Clinical examination in orthopaedics

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Clinical examination

The aim- establish the diagnosis

1. History
2. Objective examination - general
3. Objective examination - local
4. Laboratory tests
5. Imaging methods

History

Family
Personal
Pharmacological
Social
Occupation
Epidemiological
Current problems
Analysis of pain

Family

- Congenital abnormalities
- Important diseases in family (heart, DM, haemophilia, oncological diseases, neurological diseases, TB
- Birth, miscarriage

Personal

- Important general diseases (hypertension, DM, heart, tumors, lung problems
- Coagulopathies
- Infections
- Injuries: consequences, complications
- In children- pregnancy
  psychomotor development

Current symptoms

Local

Pain, motor function, limping, deformity, ROM, swelling, loss of sensation

General: fever, shivering, cachexia

Cause of the problem

- injury
- overloading
- Infection
- systemic diseases (endocrine,metabolic, inflammation, neurological, haemotological.)

- Development of symptoms
  - Onset, duration
  - Intensity
  - Aleviation, increasing factors
- Present management
  - Examination in the past time
  - Conservative therapy
  - Operative therapy
- Mobility, occupation
- Emotions, psychological condition
- Simulation, dissimulation, aggravation

Analysis of pain

Intensity, frequence, duration
Acute, chronic
Local, irradiating
Visceral
Type- sharp, blunt, burning, stubbing
Neuralgia
Nerve root pain
Phantom pain
Neurogenic claudication

Analysis of pain

Localised, diffuse
Psychological background
Durig activity or in rest

VAS – visual analogue scale
Scale of ten degrees
0 - no pain
10 - the most sever pain not bearable

Pain 5 or more- change of management

Pharmacology

- Medicines used currently
- Important medecines: warfarin, heparin, other anticoagulants, antiepileptics, cytostatics, immunosuppresives, NSA, corticoids, biological treatment,

- Alcohol, smoking, drugs
- Alergy (antibiotics, metal, dissinfections)

Occupation and social

- Occupation, type of work, manual labor
- Rent
- Social situation (living, marriage)
- Subsequent management

Gynecological history

- Cycles, gravidity, menopause, current gynecological problems

- Epidemiologiocal history

  influenza, viral infections, herpes simplex, focal infections (UTI, stomatological infections, ulcers, erysipel)

Objective examination

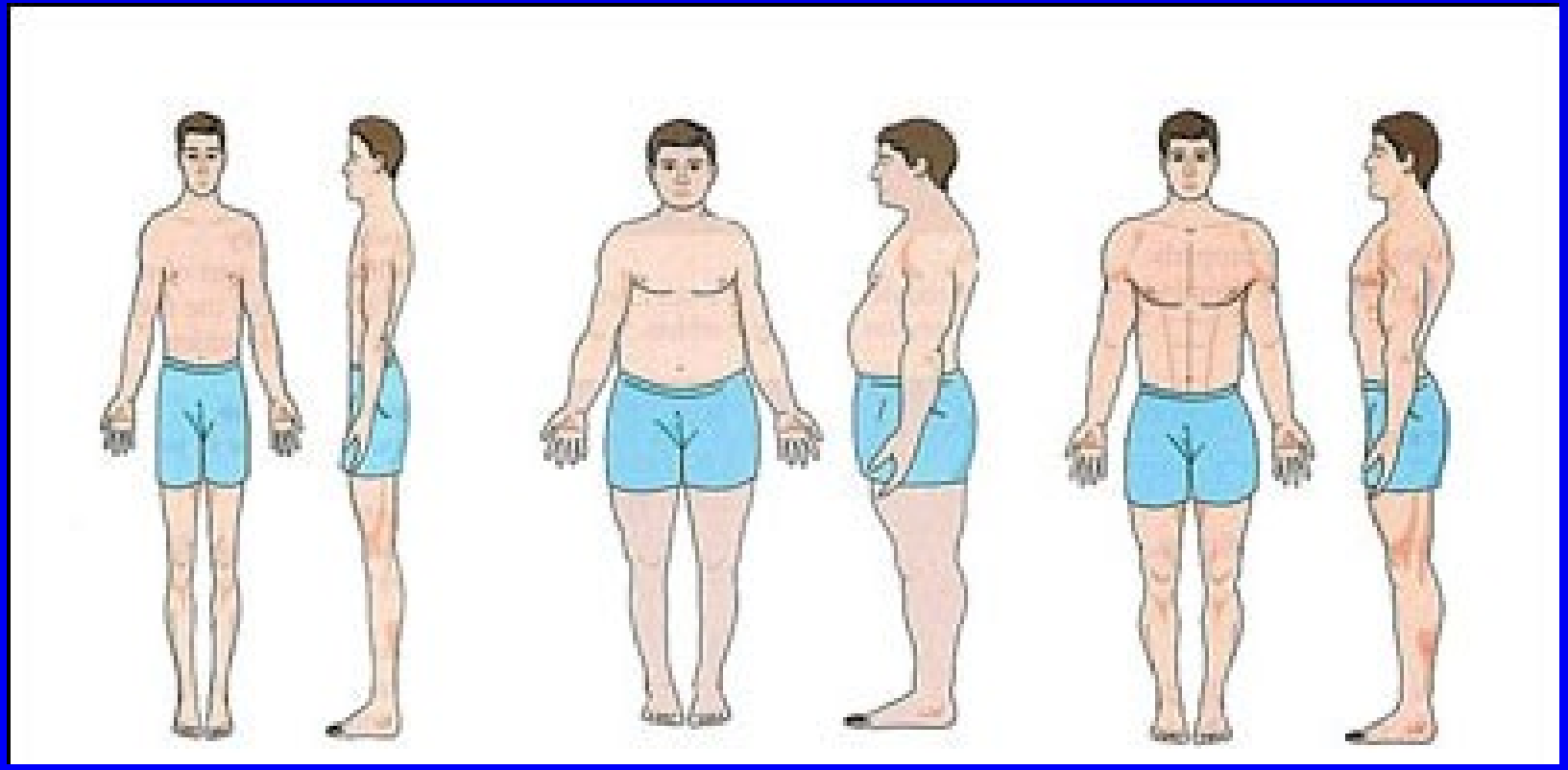
General examination

General orthopaedic examination

Local orthopaedic examination

Posture and gait

Somatotype

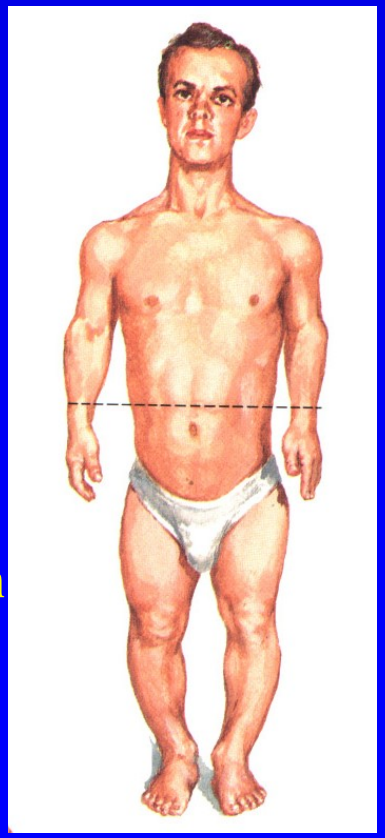


asthenic **pycnic** **normosthenic**

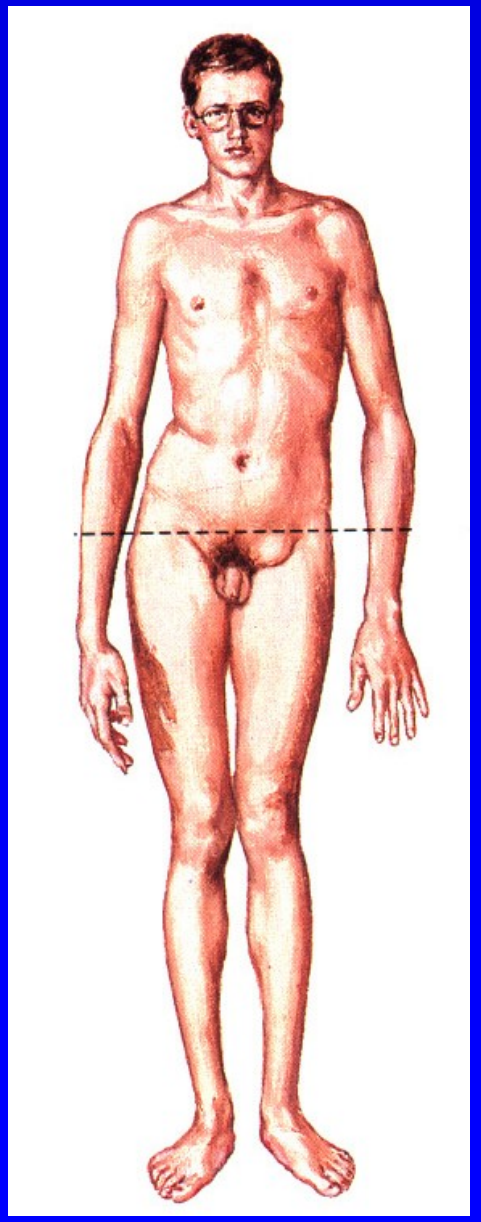
Gigantisms

Nanisms

Fröhlich syndrom



Achondroplasia



Marfan syndrom

Nutrition

- **Body mass index**: $\frac{\text{weight kg}}{\text{height}^2 \text{ m}^2}$ **(BMI)**

- Below 20 - cachexia
- 20-25 - normal weight
- 25-30 - overweight
- 30-35 - obesity
- Over 35 - severe obesity

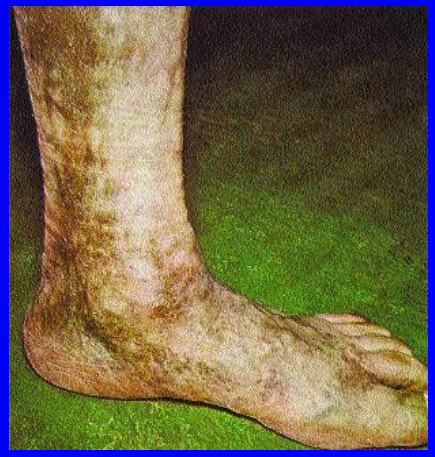
Skin

- Colour

- pigmentation, naevus



- Trophicity, turgor


- Fistulas, ulcers
- Subcutaneus nodes
- nails

- Lymfadenopathy, soft tumors, inflammations

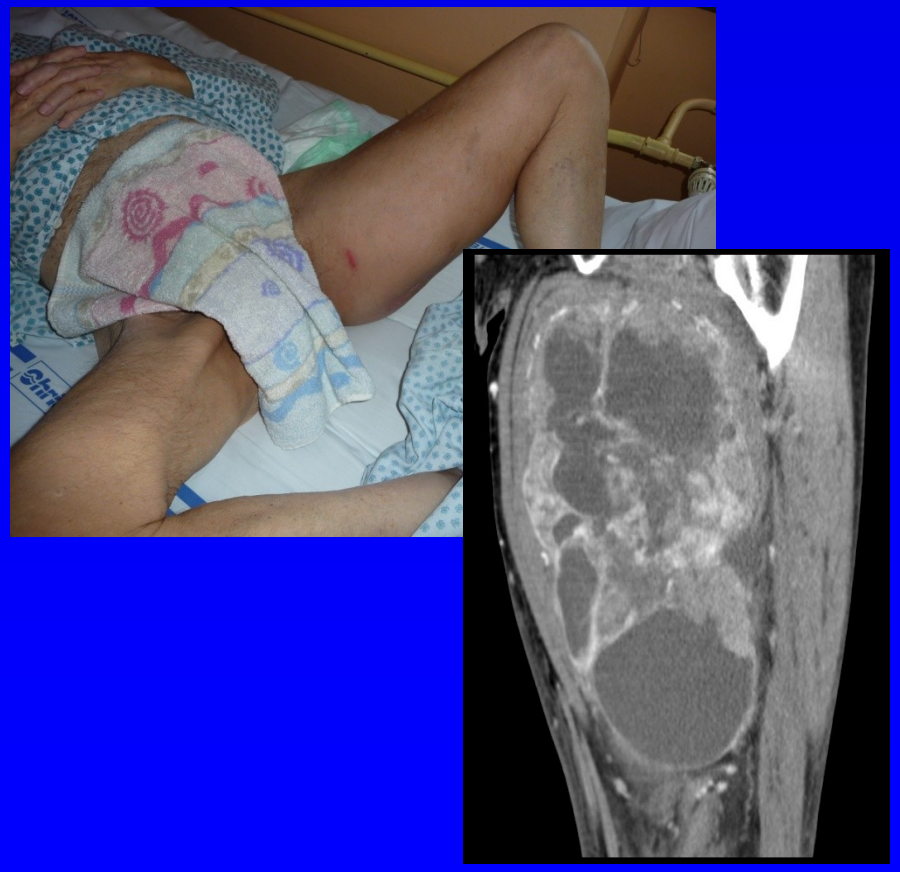
Swelling

- Local
- General
- Anasarca
- Decollement

Local signs of inflammations:
readness, swelling, pain, warm, limited function, soft mass, effusion, discharge

Soft mass

- Haematoma
- Lymphonodes
- Tumor



Effusion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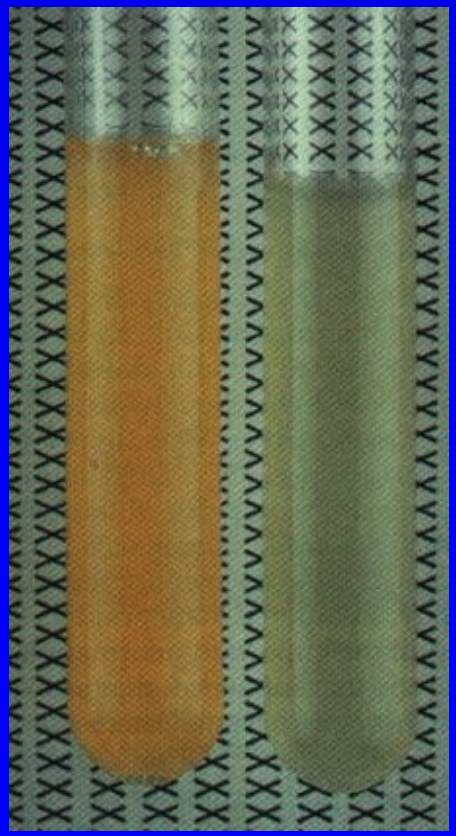


