion



Hallux valgus



# Nerve compression

Anterior tarsal canal syndrome

N. peroneus profundus compression under lig. cruciforme

After distortion or synovial distension

Paresthesias in dorsal metatarsal area between 1 and 2 toe



Interdigital neurom

Interdigital nerve entrapment inside metatarsal tunnel between MT bones

Compression from lig. metatarsum transversum  
Sharp pain and paresthesias in activity and after in rest also, usually unilateral and in women

Medial tarsal canal syndrome

N. tibialis posterior compression through medial compartment

Innervation of dorsomedial side of the calcaneus

Pain and paresthesias in the area of 1, 2, and 3 digit

Pain is bigger at night and after long standing  
Tinelov sign is positive

