FRAME ­­\_ ANATOMY 1

DENTISTRY

ANATOMICAL NOMENCLATURE

OSTEOLOGY

ARTHROLOGY

MYOLOGY

2015

ANATOMICAL NOMENCLATURE

Basic terms of anatomical nomenclature

Anatomical position

Anatomical planes: sagittal plane (plana sagittalis, planum medianum); frontal plane (plana frontalis); transverse (horizontal) plane (plana transversalis)

Axes: longitudinal, vertical (axis longitudinalis); sagittal (axis sagittalis); transversal (axis transversalis)

Directions:

* vertical axis: cranialis (superior, above); caudalis (inferior, below)
* transversal axis: medialis, lateralis, medius (intermedius), medianus
* sagittal axis: frontalis (anterior), dorsalis (posterior)
* limbs: proximalis, distalis
* upper limb: radialis (lateralis), ulnaris (medialis), palmaris, dorsalis
* lower limb: fibularis (lateralis), tibialis (medialis), plantaris, dorsalis
* mouth: mesialis, distalis, vestibularis, oralis, palatinalis, lingualis, labialis, buccalis, occlusalis

Main parts of human body

Head - caput

Neck - collum

Trunk - truncus:

 chest (thorax)

back (dorsum)

belly (abdomen)

pelvis (pelvis)

Upper limb - membrum superius:

arm (brachium)

forearm (antebrachium)

hand (manus): back of the hand (dorsum manus), palm (palma manus), fingers (digiti manus)

Lower limb - membrum inferius:

thigh (femur)

lower leg (crus)

foot (pes): back of the foot (dorsum pedis), sole (planta pedis), fingers (digiti pedis)

GENERAL OSTEOLOGY

Two basic types of bone:

1. woven bone (during ontogenesis, insertions of tendons)
2. lamellar bone a) compact bone (substantia compacta, b) spongy bone (substantia spongiosa)

Basic structure of the lamellar bone: substantia compacta, substantia spongiosa, periosteum; bone architecture (trajectories) in substantia spongiosa – only briefly (lines of pressure and tension)

Classification of bones according to the shape:

long bones, short bones, flat bones, irregular bones, sesamoid bones, pneumatic bones – examples, structure

Structure of long bone: proximal epiphysis; diaphysis (body, corpus); distal epiphysis

* diaphysis: compact bone, inside cavum medullare with medulla ossium (rubra - red, flava - yellow, grisea - grey)
* epiphyses: spongy bone, on the surface thin layer of compact bone

Structure of flat bones: compact bone (lamina externa et lamina interna); spongy bone between laminae = diploe

Structure of short bones: compact bone (on the surface), spongy bone (inside)

Development of bones – ossification:

* intramembranous (from connective tissue)
* chondral ossification (preformed cartilaginous skeletal parts)

Vascularization and innervation of bones: arteriae nutriciae, periostal vessels, veins of the bones; inervation of periosteum

Radiology and anatomy

X–ray (K. Roentgen 1895 – awarded by Nobel price in physics)

A highly penetrating beam of x-rays „transluminates“ the pacient, showing tissues of differing densities on x-ray film. A tissue or organ that is relatively dense absorbs (stops) more x-rays than a less dense tissue. Relatively fewer x-rays reach the silver emulsion in the film therefore only fewer grains of silver are developed at this area when the film is processed – „white area of bones“.

Two basic types of x-rays:

* simple X-ray
* X-ray with contrast materials: positive (iodide preparations, barium meal), negative (air, gases)

Projection according to the course of x-ray (anteroposterior, lateral)

SPECIAL OSTEOLOGY

Skeleton of the trunk

**Vertebrae (vertebrae)**

General vertebral characteristics (corpus vertebrae, pediculus arcus vertebrae, arcus vertebrae, foramen vertebrae, processus spinosus, processus transversi, processus articulares)

Specialities of individual vertebral groups:

* Vertebrae cervicales:foramen processus transversi. Atlas (arcusanterior et posterior, tuberculum anterius et posterius, fovea dentis, foveae articulares superiores et inferiores, massae laterales atlantis), orientation of atlas. Axis (dens axis, facies articularis anterior axis). C6 – tuberculum caroticum; C7 - vertebra prominens
* vertebrae thoracicae:foveae costales, facies costales processus transversi
* vertebrae lumbales:processus costarii, processus accessorii, processus mammilares
* vertebrae sacrales*:* os sacrum
* vertebrae coccygeae:os coccygis

**Sacral bone (os sacrum)**

Basis ossis sacri: processus articulares superiores, promontorium

Facies pelvina: foramina sacralia pelvina, lineae transversae

Facies dorsalis: crista sacralis mediana, intermedia et lateralis, foramina sacralia dorsalia, cornua sacralia, hiatus sacralis, apex ossis sacri, canalis sacralis

Partes laterales: facies auricularis, tuberositas sacralis

**Coccyx bone (os coccygis)**

cornua coccygea, apex ossis coccygis

**Breast bone (sternum)**

Manubrium sterni: incisura jugularis; incisurae claviculares; incisurae costales; angulus sterni

Corpus sterni: incisurae costales

Processus xiphoideus (synchondrosis xiphisternalis)

**Ribs (costae)**

costae verae; costae spuriae; costae fluctuantes

General characteristic of the rib: corpus costae (sulcus costae, crista costae, angulus costae); caput costae (facies articularis); collum costae (tuberculum costae, facies articularis tuberculi costae)

Typical structures of 1. and 2. rib: 1. rib - sulcus arteriae subclaviae, tuberculum musculi scaleni anterioris et medii; 2. rib - tuberculum musculi scaleni posterioris

Skeleton of upper limb

**Shoulder blade (scapula)**

Facies: dorsalis (spina scapulae; acromion; facies articularis; fossa supraspinata; fossa infraspinata); costalis (fossa subscapularis)

Angulus: superior, inferior, lateralis (cavitas glenoidalis, tuberculum supraglenoidale, tuberculum infraglenoidale, collum scapulae)

Margo: lateralis; medialis; superior (processus coracoideus scapulae, incisura scapulae)

**Collarbone, clavicle (clavicula)**

Corpus: extremitas sternalis (facies articularis sternalis); extremitas acromialis (facies articularis acromialis)

Facies: superior, inferior

**Arm bone (humerus)**

Proximal epiphysis: caput humeri; collum humeri (anatomicum et chirurgicum); tuberculum majus et minus; sulcus intertubercularis; crista tuberculi majoris et minoris

Diaphysis: tuberositas deltoidea; sulcus nervi radialis

Distal epiphysis: epicondylus lateralis et medialis (sulcus nervi ulnaris); capitulum humeri; fossa radialis; trochlea humeri; fossa coronoidea; fossa olecrani

**Ulna (ulna)**

Proximal epiphysis: olecranon; processus coronoideus; incisura trochlearis; incisura radialis; tuberositas ulnae

Diaphysis: margo interosseus

Distal epiphysis: caput ulnae (circumferentia articularis capitis ulnae); processus styloideus

**Radial bone (radius)**

Proximal epiphysis: caput radii (fovea capitis radii, circumferentia articularis radii); collum radii; tuberositas radii

Diaphysis: margo interosseus

Distal epiphysis: incisura ulnaris radii; facies articularis carpalis radii; processus styloideus

Hand bones

**Carpal bones (ossa carpi)**

Os scaphoideum (tuberculum ossis scaphoidei); os lunatum; os triquetrum; os pisiforme; os trapezium (tuberculum ossis trapezii); os trapezoideum; os capitatum; os hamatum (hamulus ossis hamati)

Eminentia carpi medialis et lateralis, sulcus carpi

**Metacarpal bones (ossa metacarpi)**

Basis, corpus et caput ossis metacarpi; ossa sesamoidea

**Phalanges of hand fingers (phalanges digitorum manus)**

* 1th finger: phalanx proximalis et distalis; 2-4th finger: phalanx proximalis, media et distalis
* Phalanx proximalis et media: basis, corpus et caput. Phalanx distalis: basic, corpus et tuberositas phalangis distalis