5
10
15
20ml
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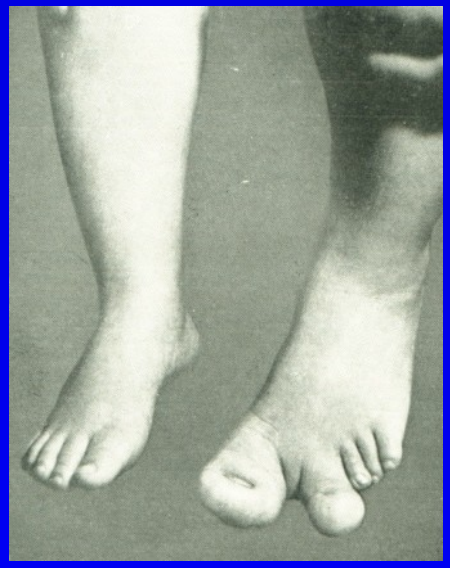
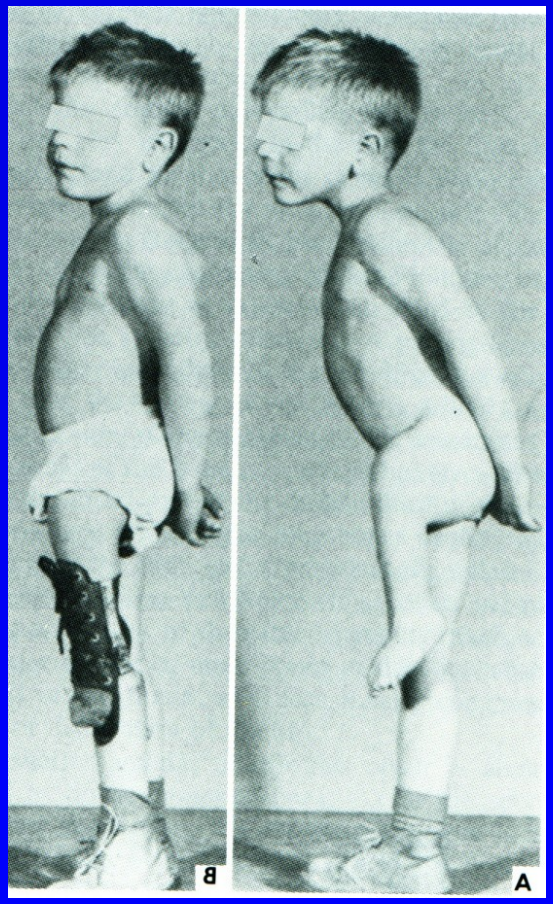
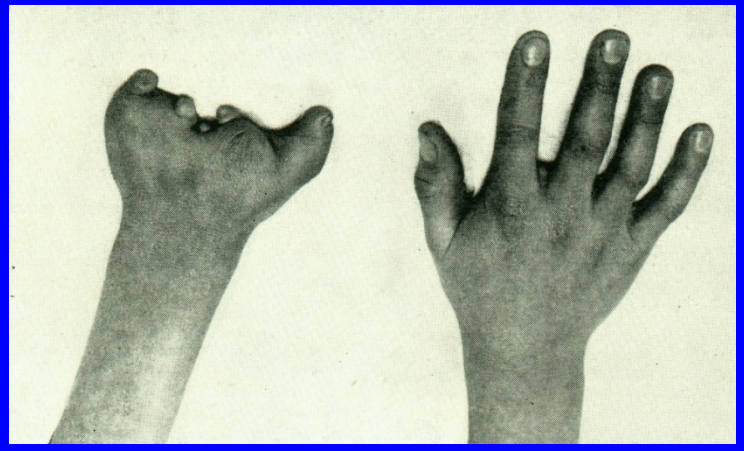
1
2
3
4
5
6
7

Congenital deformity

- 1. Shape, size
- 2. Differential
- 3. Duplicity
- 4. Gigantisms
- 5. Hypoplasia

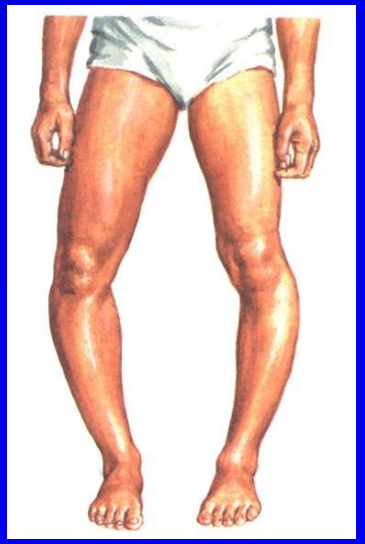


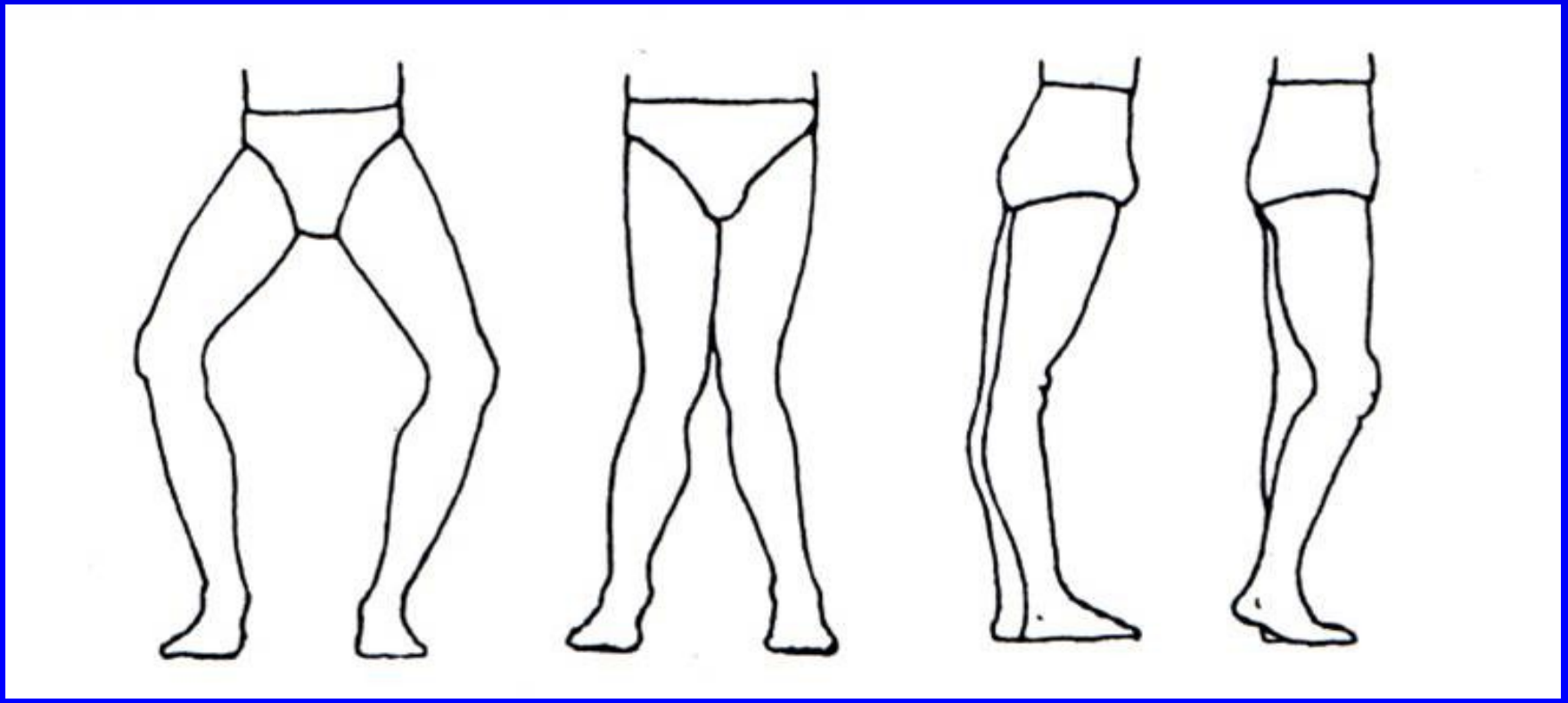




Malalignment

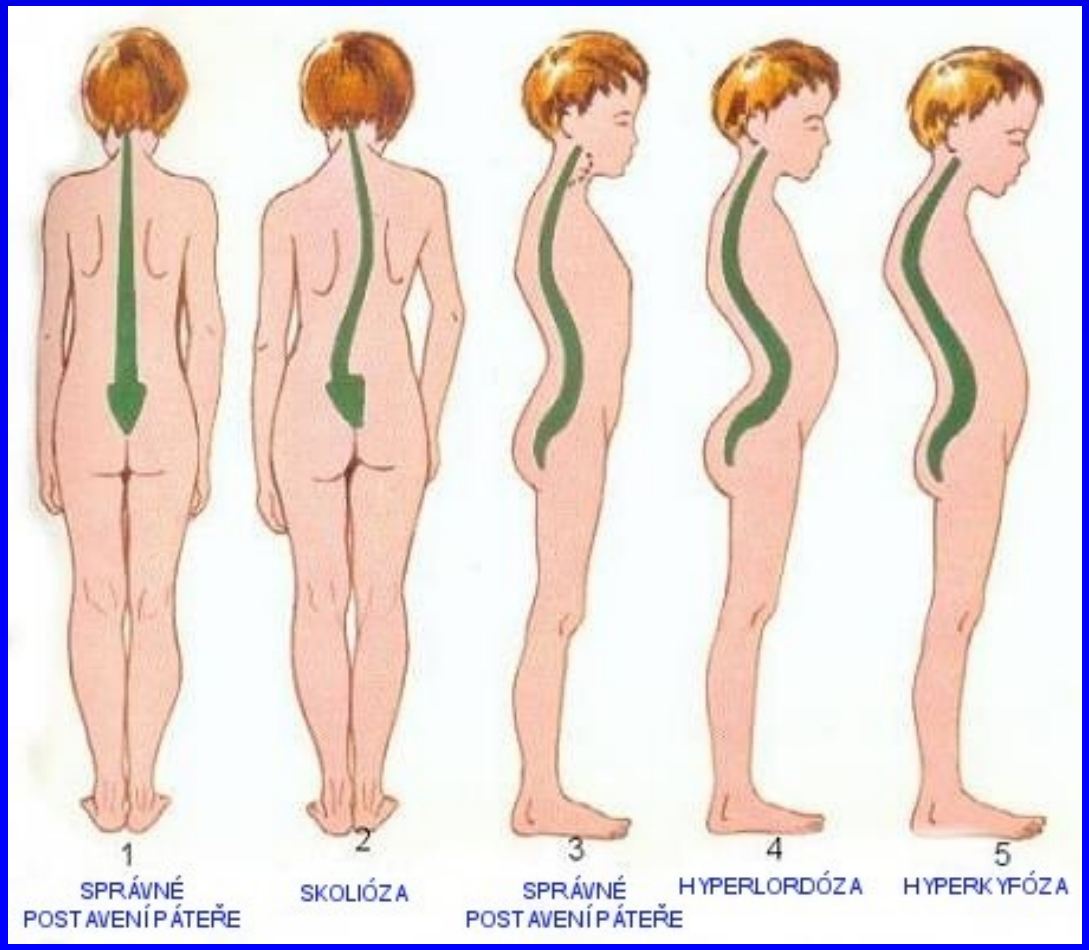
- varus x valgus
- antecurvation x recurvation
- rotation deformity

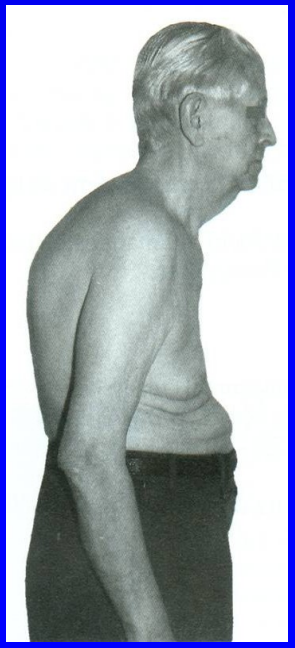




Deformity of spine

- Scoliosis
- Hyperkyphosis, hyperlordosis

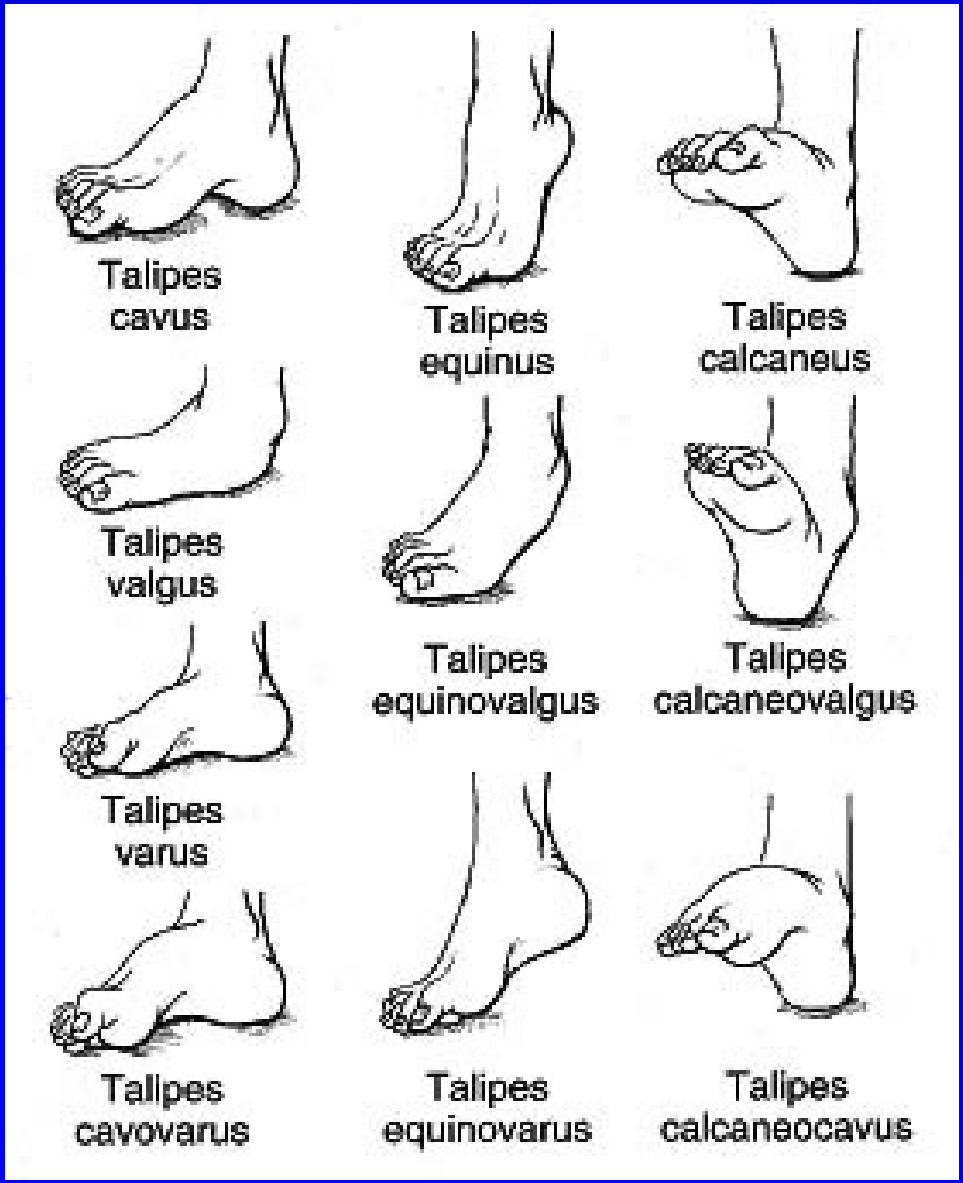


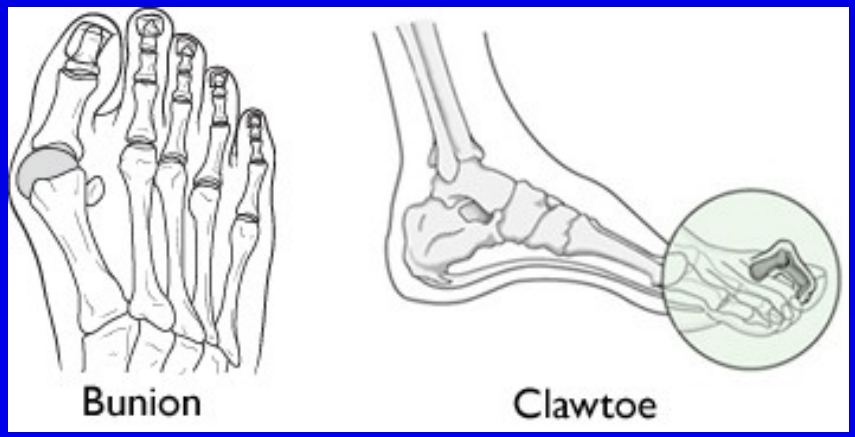


Hand deformities

Boutonniere deformity
Swan neck deformity

Foot deformities





Length of extremity

Lower extremity

- Spinomaleolar distance
- Umbilicomaleolar distance
- Support during standing
- X- ray of the hip, knee, ankle joint

