

MUNI

Overview of the veins and lymphs

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MUNI

VEINS



Head
Neck
UL
Thorax

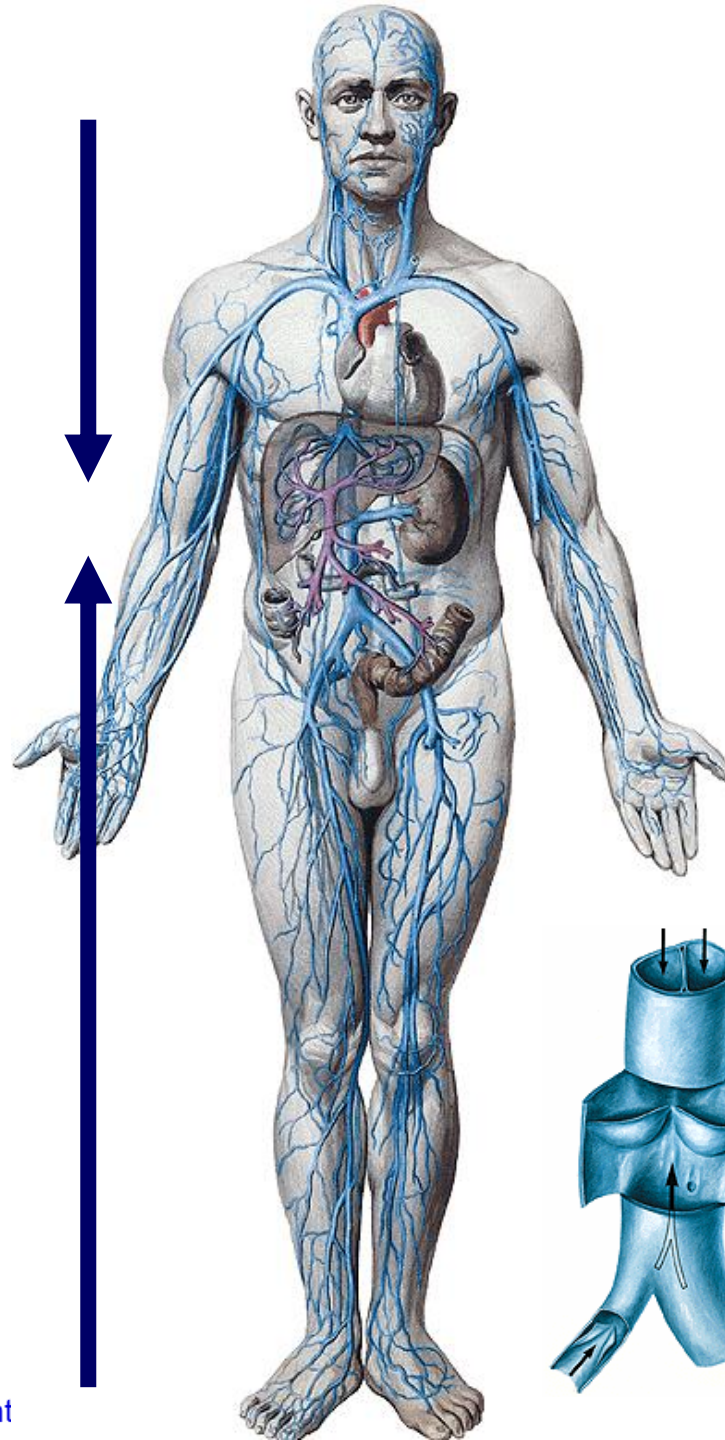
V. cava sup.

Atrium dx.

V. cava inf.

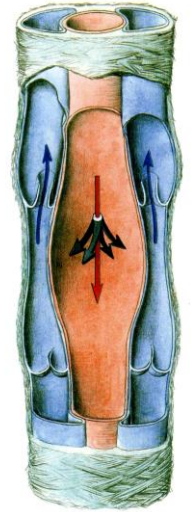
abdomen
pelvis
LL

V. PORTAE



Vv. pulm.

