

# Introduction to anatomy

# RECOMMENDED LITERATURE

- **Páč, L., Horáčková, L., Nechutová, H.:**  
***Anatomy of human locomotor system.*** Brno  
2010

**Atlases** for example:

- **Netter, F. H.:** ***Atlas of Human Anatomy***
- **Sobotta:** ***Atlas of Human Anatomy***

## Anatomical nomenclature

The first word is name of described formation,  
next adjectives specificate it  
and in the end there is a name of formation where the  
described formation is located.

Examples:

**Collum** (neck) **radii** (of radius)

**Collum** (a neck) **anatomicum** (anatomical) **humeri** (of humerus)

**Collum** (a neck) **chirurgicum** (surgical) **humeri** (of humerus)

**Tuberculum** (a tubercle, a bulge) **majus** (big) **humeri** (of humerus)

**Spina** (a thorn) **iliaca** (iliac) **anterior** (fore) **superior** (upper) **ossis coxae** (of coxal bone)

**Epicondylus medialis humeri**

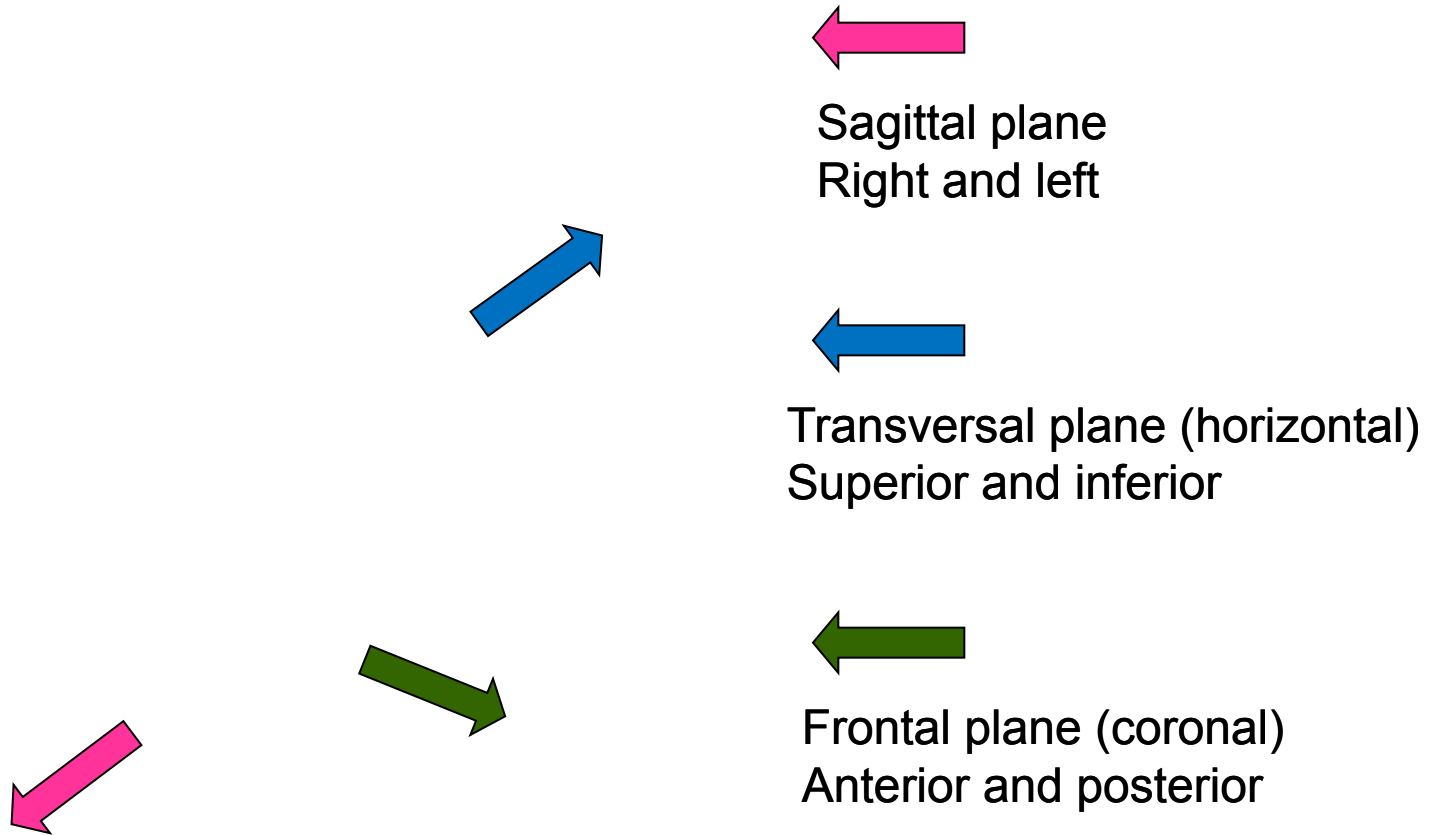
**Epicondylus medialis femoris**

**Anatomical position  
standard erect position**

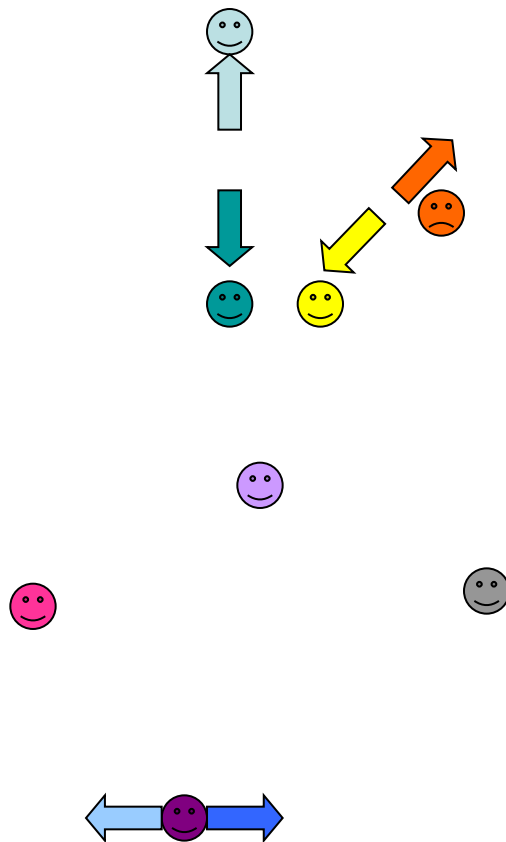
Not  
a military  
position

# Orientation on the body

# PLANES – 3 anatomical planes or sections



# Directions on the body



→ cranialis

😊 superior

→ ventralis

😊 anterior