Upper extremity: acromion- 3. finger

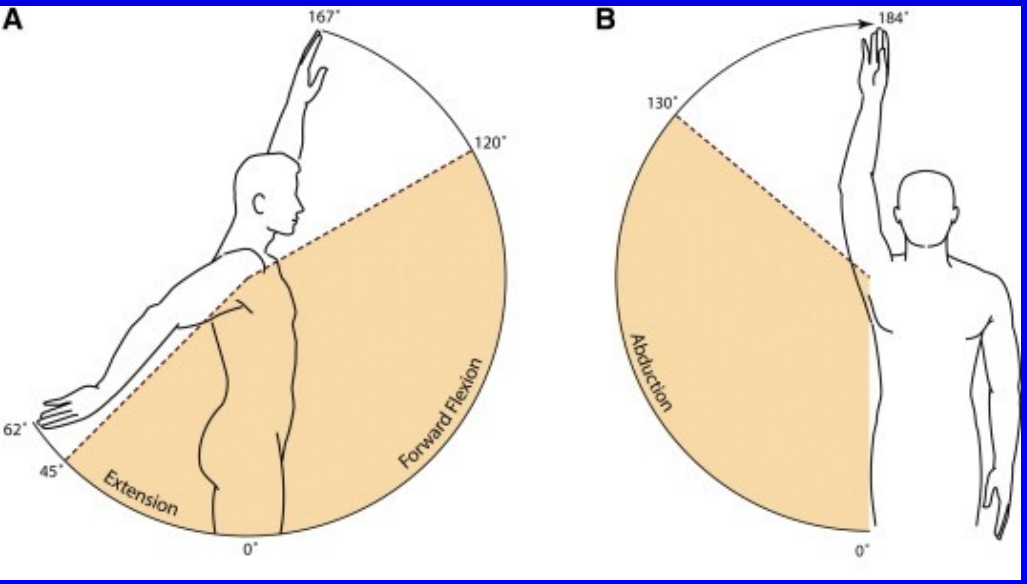
- Circumferential measurement

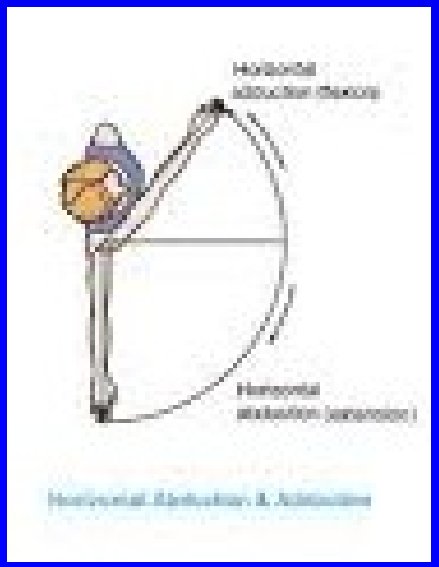
ROM

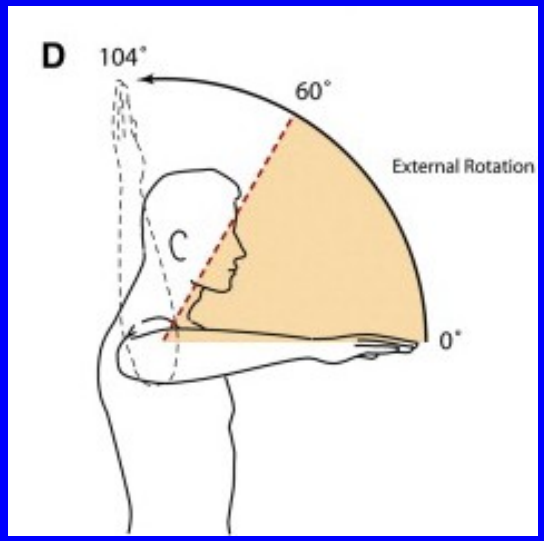
- Active and passive movements

- **S**agital
- **F**rontal
- **T**ransversal = horizontal
- **R**otation

Shoulder







S: extenze - 0 - flexe
50 - 0 - 180
F: abdukce - 0 - addukce
180 - 0 - 25
T: abdukce - 0 - addukce
110 - 0 - 30
R: ZR - 0 - VR
90 - 0 - 90

Elbow

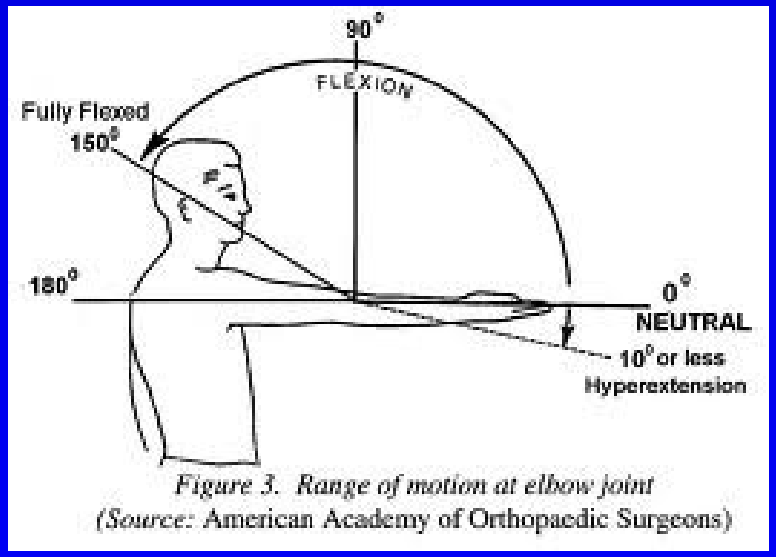
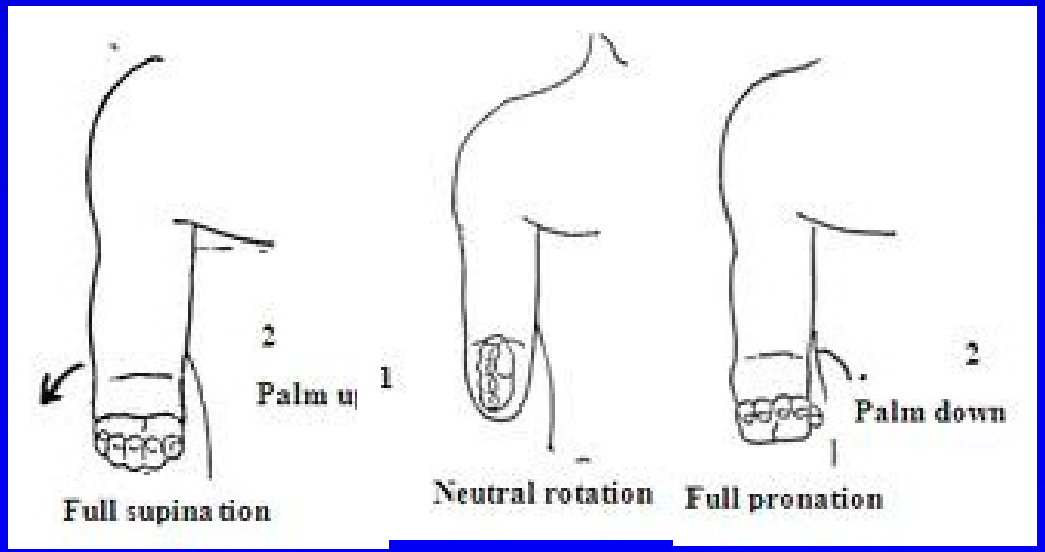


Figure 3. Range of motion at elbow joint
(Source: American Academy of Orthopaedic Surgeons)



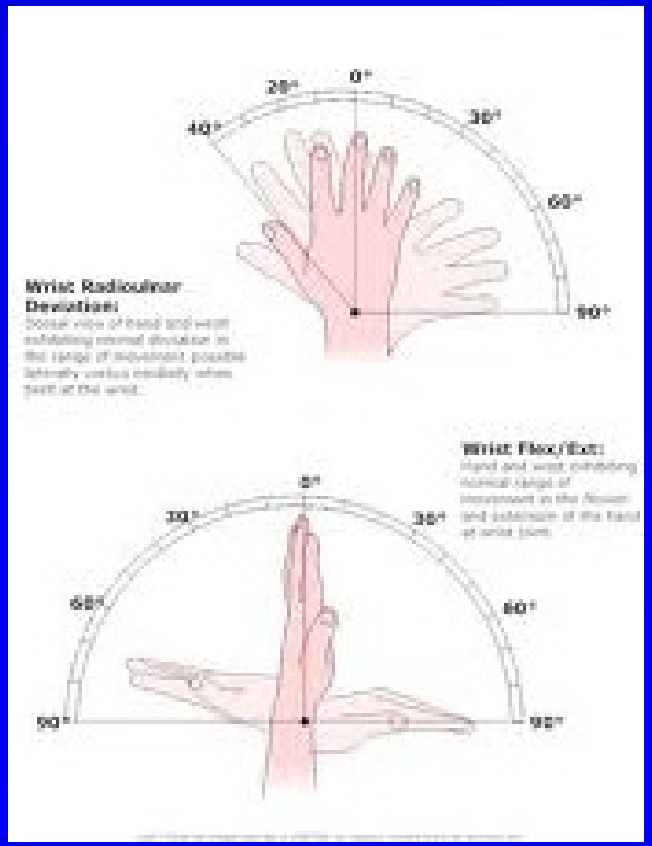
S: extenze - 0 - flexe

10 - 0 - 150

R: supinace - 0 - pronace

90 - 0 - 90

Wrist



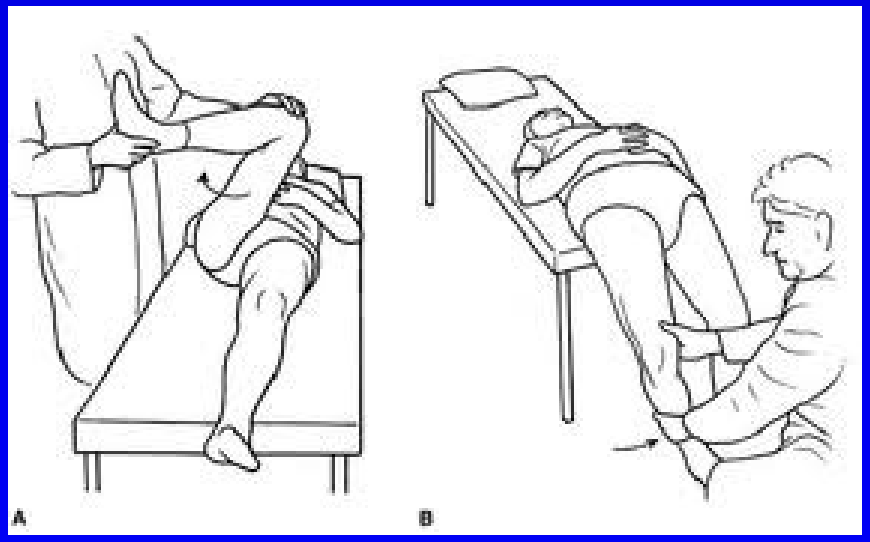
F: rad. dukce - 0 - uln. dukce

20 - 0 - 40

S:extenze (dorz. flexe) - 0 – flexe (palm. flexe)

