

FRAME _ ANATOMY 1

DENTISTRY

ANATOMICAL NOMENCLATURE
OSTEOLOGY
ARTHROLOGY
MYOLOGY

2011/2012

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 (axis longitudinalis); sagittal (axis sagittalis); transversal (axis transversalis)

Directions: cranialis, caudalis; superior, inferior; ventralis, dorsalis; anterior, posterior; medianus, medialis, lateralis; dexter, sinister; superficialis, profundus; externus, internus; proximalis, distalis; radialis, ulnaris; tibialis, fibularis; dorsalis, palmaris, plantaris; mesialis, distalis; vestibularis, oralis; palatinalis, lingualis; labialis, buccalis; occlusalis; rostralis

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

Basic structure of the bone tissue:

substantia compacta, substantia spongiosa, periosteum, cavum medullare, medulla ossium (rubra, flava, grisea), bone architecture (trajectories) – only briefly (see histology)

Classification of bones according to the shape:

long bones, short bones, flat bones, irregular bones, pneumatic bones – with examples. In case of long bones description of its parts (proximal epiphysis, diaphysis, distal epiphysis)

X-ray: identification of individual bones, basic structures on bones and growth plate

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

SPECIAL OSTEOLOGY

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 meningae 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 styломastoideum)

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 muscoli 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:

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

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

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

Processus zygomatikus

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

Zygomatikus bone, facial bone (os zygomatikus)

Corpus ossis zygomatiki: facies orbitalis, facies lateralis, facies temporalis; foramen zygomatikoorbitale (canalis et foramen zygomatikofacialis et zygomaticotemporalis)

Processus: frontalis, maxillaris, temporalis (arcus zygomatikus)

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: celulae 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

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 (arcus anterior 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 mammillares
- 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

Sternal 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 talaris 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

GENERAL ARTHROLOGY

SYNARTHROSIS

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

JOINT (ARTICULATION)

Definition of the joint

General features of a joint (facies articulares – articular surfacces, cartilagine 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, muscoli 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 spheroidica: 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

Synchondroses: 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). Because 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. transversum 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 joints: 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.

JUNCTION 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

Syndesmotic 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. During the movement the frontal end of rib is rising or dropping down, and thus the shape of the chest is changing.

Juncturae sternocostales

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

1. cartilagineae 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 connecting the adjacent ribs. Externa is stretched between the cartilaginous 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

articulatio 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 ellipsoidal joint, for this reason movements along two axes are possible here: palmar and dorsal hand flexion and ulnar and radial hand deviation. Combination of both types of movements results in circular movements (circumduction).

Articulationes carpometacarpales

Art. carpometacarpalis pollicis

1. os trapezium + basis 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; opposition 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 + basis 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 + basis 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, lig. 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 capsule is attached to the margins of joint surfaces
3. lig. capitis fibulae
4. flat joint
5. shifting movements are of negligible extent

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 + basis 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 + basis 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 + basis 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. depressor anguli oris, m. depressor 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

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

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	<i>caput superficiale:</i> corpus ossis zygomatici et arcus zygomaticus (anterior $\frac{2}{3}$)	tuberositas masseterica	elevation and protrusion	
	<i>caput profundum:</i> arcus zygomaticus (posterior $\frac{1}{3}$)	external surface of ramus mandibulae	elevation	
M. pterygoideus medialis	<i>caput mediale:</i> fossa pterygoidea <i>caput laterale:</i> tuber maxillae	tuberositas pterygoidea	<u>bilaterally:</u> elevation <u>unilaterally:</u> lateropulsion	
M. pterygoideus lateralis	<i>caput superius:</i> facies infratemporalis alae majoris ossis sphenoidalis <i>caput inferius:</i> lamina lateralis processus pterygoidei	capsula articularis, fovea pterygoidea, discus articularis	<u>bilaterally:</u> protrusion <u>unilaterally:</u> lateropulsion	

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 nasi	
M. procerus	osseous radix nasi	glabella	transversal skin folds above radix nasi	

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

Muscles of the mouth	Origin	Insertion	Function	Innervation
M. orbicularis oris	<u>pars labialis</u> , <u>pars marginalis</u> : 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 against molar teeth; sucking and blowing unilateral 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)

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 1/3)	processus mastoideus et linea nuchae superior	<u>bilateral</u> : dorsiflexion of the head and neck; <u>unilateral</u> : lateroflexion of the head and neck; auxiliary inspiratory m.	n. accessorius, plexus cervicalis

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

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		<u>venter inf.</u> : margo superior scapulae (nearby lig. transversum)	continues as intermediate tendon, and then as <u>venter sup.</u> , insertion on os hyoideum	depresses of hyoid bone and larynx	

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

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

Heterochtonous muscles	Origin	Insertion	Action	Innervation
M. pectoralis major	<i>clavicular part</i> : clavicula (medial ½)	crista tuberculi majoris	adduction, internal rotation, arm flexion; auxiliary inspiratory m.	plexus brachialis
	<i>sternocostal part</i> : manubrium sterni et cartilagine costae (2nd-7th)			
	<i>abdominal part</i> : vagina muscoli 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 respiration m.
M. subclavius	first rib	clavicula (inferior surface)	pulls clavicle → indirectly the shoulder distoventrally; auxiliary inspiration m.

