



INTRODUCTION TO ARTHROLOGY



1. Arthrology – the study of joints
2. Types of joints
3. Fibrous and cartilaginous joints
4. Synovial joints (articulations)
5. The structure of synovial joints
6. Biomechanics of joints
7. Methods for the joint examination
8. Arthroscopy

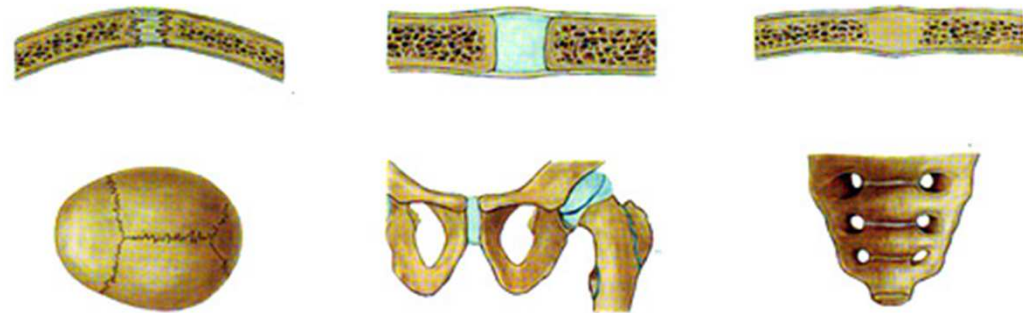




Arthrology, *arthrologia*

- The science concerned with the structure, function, dysfunction and treatment of joints (articulations)
- **Synarthrosis** (BNA) – form of articulation in which the bones are rigidly joined by solid connective tissue:

- ✓ fibrous
- ✓ cartilaginous
- ✓ osseus



- **Diarthrosis** (BNA) or **Synovial joint** – a freely movable joint:

- ✓ articular cavity
- ✓ passive and active body movements

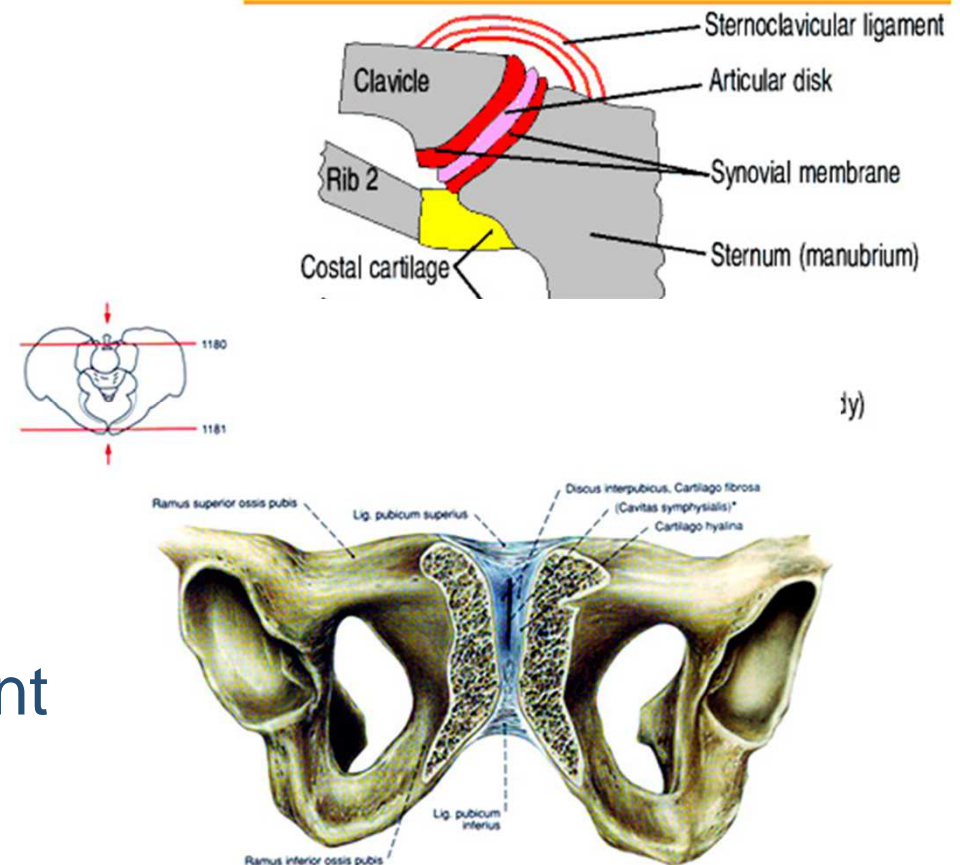


NB: The prefix "arthro-" refers to joints,
Gr. ἄρθρον *arthron*, a joint

Cartilagenous joints, *juncturae cartilagineae*

- by cartilage tissue,
articulatio cartilaginea:
 - ✓ hyaline cartilage,
symphysis
 - ✓ fibrocartilage:
 - *symphysis*
 - *hemiarthrosis*
 - ✓ temporary and permanent