80 - 0 - 80

Hip



S: extenze - 0 - flexe

15 - 0 - 140

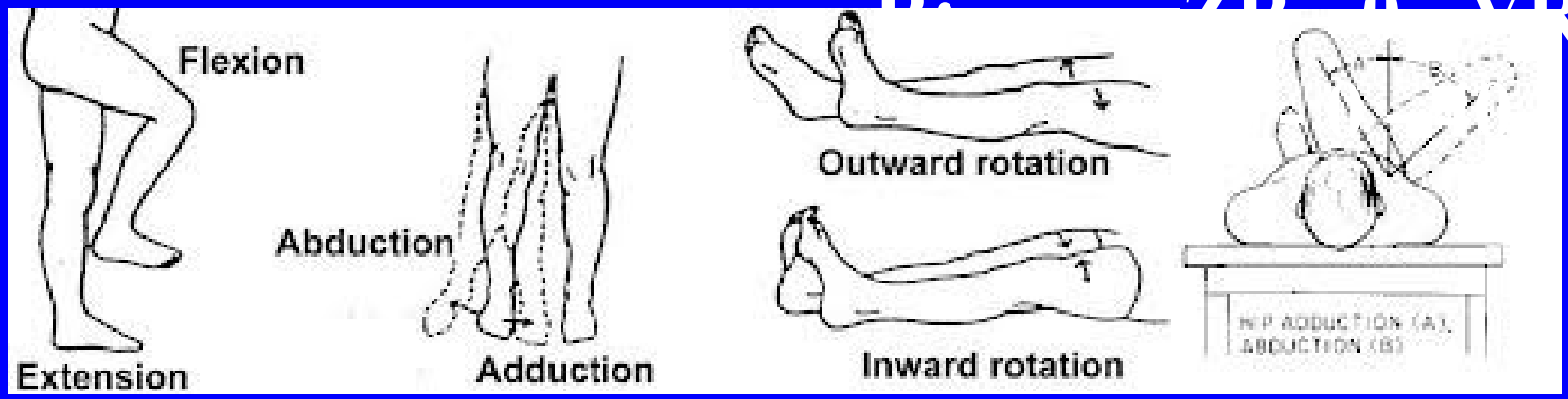
F: abdukce - 0 - addukce

60 - 0 - 40

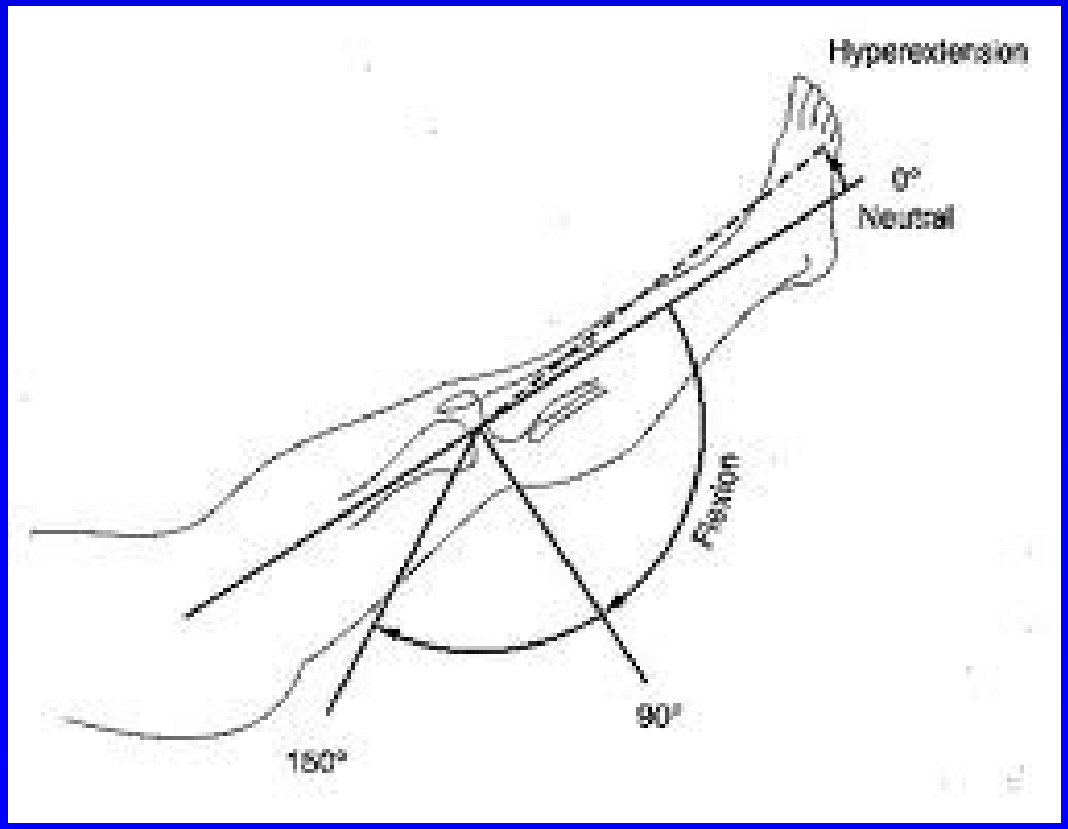
T: abdukce - 0 - addukce

80 - 0 - 30

R: [illegible] ZR - 0 - VR



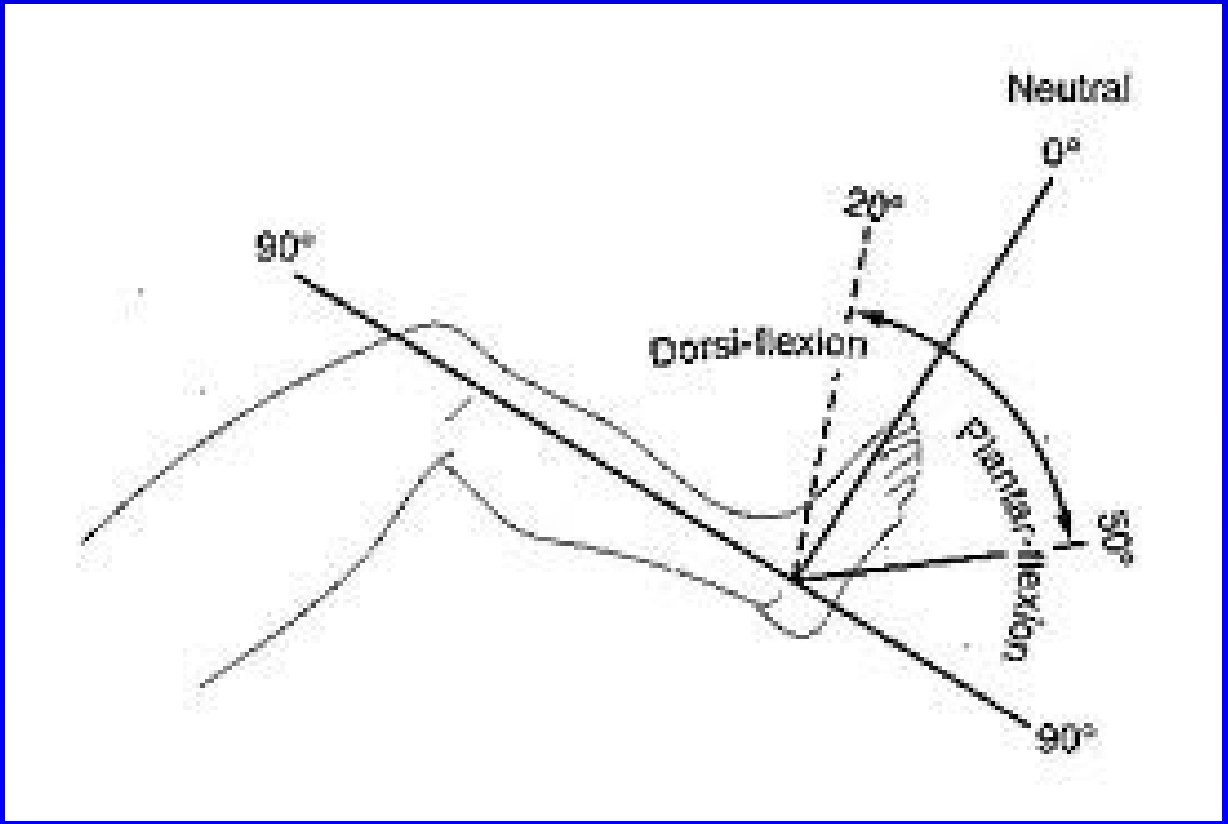
Knee



S: extenze - 0 - flexe

0 - 0 - 140

Ankle



S: extenze (dorziflexe) - 0 - flexe (plantiflexe)

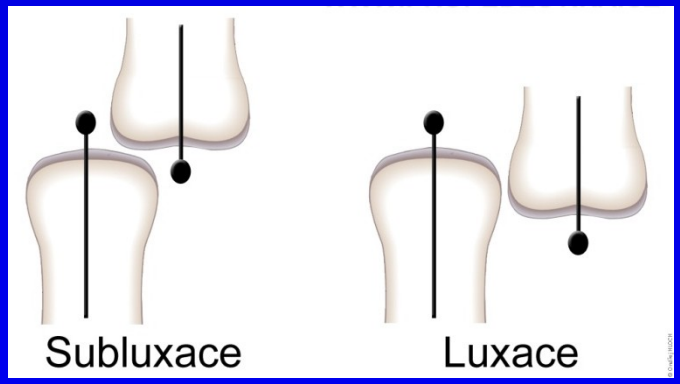
20 - 0 - 50

Ancylosis

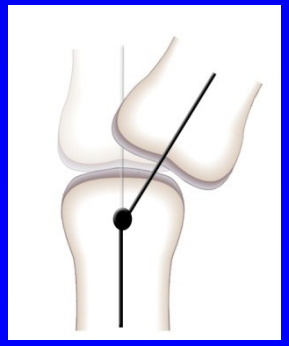
- **Extrarticular**
- **Intraarticular**

Stability of joints

- Stable joint
- Unstable joint



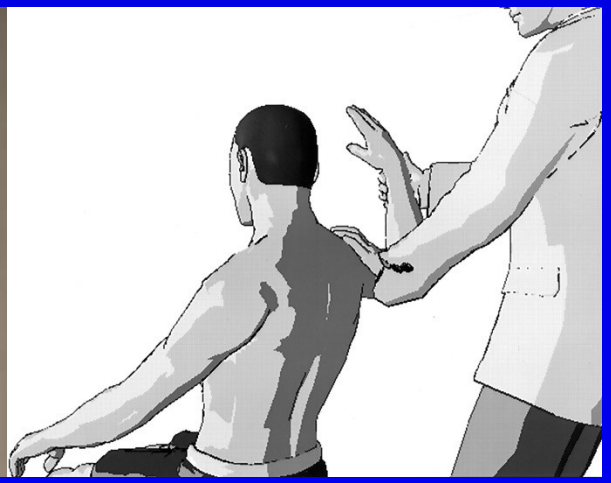
- Instability
  - acute
  - chronic
  - habitual