→ medialis

😊 medianus

😊 dexter

● superficilais

😊 internus

→ caudalis

😊 inferior

→ dorsalis

😊 posterior

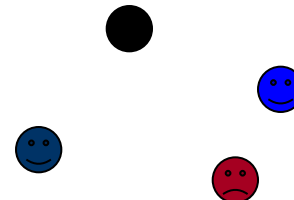
→ lateralis

😊 medius (intermedius)

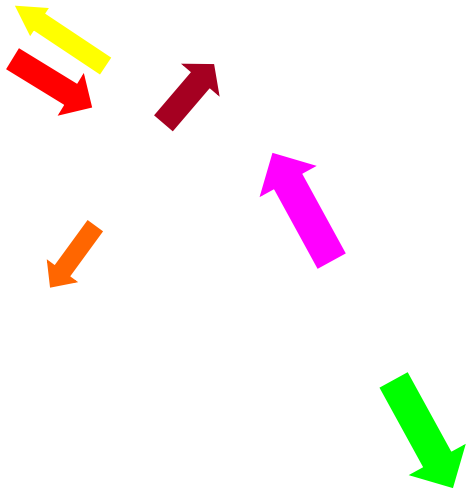
😊 sinister










😊 profundus

😊 externus



# Directions at the limbs



- proximalis 
- distalis 
- radialis 
- ulnaris 
- tibialis 
- fibularis 
- palmaris 
- plantaris 
- dorsalis 





# PARTS OF HUMAN BODY

head – **caput**

neck – **collum (cervix)**

trunk – **truncus**

chest – **thorax**

belly – **abdomen**

pelvis – **pelvis**

back – **dorsum**

Upper limb– **membrum superius**

arm – **brachium**

forearm – **antebrachium**

hand – **manus**

Lower extremity– **membrum inferius**

thigh – **femur**

leg – **crus**

foot- **pes**

# Positive and negative relief

- **Sulcus** – a groove
- **Incisura** – a notch
- **Canalis** – a canal
- **Fossa** – a pit, hollow
- **Fovea** – a pit, hollow
- **Processus** – a projection, prominence
- **Spina** – a thorn
- **Tuberculum** – a tubercle
- **Tuber** – a torus
- **Tuberositas** – a tuberosity
- **Foramen** – an opening, orifice, gap
- **Facies** – a facet, surface
- **Articulatio** – a joint
- **Os, ossis, ossa** – a bone, bones