Atrium sin.



CAPILLARIES, SINUSOIDS,
POSTCAPILLARY VENULES

VENULES, VEINS

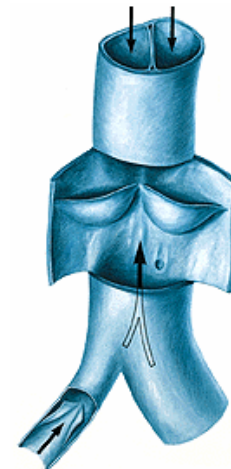
TUNICA INTIMA, MEDIA, ADVENTITIA

VASA VASORUM,
SYMPATHETIC AND AFFERENT NERVES

VALVES, SINUS

PHLEBOGRAPHY

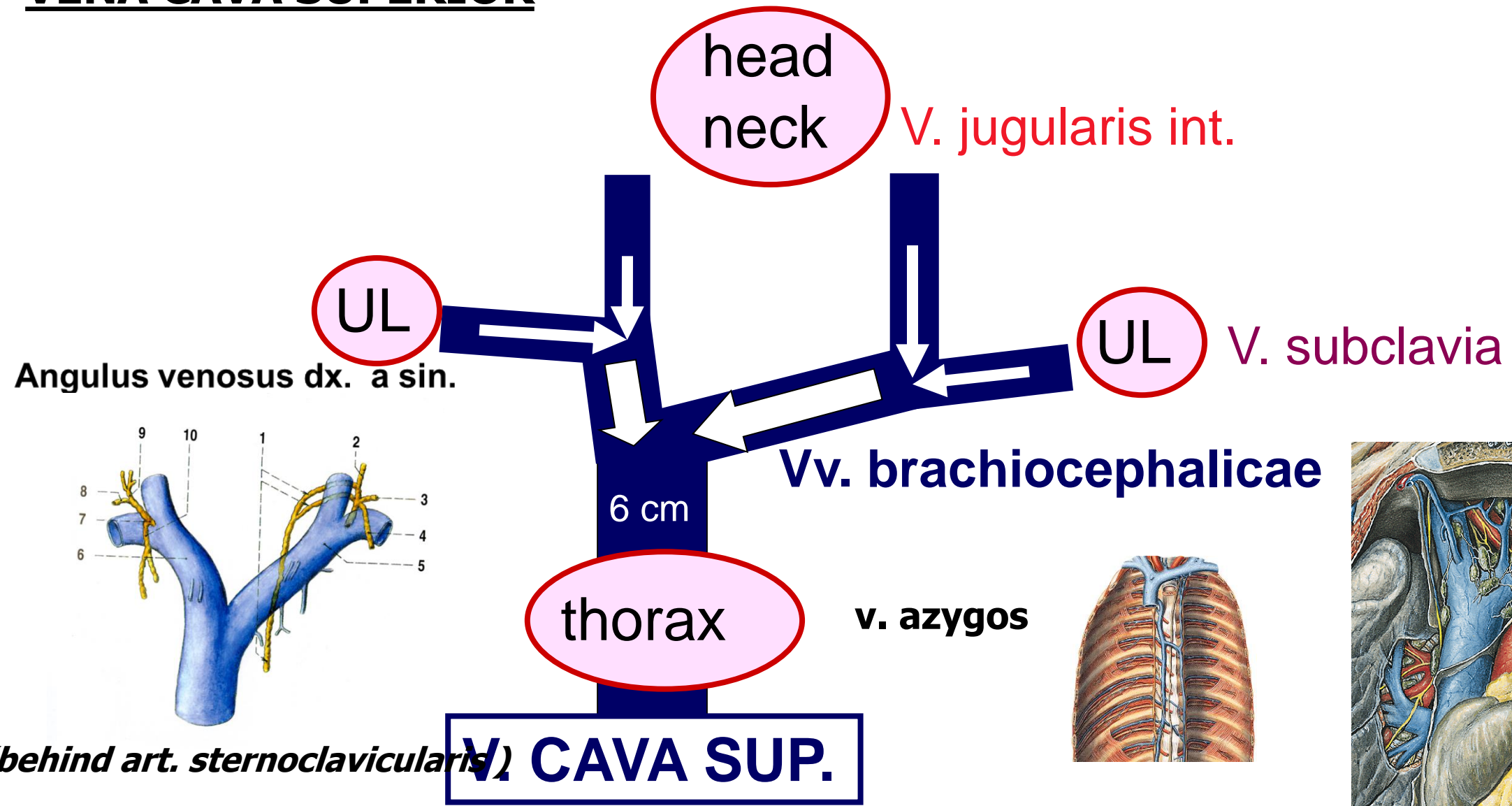
VENAE COMITANTES



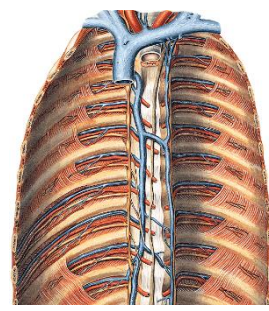
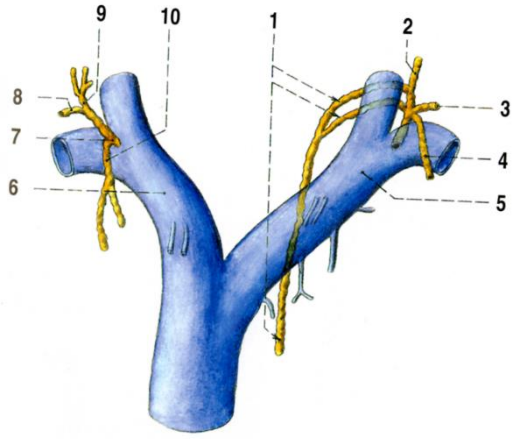
ly Brno



VENA CAVA SUPERIOR



Angulus venosus dx. a sin.