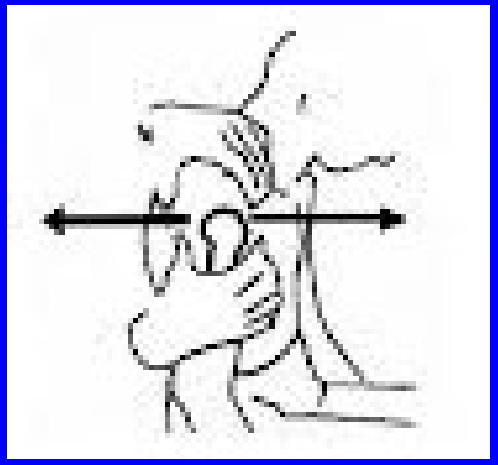
Deviace Desaxace

Shoulder

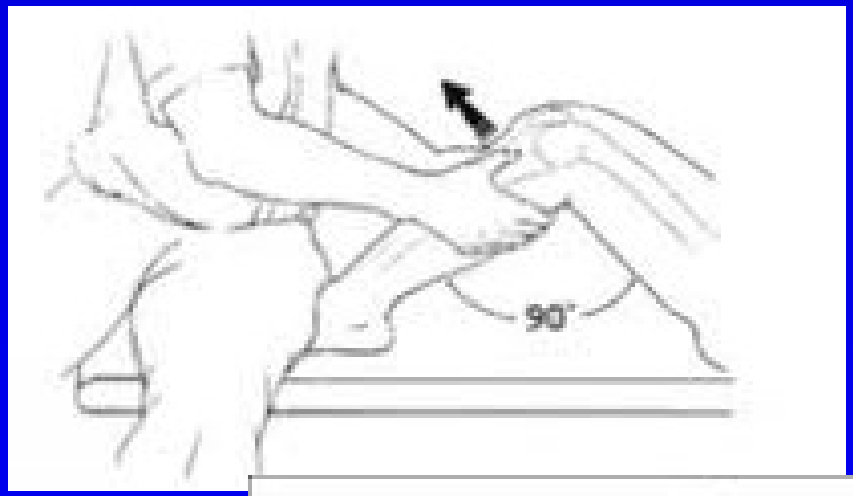
Apperhension test

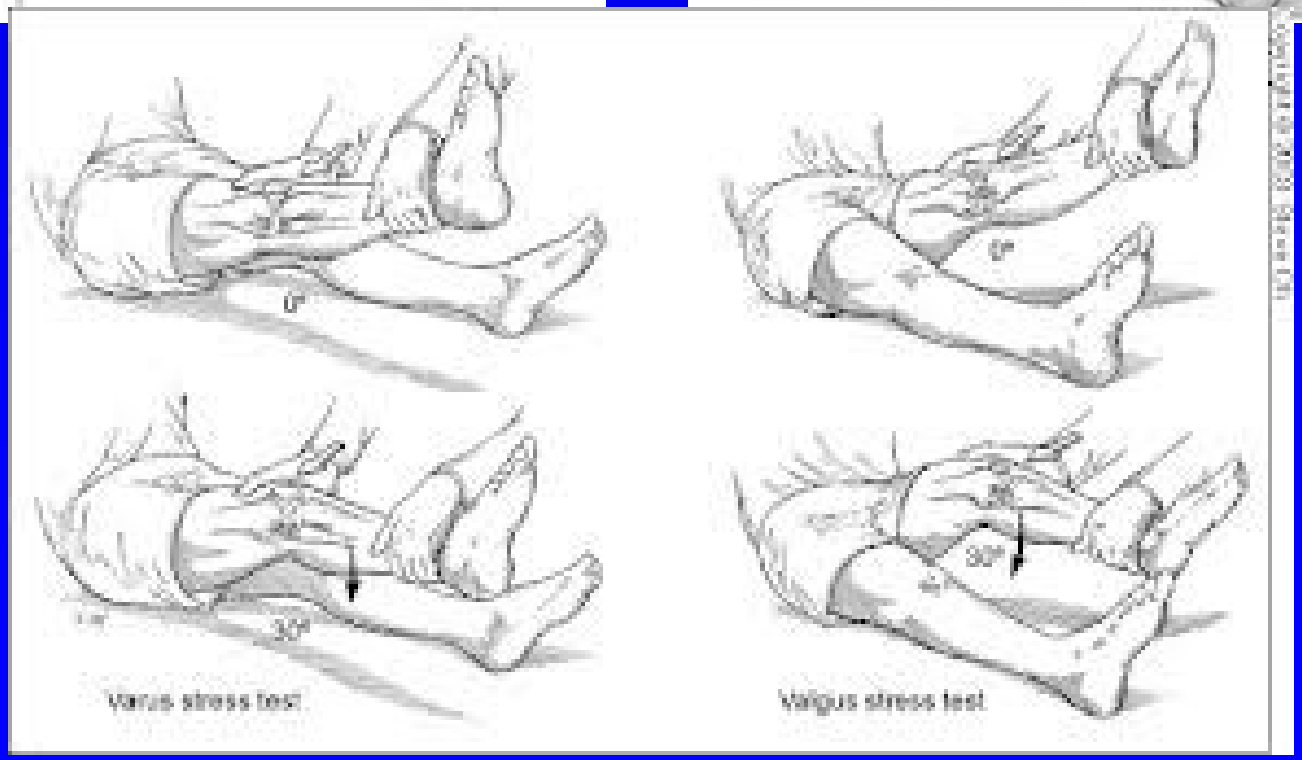


Drawer sign

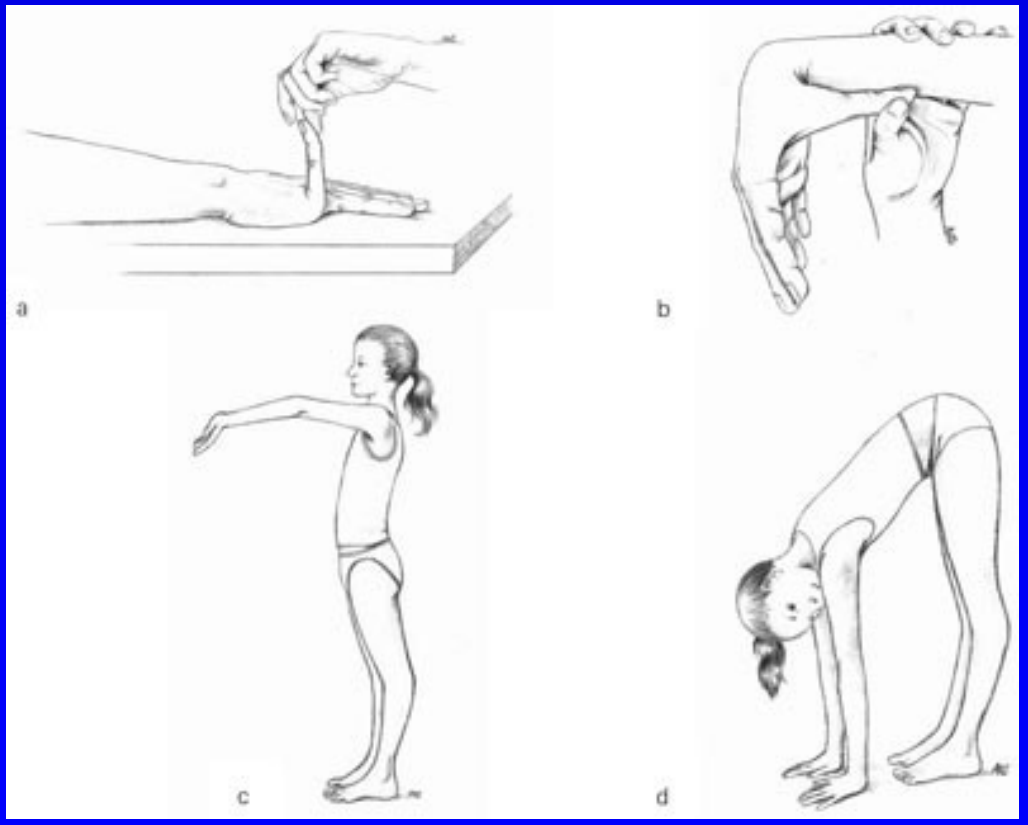


Knee





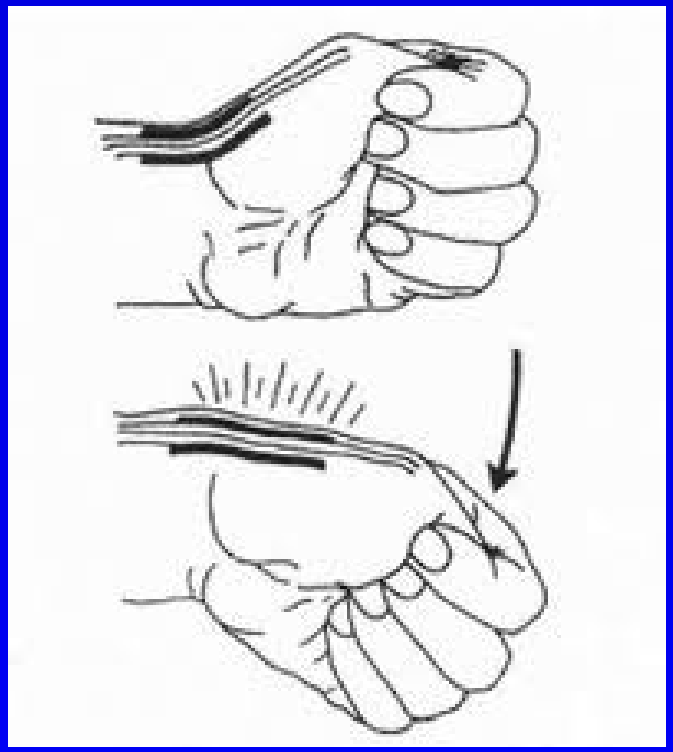
Laxity

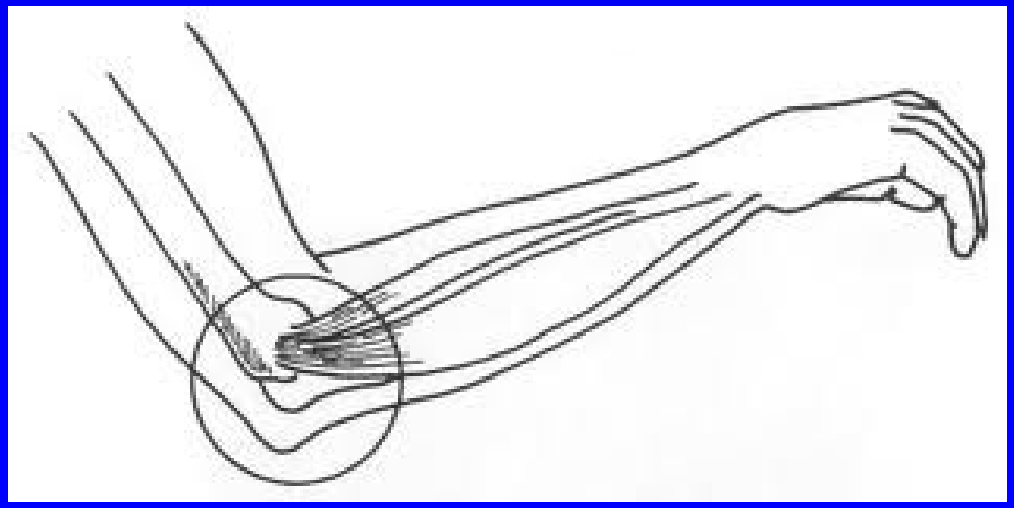


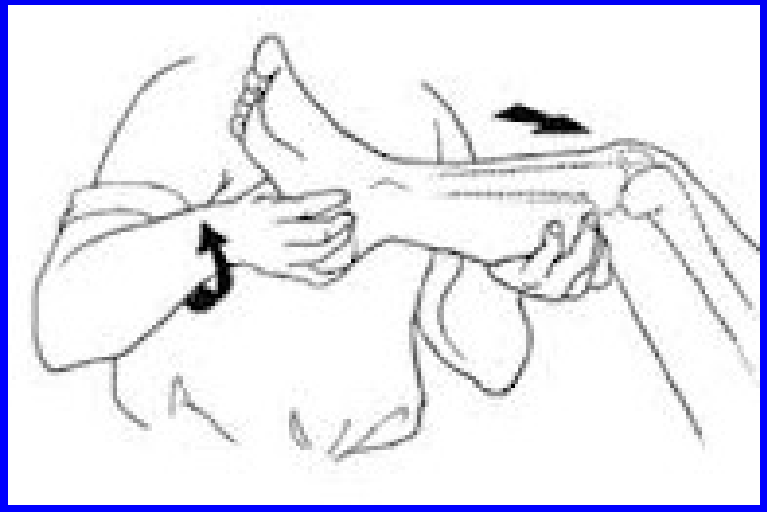
- test

Maneuvers

- Maneuvers







Sound phenomenons

- Crepitus

Contracture

- Lumbago, torticollis
- Cerebral palsy



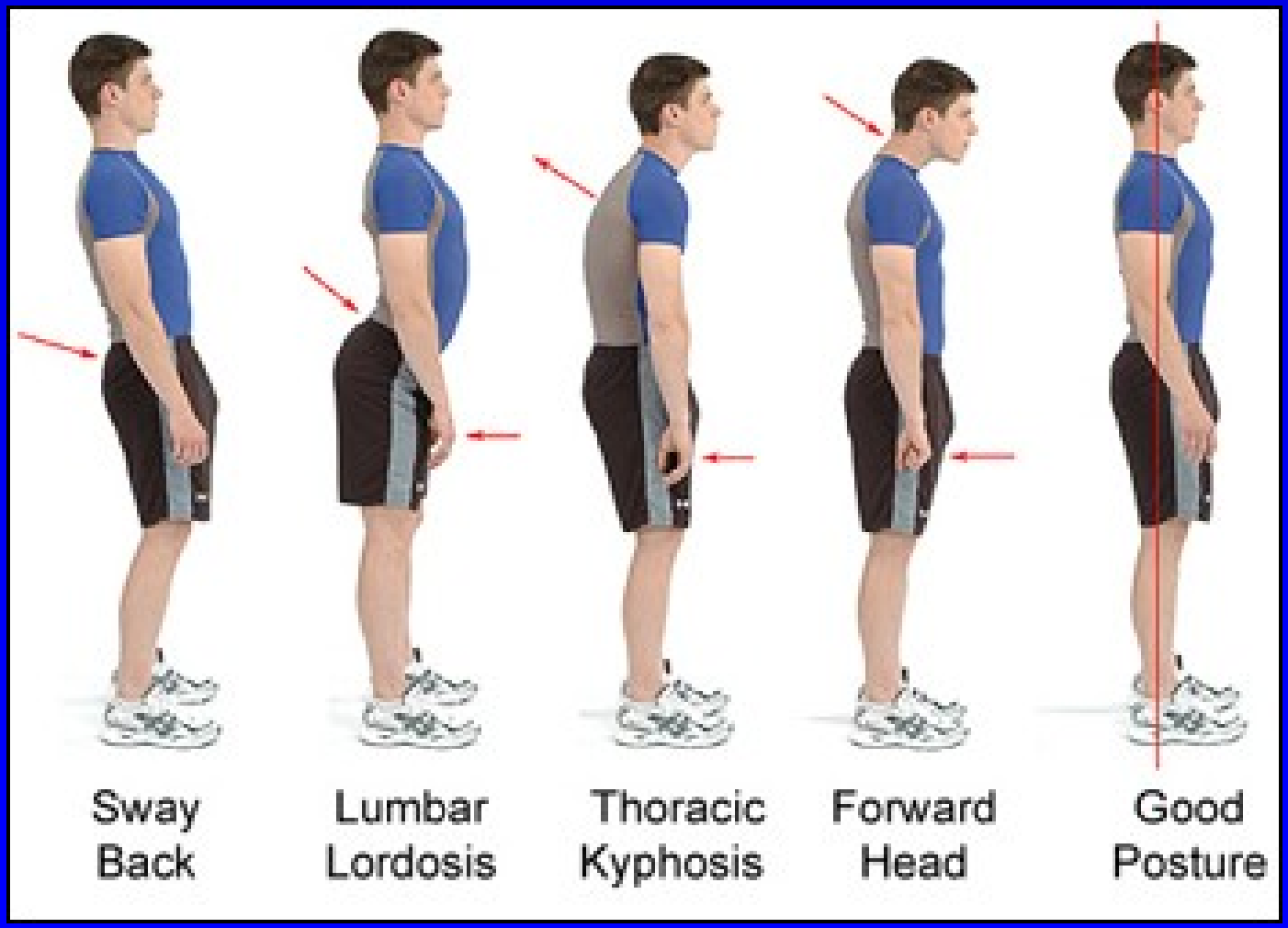

Muscles

- Trophicity
- Tonus
- Cramps
- Power

Muscle test

0 - no activity	0 %
1 - trace	10 %
2 - motion without gravity	25 %
3 - motion against gravity	50 %
4 - motion against gravity and slight resistance	75 %
5 - normal activity	100 %

Posture

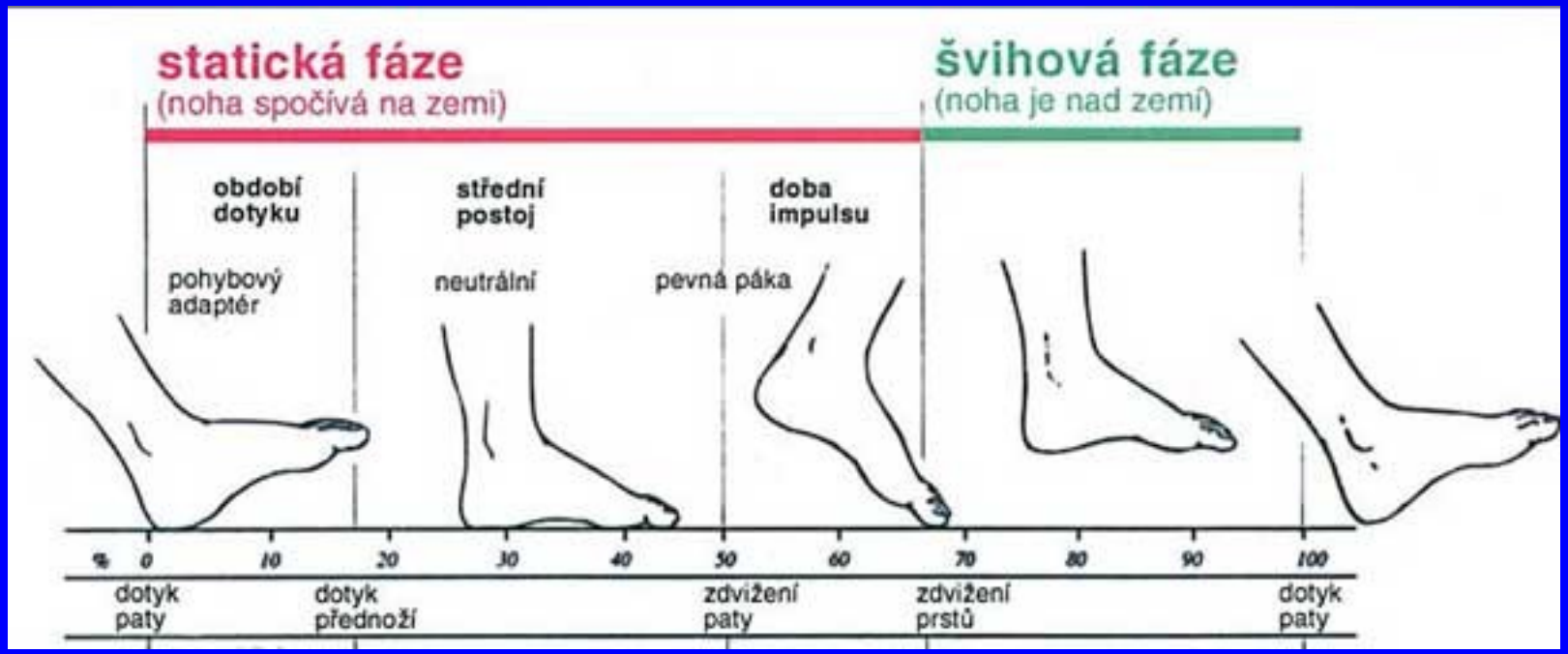


Correct

Wrong

Gait

- 1. heel strike
  2. standing
  3. toe off
  4. swing phase



Limping

- Antalgic gait
- Shortening of a lower extremity
- Ancylosis
- Trendeleburg sign and gait
- Hemiparetic gait
- Spastic gait
- Drop foot gait
- Parkinson gait

Imaging methods

- X-ray, artrography
- Angiography
- Ultrasonography
- CT, MRI
- Scintigraphy
- DEXA
- Biopsy

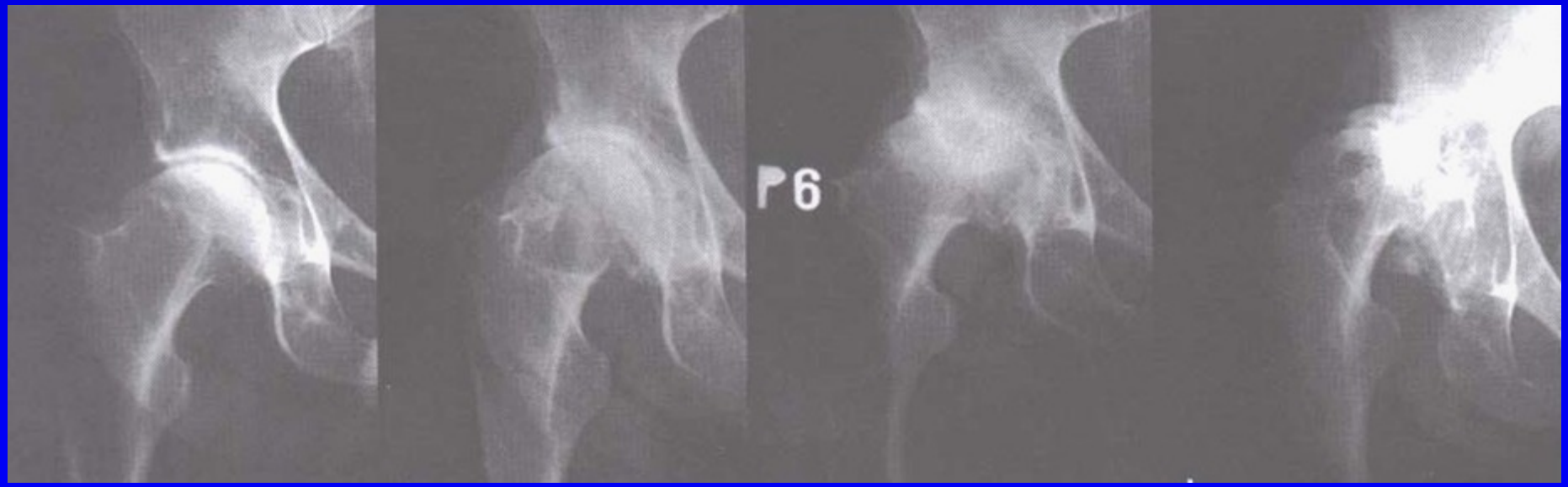
X-ray

In two planes

- bone hypertrophy
- bone atrophy
- osteolysis
- osteonecrosis

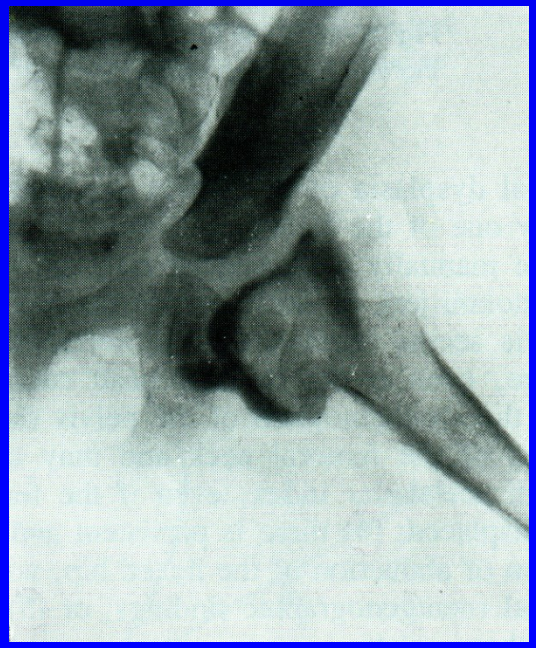
Kellgren- Lawrence clasification of O.A.