Skeleton of lower limb

**Pelvic bone, (os coxae)** =*iliac bone (os ilium); pubic bone (os pubis); sciatic bone (os ischii):*

corpus ossis ilii; ala ossis ilii; fossa iliaca; linea arcuata; facies auricularis; linea glutea anterior, posterior et inferior; crista iliaca; spina iliaca anterior superior et inferior; spina iliaca posterior superior et inferior; eminentia iliopubica; incisura ischiadica major; corpus ossis pubis; ramus superior ossis pubis; sulcus obturatorius, pecten ossis pubis, tuberculum pubicum; ramus inferior ossis pubis; facies symphysialis; corpus ossis ischii; ramus ossis ischii; tuber ischiadicum; spina ischiadica; incisura ischiadica minor

**Femur, thigh-bone (femur)**

Proximal epiphysis: caput femoris (fovea capitis femoris); trochanteric fossa;

Diaphysis: collum femoris; trochanter major et minor; intertrochanteric line; intertrochanteric crest; linea aspera; tuberositas glutea

Distal epiphysis: condylus medialis et lateralis; fossa intercondylaris; epicondylus medialis et lateralis; facies patellaris; planum popliteum

**Knee-cap** **(patella)** –sesamoid bone, basis patellae, apex patellae, facies articularis patellae

**Tibia, shin bone** **(tibia)**

Proximal epiphysis: condylus medialis et lateralis (facies articulares superiores, eminentia intercondylaris, tuberculum intercondylare mediale et laterale, area intercondylaris anterior et posterior), facies articularis fibularis

Diaphysis: margo anterior, medialis et interosseus, tuberositas tibiae, linea musculi solei

Distal epiphysis: malleolus medialis (facies articularis malleoli medialis), facies articularis inferior tibiae, incisura fibularis

**Fibula, calf bone** **(fibula)**

Proximal epiphysis: caput fibulae (facies articularis capitis fibulae)

Diaphysis: margo interosseus, margo anterior

Distal epiphysis: malleolus lateralis (facies articularis malleoli lateralis); malleolar fossa

Foot bones

**Talus (talus)**

Caput tali (facies articularis navicularis)

Collum tali

Corpus tali (trochlea: facies articulares for articulation with tibia and fibula; facies articularis calcanea anterior, media et posterior, sulcus tali; processus posterior tali; processus lateralis tali)

**Calcaneus** **(calcaneus)**

Facies articularis cuboidea; facies articulares talares anterior, media et posterior; sulcus calcanei; sustentaculum tali;trochlea fibularis tuber calcanei

**Navicular (os naviculare)** – articulation (connection) with surrounding bones

**Cuboid bone (os cuboideum)** – articulation (connection) with surrounding bones

**Cuneiform bones (ossa cuneiformia):** os cuneiforme mediale, intermedium et laterale – articulation (connection) with surrounding bones

**Metatarsal bones (ossa metatarsi):** basis, corpus et caput ossis metatarsi

**Phalanges feet fingers (phalanges digitorum pedis)**

* 1th finger: phalanx proximalis et distalis 2-4th finger: phalanx proximalis, media et distalis;
* phalanx proximalis et media: basis, corpus et caput; phalanx distalis: basic, corpus et tuberositas phalangis distalis

Skull

I. Neurocranium

**Occipital bone** **(os occipitale)**

Pars basilaris: clivus, tuberculum pharyngeum

Partes laterales: condylus occipitalis, fossa condylaris, canalis condylaris, incisura jugularis, canalis nervi hypoglossi

Squama occipitalis: protuberantia occipitalis externa; crista occipitalis externa; linea nuchae suprema, superior et inferior; planum nuchale; planum occipitale; fossae cerebrales; fossae cerebellares; sulcus sinus transversi; sulcus sinus sagittalis superioris; protuberantia occipitalis interna; crista occipitalis interna; eminentia cruciformis.

Foramen magnum.

**Sphenoid bone (os sphenoidale)**

Corpus ossis sphenoidalis: processus clinoidei posteriores; sella turcica; dorsum sellae; fossa hypophysialis; sulcus chiasmatis; sulcus caroticus; lingula sphenoidalis; rostrum sphenoidale; crista sphenoidalis; sinus sphenoidalis (apertura sinus sphenoidalis)

Alae minores: canalis opticus; processus clinoidei anteriores; fissura orbitalis superior

Alae majores: foramen rotundum, ovale et spinosum; spina ossis sphenoidalis; facies - cerebralis, temporalis, infratemporalis, orbitalis, maxillaris

Processus pterygoidei: lamina medialis et lateralis; fossa pterygoidea, fossa scaphoidea, hamulus pterygoideus, canalis pterygoideus

**Frontal bone** **(os frontale)**

Squama frontalis: tuber frontale; margo supraorbitalis; incisura /foramen frontale; incisura /foramen supraorbitale; arcus superciliares

Partes orbitales: fossa glandulae lacrimalis; fovea trochlearis; foramen ethmoidale anterius et posterius

Pars nasalis: sinus frontalis

**Parietal bone (os parietale)**

foramina parietalia; tubera parietalia; linea temporalis superior et inferior; sulcus sinus sagittalis superioris; sulci arteriae meningeae mediae

**Temporal bone (os temporale)**

Pars petrosa (os petrosum, pyramis)

Apex; basis; facies (anterior, posterior, inferior, ventrobasalis); margo (superior, inferior, posterior)

*facies anterior pyramidis*: impressio trigeminalis; hiatus et sulcus nervi petrosi majoris; hiatus et sulcus nervi petrosi minoris; eminentia arcuata, tegmen tympani

*facies posterior pyramidis*: sulcus sinus petrosi superioris et inferioris; porus acusticus internus; meatus acusticus internus; fundus meatus acustici interni (crista transversa, introitus canalis nervi facialis); apertura externa aquaeductus vestibuli; apertura externa canaliculi cochleae; incisura jugularis, sulcus sinus sigmoidei

*facies inferior pyramidis*: apertura externa canalis carotici; fossa jugularis (canaliculus mastoideus); fossula petrosa (apertura externa canaliculi tympanici)

*facies ventrobasalis*: will be discussed with the structures of the auditory system

Pars squamosa: squama ossis temporalis; processus zygomaticus; porus acusticus externus; fossa mandibularis; tuberculum articulare

Pars mastoidea: processus mastoideus (antrum mastoideum, celullae mastoideae); incisura mastoidea; sulcus arteriae occipitalis, incisura digastrica

Pars tympanica: incisura tympanica; sulcus tympanicus; fissura petrosquamosa (fissura petrotympanica et petrosquamosa); fissura tympanomastoidea

Pars hyoidea: processus styloideus (foramen stylomastoideum)

**Cannals in temporal bone**

1. Canalis caroticus: apertura externa canalis carotici, canaliculi caroticotympanici, apertura interna canalis carotici
2. Canalis nervi facialis: fundus meatus acustici interni (introitus canalis nervi facialis), foramen stylomastoideum
3. Canaliculus chordae tympani: cavum tympani, fissura petrotympanica
4. Canalis musculotubarius: septum canalis musculotubarii: semicanalis musculi tensoris tympani, semicanalis tubae auditivae
5. Canaliculus mastoideus: fossa jugularis, fissura tympanomastoidea
6. Canaliculus tympanicus: fossula petrosa, (cavum tympani), hiatus nervi petrosi minoris
7. Aquaeductus vestibuli: apertura externa aquaeductus vestibuli
8. Canaliculus cochleae: apertura externa canaliculi cochleae

II. Facial skeleton

**Maxilla, upper jaw (maxilla)**

Corpus maxillae:

* facies orbitalis: sulcus et canalis infraorbitalis (canales alveolares)
* facies anterior: foramen infraorbitale; fossa canina; crista infrazygomatica; incisura nasalis; spina nasalis anterior
* facies infratemporalis: tuber maxillae; foramina alveolaria (canales alveolares posteriores)
* facies nasalis: hiatus sinus maxillaris

Sinus maxillaris (hiatus semilunaris; recessus frontalis, zygomaticus, palatinus et alveolaris)

Processus frontalis: crista lacrimalis anterior; crista ethmoidalis; crista conchalis

Processus zygomaticus

Processus alveolaris: alveoli dentales; septa interalveolaria, septa intraalveolaria (interradicularia); juga alveolaria

Processus palatinus: sulci palatini; foramen incisivum; os incisivum; torus palatinus

**Nasal bone (os nasale):** sutura internasalis

**Lacrimal bone** **(os lacrimale):** crista lacrimalis posterior; sulcus lacrimalis

**Vomer** **(vomer):** alae vomeris

**Inferior nasal turbinate, inferior nasal concha (concha nasalis inferior):** processus maxillaris, lacrimalis et ethmoidalis