Autochthonous 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	cartilagineae costae verae	expiratory muscle	

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	<u>med. crus</u> : ligamentum longitudinale anterius (vertebrae lumbales) <u>lat. crus</u> : 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**

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

Lateral group	Origin	Insertion	Action	Innervation
M. obliquus externus abdominis	lower ribs	crista iliaca, ligamentum inguinale, 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	

Dorsal group	Origin	Insertion	Action	Innervation
M. quadratus lumborum	The muscle is attached between last rib, iliac crest and lumbar vertebrae		<u>unilateral</u> - homolateral lateroflexion, <u>bilateral</u> - 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 capitis posterior minor

m. obliquus capitis superior

m. obliquus capitis inferior

Fasciae of dorsal muscles: fascia nuchae, fascia thoracolumbalis

Heterochtonous muscles	Origin	Insertion	Action	Innervation
M. trapezius	protuberantia occipitalis externa, septum nuchae, processus spinosi C7 and all thoracic vertebrae	lateral 1/3 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 cervical and cranial thoracic vertebrae	margo medialis scapulae (<u>minor</u> - at the level of the scapular spine, <u>major</u> - 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	

Autochthonous muscles		Origin	Insertion	Action	Innervation
Spino-transversal	M. splenius capitis	runs from processus spinosus to processus transversus	cranial base	<u>bilateral</u> – dorsiflexion <u>unilateral</u> - 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	<u>bilateral</u> – dorsiflexion <u>unilateral</u> - 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		<u>bilateral</u> – dorsiflexion <u>unilateral</u> - lateroflexion	
Sacro-spinal	M. longissimus dorsi, cervicis et capitis	fill the space between processus spinosus et transversus	medial part	<u>bilateral</u> – dorsiflexion <u>unilateral</u> - homolateral lateroflexion	
	M. iliocostalis		lateral part		

Musculi nuchae profundi	Origin	Insertion	Action	Innervation
M. rectus capitis post. minor	tuberculum posterius atlantis	linea nuchae inferior	<u>bilateral</u> – dorsiflexion <u>unilateral</u> - homolateral lateroflexion and rotation	dorsal roots of spinal nerves (suboccipital nerve)
M. rectus capitis post. major	processus spinosus axis	linea nuchae inferior		
M. obliquus superior	processus transversus atlantis	linea nuchae inferior		
M. obliquus inferior	processus spinosus axis	processus transversus 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)

Musculi humeri	Origin	Insertion	Action	Innervation
M. deltoideus	pars lateralis claviculae, acromion and spina scapulae	tuberositas deltoidea	abduction, <u>anterior part</u> – anteflexion <u>posterior part</u> - dorsiflexion	plexus brachialis n. 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 brachialis n. 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	

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

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 brachialis n. medianus n. ulnaris
	M. flexor carpi radialis		long tendons of the hand	flexion at the elbow joint	
	M. palmaris longus			flexion of the hand	
	*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 thumb	
	M. flexor pollicis longus			flexion of the hand and fingers	
	M. pronator quadratus			pronation of the forearm	

Musculi antebrachii Dorsal group		Origin	Insertion	Action	Innervation
Superficial layer	M. extensor digitorum communis	epicondylus lateralis	dorsal aponeurosis of the 2nd-5th fingers	dorsal flexion of the hand extension of the fingers	plexus brachialis n. radialis
	M. extensor digiti minimi		base of the 5th metacarpal		
	M. extensor carpi ulnaris				
Deep layer	M. abductor pollicis longus	dorsal surface of proximal end of the forearm	bones of the thumb	abduction of the thumb	
	M. extensor pollicis brevis			extension of the thumb abduction of the thumb	
	M. extensor pollicis longus			thumb extension	
	M. extensor indicis		2 nd finger	extension of the 2nd finger	

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 brachialis n. 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	

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 pollicis				
	M. adductor pollicis				
Middle	Mm. interossei dorsales (4) et palmares (3)	metacarpal bones	proximal phalanges	adduction of the fingers abduction of the fingers	plexus brachialis n. ulnaris
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)