I. II. III. IV.

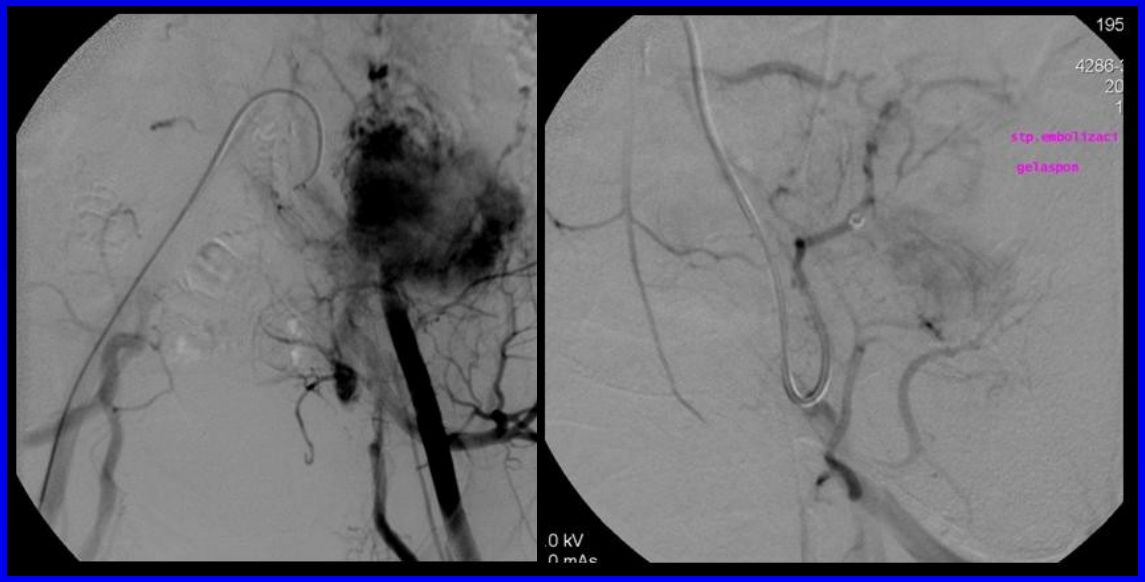


Fistulography

Artrography



Angiography



Clasical

CT angiography

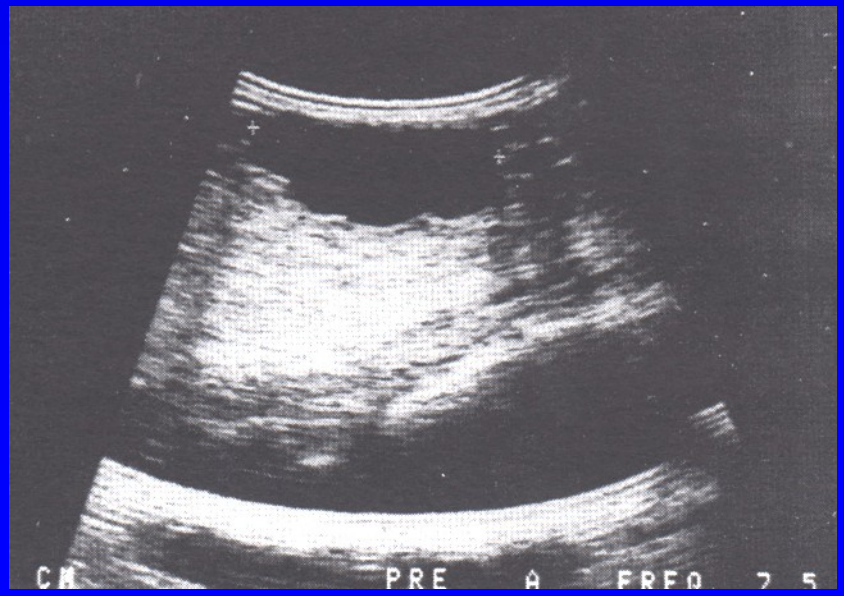
MR angiography

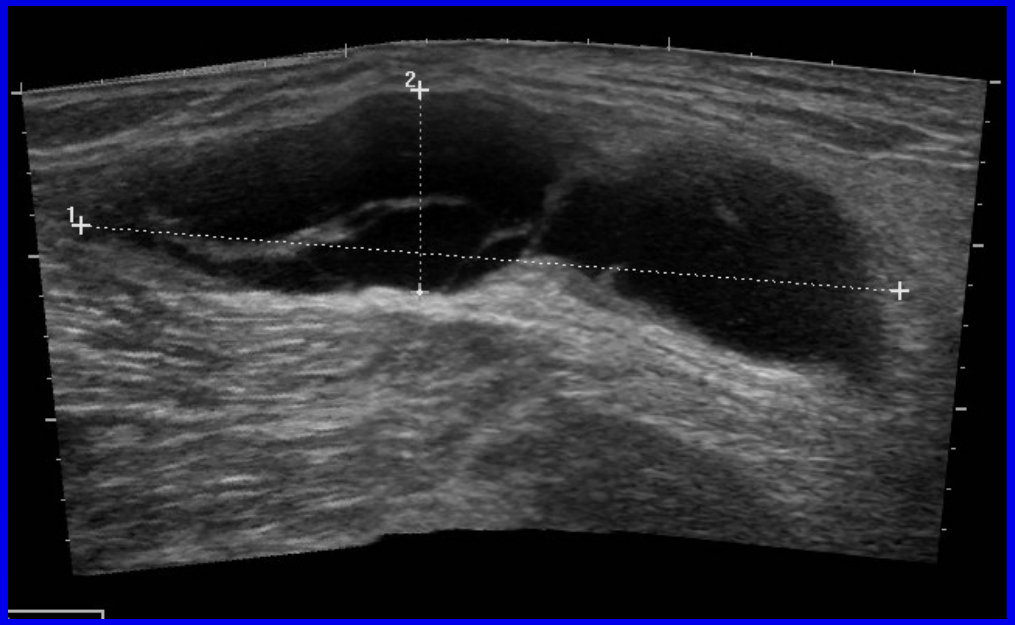
Digital subtraction angiography

Ultrasonography

Echogenity of tissues
Bone, fibrous tissue, muscles, adipous tissue, cartilage, fluid
Anechogenic structure- black
Hypoechogenic structure- grey
Hyperechogenic structure- white

Soft tissues
Tumors
DDH
Effusion in joints

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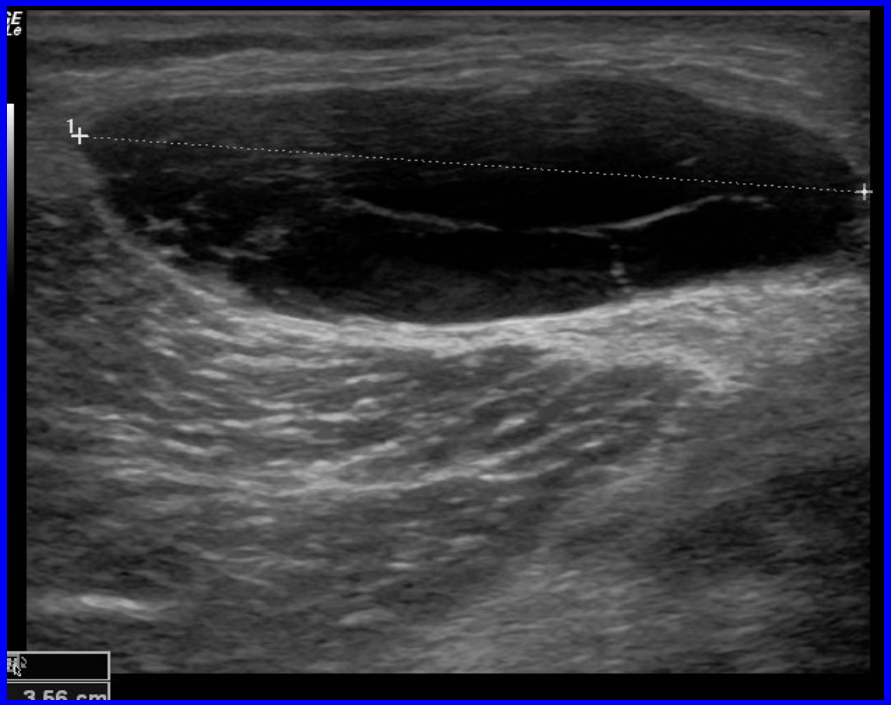
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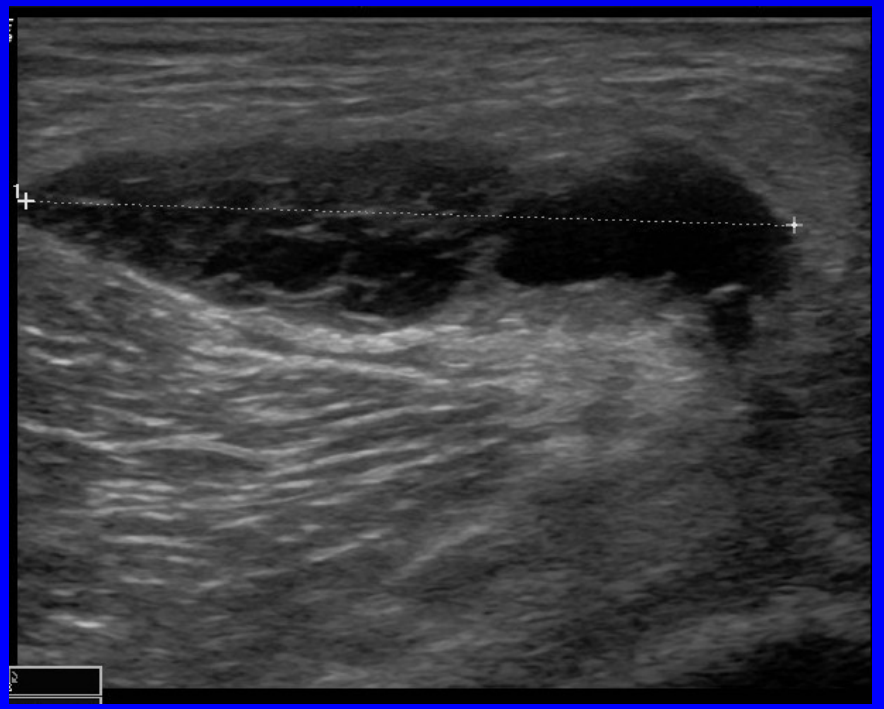
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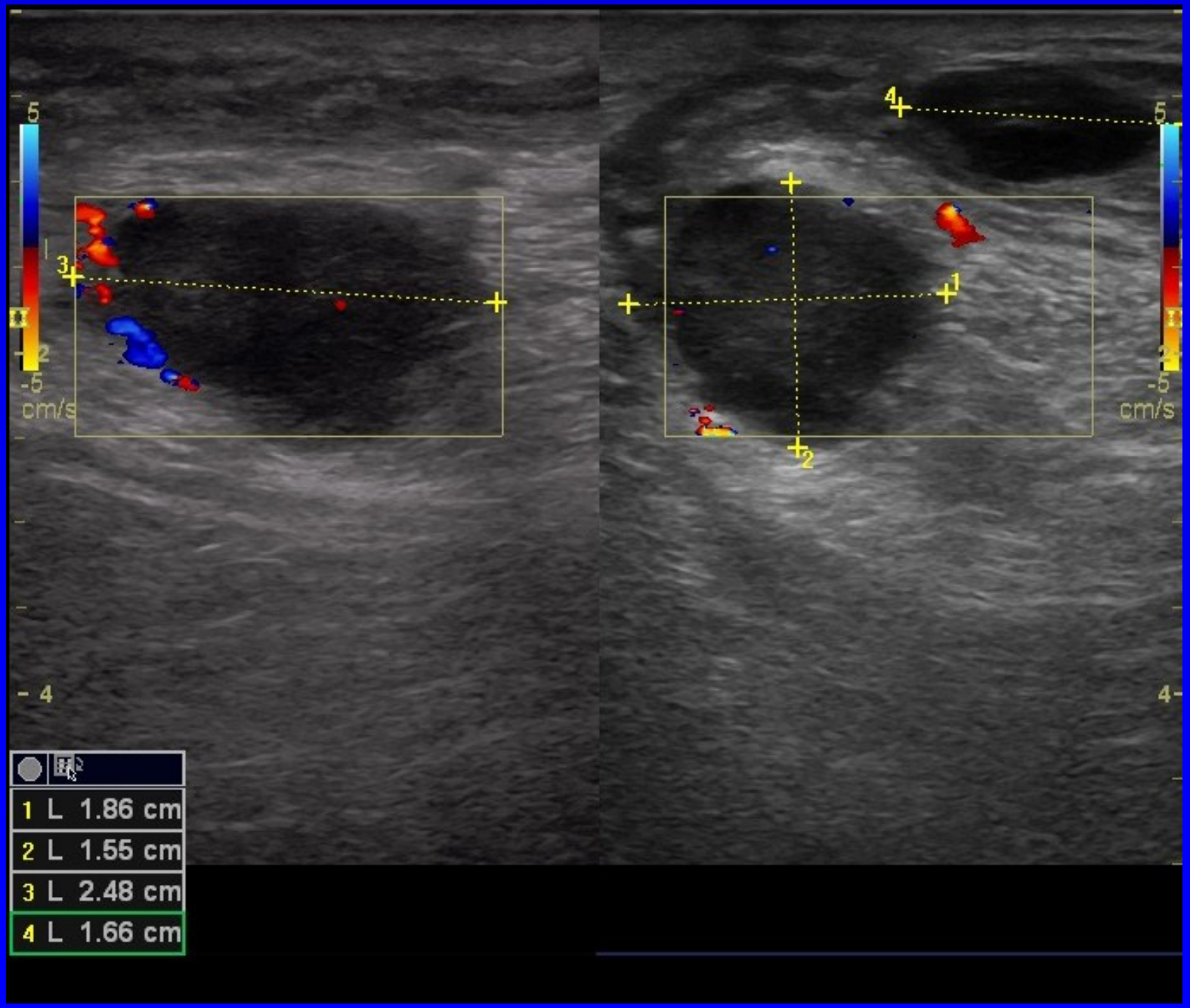
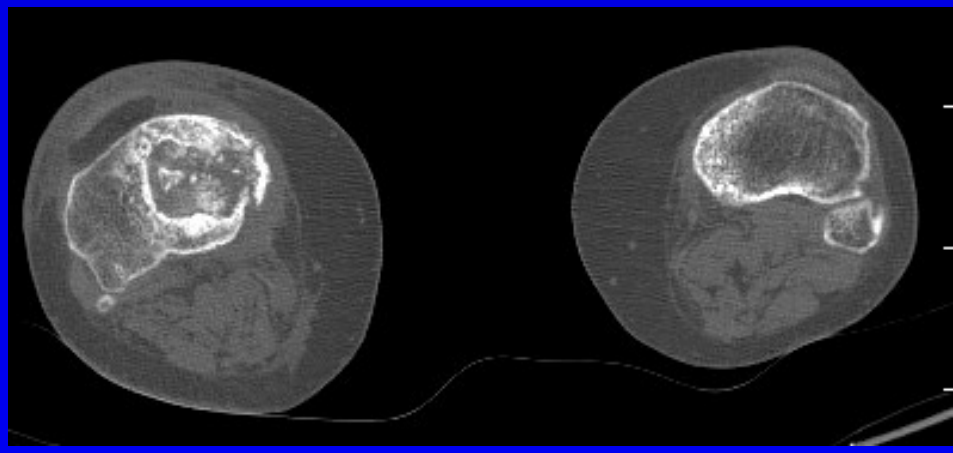

5
-5
cm/s
3
4
5
1
2
-5
cm/s
4
4
1 L 1.86 cm
2 L 1.55 cm
3 L 2.48 cm
4 L 1.66 cm

CT scann

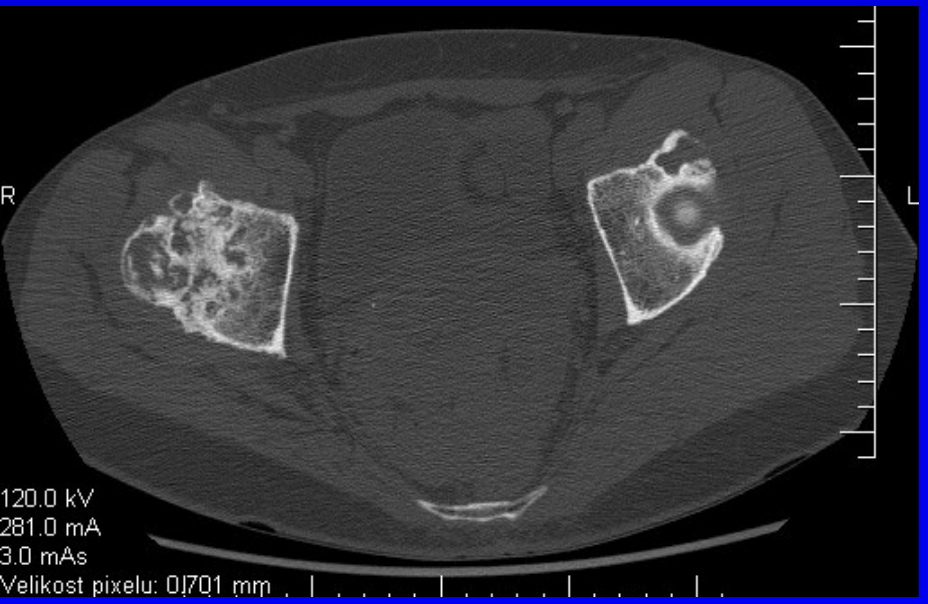
Absorption of X-ray beams

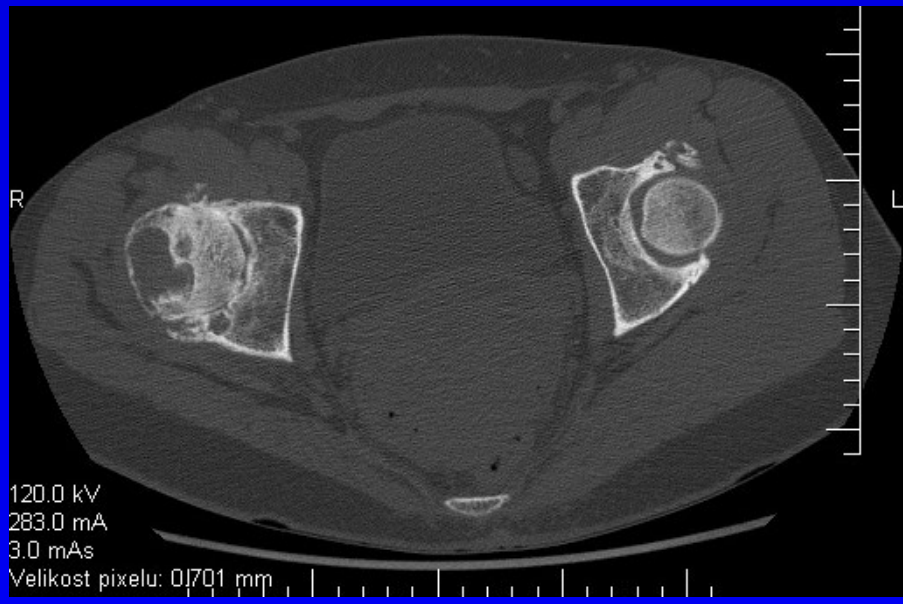
Air – 1000 H.U.
Water 0 H.U.
Bone + 1000 H.U.
Enhancement with a dye