**Zygomatic bone, facial bone (os zygomaticum)**

Corpus ossis zygomatici: facies orbitalis, facies lateralis, facies temporalis; foramen zygomaticoorbitale (canalis et foramen zygomaticofacialis et zygomaticotemporalis)

Processus: frontalis, maxillaris, temporalis (arcus zygomaticus)

**Palatal bone (os palatinum)**

Lamina horizontalis: spina nasalis posterior; foramen palatinum majus; foramina palatina minora; processus pyramidalis

Lamina perpendicularis:processus orbitalis; processus sphenoidalis; incisura sphenopalatina

**Ethmoidal bone** **(os ethmoidale)**

Lamina perpendicularis: septum nasi osseum; crista galli; foramen caecum

Lamina cribrosa

Labyrinthus ethmoidalis: celullae ethmoidales anteriores, medii et posteriores; bulla ethmoidalis; concha nasalis superior; concha nasalis media (processus uncinatus)**;** facies orbitalis

**Mandible, lower jaw (mandibula)**

Corpus mandibulae: trigonum mandibulae (protuberantia mentalis, tuberculum mentale); spina mentalis; fossae digastricae; processus alveolaris (alveoli dentales, juga alveolaria, septa interalveolaria, septa intraalveolaria, septa interradicularia); trigonum retromolare; linea mylohyoidea; fovea sublingualis; fovea submandibularis; foramen mentale; canalis mandibulae; angulus mandibulae

Ramus mandibulae: processus coronoideus (crista temporalis); processus condylaris (caput mandibulae, collum mandibulae, fovea/fossa pterygoidea); incisura mandibulae; linea obliqua; foramen mandibulae; canalis mandibulae; lingula mandibulae; sulcus mylohyoideus; tuberositas masseterica; tuberositas pterygoidea

**Hyoid bone, tongue bone (os hyoideum):** corpus; cornua minora; cornua majora

Skull as a whole

**Description of the plane X-ray picture** of the skull - in sagittal and lateral projection

**Newborn skull**

* ratio neurocranium : splanchnocranium
* narrow fibrous bands between flat bones (instead of sutures), that are spatially enlarged, and forms fonticuli (fonticulus major et minor – position, age of obliteration; fonticulus sphenoidalis et mastoideus – position)

**Sex differences in skull**

**Cranial cavities** – limitation; anatomical structures; communication (connection) with surrounding cavities:

* basis cranii interna (fossa cranii anterior; fossa cranii media; fossa cranii posterior)
* fossa temporalis
* fossa infratemporalis
* pterygopalatine fossa
* orbita
* cavitas nasi ossea

General Arthrology

Synartrosis

Definition,different types of synarthrosis (syndesmosis, synchrondosis a synostosis)

joint (articulation)

Definition of the joint

General features of a joint (facies articulares – articular surafecs, cartilagines articulares – articular cartilage, synovia synovial fluid, cavitas articularis – joint fissure – joint cavity) capsula articularis (division into free, solid, complete, incomplete), description and significance of different parts

Special (accessory) joint apparatus (additional joint structures): labrum articulare, disci et menisci articulares, ligamenta, musculi articulares, bursae synoviales

Elementary position of a joint

Middle position of a joint

Basic movements (flexion = ventral flexion; extension = dorsal flexion; abduction; adduction; rotation (internal = pronation; external = supination)

Classification of joints:

* according to the number of connecting bones: simple and composed joints, characteristic
* according to the shape of contact surfaces: **1. spheroidal joint** (ball and socket joint), articulatio spheroidea: free – arthrodia; restricted – enarthrosis; **2. ellipsoidal joint**, articulatio ellipsoidea; **3. sellar joint** (saddle joint), articulatio sellaris; **4. cylindrical joint**, articulatio cylindroidea: a) axis of movements is perpendicular to the longitudinal axis of bone; b) axis of movements is parallel to the longitudinal axis of a long bone, **5. trochlear joint** (hinge joint), articulatio trochlearis; **6. flat joint**, articulatio plana; **7. joint with minimal movements** (amphiarthrosis)
* according to the level of moveability – joints with minimal movements, sliding movements, rotational movements (monoaxial joint, biaxial joint, triaxial joint) – characteristic and mobility of different joints

**In describing the joints is required for each joint to state:**

* 1. name of the articular surfaces
	2. characteristic of the joint capsule
	3. special joint apparatus
	4. type of the joint
	5. movements of the joint

It includes description of the native joint radiographs in the sagittal and lateral projection.

Special Arthrology

junctions of skull

**Syndesmoses**: suturae (sutures); lig. stylohyoideum; gomphosis

**Synchrondroses**: fibrocartilago basialis, synchondrosis sphenopetrosa, synchondrosis petrooccipitalis

**Articulatio temporomandibularis**

1. caput mandibulae + fossa mandibularis and tuberculum articulare ossis temporalis
2. joint capsule is relatively free; it is attached to the margins of joint surfaces on the temporal bone, on the discus articularis and on mandibula reach to cervical region
3. discus articularis; ligamentum laterale, ligamentum stylomandibulare, ligamentum sphenomandibulare
4. articulatio composita; the discus articularis divides the joint cavity into two joints – cranial part is discotemporal joint (flat joint), the caudal part represents discomandibular joint (cylindrical joint)
5. mandibular depression, elevation, protraction, retraction

**Craniovertebral joints**

Articulatio atlantooccipitalis

1. condyli occipitales + fovea articularis superior atlantis
2. joint capsules are individual for each of two joints; it is attached to the margins of joint surfaces

 4. articulatio ellipsoidea

 5. flexion and extension of the head; lateroflexion (minimal). Becouse there are two joints, the movement is possible only along their common axis

Articulatio atlantoaxialis – composite joint:

 1. *art. atlantoaxialis mediana*: facies articularis ant. on dens axis + fovea dentis of atlas (facies articularis post. on dens axis + lig. transvesum atlantis)

*art. atlantoaxialis lateralis*: processus articulares sup. axis + facies articulares inf. of atlas

 2. joint capsules are individual for each of two joints; it is attached to the margins of joint surfaces

 4. art. atlantoaxialis mediana: cylindrical joint; art. atlantoaxialis lat.: flat joint

 5. rotating of the head (total range of movement is about 60°)

Common characteristics: special joint apparatus for both jonts: lig. apicis dentis; ligg. alaria; lig. cruciformis (lig. transversum atlantis, fasciculi longitudinales); lig. longitudinale post., membrana tectoria; membrana atlantooccipitalis ant. et post. Both named joints of craniovertebral connection represent a functional unit.

juinction of the spine

**I. Junction of adjacent vertebrae**

Articulationes intervertebrales

1. facies articulares located on against each other processus articulares of adjacent vertebrae
2. joint capsules are individual for each joints; it is attached to the margins of joint surfaces
3. -
4. articulation plana
5. minimal movements

Disci intervertebrales (anulus fibrosus, nucleus pulposus). Synchondrosis

Syndesmotical system: ligamenta flava, ligamenta intertransversaria, ligamenta interspinalia

**II. Junctions common for all vertebrae**

Syndesmosis: lig. longitudinale ant. et post.; lig. supraspinale

Synchondrosis: synchondrosis sacrococcygea

**Vertebral column**

* Structure and shape: canalis vertebralis, foramina intervertebralia, lordoses and kyphoses of the spine
* Movements: anteflexion, retroflexion, lateroflexion, rotational and springy movements, differences in different parts of the spine

junctions of thoracic cage

**Articulationes costovertebrales**

Articulationes capitis costae

1. facies articularis capitis costae + fovea costales sup. at inf. on adjacent vertebral bodies
2. joint capsule is individual for each joints; it is attached to the margins of joint surfaces
3. lig. capitis costae radiatum

Articulationes costotransversariae

1. facies articularis tuberculi costae + fovea costalis processus transversi
2. joint capsule is individual for each joints is attached to the margins of joint surfaces areas
3. lig. costotransversarium, lig. costotransversarium lat., lig. costotransversarium sup.

Common characteristics: both named joints represent a functional unit in which the movement occurs along the common axis, passing through collum costae. Durint the movement the frontal end of rib is rising or dropping down, ad thus the shape of the chest is changing.