Synovial & synchondrosal joints

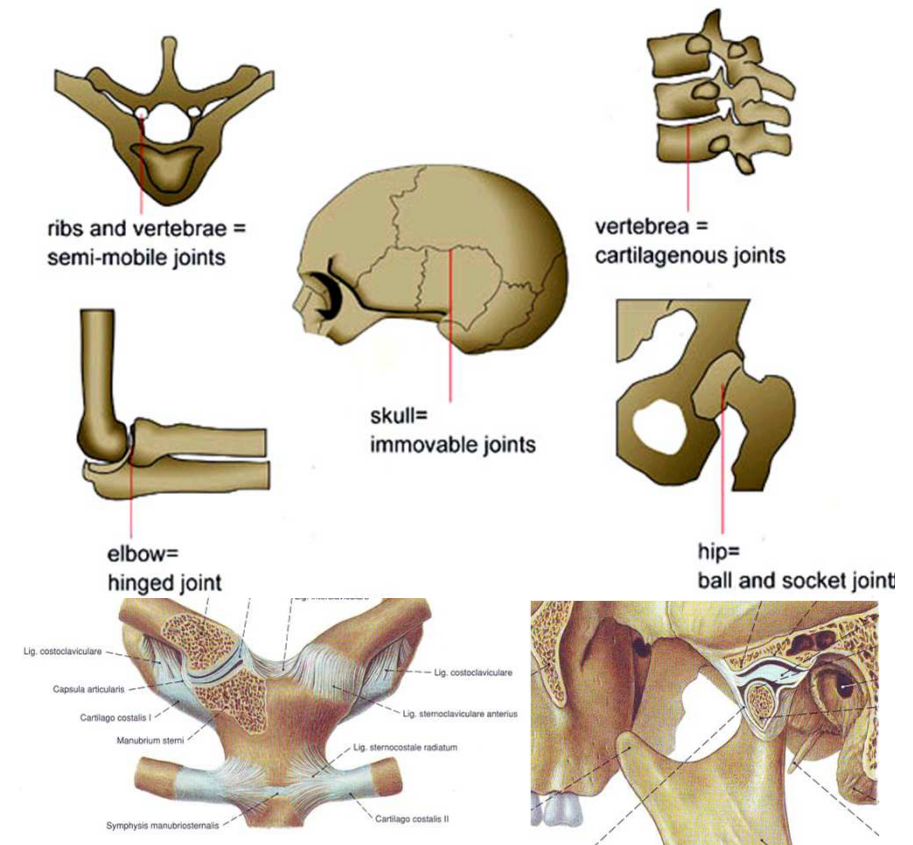


Synovial joints, *juncturae synoviales s. articulationes*

- according to the number of articular surfaces:

- ✓ simple joint,
art. simplex
- ✓ compound joint,
art. compósita
- ✓ complex joint (two cavities),
art. complexa
- ✓ united (combined) joint –
functional combination of
anatomically distinct joints

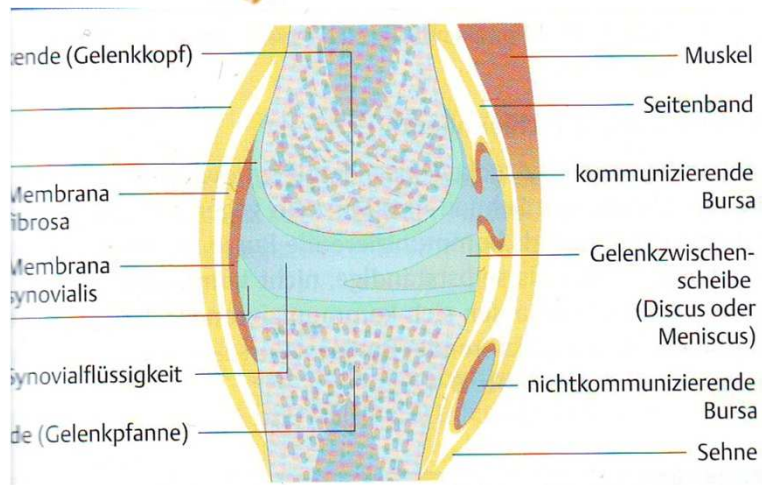
TYPES OF JOINTS FOUND IN THE HUMAN BODY



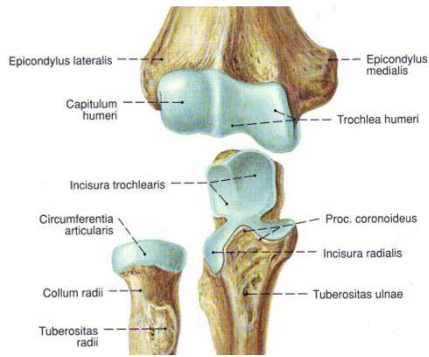
Structure of synovial joints, *diarthroses*



- ✓ articular surfaces
- ✓ articular capsule
- ✓ synovial (joint) cavity
- ✓ ligaments

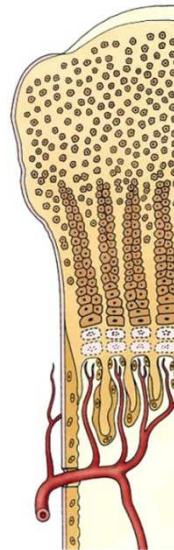


Articular surface, *facies articularis*



- articular cartilage, *cartilago articularis*:

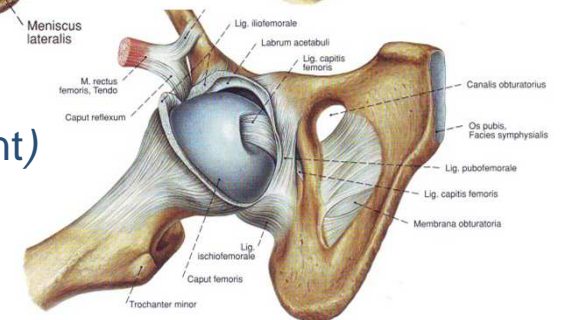
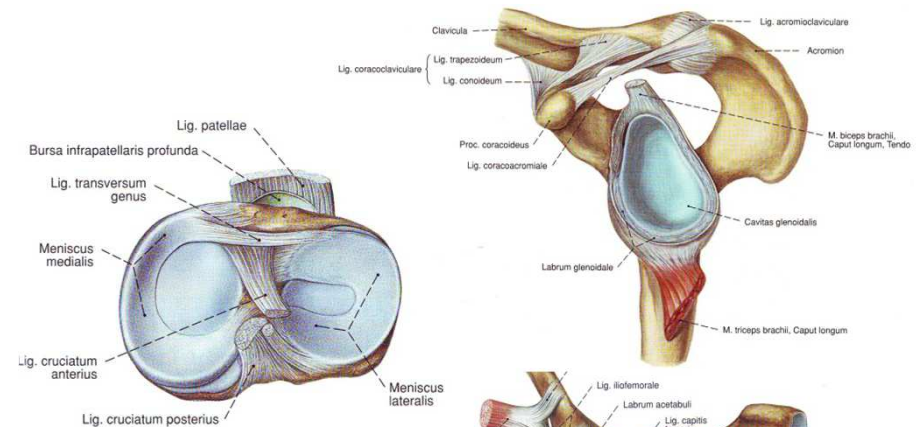
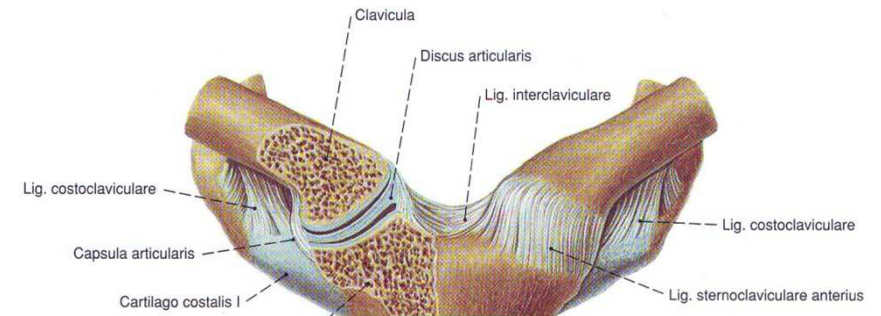
- ✓ hyaline
- ✓ fibrous
- ✓ 4 morphological zones
- ✓ role of a bone cushion