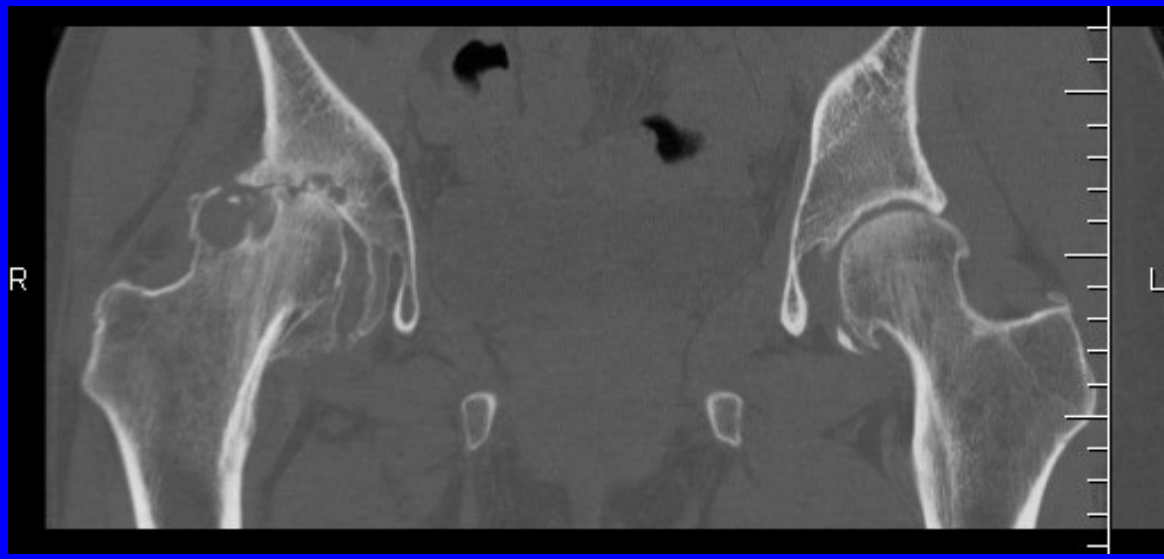
Bone lesions
Bone tumors

CT


R
L
120.0 kV
281.0 mA
3.0 mAs
Velikost pixelu: 0,701 mm


R
L
120.0 kV
283.0 mA
3.0 mAs
Velikost pixelu: 0,701 mm


R
L
120.0 kV
288.0 mA
3.0 mAs
Velikost pixelu: 0,701 mm
Pozice: -120.8 mm
W: 2000 L: 500
P
DFOV: 35.90 x 35.90cm


R
L


R
120.0 kV
251.0 mA
30.0 mAs
2011/2/16
08:16:01
R
L
R
120.0 kV
251.0 mA
30.0 mAs
Velikost pixelu: 0|313 mm
Pozice: 138.3 mm
W: 300 L: 60
P
DFOV: 16.00
2011/2/16
08:16:01
R
L
120.0 kV
251.0 mA
30.0 mAs
Velikost pixelu: 0|313 mm
Pozice: 128.3 mm
W: 300 L: 60
P
DFOV: 16.00 x 16.00cm

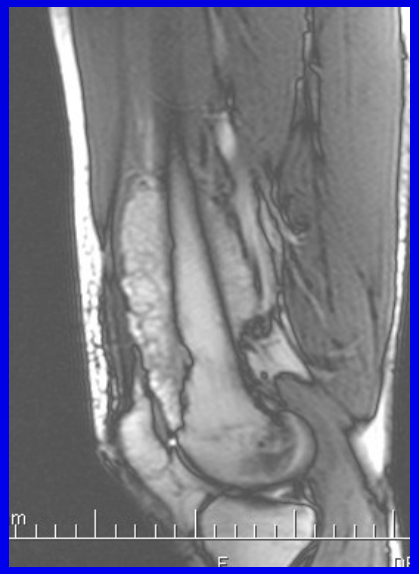

R
L
120.0 kV
520.0 mA
21.0 mAs
Velikost pixelu: 0.811 mm
Pozice: -530.8 mm
WW: 1000 L: 200
P
DFOV: 41.50 x 41.50cm

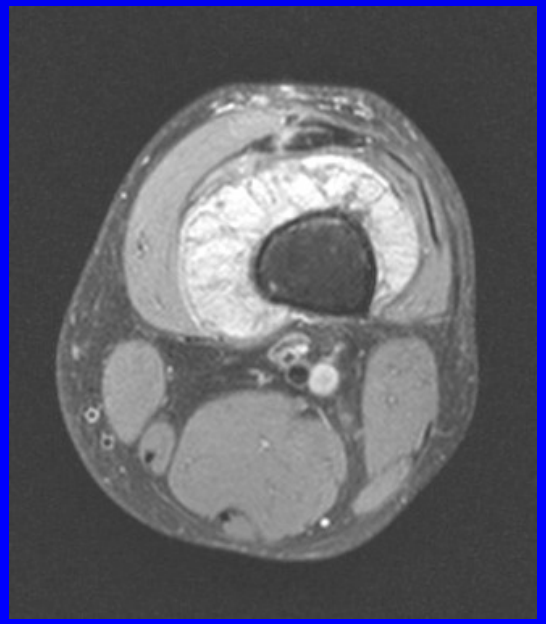
MRI

Magnetic field

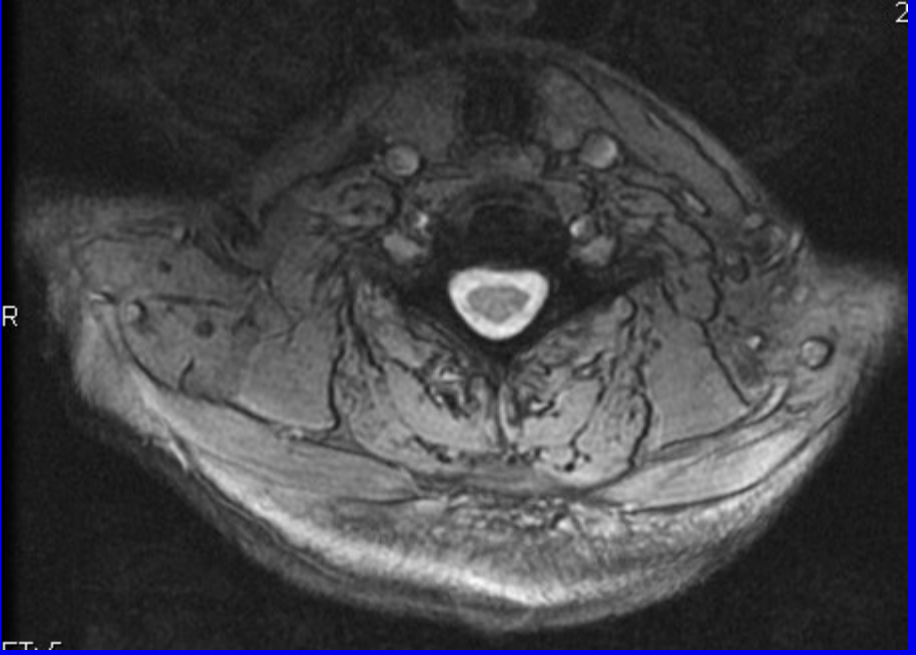
Hyposignal- dark
Hypersignal - white

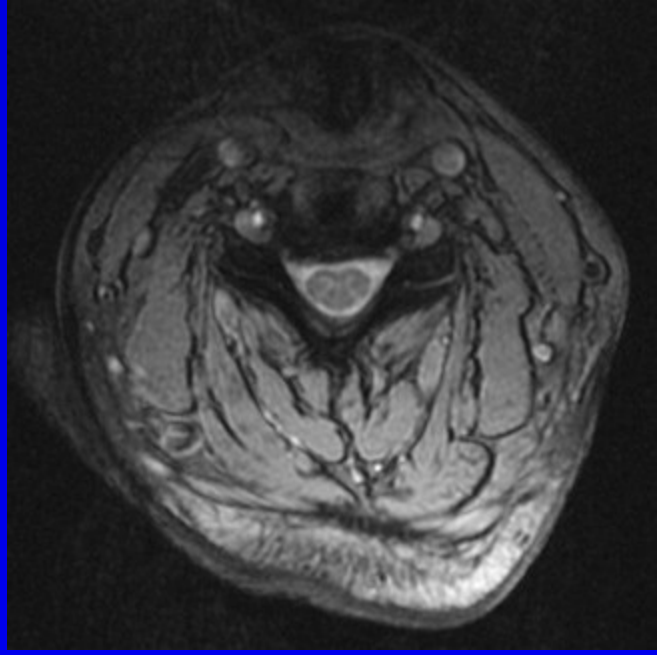
Soft tissue tumors
Soft tissue mass
Spine

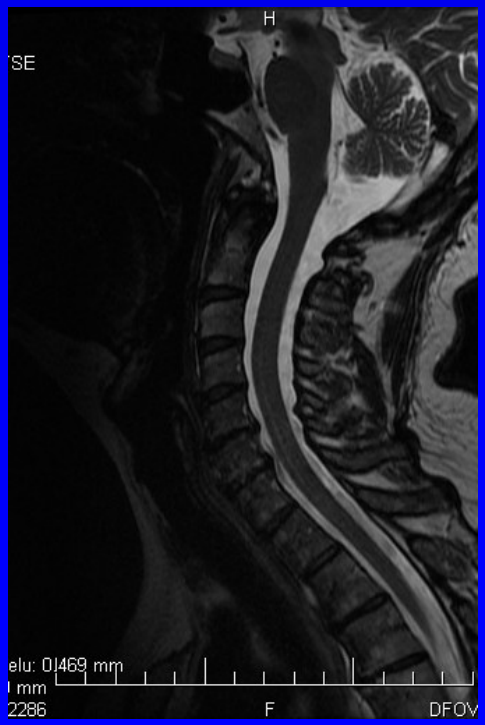




MRI

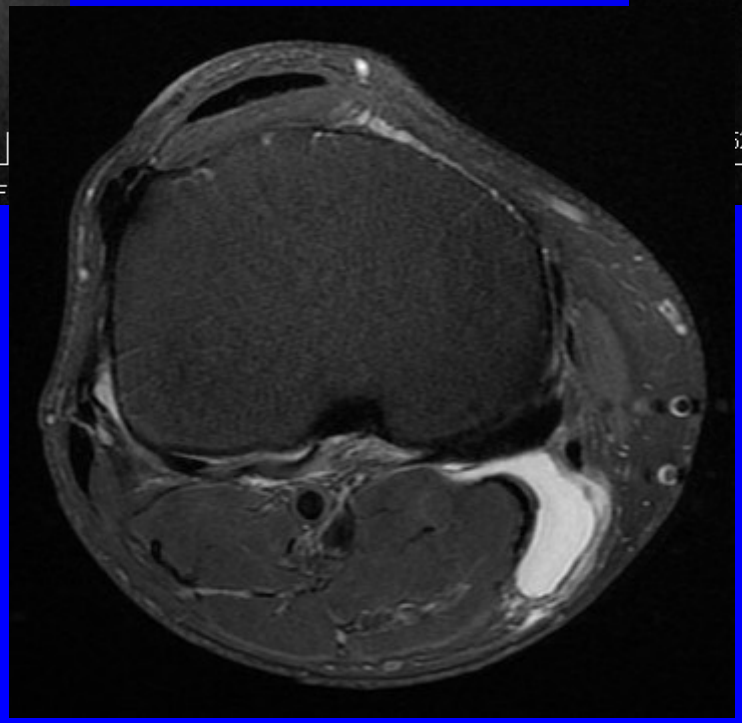

2
R




H
SE
elu: 0|469 mm
mm
2286
F
DFOV

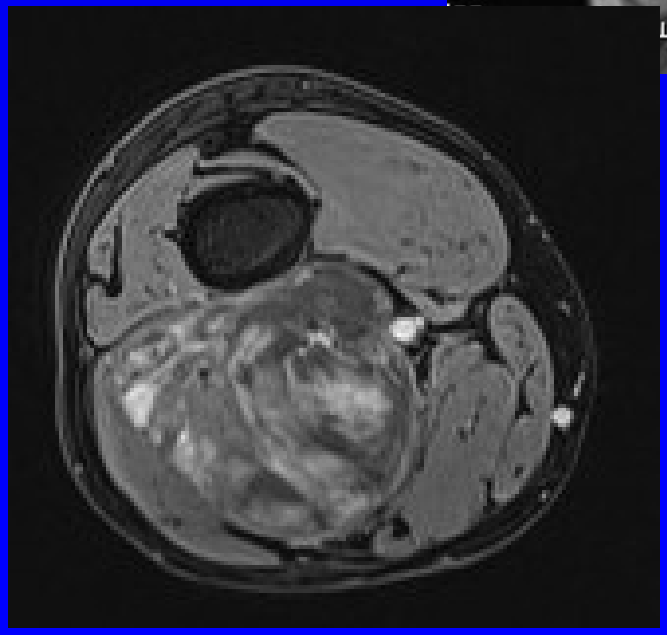

H
KON
258.0
9.8
st pixelu: 0|469 mm
e: -13.5 mm
72 L: 2636
F
DFOV: 24.