**Juncturae sternocostales**

There are junction between frontal ends of the ribs and sternum.

1. cartilagines costales (joint head) + incisurae costales sterni
2. the joint capsule is attached to the margins of joint surfaces areas
3. ligg. sternocostalia radiata anterius et posterius (create membrana sterni ant. et post.)
4. 1th, 6th and 7th ribs – there are synchondrosis; the rest are joints
5. movement is minimal

**Juncturae intercostales**

The connections between costal cartilages of the 5th do 9th rib.

The tight joint capsule is affixed on margins of joint surfaces

Connection is immobile

**Membrana intercostalis externa et interna**

Membrane connectiong the adjacent ribs. Externa is stretched between the cartilaginou parts of adjoining ribs; interna connects adjacent ribs in the surrounding of vertebral column.

Chest cage

Shape. Description of the walls, basis and apex. Movements

Connection of bones of upper extremity

I. Junction of girdle of upper extremity

**Articulatio sternoclavicularis**

1. incisura clavicularis on manubrium sterni + facies articularis sternalis claviculae
2. joint capsule is solid and it attached to the margins of joint surfaces
3. lig. interclaviculare, lig. sternoclaviculare, lig. costoclaviculare
4. spheroidal joint with restricted movements
5. clavicula in its lateral part is inclinig frontally dorsally, upwards and backwards. The movement in the joint is linked to the movements of the shoulder-blade and the shoulder joint.

**Articulatio acromioclavicularis**

1. facies articularis acromialis (collar bone) + facies articularis acromii (shoulder blade)
2. joint capsule is being attached to the margins of joint surfaces
3. discus articularis, lig. acromioclaviculare, lig. coracoclaviculare
4. spehroidal joint with restricted movements
5. movements inside the joint are possible into all directions in a very small extent. Similar as with the sternoclavicular joint, these are connected with overall movements of shoulder blade and shoulder joint.

**Shoulder-blade syndesmoses**

Lig. transversum scapulae, lig. coracoacromiale (fornix humeri). Movements of shoulder blade.

II. Junctions of free upper extremity

**Articulatio humeri** (shoulder joint)

1. caput humeri + cavitas glenoidalis
2. the joint capsule is strong and spacious; it is attached to the margin of cavitas glenoidalis, on humerus on collum anatomicum (on the medial side it descends somewhat distally)
3. labrum glenoidale, ligg. glenohumeralia, lig. coracohumerale, bursae synoviales
4. free spherical joint
5. ventral and dorsal flexion; abduction and adduction; pronation and supination

**Articulario cubiti** (elbow joint) – composite joint:

articulatio humeroradialis

capitulum humeri + fovea capitis radii

spherical joint

articulatio humeroulnaris

trochlea humeri + incisura trochlearis ulnae

trochlear joint

articulatio radioulnaris proximalis

circumferentia articularis radii + incisura radialis ulnae

cylindrical joint

Common characteristics: joint capsule is attaching onto humerus proximally from fossa radialis, fossa coronoidea and fossa olecrani. Along the sides, the attachment of the capsule is shifted somewhat distally; both epicondyles humeri are located extraarticularly. On radius the joint capsule descends distally into the region of collum radii. The joint capsule is reinforced along the sides by collateral ligaments: lig. collaterale ulnare et radiale. By a combination of all three parts of the elbow joint, movements are: flexion and extension; supination and pronation.

**Membrana interossea antebrachii**

Is strengthened between the bodies of radius and ulna (margines interossei). Membrana interossei antebrachii links both antebrachial bones, restricts supination, and at the same time it also serves as a plane for adjoining of numerous anterbrachial muscles.

**Articulatio radioulnaris distalis**

1. caput ulnae + incisura ulnaris radii
2. the joint capsule is attached to the margins of joint surfaces
3. discus articularis
4. cylindrical joint
5. supination, pronation

Joints of the hand

**Articulatio radiocarpalis et mediocarpalis**

articulario radiocarpalis

proximal row of carpal bones + facies articularis carpalis radii (+ discus articularis)

articulatio mediocarpalis

proximal row of carpal bones + distal row of carpal bones

Common characteristics: both joints create a functional unit. The joint capsule attaches itself on the margins of joint surfaces. Special joint apparatus: discus articularis, ligg. intercarpalia, lig. radiocarpeum, lig. ulnocarpeum. It is ellpsoidal joint, for this reason movements along two axes are possilble here: palmar and dorsal hand flexion and ulnar and radial hand duction. Combination of both types of movements results in circular movements (circumduction).

**Articulationes carpometacarpales**

Art. carpometacarpalis pollicis

1. os trapezium + base of first metacarpus

2. joint capsule is attached onto the margins of joint surfaces

3. lig. carpometacarpale

4. sellar-type of joint

5. abduction and adduction; oposition and reposition

Artt. carpometacarpales II. – V.

1. distal row of carpal bones + bases of 2nd to 5th metacarpus (also joint surfaces on adverted metacarpal bases)

2. joint capsule is attached onto the margins of joint surfaces

3. ligg. carpometacarpalia, ligg. metacarpalia

4. amphiarthrosis

5. mobility is minimal

**Articulationes metacarpophalangeales**

1. metacarpal heads + base of proximal phalanges
2. joint capsule is attached onto the margins of joint surfaces
3. lig. collaterale ulnare et radiale; lig. metacarpale transversum profundum (2nd to 5th metacarpus)
4. ellipsoidal joints
5. flexion and extension; abduction and adduction

**Articulationes interphalangeales manus**

1. trochlea phalangis + base of distally situated phalanx
2. joint capsule is attached onto the margins of joint surfaces
3. ligg. collateralia
4. trochlear joint
5. flexion and extension

Connection of lower extremity

I. Junction of girdle of lower extremity

**Pelvis as a whole**:pelvis minor, pelvis major (border)

Pelvic planes – aditus pelvis (pelvic inlet), amplitudo pelvis (pelvic width), angustia pelvis (narrow part), exitus pelvis (pelvic outlet). Only course of the border of the plains, not dimensions

**Articulatio sacroiliaca** (sacro-iliac joint)

1. facies auricularis ossis coxae + facies auriculares ossis sacri
2. joint capsule is attached to the margins of joint areas; it is solid and short
3. ligg. sacroiliaca dorsalia, ventralia, interossea
4. amphiarthrosis
5. practical immobile joint

**Symphysis pubica**

It is synchondrosis of the frontal margins of pelvis bones. Between facies symphysiales of both pubic bones is discus interpubicus (from fibrous cartilage). The junction is reinforced by two strong ligaments: lig. pubicum superius and inferius. The junction is practically immobile.

**Syndesmosis of pelvis**

Membrana obturatoria (conversion of the sulcus obturatoris into canalis obturatorius)

Lig. sacrospinale, lig. sacrotuberale (formation foramen ischiadicum majus et minus)

I. Junction of Free lower extremity

**Articulatio coxae** (hip joint)

1. caput femoris + facies lunata acetabuli
2. strong joint capsule is attached to the acetabular margin, which on femur reaches forward to linea intertrochanterica, dorsally it reaches approximately to the centre of collum femoris (fossa trochanterica lies extraarticularly)
3. labrum acetabuli, lig. iliofemorale, lilg. pubofemorale, lig. ischiofemorale (zona orbicularis), lig. capitis femoris, bursa synovialis
4. spherical joint with restricted movement
5. flexion and extension; abduction and adduction; supination and pronation

**Articulatio genus** (knee joint)

 1. a) condylus med. et lat. femoris + facies articularis med. et lat. on the proximal tibial end

 b) facies articularis patellae + facies patellaris femoris

 2. the joint capsule is strong and spacious. On femur it reaches about 1 cm proximally from the margins of joint surfaces; on tibia joint capsule is attached onto the margins of joint surfaces

 3. meniscus medialis (shape of a letter C), meniscus lateralis (circular shape); lig. cruciatum ant. et post. (connect area intercondylaris ant. et post. on the tibia with fossa condylaris on the femur; lig. patellae et retinaculum patellae

 4. composed type of a joint, trochlear

 5. flexion and extension

**Articulatio tibiofibulares** (tibiofibular joint)

1. facies articularis capitis fibulae + facies articularis fibularis tibiae
2. joint caqpsule is attached to the margins of joint surfaces
3. lig. capitis fibulae
4. flat joint
5. shifting movements are of negligible extens

**Membrana interossea cruris**

It is stretched between margo interosseus tibiae and fibulae. It serves as a division site of some crus muscles.