- congruent surfaces

- incongruent surfaces –
intraarticular structures:

- ✓ articular disk, *discus articularis*
- ✓ meniscus, *meniscus articularis* (Gr. *meniskos*, crescent)
- ✓ articular labrum, *labrum articulare*
- ✓ intraarticular ligaments

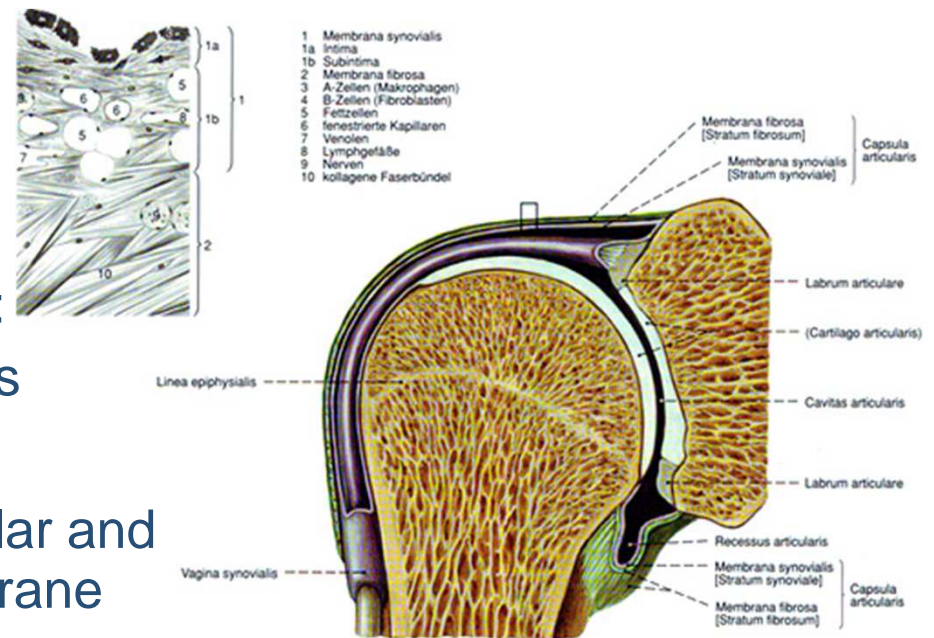


Articular capsule, *capsula articularis*

- fibrous membrane, *membrana fibrosa*:
 - ✓ fibrous connective tissue
 - ✓ mechanical function
 - ✓ ligaments and tendons

- synovial membrane, *membrana synovialis*:

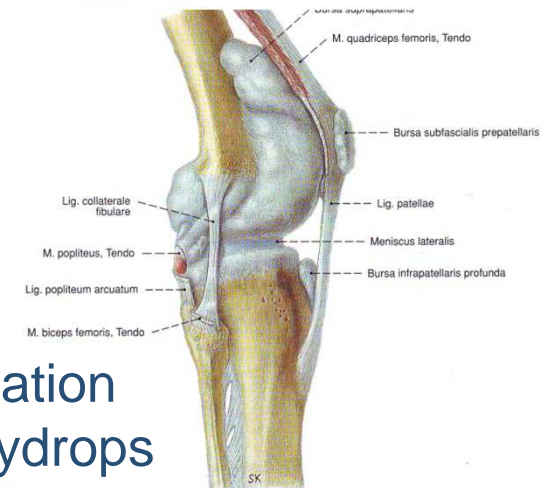
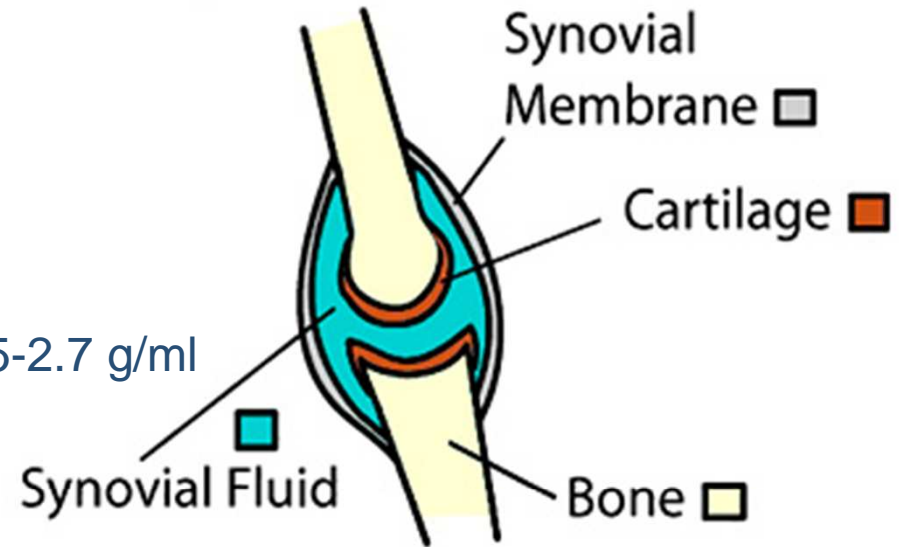
- ✓ loose connective tissue –
 - *intima synovialis* ⇒ synovial cells:
 - synovial macrophages – A-cells
 - synovial fibroblasts – B-cells
 - subintimal lamina – fibrous, areolar and adipose types of synovial membrane
- ✓ secretion role: *synovia*
- ✓ absorption and regeneration abilities: synovial villi



