Connections of bones

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Arthrologia generales- general arthrology

Classification based on the freedom of movement

- Synarthrosis [Articulationes fibrosae]
  - limited movement, connection through connective tissue
- Amphiarthrosis
  - limited movement
  - narrow articular gap
  - may be through cartilage or ligaments
  - art. carpometacarpea
- Diarthrosis – [Articulationes synoviales]
  - unlimited movement
- (Synsarcosis)
  - connection via muscles

Synarthrosis [Articulationes fibrosae]

- No joint gap
- Synostosis - ossification
  - Ru McIII-IV.
- Gomphosis – penetration
  - alveolus-tooth
- Suturae - suture
  - Sutura serrata – saw suture
    - Ossa parietalia
  - Sutura foliata – leaf suture
    - Sutura frontonasalis
  - Sutura squamosa –squamosal suture
    - Sutura squamosofrontalis
  - Sutura plana – flat suture
    - Sutura internasalis
- Syndesmosis – through connective tissue, ligament
  - Car: radius-ulna

Amphiarthrosis [Articulationes cartilagineae]

- minimal joint gap
- able to move in every directions
- but those are very limited
  - Art. carpometacarpea
- Synchondrosis
  - hyalin cartilage
  - Art. sternocostalis
- Symphysis
  - fibrous cartilage
  - Symphysis pelvis

Diarthrosis [Articulationes synovialis]

- Joint gap
- Free movement
- General description of joints [drawing]
- [video]

- Ligaments of joints
  - Ligg. Intracapsularia – part of the joint capsule
  - Ligg. Extracapsularia – outside the joint capsule
  - Ligg. Intercapsularia - within the joint cavity
- If the surfaces do not match (incongruent surfaces)
  - Cartilage supplement
    - discus – separates the joint into 2 independent parts
    - meniscus – does not separate it fully
    - labrum – to increase the surface

Diarthrosis [Articulationes synovialis]

- Flexion-extension [flexio-extensio]
  - Overextension [hyperextensio]
- Abduction-adduction [abductio-adductio]
- Turning inside/outside [pronatio-supinatio]
- Rotation [rotatio]

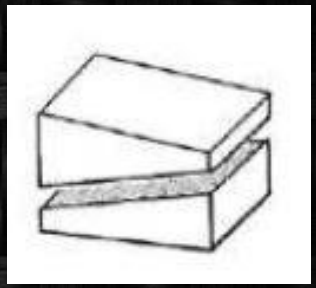
Diarthrosis [Articulationes synovialis]

Classification based on the number of participating bones

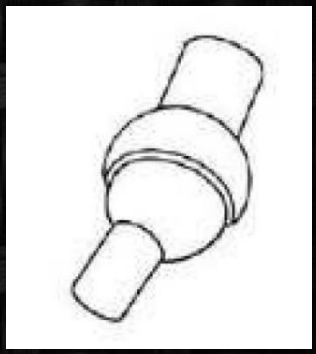
- Articulatio simplex (two bones)
  - eg.: hip joint
- Articulatio composita (three or more bones)
  - eg.: elbow joint
- Articulatio duplex (discus/meniscus between the bones)
  - eg.: art. femorotibialis

Diarthrosis [Articulationes synovialis]

- (Classification based on function)
- Classification based on the number of axis
  - Single axial
  - Biaxial
  - Multiaxial
- Classification based on the form of the joint surfaces
  - Art. plana – *sliding joint*
    - Flat surfaces lying, sliding on top of each other
    - Processus articularis cran.⇔ Processus articularis caud.

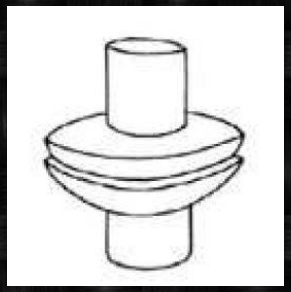


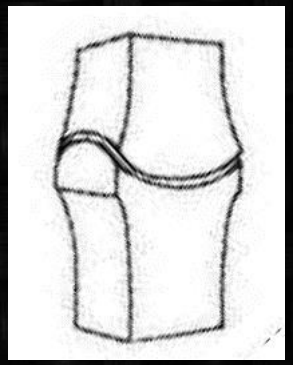
  - Art. sphaeroidea – *spherical joint*
    - Multiaxial
    - Nearby muscles may limit the freedom of movement
    - Shoulder joint, hip joint

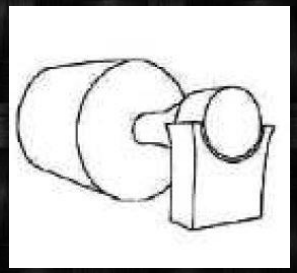


Diarthrosis [Articulationes synovialis]