**Syndesmosis tibiofibularis**

Distal end of fibula is being inserted into incisura fibularis tibiae. Syndesmosis is secured by strong ligaments: lig. tibiofibulare ant. et post. The position of both bones is practical unchanged, fibular movements are only possible in the sense of a slight spring-shape elastic movement.

Foot joints

**Articulatio talocruralis**

1. facies articularis inferior tibiae, facies articularis malleoli medialis (on tibia), facies articularis malleoli lateralis (on fibula) + trochlea tali
2. joint capsule is attached onto the margins of joint surfaces
3. lig. collaterale mediale, lig. collaterale laterale
4. trochlear joint
5. plantar and dorsal flexion of the foot

**Intertarsal joints**

Articulatio subtalaris

facies articularis posterior on talus + facies articularis posterior on calcaneus

Articulatio talocalcaneonavicularis

facies articularis media and ant. on talus + facies articularis media and ant. on calcaneus

 caput tali + os naviculare

Common characteristics: joint capsule of each joint is attached onto the margins of joint surfaces. Both mentioned joints represent a mechanical unit (lower tarsal joint). The movements occur along the axis, passing through sinus tarsi. Resulting movements are internal rotation (pronation) and external rotation (supination) of the foot.

Articulatio calcaneocuboidea (calcaneus + os cuboideum)

Articulatio cuneonavicularis (ossa cuneiformia + os naviculare)

Articulatio cuneocuboidea (os cuneiforme lateralis + os cuboideum)

Common characteristics: each of these joints has a joint capsule that is attached to the edge of the articular surfaces. Above mentioned joints are joints with irregular joint surfaces (amphiarthroses) and only shifting movements of small extent are possible

Special joint apparatus of intertarsal joints: ligg. collateralia, ligg. interossea, dorsalia, plantaria (lig. plantare longum)

**Articulationes tarsometatarsales** (Lisfranck´s joint)

1. ossa cuneiformia and os cuboideum + base of 1th to 5th metatarsus
2. each of these joints has a joint capsule that is attached to the edge of the articular surfaces
3. ligg. tarsometatarsalia dorsalia, plantaria et interossea
4. amphiarthrosis
5. minimal movements

In this joint exarticulation (amputation) is possible

**Articulationes metatarsophalangeales**

1. metatarsal heads + base of proximal phalanges
2. joint capsule is attached onto the margins of joint surfaces
3. ligg. collateralia, lig. metatarsale transversum profundum
4. ellipsoidal joints
5. flexion and extension; abduction and adduction

**Articulationes interphalangeales pedis**

1. trochlea phalangis + base of distally situated phalanx
2. joint capsula is attached onto the margins of joint surfaces
3. ligg. collateralia
4. trochlear joint
5. flexion and extension

Foot vault (arcus pedis)

* longitudinal foot vault (medial and lateral lengthwise row)
* transversal foot vault
* special apparatus: muscles (m. tibialis ant. et post., m. fibularis longus), ligaments (longitudinal, transversal)
* significance of foot vault

General Myology

Structure of skeletal muscle (origo, venter musculi, insertio

Auxiliary muscular equipment (fascie, bursae synoviales, vaginae tendinum, trochleae musculares)

Vascularization, innervation

Classification of muscles according to:

* number of heads (one-headed muscle, multi-headed muscle)
* number of bellies (one-bellied muscle, multi-bellied muscle)
* function (flexors, extensors, abductors, adductors, levators, sfincters...)

Special myology

*For each muscle or muscle group, it is necessary to know the beginning, insertion, innervation and function. Fascias are part of the description of muscles. Simplified description of muscles or muscle groups is attached to the frame in form of tables.*

head muscles

**Mm. faciei:**

mm. epicranii: m. temporoparietalis, m. occipitofrontalis

muscles around the eye socket: m. orbicularis oculi, m. corrugator supercilii, m. procerus,

muscles of the nose: m. nasalis

muscles around the mouth: m. orbicularis oris, m. levator labii superioris alaeque nasi, m. levator labii superioris, m. zygomaticum major et minor, m. levator anguli oris, m. risorius, m. buccinator, m. depresor anguli oris, m. depresor labii inferioris, m. mentalis

**Mm. masticatorii**: m. temporalis, m. masseter, m. pterygoideus medialis, m. pterygoideus lateralis

**Fasciae of the head**:fascia temporalis, fascia masseterica, fascia buccopharyngea

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| --- | --- | --- | --- | --- |
| Musculi epicranii | Origin | Insertion | Function | Innervation |
| M. occipitofrontalis | *venter frontalis*: margo anterior of galea aponeurotica | skin of forehead and eyebrow | contraction causes transversal forehead wrinkles, and elevation of palpebra superior | n. facialis |
| *venter occipitalis*: linea nuchae suprema | galea aponeurotica | traction of the head skin dorsally, and erases forehead wrinkles |
| M. temporoparietalis | galea aponeurotica | articular cartilage  | pulls auricula cranially |

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| --- | --- | --- | --- | --- |
| Musculi masticatorii | Origin | Insertion | Function | Innervation |
| M. temporalis | planum temporale (as far as linea temporalis inf.) and internal surface of temporal fascia | processus coronoideus mandibulae | elevation and retrusion of mandible | n. trigeminus |
| M. masseter | *caput superficiale:* corpus ossis zygomatici et arcus zygomaticus (anterior ⅔) | tuberositas masseterica  | elevation and protrusion |
| *caput profundum:* arcus zygomaticus (posterior ⅓) | external surface of ramus mandibulae | elevation |
| M. pterygoideus medialis | *caput mediale*: fossa pterygoidea*caput laterale:* tuber maxillae | tuberositas pterygoidea  | bilaterally: elevationunilaterally: lateropulsion |
| M. pterygoideus lateralis | *caput superius*: facies infratemporalis alae majoris ossis sphenoidalis*caput inferius*: lamina lateralis processus pterygoidei | capsula articularis, fovea pterygoidea, discus articularis  | bilaterally: protrusionunilaterally: lateropulson |

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| Muscles of eye | Origin | Insertion | Function | Innervation |
| M. orbicularis oculi | circularly around the orbit, is attached to ligamentum palpebrale mediale | closing the eyelid | n. facialis |
| M. corrugator supercilii | sutura nasofrontalis | middle and lateral part of the eyebrows | vertical furrowing over radix nasí |
| M. procerus | osseous radix nasi | glabella | transversal skin folds above radix nasí |

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| Nasal muscle | Origin | Insertion | Function | Innervation |
| M. nasalis | juga alveolaria of the upper anterior teeth | ala nasi | narrowing of nostril | n. facialis |

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| Muscles of the mouth | Origin | Insertion | Function | Innervation |
| M. orbicularis oris | pars labialis,pars marginalis: juga alveolaria of incisors and inferior part of apertura piriformis | labial skin | mouth closing, labial constriction, labial puckering | n. facialis |
| M. levator labii superioris alaeque nasi  | angulus medialis orbitae et dorsum nasi | sulcus nasolabialis | elevation of upper lip and enlargement of nostril |
| M. levator labii superioris | inferior edge of aditus orbitae | labium superius | elevation of upper lip |
| M. levator anguli oris | fossa canina  | angulus oris | elevates angulus oris |
| M. zygomaticus minor et major | os zygomaticum | sulcus nasolabialis | pulls angulus oris and oral angle laterocranially |
| M. risorius | fascia masseterica | angulus oris | traction of oral angle laterocranially |
| M. depressor anguli oris | basis mandibulae | angulus oris | traction of angulus oris caudally |
| M. depressor labii inferioris | basis mandibulae | labium inferius | traction of lower lip caudally |
| M. mentalis | juga alveolaria of lower incisors | skin of the chin | pulls chin skin cranially, protrudes lower lip |
| M. buccinator | processus alveolaris of the posterior teeth et raphe buccopharyngeum | angulus oris | compresses cheeks againts molar teeth; sucking and blowingunilateral contraction: enlargement of the oral slit |

cervical muscles

Superficial layer

M. platysma

M. sternocleidomastoideus

Mm. suprahyoidei: mylohyoideus, m. digastricus, m. stylohyoideus, m. geniohyoideus