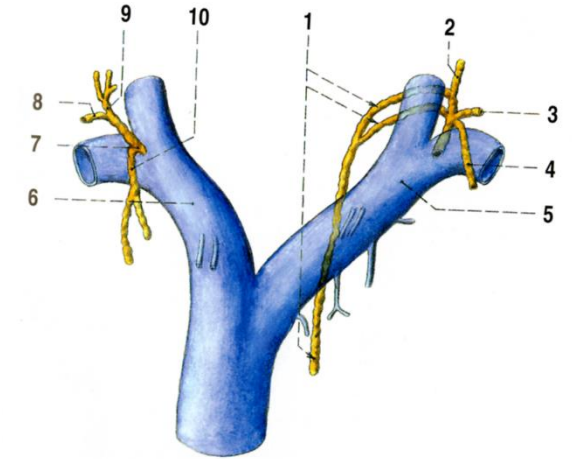
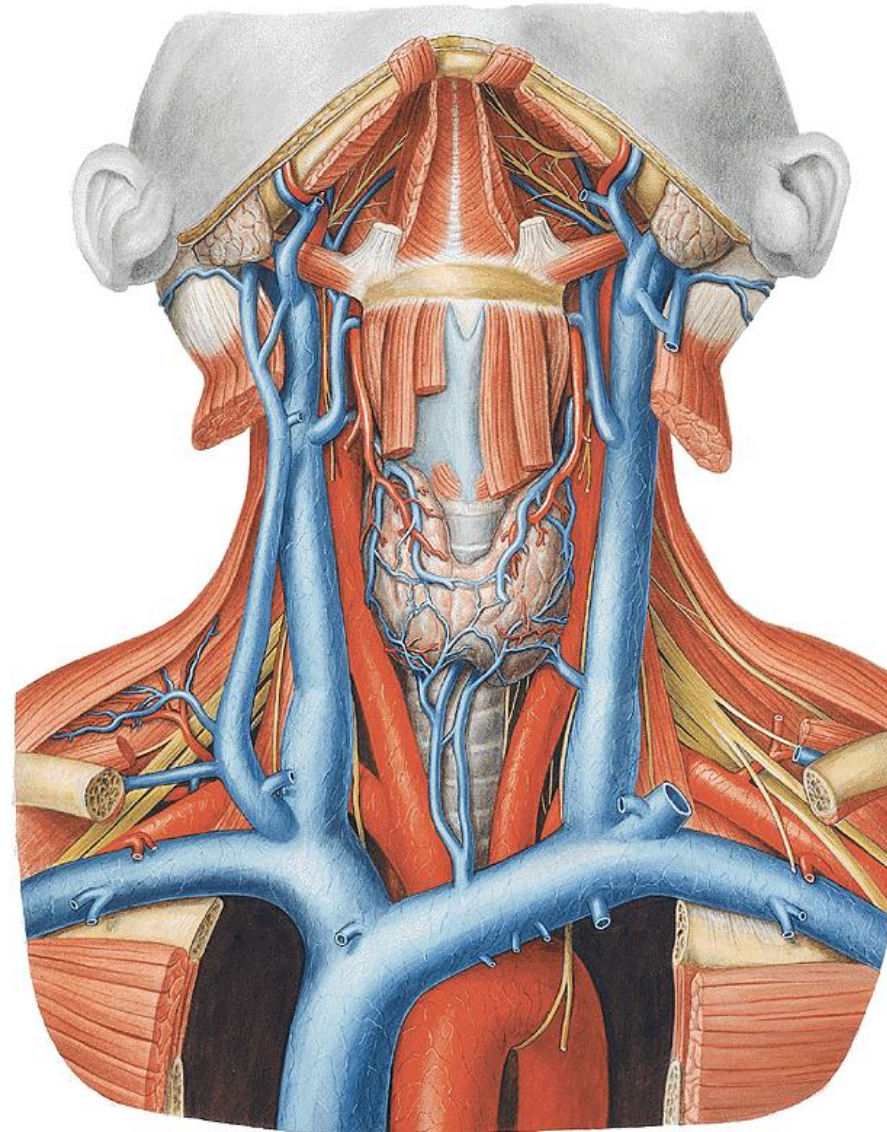
behind art. sternocostalis III. opens out into the right atrium

Venae brachiocephalicae

Angulus venosus dx. a sin.

The truncal tributaries
v. jugularis int.
- v. subclavia
(angulus venosus)