**Caput** – a head

**Capitulum** – a small head

**Collum, cervix** – a neck

# X-ray's anatomy

**Anatomy is  
essential for  
understanding  
radiology.**

**Wilhelm Conrad Röntgen 1845-1923**

**1895 – discovery of x-ray**

**1901- awarded by Nobel price in physics**

# X-rays principle

- **A highly penetrating beam of x-rays „transluminates“ the patient, 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.**
- **Like a negative**
- **Light structures –shadows**
- **Dark structures -brightening**

**NATIVE x-ray**  
without using of  
contrast agent

**X-rays with contrast  
material** (Contrast  
examination)

Negative  
Gass, air

Positive  
Barium sulfate

Iodine-based molecules

# GENERAL OSTEOLOGY

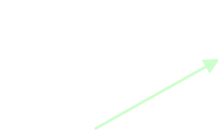
- skeleton - firm support of the body, protection for organs
- deposit of minerals
- haematogenesis

# BONE TYPES



# Long bones

- diaphysis
- epiphysis proximal and distal
- metaphysis
- cavitas medullaris
  
- substantia compacta (corticalis)
- substantia spongiosa



# Short bones

(various shapes)

- 1) On the surface - **corticalis**
- 2) Inside - **substantia spongiosa**

# Flat bones

**1) Compact bone** has two layers:

**lamina externa and interna** and between them,  
there is **spongy bone – diploe**

# **Sesamoidal bones**

In some muscle ligaments

# **Pneumatized bones**

# STRUCTURE OF BONES

# PERIOSTEUM

a) Fibrous layer(external)

b) Cambious layer (internal) – rich sensory innervation

1 – **periosteum**

2 – Sharpey fibres

3 – vessels

4 – **endosteum**

We know two forms of bone tissue

a) Compact bone (**substantia compacta**)

b) Spongy bone (**substantia spongiosa**)

# Compact bone

- 1 – Haversian lamellas**
- 2 – intersected lamellas**
- 3 – superficial lamellas**
- 4 – spongy bone**



# The spongy bone

- Substantia spongiosa
- Substantia compacta
- Skull - diploe

# BONE MARROW

Medulla ossium rubra - red bone marrow  
(active hematopoietic tissue)

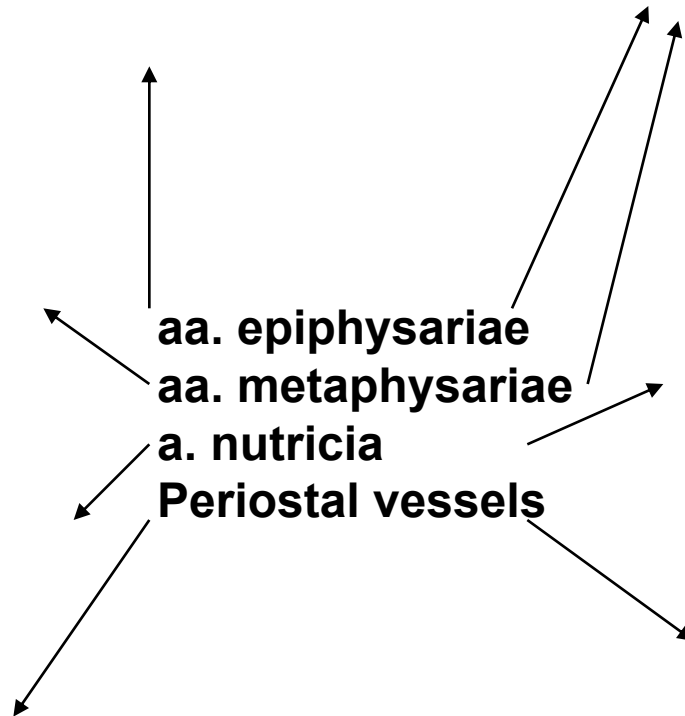
Medulla ossium flava - yellow bone marrow  
(source of energy for organism)

Medulla ossium gelatinosa - grey bone marrow

# BONE VESSELS

- The most important bone vessels come through periosteum via **Volkmann's channels**

# Blood supply of the long bone



# X-RAY PICTURES

4,5 years

7 years

11 years

14 years

SPECIAL OSTEOLOGY

SKELETON OF THORAX

# COLUMNA VERTEBRALIS - SPINE

- During development: 33-34 vertebrae
- After fusion: 24 vertebrae

## Vertebrae

7 cervical

12 thoracic

5 lumbar

4-5 sacral- os sacrum

4-5 coccygeal- os coccygis





# VERTEBRA

## corpus vertebrae

facies terminalis superior et inferior

## arcus vertebrae

pediculus arcus vertebrae

lamina arcus vertebrae

foramen vertebrale

incisura vertebralis

## processus

processus articulares

processus transversi

processus spinosus

# DEVELOPMENT OF THE VERTEBRAE

Corpus vertebrae

Arcus vertebrae

Processus articulares

Processus transversus

Processus spinosus

Costa

# CERVICAL VERTEBRAE

- uncus corporis vertebrae
- processus transversus -  
tubercula anteriora et  
posteriora, foramina processus  
transversi
- oval body
- Triangular foramen vertebrale
- cleft processus spinosus
- processus articulares - in  
oblique plane