Mm. infrahyoidei: m. sternohyoideus, m. sternothyroideus, m. thyrohyoideus, m. omohyoideus

Deep layer

Mm. scaleni: m. scalenus anterior, m. scalenus medius, m. scalenus posterior

Mm. praevertebrales: m. longus colli, m. longus capitis, m. rectus capitis anterior, m. rectus capitis lateralis

**Fasciae of the neck:** fascia colli (lamina superficialis, lamina praetrachealis, lamina praevertebralis)

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| Superficial layer | Origin | Insertion | Action | Innervation |
| M. platysma | fascia pectoralis et deltoidea | skin over basis mandibulae | stretches cervical skin | plexus cervicalis |
| M. sternocleidomastoideus | manubrium sterni et clavicula (medial ⅓ ) | processus mastoideus et linea nuchae superior | bilateral: dorsiflexion of the head and neck; unilateral: lateroflexion of the head and neck; auxiliary inspiratory m. | n. accessorius, plexus cervicalis |

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| Suprahyoid muscles | Origin | Insertion | Action | Innervation |
| M. mylohyoideus | linea mylohyoidea | corpus ossis hyoidei, raphe mylohyoidea | mandibular depression; fixed mandible: elevates the hyoid bone | n. mylohyoideus (n. V.) |
| M. digastricus | venter posterior | incisura mastoidea | os hyoideum | fixed mandible: elevation of the hyoid bone | n. facialis |
| venter anterior | os hyoideum | fossa digastrica | fixed hyoid bone: mandibular depression; fixed mandible: elevation of the hyoid bone | n. mylohyoideus(n. V.)  |
| M. stylohyoideus | processus styloideus | os hyoideum | elevates the hyoid bone and pulls it dorsally | n. facialis |
| M. geniohyoideus | spina mandibulae | os hyoideum | mandibular depression; fixed mandible: elevation of the hyoid bone | n. hypoglossus |

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| Infrahyoid muscles | Origin | Insertion | Action | Innervation |
| M.sternohyoideus | manubrium sterni, art. sternoclavicularis | os hyoideum | depresses of hyoid bone and larynx | plexus cervicalis (ansa cervicalis profunda) |
| M. sternothyroideus | manubrium sterni, 1. rib | cartilago thyroidea(linea obliqua) | depresses larynx |
| M. thyrohyoideus | cartilago thyroidea (linea obliqua) | lateral part of body and greater horn of hyoid bone | depresses of hyoid bone |
| M. omohyoideus | venter inf.: margo superior scapulae (nearby lig. transversum) | continues as intermediate tendon, and then as venter sup., insertion on os hyoideum | depresses of hyoid bone and larynx |

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| Scalene muscles | Origin | Insertion | Action | Innervation |
| M. scalenus anterior | processus transversi of cervical vertebrae | first rib | unilateral: lateroflexion and rotation of neckbilateral: flexes neck; auxiliary inspiratory muscles | plexus cervicalis |
| M. scalenus medius |
| M. scalenus posterior | second rib |

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| Prevertebral muscle  | Origin | Insertion | Action | Innervation |
| M. longus colli | the muscle is located in front of body and transverse processes of cervical vertebrae | unilateral: lateroflexion of the head and neck; bilateral: flexes head and neck | plexus cervicalis |
| M. longus capitis | processus transversi of cervical vertebrae | pars basilaris ossis occipitalis | unilateral: lateroflexion of the head and neck; bilateral: flexes head and neck |
| M. rectus capitis anterior et lateralis | processus transversi of atlas | pars basilaris ossis occipitalis | unilateral: lateroflexion of the head and neck; bilateral: flexes head and neck |

thoracis muscles

Heterochtonous thoracic muscles: m. pectoralis major et minor, m. subclavius, m. serratus anterior

Autochtonous thoracic muscle: mm. intercostales externi et interni, m. transversus thoracis

Diaphragm (diaphragma), parts, openings

**Thoracic fasciae**: fascia pectoralis superficialis, fascia clavipectoralis, fascia endothoracica

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| Heterochtonnous muscles | Origin | Insertion | Action | Innervation |
| M. pectoralis major | *clavicular part:* clavicula (medial ½ ) | crista tuberculi majoris | adduction, internal rotation, arm flexion; auxiliary inspiratory m. | plexus brachialis |
| *sternocostal part:* manubrium sterni et cartilagines costae (2nd-7th) |
| *abdominal part:* vagina musculi recti abdominis |
| M. pectoralis minor | 3rd - 5th rib | processus coracoideus scapulae | pulls the clavicle;auxiliary inspiration m |
| M. serratus anterior | cranial 9 ribs | margo medialis et angulus inf. scapulae | pulls the clavicle from the backbone; pulls inferior angle laterally → rotates scapula; auxiliary respiratiion m. |
| M. subclavius | first rib | clavicula (inferior surface) | pulls clavicule → indirectly the shoulder distoventrally; auxiliary inspiration m. |

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| Autochtonnous muscles | Origin | Insertion | Action | Innervation |
| Mm. intercostales externi | inferior margin of ribs - from the costal tubercle to the beginning of rib cartilage | superior margin of ribs immediately below | elevation of lower ribs, thorax expansion → inspiratory m. | nn. intercostales |
| Mm. intercostales interni | superior margin of ribs - costal angle to sternum | inferior margin of ribs immediately above | adduction of cranial ribs to caudal ribs → expiratory m. |
| M. transversus thoracis | internal surface of xiphoid process and body of sternum | cartilagines costae verae | expiratory muscle |

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| --- | --- | --- | --- | --- |
| Diaphragma | Origin | Insertion | Action | Innervation |
| sternal part | inner surface of xiphoid process | centrum tendineum | main inspiratory muscle; abdominal press | n. phrenicus (plexus cervicalis) |
|  costal part | inner surface of cartilage of ribs 7-12 |
| lumbar part | med. crus: ligamentum longitudinale anterius (vertebrae lumbales)lat. crus: ligaments jump over the psoas and quadratus muscles |

abdominal muscles

Ventral group: m. rectus abdominis, m. pyramidalis

Lateral group: m. obliquus externus abdominis (ligamentum inguinale), m. obliquus internus abdominis, m. transversus abdominis

Dorsal group: m. quadratus lumborum

**Abdominal fasciae**: fascia abdominis superficialis, fascia transversalis. **Abdominal press**

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| Anterior group  | Origin | Insertion | Action | Innervation |
| M. rectus abdominis | xiphoid process and costal cartilages 5th – 7th | tuberculum pubicum | trunk anteflexion; increase abdominal press | nn. intercostales, plexus lumbalis |

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| Lateral group | Origin | Insertion | Action | Innervation |
| M. obliquus externus abdominis | lower ribs | crista iliaca, ligamentum inquinale, vagina musculi recti abdominis | ↑ abdominal press; bilateral - anteflexion, unilateral - contralateral rotation | nn. intercostales, plexus lumbalis |
| M. obliquus internus abdominis | fascia thoracolumbalis, crista iliaca, lig. inguinale | lower ribs et vagina musculi recti abdominis | auxiliary expiration m., ↑ abdominal press; bilateral - dorsiflexion, unilateral - homolateral rotation |
| M. transversus abdominis | fascia thoracolumbalis, crista iliaca, lower ribs | vagina musculi recti abdominis | auxiliary respiratory m., ↑ abdominal press; unilateral - homolateral lateroflexion |

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| Dorsal group | Origin | Insertion | Action | Innervation |
| M. quadratus lumborum | The muscle is attached between last rib, iliac crest and lumbar vertebrae | unilateral - homolateral lateroflexion, bilateral - dorsiflexion of backbone | plexus lumbalis |

dorsal muscles

Heterochtonous muscles

spinohumeral group: m. trapezius, m. latissimus dorsi, m. levator scapulae, m. rhomboideus major, m. rhomboideus minor

spinocostal group: m. serratus posterior superior et m. serratus posterior inferior

Autochtonous muscles

spinotransversal system: m. splenius capitis et cervicis

sacrospinal system: m. erector spinae (m. longissimus dorsi, cervicis et capitis; m. iliocostalis)

spinospinal system: m. spinalis thoracis et cervicis

transversospinal system: m. semispinalis thoracis, cervicis et capitis, mm. multifidi