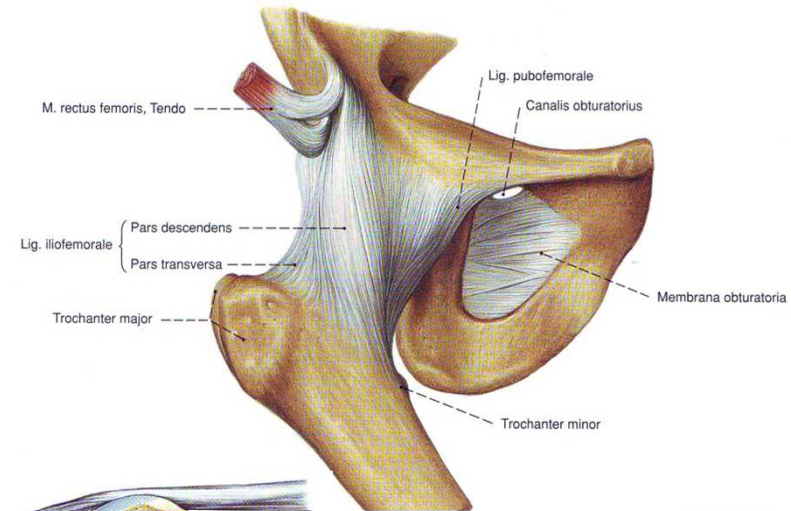
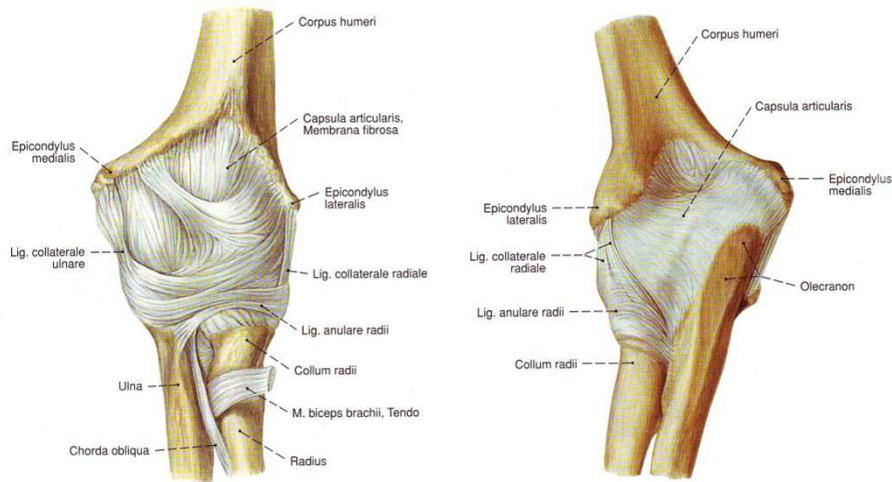
Articular cavity, *cavitas articularis*

- hermetically sealed
- filled with synovial fluid:
 - ✓ blood dializate:
 - glucose – 60-100 g/ml
 - protein – 15-25 g/ml
 - hyaluronan (hyaluronic acid) – 2.5-2.7 g/ml
 - enzymes
 - ✓ clear yellowish viscous fluid with yolk-like consistency, pH 7.4-7.7
 - ✓ cells:
 - 60 synovial cells/ml
 - single chondrocytes
 - blood cells: monocytes, lymphocytes and granulocytes
 - ✓ buffer role and nourishes articular cartilage, responsible for boundary-layer (weeping) lubrication
- synovial fluid reservoirs, *recessuses et bursae* ⇨ hydrops

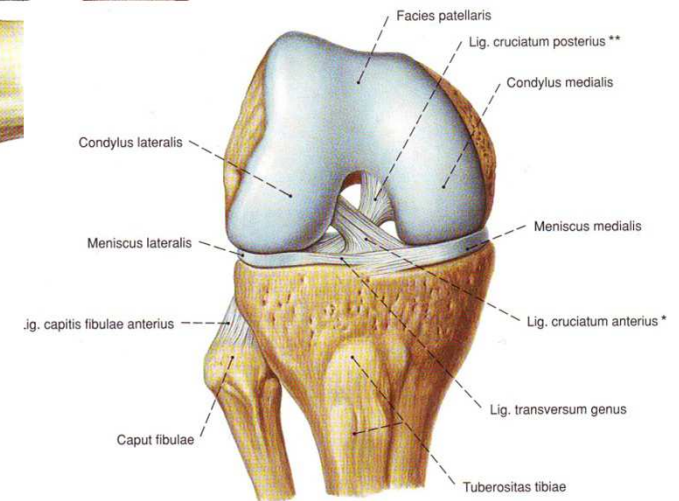
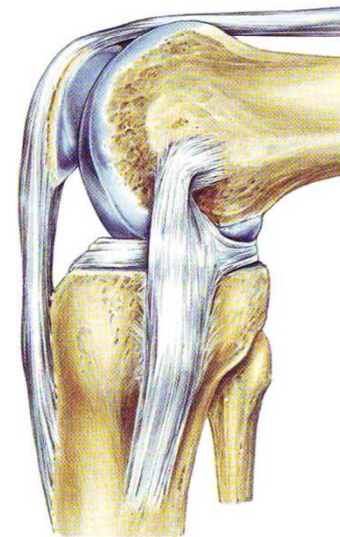
A Healthy Joint



Articular ligaments, *ligamenta articularia*

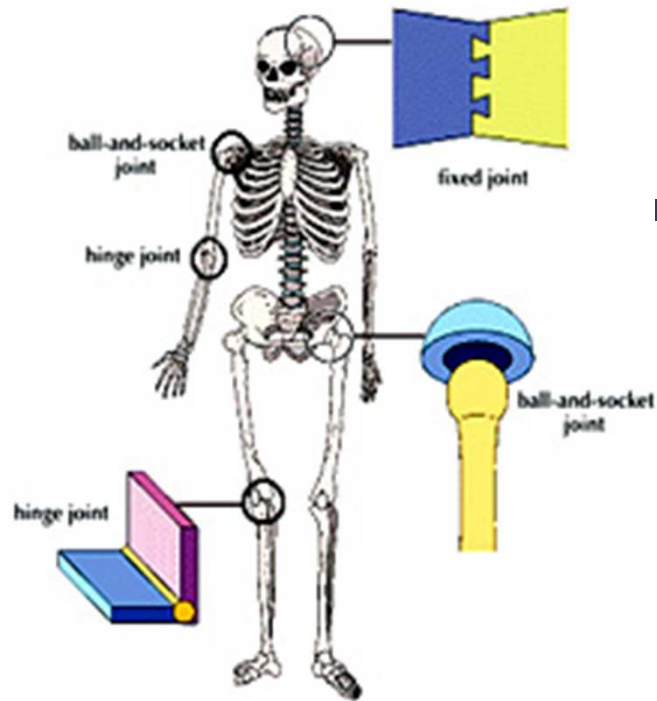


- ✓ extracapsular,
ligg. extracapsularia
- ✓ capsular,
ligg. capsularia
- ✓ intracapsular,
ligg. intracapsularia