Musculi coxae		Origin	Insertion	Function	Innervation
Anterior	M. iliopsoas	<i>m. psoas</i> : disci intervertebrales and ligaments along the lumbar backbone <i>m. iliacus</i> : fossa iliaca	pass through lacuna musculorum to trochanter minor femoris	iliac joint flexion	plexus lumbalis
Posterior	M. gluteus maximus M. gluteus medius M. 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	

Musculi femoris		Origin	Insertion	Function	Innervation
Anterior	M. sartorius	spina iliaca ant. sup.	condylus medialis tibie	flexion at the knee joint and the hip joint	plexus lumbalis n. femoralis)
	<u>M. quadriceps femoris:</u> m. vastus medialis, lateralis et interosseus; m. rectus femoris	mm. vasti: corpus femoris m. 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 joint and flexion 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 brevis M. pectineus M. obturatorius ext.	bones surrounding foramen obturatorius	corpus et condylus medialis femoris	adduction at the hip joint	

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	<u>m. tibialis ant.:</u> os cuneiforme mediale <u>other muscles:</u> dorsal aponeurosis of the digits	dorsiflexion of the foot extension of the digits	plexus sacralis n. fibularis prof.)
Lateral	M. fibularis longus et brevis	caput et corpus fibulae	<u>brevis:</u> 5. metatarsus <u>longus:</u> 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	<u>M. triceps surae:</u> M. gastrocnemius (caput mediale et laterale) M. soleus	<u>m. gastrocnemius:</u> epicondylus med. et lat. femoris <u>m. soleus:</u> caput fibulae, linea m. solei	tuber calcanei	flexion at the knee joint and plantar 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 longus M. 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	<u>plantar:</u> adduction of the digits <u>dorsal:</u> abduction of the digits	plexus sacralis (n. tibialis)
Plantar	<i>Hallux</i> 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 flexion of the fingers)	plexus sacralis (n. tibialis)
	<i>Middle region:</i> M. flexor digitorum brevis M. quadratus plantae		middle phalanx of the 2-5th digits		
	<i>Digiti minimi:</i> M. abductor digiti minimi M. flexor digiti minimi M. opponens digiti minimi		skeleton of the little digit		

QUESTIONS FOR FINAL EXAMINATION ANATOMY, DENTISTRY

Section A

1. General osteology
2. Occipital bone
3. Sphenoid bone
4. Frontal and parietal bone
5. Temporal bone
6. Canals in os temporale
7. Ethmoidal bone
8. Maxilla
9. Mandibula
10. Splanchnocranial bones excluding maxilla and mandibula
11. Newborn skull. Gender differences on skull
12. Vertebrae. Sacral and coccygeal bones
13. Skeleton of the thorax (thoracic vertebrae, sternal bone, ribs)
14. Shoulder blade, clavicle, arm bone
15. Ulna, radial bone, hand bones
16. Pelvic bone, femur, patella
17. Tibia, fibula, foot bones
18. General arthrology
19. Junctions of skull (syndesmoses, synchondroses, temporomandibular joint)
20. Junctions of skull (craniovertebral joints)
21. Junctions of the spine, shape and movements of the spine
22. Junctions of the thoracic cage, chest cage (shape, movements)
23. Junctions of girdle of upper extremity. Shoulder joint
24. Elbow joint, radioulnar junction
25. Hand joints
26. Junctions of girdle of lower extremity. Pelvis as a whole. Planes of pelvis
27. Hip joint
28. Knee joint, tibiofibular junction
29. Foot joints. Foot vault
30. General myology
31. Head muscles_ muscoli faciei
32. Head muscles_ muscoli masticatorii
33. Cervical muscles, superficial layer (m. platysma, m. sternocleidomastoideus). Musculi scaleni
34. Cervical muscles_ muscoli supra et infrahyoidei
35. Cervical muscles_ muscoli praevertebrales. Neck muscle triangles
36. Thoracic muscles_ heterochtonous
37. Thoracic muscles_ autochtonous. Diaphragma
38. Abdominal muscles
39. Dorsal muscles_ heterochtonous
40. Dorsal muscles_ autochtonous. Musculi nuchae profundi
41. Upper extremity muscles_ muscoli humeri
42. Upper extremity muscles_ muscoli brachii
43. Upper extremity muscles_ muscoli antebrachii
44. Upper extremity muscles_ muscoli manus
45. Lower extremity muscles_ muscoli coxae
46. Lower extremity muscles_ muscoli femoris
47. Lower extremity muscles_ muscoli cruris
48. Lower extremity muscles_ muscoli pedis