Short dorsal muscles (mm. nuchae profundi)

m. rectus capitis posterior major

m. rectus capistis posterior minor

m. obliquus capitis superior

m. obliquus capitis inferior

**Fasciae of dorsal muscles:** fascia nuchae, fascia thoracolumbalis

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| Heterochtonnous muscles | Origin | Insertion | Action | Innervation |
| M. trapezius | protuberantia occipitalis externa, septum nuchae, processus spinosi C7 and all thoracic vertebrae | lateral ⅓ of clavicle, acromion and spina scapulae | adduction of shoulder, upper fibres elevates the scapula; the lower part pulls the scapula | n. accessorius et plexus cervicalis |
| M. latissimus dorsi | processus spinosi of caudal thoracic vertebrae, lumbar vertebrae, sacrum, crista iliaca and caudal ribs | crista tuberculi minoris | adduction, extension, medially rotation | plexus brachialis(n. thoracodorsalis) |
| M. levator scapulae | processus transversi of cranial cervical vertebrae | angulus superior scapulae | elevates scapula, rotates scapula medially | plexus brachialis(n. dorsalis scapulae) |
| M. rhomboideus major et minor | processus spinosus of caudal cerical and cranial thoracic vertebrae | margo medialis scapulae (minor - at the level of the scapular spine, major - from about the level of the scapular spine to the scapula's inferior angle) | pulls the scapula medially and cranially |
| M. serratus posterior superior | processus spinosus of caudal cervical and cranial thoracic vertebrae | cranial ribs | elevates the ribs → auxilliary inspiratory muscle | nn. intercostales |
| M. serratus posterior inferior | processus spinosus of caudal thoracic and cranial lumbar vertebrae | caudal ribs | auxiliary expiratory muscle |

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| --- | --- | --- | --- | --- |
| Autochtonnous muscles | Origin | Insertion | Action | Innervation |
| Spino-transversal | M. splenius capitis  | runs from processus spinosus to processus transversus | cranial base | bilateral – dorsiflexionunilateral - lateroflexion and homolateral rotation | dorsal roots of spinal nerves |
| M. splenius cervicis | cervical vertebrae |
| Transverso-spinal | Mm. semispinales capitis, cervicis et thoracic | are stretched from transversal to the spinous processes; is located along the whole spine with insertion on the cranial base | jump over 4-5 vertebrae | bilateral – dorsiflexion unilateral - homolateral lateroflexion and contralateral rotation |
| Mm. multifidi | jump over 1-3 vertebrae |
| Spino-spinal | Mm. spinales thoracis et cervicis | are stretched between processus spinosus of the thoracic and cervical vertebrae | bilateral – dorsiflexionunilateral - lateroflexion |
| Sacro- spinal | M. longissimus dorsi, cervicis et capitis | fill the space between processus spinosus et transversus | medial part | bilateral – dorsiflexionunilateral - homolateral lateroflexion |
| M. iliocostalis | lateral part |

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| Musculi nuchae profundi | Origin | Insertion | Action | Innervation |
| M. rectus capitis post. minor | tuberculum posterius atlantis | linea nuchae inferior | bilateral – dorsiflexion unilateral - homolateral lateroflexion and rotation | dorsal rootsof spinal nerves (suboccipital nerve) |
| M. rectus capitis post. major | processus spinosus axis | linea nuchae inferior |
| M. obliquus superior | processus transversi atlantis | linea nuchae inferior |
| M. obliquus inferior | processus spinosu axis | processus transversi atlantis |

upper extremity muscles

Mm. humeri (shoulder muscles)

m. subscapularis, m. supraspinatus, m. infraspinatus, m. teres minor, m. teres major, m. deltoideus

Mm. brachii (brachial muscles)

anterior group: m. brachialis, m. coracobrachialis, m. biceps brachii

posterior group: m. triceps brachii

Mm. antebrachii (antebrachial muscles)

anterior group, *superficial layer:* m. pronator teres, m. flexor carpi radialis, m. palmaris longus, m. flexor carpi ulnaris; *middle layer:* m. flexor digitorum superficialis; *deep layer:* m. flexor pollicis longus, m. flexor digitorum profundus, m. pronator quadratus. Retinaculum flexorum (vagina fibrosa), vaginae synoviales – not into the details, canalis carpi

lateral group: m. brachioradialis, m. extensor carpi radialis longus et brevis, m. supinator

posterior group, *superficial layer:* m. extensor digitorum communis, m. extensor digiti minimi, m. extensor carpi ulnaris; *deep layer:* m. abductor pollicis longus, m. extensor pollicis longus et brevis, m. extensor indicis. Retinaculum extensorum (vagina fibrosa), vaginae synoviales – not into the details

Mm. manus (short hand muscles)

thenar muscles: m. abductor pollicis brevis, m. flexor pollicis brevis, m. opponens pollicis, m. adductor pollicis

hypothenar muscles: m. abductor digiti minimi, m. flexor digiti minimi, m. opponens digiti minimi

middle group: mm. interossei dorsales et palmares

**Fasciae of the upper limb**:fascia deltoidea, fascia supraspinata, fascia infraspinata, fascia subscapularis, fascia brachii, fascia antebrachii, fascia manus(fascia dorsalis manus superficialis et interossea; fascia palmaris manus superficialis et interossea)

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| **Musculi humeri** | Origin | Insertion | Action | Innervation |
| M. deltoideus | pars lateralis claviculae, acromion and spina scapulae | tuberositas deltoidea | abduction,anterior part – anteflexion posterior part - dorsiflexion | plexus brachialisn. axillaris |
| M. subscapularis | fossa subscapularis | tuberculum minus humeri | humeral pronation | plexus brachialis n. subscapularis |
| M. teres major | angulus inferior scapulae | crista tuberculi minoris | adduction, extension and humeral pronation |
| M. teres minor | margo lateralis scapulae | inferior part of tuberculum majus | humeral supination | plexus brachialisn. axillaris |
| M. supraspinatus | fossa supraspinata | superior part of tuberculum majus | humeral supination and abduction | plexus brachialis n. suprascapularis |
| M. infraspinatus | fossa infraspinata | middle part of tuberculum majus | humeral supination |

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| **Musculi brachii** | Origin | Insertion | Action | Innervation |
| Anterior  | M. coracobrachialis | processus coracoideus scapulae | medial surfaceof the humerus | adduction and partial anteflexion in the humeral joint | plexus brachialis n. musculocutaneus |
| M. biceps brachii | *caput longum*: tuberculum supraglenoidale *caput breve*: processus coracoideus scapulae | tuberositas radii | *caput longum*:anteflexion abduction of the arm*caput breve:*anteflexion adduction of the arm |
| M. brachialis | distal ½ of the anterior surface of the humerus | tuberositas ulnae | flexion in elbow joint |
| Posterior | M. triceps brachii | *caput longum*: tuberculum infraglenoidale*caput lat.:* dorsal surface of the humerus proximally from sulcus n. radialis*caput med.:* dorsal surface of the humerus distally from sulcus n. radialis | olecranon ulnae | *caput longum*.extension of the elbow joint adduction of the arm*caput med. et lat*. extension of the elbow joint | plexus brachialis n. radialis |

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| **Musculi antebrachii** Anterior group | Origin | Insertion | Action | Innervation |
| Superficial layer  | M. pronator teres | epicondylus medialis | proximal part of the corpus radii | flexion at the elbow joint and pronation of forearm | plexus brachialisn. medianus n. ulnaris |
| M. flexor carpi radialis | long tendons of the hand | flexion at the elbow jointflexion of the hand |
| M. palmaris longus |
| \*M. flexor carpi ulnaris |
| Middle layer | M. flexor digitorum superficialis | epicondylus medialis and proximal end of the forearm | middle phalanges of 2nd-5th fingers | flexion at the wrist and the finger joints |
| Deep layer | M. flexor digitorum prof. | proximal end of the forearm | long tendons on the distal phalanges of the fingers | flexion of the hand and fingers |
| M. flexor pollicis longus |
| M. pronator quadratus | distal end of the ulna | distal end of the radius | pronation of the forearm |