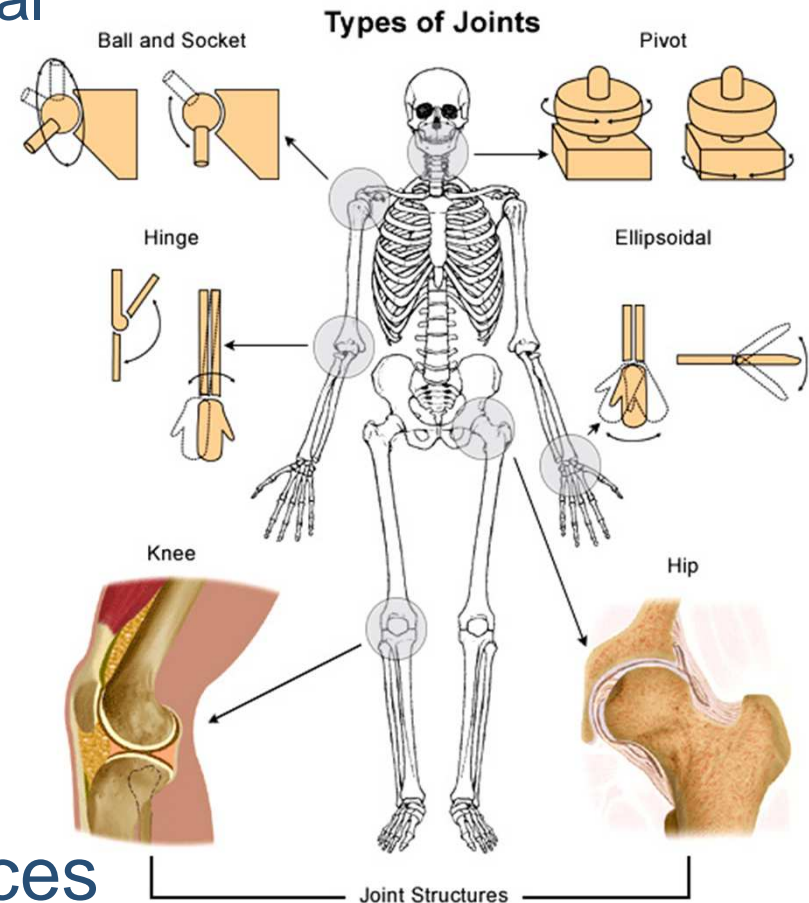


Biomechanics of joints

- Two types of movements:
 - ✓ translational
 - ✓ rotational

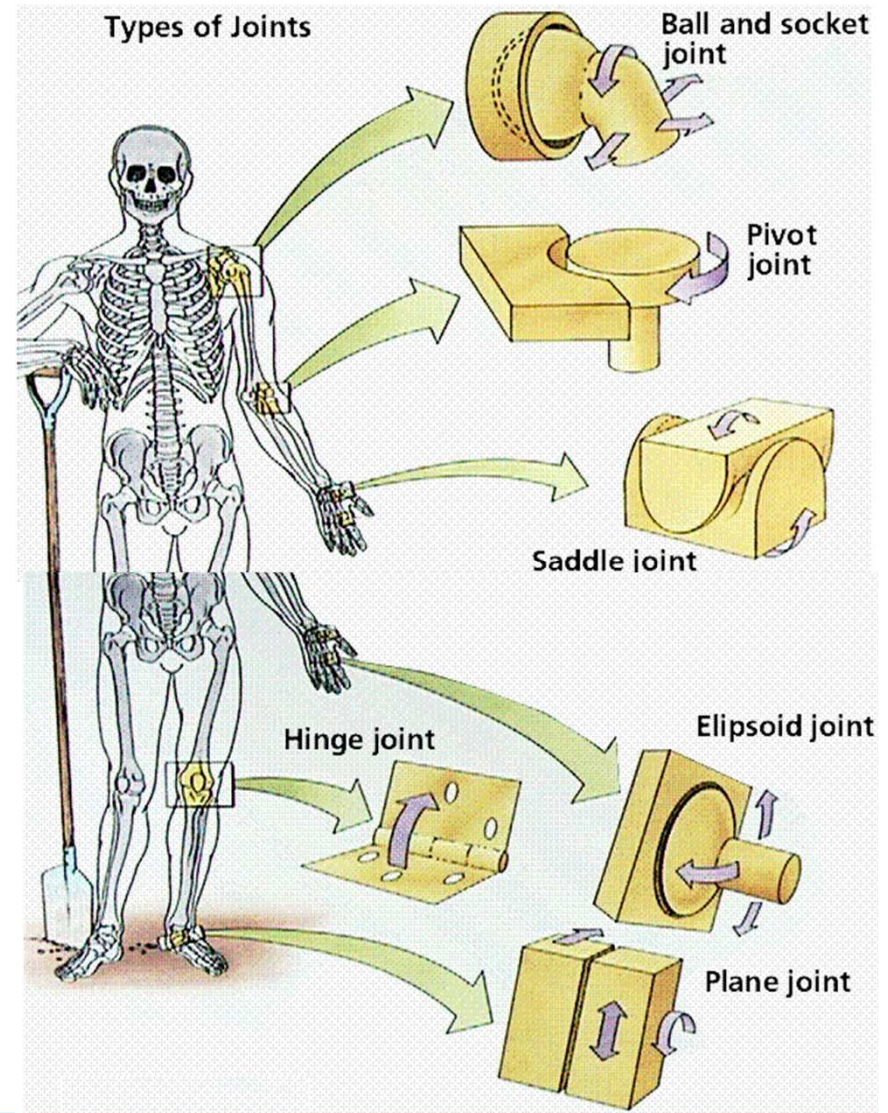


- Character of movements \Rightarrow shape of articular surfaces
- Freedom of movements \Rightarrow congruence of articular surfaces