**Corpus vertebrae**

**Arcus vertebrae**

**Processus articulares**

**Processus transversus**

**Processus spinosus**

**Costa**

# ATLAS - C1

- **arcus anterior**  
tuberculum anterius  
fovea dentis
- **arcus posterior**  
tuberculum posterius  
sulcus a. vertebralis
- **massae laterales**  
processus transversi  
foramina pr. transversi

**Corpus vertebrae**

**Arcus vertebrae**

**Processus articulares**

**Processus transversus**

**Processus spinosus**

**Costa**

# AXIS - C2

- dens axis (original body of atlas)- apex dentis
- facies articularis anterior et posterior
- os odontoideum

**Corpus vertebrae**

**Arcus vertebrae**

**Processus articulares**

**Processus transversus**

**Processus spinosus**

**Costa**



**C6- TUBERCULUM CAROTICUM**

**VERTEBRA PROMINENS- C7**

# VERTEBRAE THORACICAE

- **corpus:** foveae costales - superiores, inferiores
- **processus transversus** 1.-10.Th: fovea costalis pr. transversi
- **processus articulares:** in frontal plane
- **Th4 - 9:** impressio aortica

**Corpus vertebrae**

**Arcus vertebrae**

**Processus articulares**

**Processus transversus**

**Processus spinosus**

**Costa**

# VERTEBRAE LUMBALES

- **processus costarii**
- **processus accesorius**- more caudally
- **processus mamillaris**- more cranially
- **processus articulares**- in sagittal plane
- **processus spinosi**- flat plate
- **Sacralization of last lumbar vertebra**

**Corpus vertebrae**

**Arcus vertebrae**

**Processus articulares**

**Processus transversus**

**Processus spinosus**

**Costa**

# OS SACRUM

- **facies dorsalis**- crista- mediana, medialis, lateralis
- **facies auricularis**- partes laterales ossis sacri
- **facies pelvina**- lineae transversae
- **foramina sacralia**- dorsalia, pelvina
- **canalis sacralis**- hiatus sacralis- cornua sacralia
- **basis ossis sacri**
- **apex ossis sacri**

**Corpus vertebrae**

**Arcus vertebrae**

**Processus articulares**

**Processus transversus**

**Processus spinosus**

**Costa**

# OS COCCYGIS

- cornua ossis coccygis=  
processus transversi Co1
- apex coccygis

**Corpus vertebrae**

**Processus articulares**

**Processus transversus**



# COSTAE - RIBS

- 12 pairs of ribs:
- **costae verae**: 7 pairs, true ribs
- **costae spuriae**: 8th-10th pair, false ribs
- **costae fluctuantes (liberae)** : 11th and 12th pair- free ribs
- length- from 1st to 8th increases, the smallest: 1st and 12th, the largest 6th - 9th

# RIB

## os costae + cartilago:

- caput costae, crista
- collum costae
- tuberculum costae
- corpus costae
- crista costae
- sulcus costae
- angulus costae

**Facies articularis capitis costae**  
**Facies articularis tuberculi costae**

## **COSTA PRIMA/the first rib**

- sulcus arterie subclaviae
- (sulcus venae subclaviae)
- tuberculum m. scaleni anterioris
- insertion of m. scalenus medius
- beginning of m. subclavius

## **COSTA SECUNDA/the second rib**

- tuberculum m. scaleni posterioris
- tuberositas m. serrati anterioris

# STERNUM

- **manubrium sterni**- incisura-jugularis, clavicularis and places for connection with cartilages of the first pair of ribs
- **angulus sterni**
- **corpus**- incisurae costales
- **processus xiphoideus**

# X-RAY of cervical spine

# X-RAY of thoracic spine



# X-RAY of lumbar spine

# Thank you for your attention!

## Pictures:

**Atlas der Anatomie des Menschen/Sobotta. Putz,R., und Pabst,R. 20. Auflage.  
München:Urban & Schwarzenberg, 1993**

**Netter: Interactive Atlas of Human Anatomy.**

**Naňka, Elišková: Přehled anatomie. Galén, Praha 2009.**

**Čihák: Anatomie I, II, III.**

**Drake et al: Gray's Anatomy for Students. 2010**