- Art. ellipsoidea – *ellipsoid joint*
  - Joint surfaces are ellipsoid
  - Biaxial
    - The 2 axis are perpendicular on each other
    - One through the short, one through the long diameter
  - art. atlantooccipitalis
    - *(in human it is condylar!)*
- Art. sellaris –saddle joint
  - „like a saddle”
  - Biaxial
    - Main movement in the transverse plane(flexio-extensio)
    - Limited movement to the sides (abduktio-adduktio)
  - art. interphallangis prox. et dist.
- Art. trochoidea –pivot joint
  - Rotation around a „tenon”
  - Single axis
  - art. atlantoaxialis, art. radioulnaris

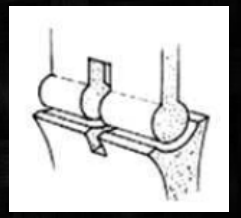


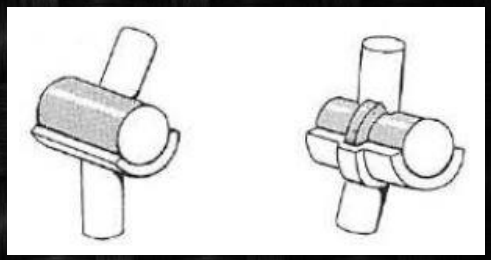


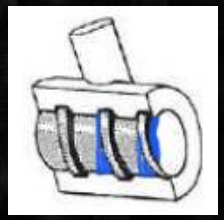


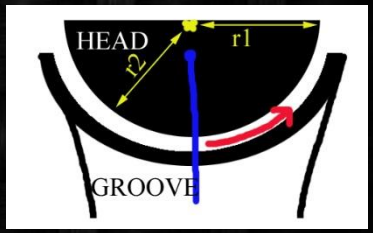
Diarthrosis [Articulationes synovialis]

- Art. condylaris – condylar joint
  - A half cylinder in the dross direction provides the joint head
  - May be double
  - If only flexion and extension, that it may be a trochlear joint by ***function*** (art. trochlearis)
  - eg.: art. femorotibialis
  - Ginglymus
    - The joint head and groove are precisely fitting each other
    - Only flexion and extension
      - It must be perpendicular to the axis
    - Art. cubiti
    - May be a snap joint by ***function***
  - Art. cochlearis – cochlear joint
    - There is an angle between the ridge and the axis of movement
    - Art. tarsocruralis (Eq)
    - May be a snap joint by ***function***
  - Art. delabens –"sledge" joint
    - The head slides between two ridges
    - Art. femoropatellaris
  - Art. spiralis – spiral joint
    - The head is a flat sphere (r1>r2)
    - The elastic collateral ligaments originate from inside the center => slowing the movement down
    - Flexor part of the stifle joint (art. femorotibialis)
    - Is also a class by ***function***!



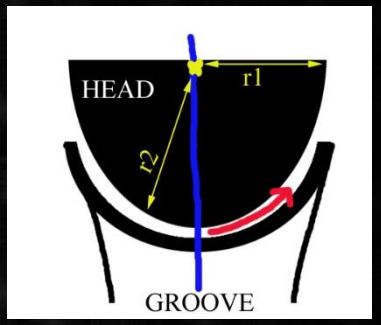






Diarthrosis [Articulationes synovialis]

[classification by function*]



…

- snap joint
  - The joint head is an elonganeted sphere (r1<r2)
  - The elastic collateral ligaments originate from outside the center => sacceretaion
  - art. talucruralis
- spiral joint
  - The head is a flat sphere (r1>r2)
  - The elastic collateral ligaments originate from inside the center => slowing the movement down

…

** Only explaing the two critical ones without details of the family*

Myologia

- Contractibility (contractilitas)
- Elasticity (elasticitas)
- Stimulatable (irritabilitas)
- Conductivity (conductivitas)

- Striated muscle
- Smooth muscle
- Cardiac muscle

- Cytology (aktin-miozin, myofibra, myolemma, sarcolemma stb.)
- Physiology (red muscle vs white muscle)
- Meat

Myologia

- Tendo of origin (tendo)
- Head (caput)
  - Biceps, triceps…
- Belly (venter)
  - Biventer
- Insertion (cauda)
  - M. communis
- Functio
  - Main
  - Auxiliary
  - Synergist
  - Antagonist
- Pennate
  - Unipennate
  - bipennate/multipennate
    - Larger muscle power
    - More endurance
    - Smaller range

Myologia

- Blood- and nerv supply
- Fascia musculi
- Bursa synovilais
- Vagina tendinis
  - Vagina synovialis
    - sleeving
    - communis
  - Vagina fibrosa
    - fastening