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| **Musculi antebrachii** Dorsal group | Origin | Insertion | Action | Innervation |
| Superficiallayer | M. extensor digitorum communis | epicondylus lateralis | dorsal aponeurosis of the 2nd-5th fingers | dorsal flexion of the hand extension of the fingers | plexus brachialisn. radialis |
| M. extensor digiti minimi |
| M. extensor carpi ulnaris | base of the 5th metacarpal |
| Deeplayer | M. abductor pollicis longus | dorsal surface of proximal end of the forearm | bones of the thumb | is determined by names of the muscles |
| M. extensor pollicis brevis |
| M. extensor pollicis longus |
| M. extensor indicis | 2nd finger |

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| **Musculi antebrachii** Lateral group | Origin | Insertion | Action | Innervation |
| M. brachioradialis | lateral margin of the distal end of humerus | processus styloideus radii | flexion at elbow joint | plexus brachialisn. radialis |
| M. extensor carpi radialis longus et brevis | epicondylus lateralis | base of the 2nd and 3th metacarpals | extension of the hand |
| M. supinator | epicondylus lateralis, ulna and ligaments around the elbow joint | encircles the radius | supination of the forearm |

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| **Musculi manus** | Origin | Insertion | Action | Innervation |
| Thenar | M. abductor pollicis brevis | eminentia carpi radialis | skeleton of the thumb | is determined by names of the muscles | plexus brachialis n. medianus |
| M. flexor pollicis brevis |
| M. opponens pllicis |
| M. adductor pollicis | plexus brachialis n. ulnaris |
| Middle | Mm. interossei dorsales (4) et palmares (3) | metacarpal bones | proximal phalanges | dorsales: abduction palmares: adduction of the fingers |
| Hypothenar | M. abductor digiti minimi | eminentia carpi ulnaris | skeleton of the 5th finger | is determined by names of the muscles |
| M. flexor digiti minimi |
| M. opponens digiti minimi |

lower extremity muscles

Mm. coxae (coxal muscles)

anterior group: m. iliopsoas

posterior group: m. gluteus maximus, medius et minimus; m. tensor fasciae latae; pelvitrochanterické svaly (m. piriformis, m. obturatorius internus, m. gemellus superior et inferior, m. quadratus femoris)

Mm. femoris (femoral muscles)

anterior group: m. sartorius, m. quadriceps femoris

posterior group: m. semitendinosus, m. semimembranosus, m. biceps femoris

medial group: m. gracilis, m. adductor longus, brevis et magnus, m. pectineus, m. obturatorius externus

Mm. cruris (crural muscles)

anterior group: m. tibialis anterior, m. extensor hallucis longus, m. extensor digitorum longus. Retinaculum extensorum, vaginae synoviales – not detailed description

lateral group: m. fibularis (peroneus) longus et brevis. Retinaculum mm. peroneorum, vaginae synoviales – not detailed description

posterior group: *superficial layer* (m. triceps surae, m. plantaris, m. popliteus), *deep layer* (m. tibialis posterior, m. flexor digitorum longus, m. flexor hallucis longus). Retinaculum mm. flexorum, vaginae synoviales

Mm. pedis (foot muscles)

dorsal group: m. extensor hallucis brevis, m. extensor digitorum brevis

plantar group: the muscles of the sole of the foot can be divided into three groups:

*muscles of great toe*: m. abductor hallucis, m. adductor hallucis a m. flexor hallucis brevis;

*muscles of little toe:* m. abductor digiti minimi, m. flexor digiti minimi a m. opponens digiti minimi;

*middle region :*m. flexor digitorum brevis, m. quadratus plantae a v hloubce mm. interossei plantares et dorsales).

**Fasciae of lower extremity:** fascia iliaca, fascia psoica, fascia glutea, fascia piriformis, fascia obturatoria interna, fascia lata (tractus iliotibialis), fascia cruris, fascia pedis (fascia dorsalis pedis superficialis et interossea; fascia plantaris pedis superficialis et interossea)

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| Musculi coxae | Origin | Insertion | Function | Innervation |
| Anterior | M. iliopsoas | *m. psoas*: disci intervertebrales and ligaments along the lumbar backbone *m. iliacus*: fossa iliaca | pass through lacuna musculorum to trochanter minor femoris  | iliac joint flexion | plexus lumbalis |
| Posterior | M. gluteus maximus M. gluteus mediusM. gluteus minimus | external surface of the pelvis muscles lie in layers under the other | trochanter major et tuberositas glutea femoris | abduction, extension flexion at the hip joint | plexus sacralis (n. gluteus sup. et inf.) |
| M. tensor fasciae latae | spina iliaca ant. sup. | tractus iliotibialis  | tension of the tractus iliotibialis (stabilization on knee extension) |
| M. piriformis M. obturatorius int.M. gemellus sup., inf.M. quadratus femoris | muscles begin to sacrum and pelvic bone, directed laterally and inserted to the surroundings trochanter major | supination at the hip joint |

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| Musculi femoris | Origin | Insertion | Function | Innervation |
| Anterior | M. sartorius | spina iliaca ant. sup. | condylus medialis tibie | flexion at the knee jointand the hip joint | plexus lumbalis n. femoralis) |
| M. quadriceps femoris:m. vastus medialis, lateralis et interosseus; m. rectus femoris | mm. vasti:corpus femorism. rectus: spina iliaca ant. inf. | patella → ligamentum patellae into tuberositas tibiae | extension at the knee joint (m. rectus femoris also flexion at the hip joint) |
| Posterior | M. semitendinosus M. semimembranosus  | tuber ischiadicum  | condylus medialis tibie | extension at the hip jointflexion at the knee joint | plexus sacralis (n. ischiadicus) |
| M. biceps femoris | tuber ischiadicum, femur | caput fibulae |
| Medial | M. gracilis | near the symphysis | condylus medialis tibie | adduction at the hip joint and flexion at the knee joint | plexus lumbalis (n. obturatorius) |
| M. adductor magnus, longus et brevisM. pectineusM. obturatorius ext. | bones surrounding foramen obturatorius | corpus et condylus medialis femoris | adduction at the hip joint  |

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| Musculi cruris | Origin | Insertion | Function | Innervation |
| Anterior | M. tibialis ant. M. extensor hallucis longus M. extensor digit. longus | membrana interossea and the adjacent proximal parts of tibia and fibula | m. tibialis ant: os cuneiforme mediale other muscles: dorsal aponeurosis of the digits | dorsiflexion of the footextension of the digits | plexus sacralis n. fibularis prof.) |
| Lateral | M. fibularis longus et brevis | caput et corpus fibulae  | brevis: 5. metatarsus longus: across planta pedis to os cuneiforme mediale et I. metatarsus | pronation of the foot plantar flexion of the foot  | plexus sacralis (n. fibularis superf.) |
| Posterior | M. triceps surae:M. gastrocnemius (caput mediale et laterale) M. soleus | m. gastrocnemius: epicondylus med. et lat. femorism. soleus: caput fibulae, linea m. solei | tuber calcanei | flexion at the knee joint andplantar flexion of the foot | plexus sacralis (n. tibialis) |
| M. plantaris | epicondylus lat. femoris |
| M. popliteus | epicondylus lat. femoris | proximal part of the posterior tibial surface | flexion at the knee joint |
| M. tibialis post.M. flexor digitorum longusM. flexor hallucis longus | membrana interossea and the adjacent posterior parts of tibia and fibula | plantar surfaces of the tarsal, metatarsal bones and proximal phalanges of digits | plantar flexion of the foot and digits |

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| Musculi pedis | Origin | Insertion | Function | Innervation |
| Dorsal | M. extensor hallucis brevis M. extensor digitorum brevis | calcaneus(dorsal plane) | aponeurosis dorsalis | dorsiflexion of digits | plexus sacralis (n. fibularis prof.) |
| Middle | M. interossei plantares et dorsales | metatarsal bones | proximal phalanx of the digits | plantar: adduction of the digits dorsal: abduction of the digits | plexus sacralis (n. tibialis) |
| Plantar | *Hallux* M. abductor hallucis M. flexor hallucis brevis M. adductor hallucis | tarsal bones (plantar plane)  | skeleton of the thumb | is determined by names of the muscles (m. quadratus plantae helps in flection of the fingers) | plexus sacralis (n. tibialis) |
| *Middle region:*M. flexor digitorum brevis M. quadratus plantae | middle phalanx of the 2-5th digits |
| *Digiti minimi:* M. abductor digiti minimiM. flexor digiti minimi M. opponens digiti minimi | skeleton of the little digit |