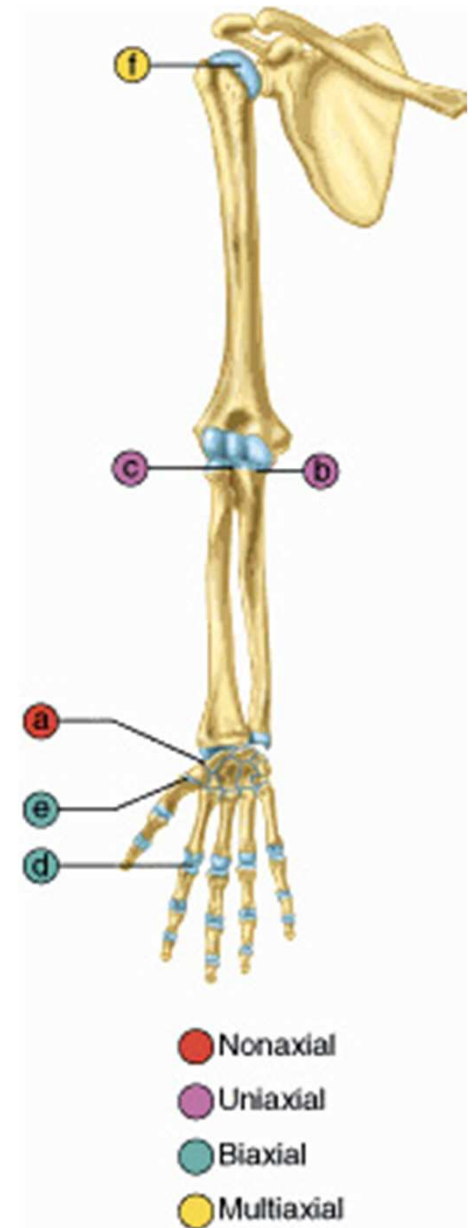
Morphological classification of synovial joints

- according to the shape of the articular surfaces:
 - ✓ **spheroidal (ball-and-socket) joints**, *artt. spheroidea*
 - ✓ **pivot (trochoid) joints**, *artt. trochoidea*
 - ✓ **condyloid (ellipsoid) joints**, *artt. ellipsoidea*
 - ✓ **sellar (saddle) joints**, *artt. sellaris*
 - ✓ **hinge joints**, *ginglymus*
 - ✓ **plane joints**, *artt. plana*



Kinesiology

- according to the number of axes of movements:
 - ✓ nonaxial joints
 - ✓ uniaxial joints
 - ✓ biaxial joints
 - ✓ multiaxial joints



Uniaxial joints

- *articulationes unicondylares:*

- ✓ **pivot (trochoid) joint,**

art. trochoidea – proximal radio-ulnar joint:

- rotation – pronation-supination

- ✓ **hinge joint, *ginglymus***

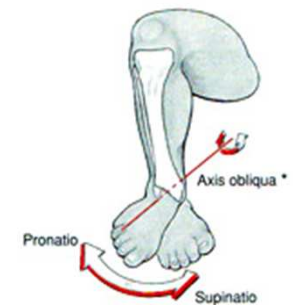
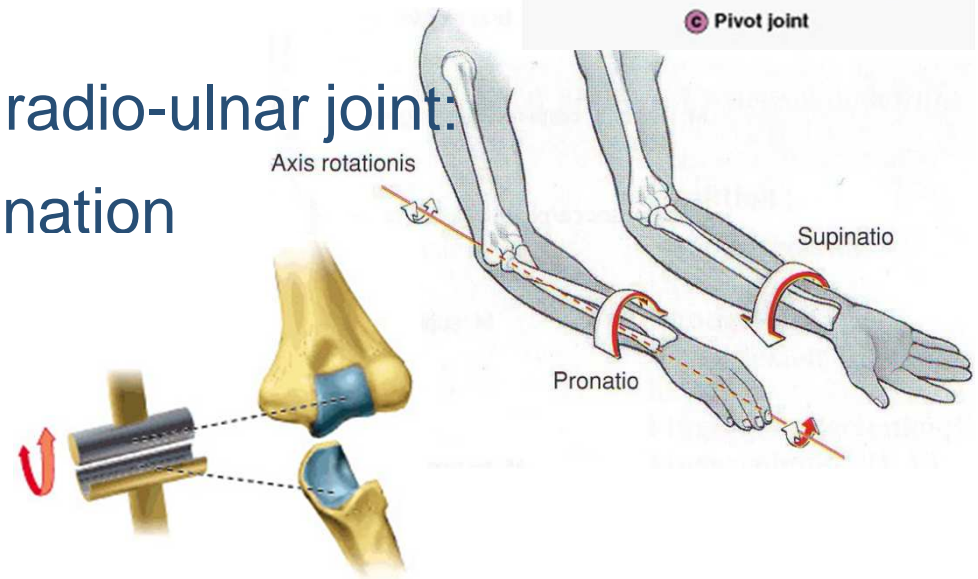
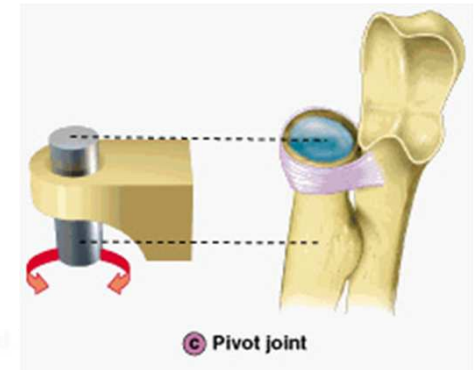
– the interphalangeal joints:

- flexion-extension

- ✓ **cochlear (spiral) joint,**

art. cochlearis – ankle joint:

- flexion-extension



Biaxial joints

- *articulationes bicondylares:*

- ✓ **ellipsoid (condyloid) joint,**

art. ellipsoidea (condylaris) –

radiocarpal (wrist) joint, *art. radiocarpalis:*

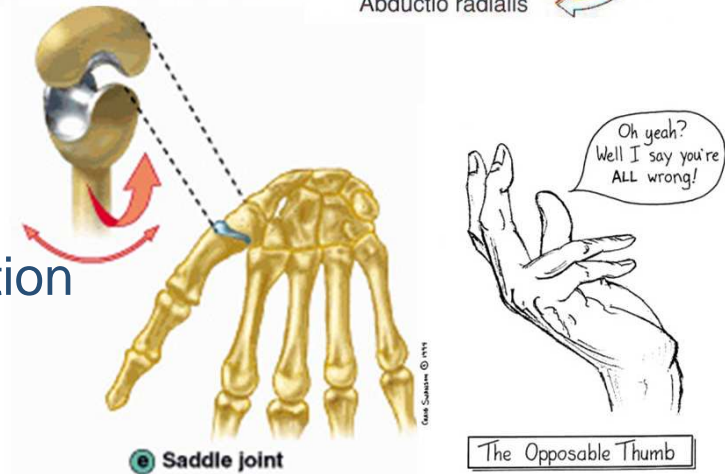
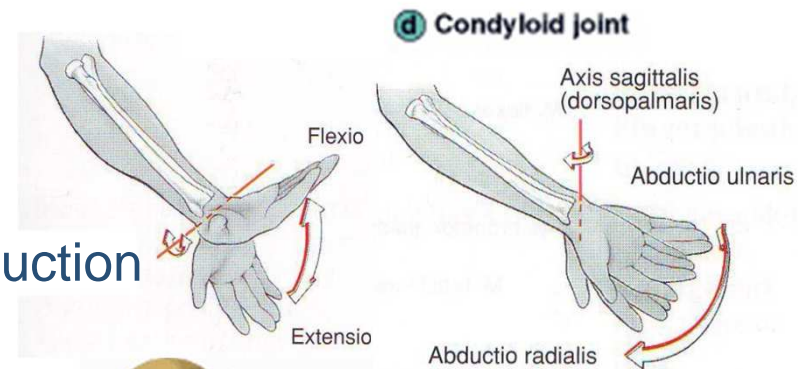
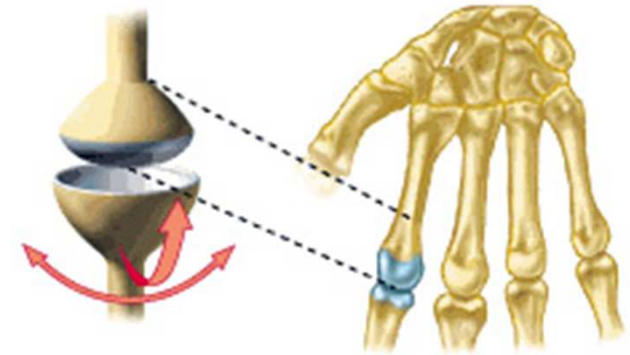
- transversal axis – flexion-extension
- anterior-posterior axis – abduction-adduction

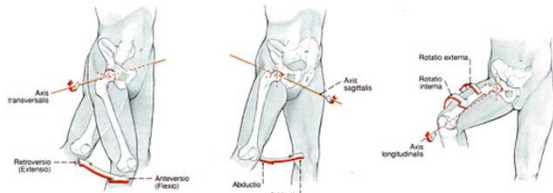
- ✓ **sellar (saddle) joint,**

art. sellaris – *art. carpometacarpea pollicis*

carpometacarpal joint of the thumb:

- anterior-posterior axis – abduction-adduction
- transversal axis – flexion-extension
(opposition-reposition)



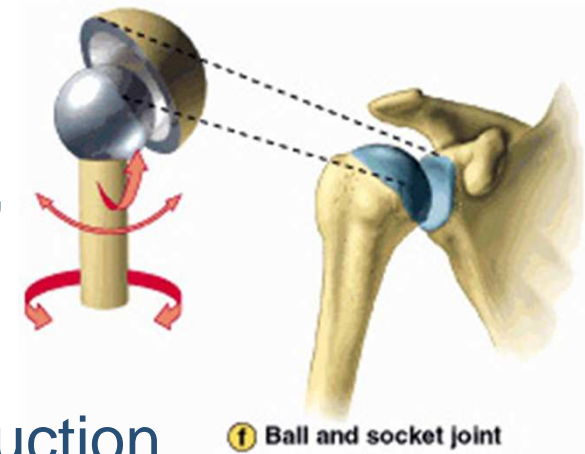


Multiaxial joints

- *articulationes polycondylares:*

- ✓ **spheroidal (ball-and-socket) joint,** *art. spheroidea* – shoulder joint:

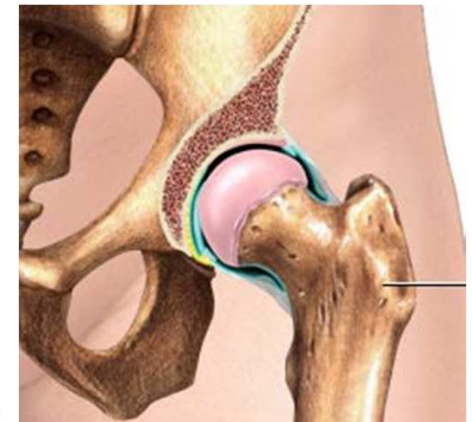
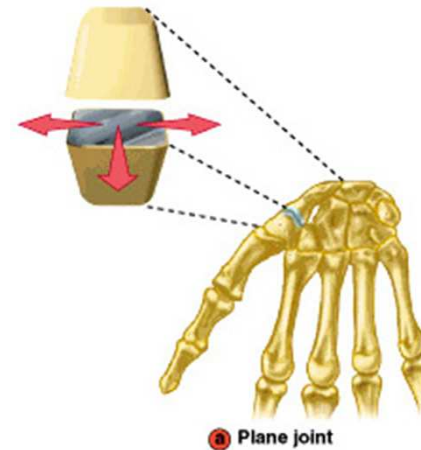
- transversal axis – flexion-extension
 - anterior-posterior axis – abduction-adduction
 - longitudinal axis – rotation
 - compound movement – circumduction