H
F




H
F

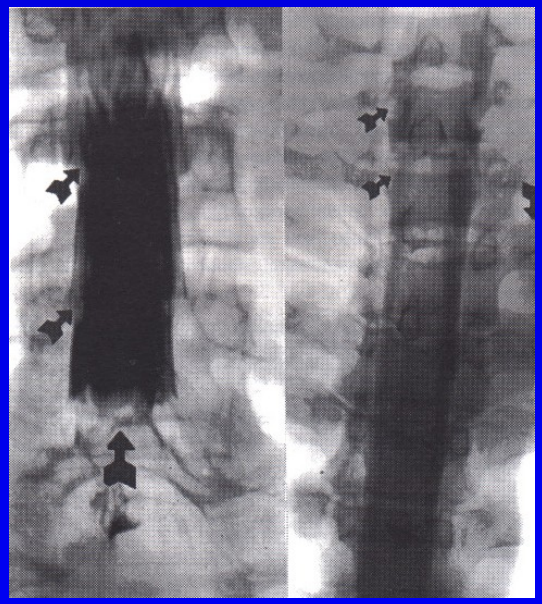

H
H
_p2
113 mm
F
F



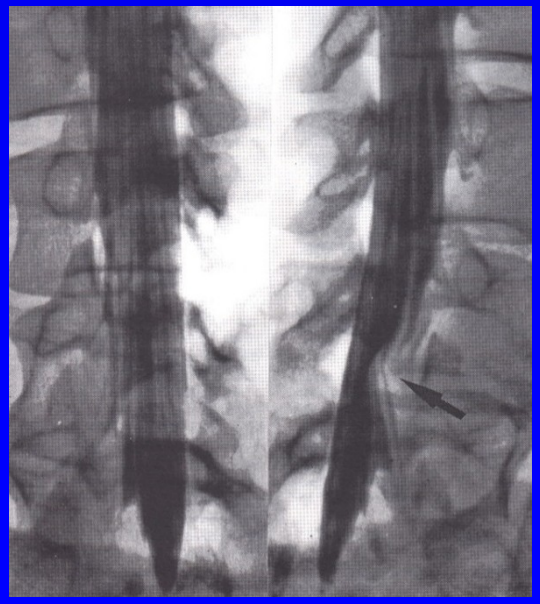

H
_p2

Perimyelography

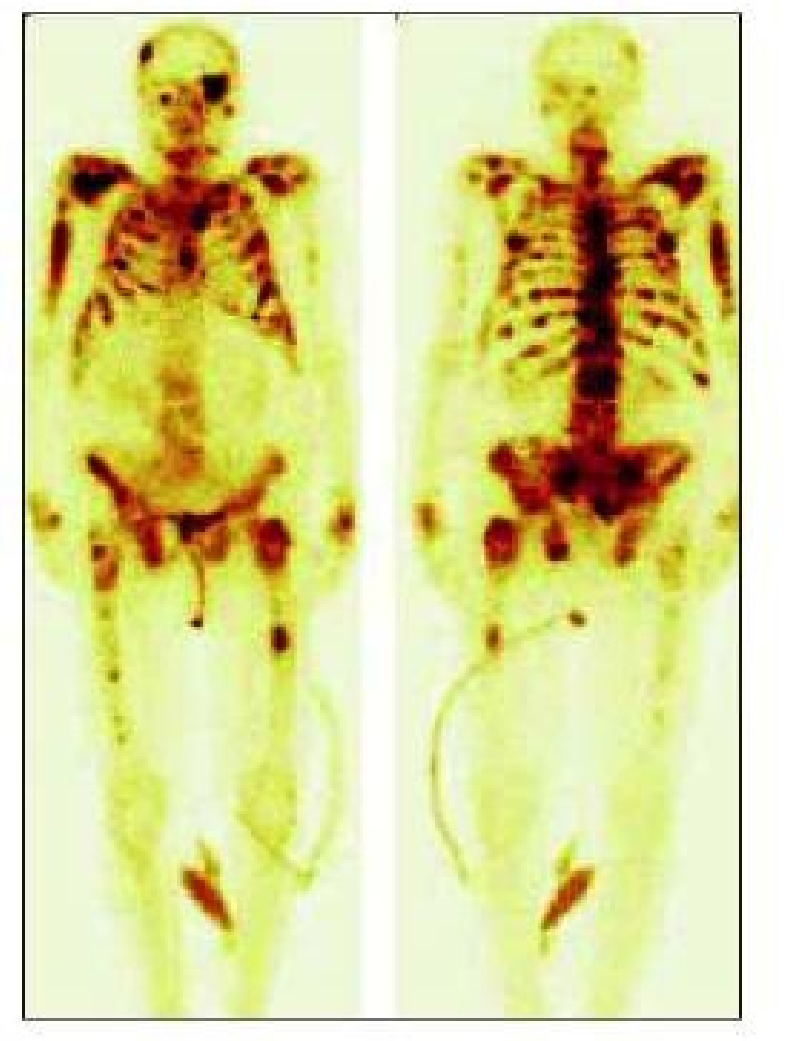
Myelography

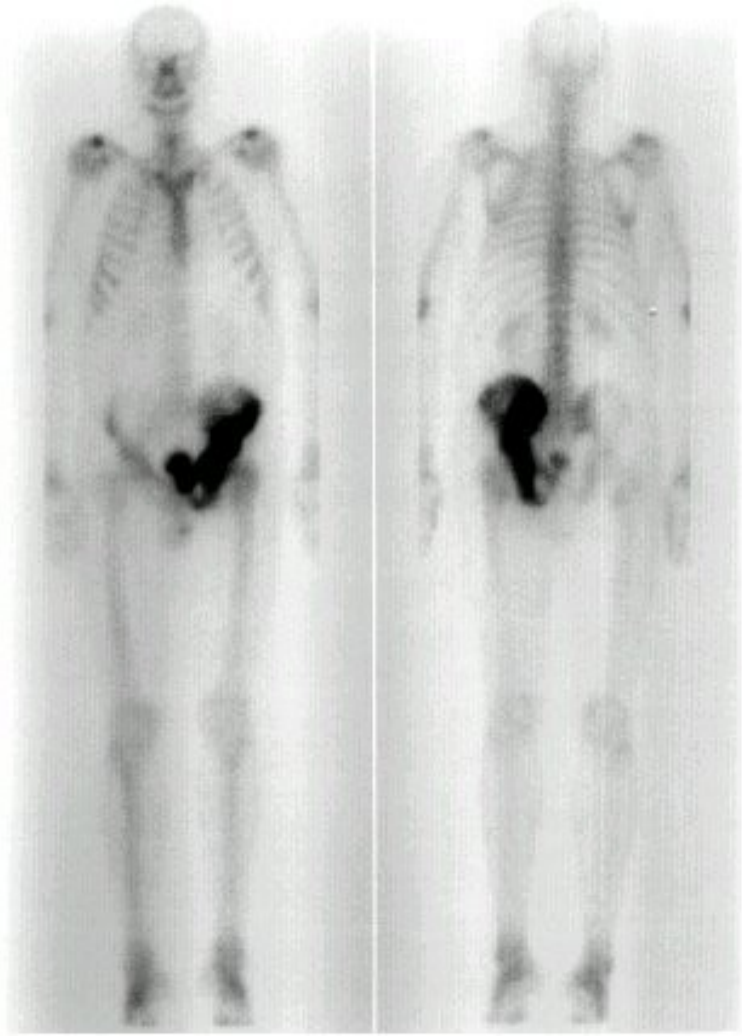


Radiculography



Scintigraphy





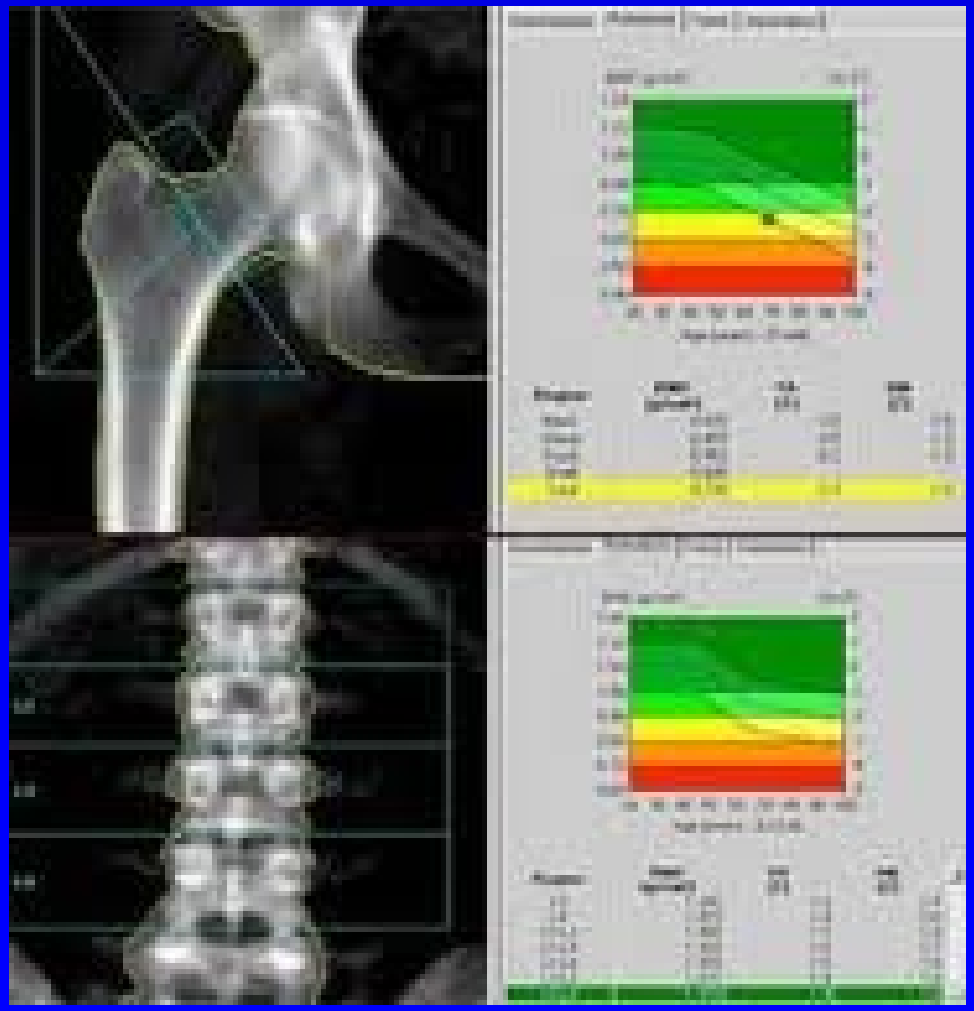
Densitometry DEXA

Absorption of X-ray of two energies (70 and 140 kV)
BMD- bone mineral density in g/cm^2

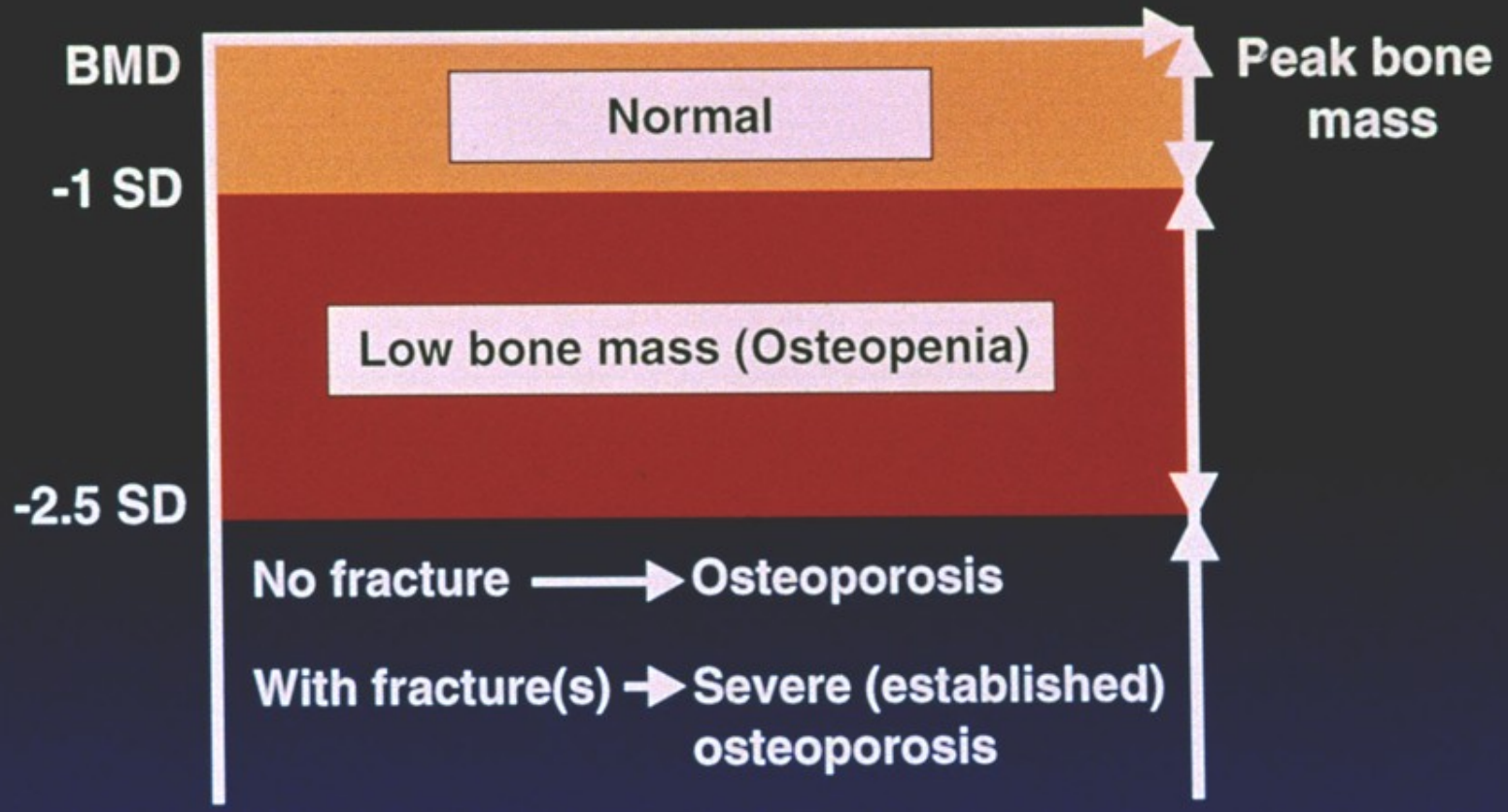
T- score - difference from peak bone mass
Z- score - difference in the same age
Change - difference from previous examination

1 SD = 10% of bone mass

DEXA



WHO definition of osteoporosis



Laboratory tests

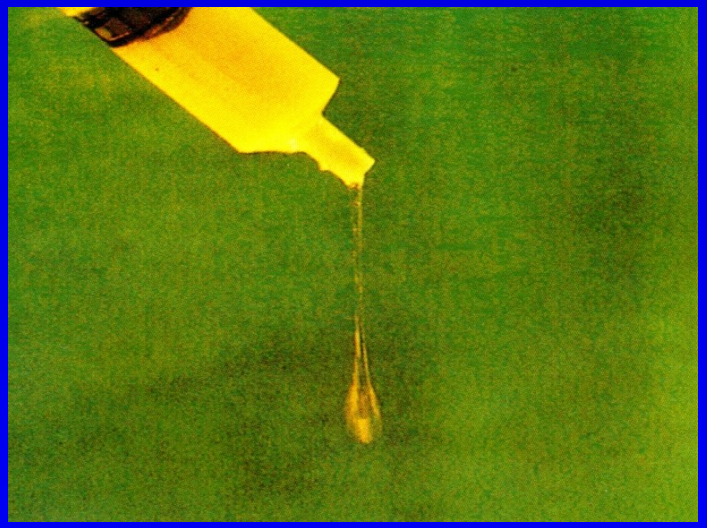
- Inlammation: ESR, leu, CRP, differencial, ELFO
- Osteopathy: Ca, P, ALP, bone isoenzyme of ALP
  osteokalcin, osteonectin, PTH, vitamin D
- Bone markers- PSA

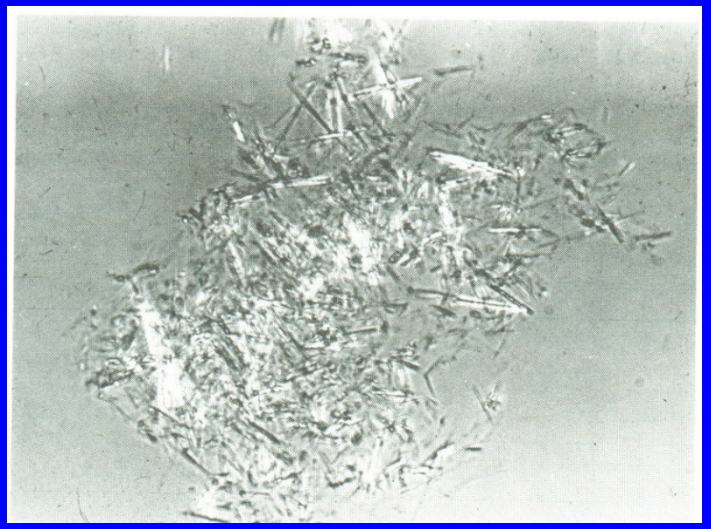
Biochemistry

- Proteins
- Glucose
- Lactate
- Uric acid

Joint effusion

- Microscopic
- Biochemic
- Bacteriologic
- Immunologic
- Cytologic





Biopsy

Histological examination

Biopsy – CT, ultrasonograpy