- ✓ *art. cotylica (enarthrosis)* – hip (coxal) joint

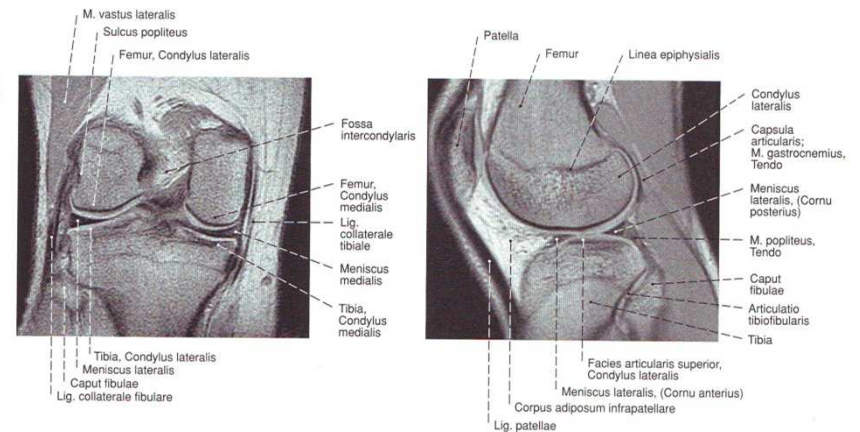
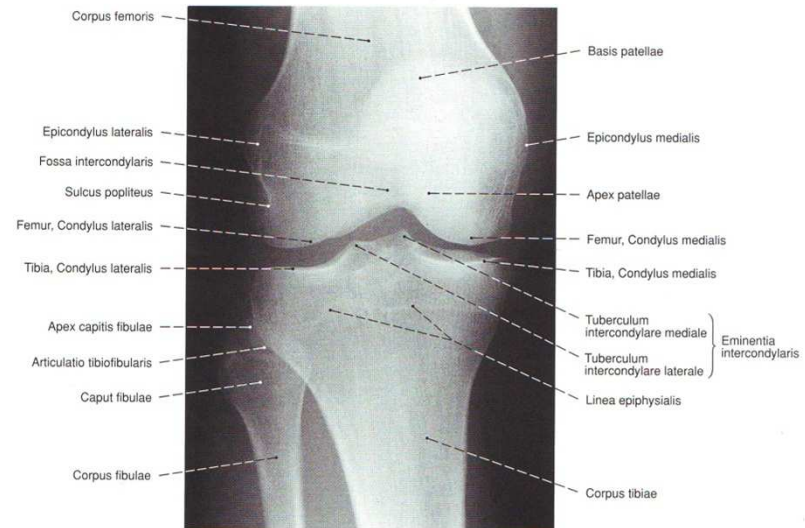
- ✓ plane joint, *art. plana* – *intercarpal joints* – slides

- ✓ *amphiarthrosis*



Methods for joint examination

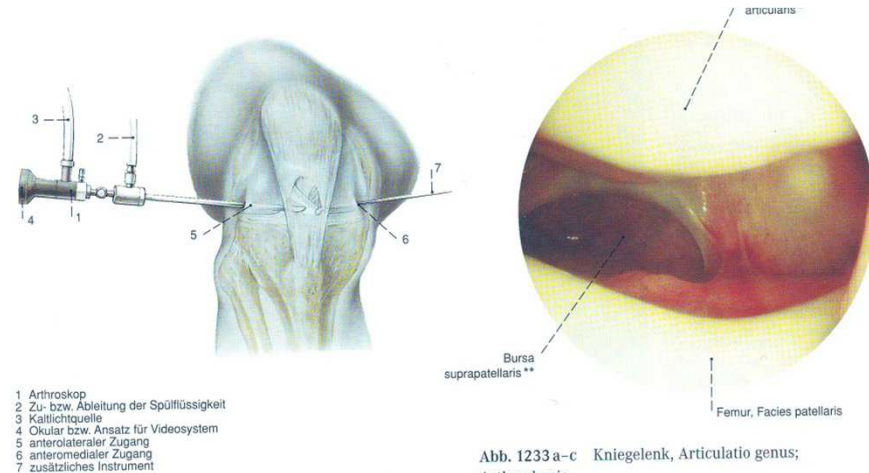
- *In vivo* methods:
 - ✓ inspection, *inspectio*
 - ✓ palpation, *palpatio*
 - ✓ extent (degree or range) of joint movements
 - ✓ roentgenography
 - ✓ computer imaging/tomography
 - ✓ magnetic resonance imaging
 - ✓ conventional and contrast arthrography
 - ✓ ultrasound arthrography



Arthroscopy – clinical relevance

■ Arthroscopy (arthroscopic surgery):

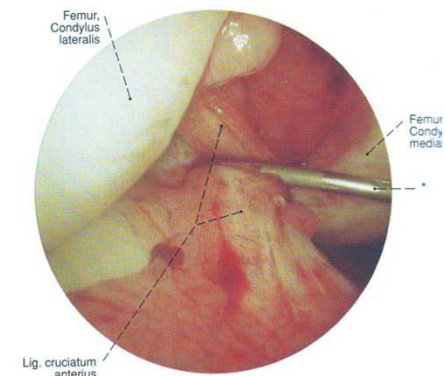
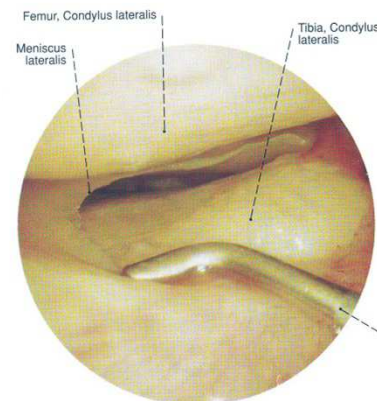
- ✓ a minimally invasive surgical procedure
- ✓ intraarticular examination
- ✓ evaluation and treatment of damage
- ✓ biopsy
- ✓ arthroscope, a type of endoscope



1 Arthroskop
2 Zu- bzw. Ableitung der Spülflüssigkeit
3 Kaltlichtquelle
4 Okular bzw. Ansatz für Videosystem
5 anterolateraler Zugang
6 anteromedialer Zugang
7 zusätzliches Instrument

Abb. 1232 Zugänge bei der Arthroskopie.

Abb. 1233 a-c Kniegelenk, Articulatio genus; Arthroskopie.
a Blick von unten in das Femoropatellargelenk (re)
* Patellafrist: First zwischen medialer und lateraler Gelenkfläche
** Klinisch: Recessus suprapatellaris



Thank you ...



"He was kicked out of medical school. He flunked anatomy."