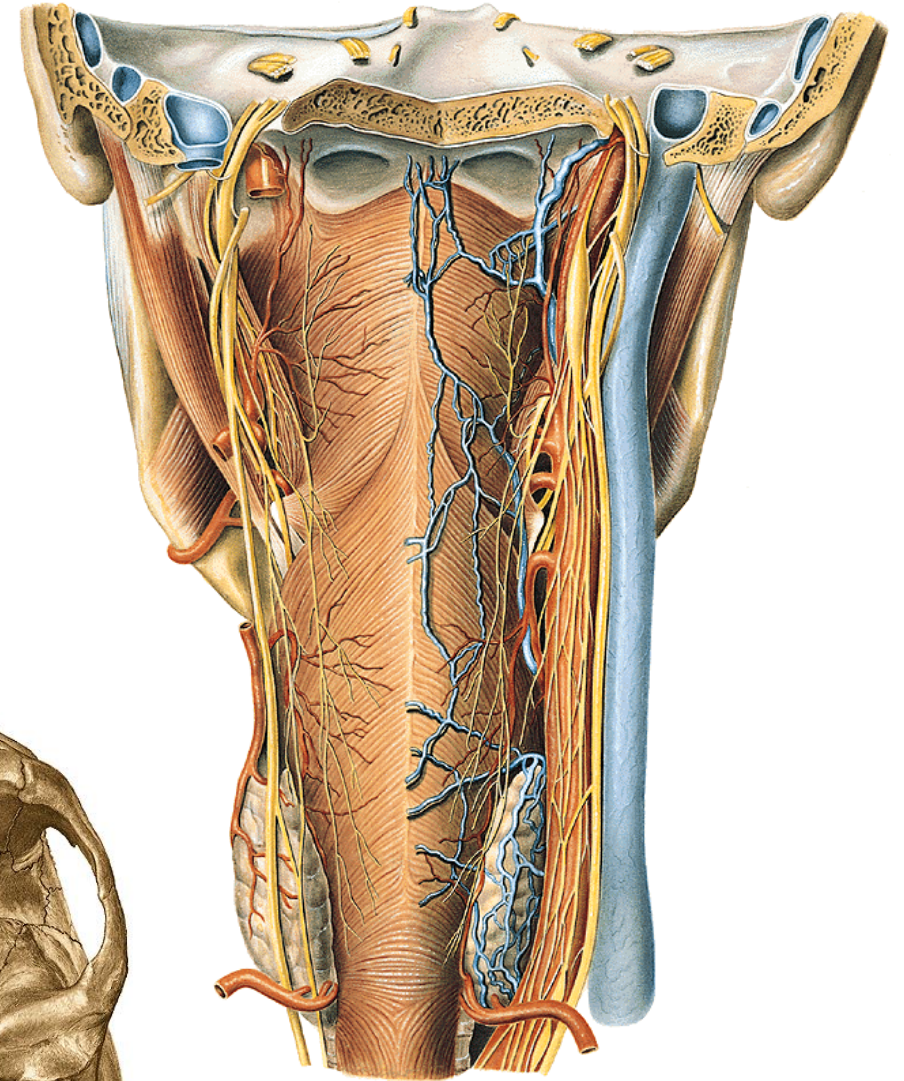
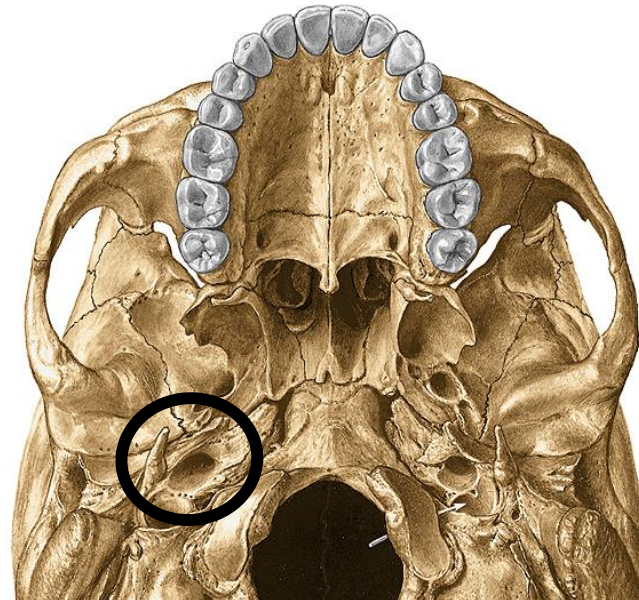
The collateral branches
from the thyroid gland,
the larynx,
the trachea
vena vertebralis
vena thoracica interna
from the mediastinal organs



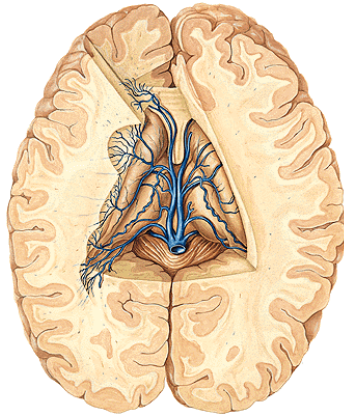
Vena jugularis interna

- The cranial cavity, the facial areas of the head, the neck
- It starts as *bulbus superior venae jugularis internae*, behind the sternoclavicular joint it is extended as *bulbus inferior venae jugularis internae*

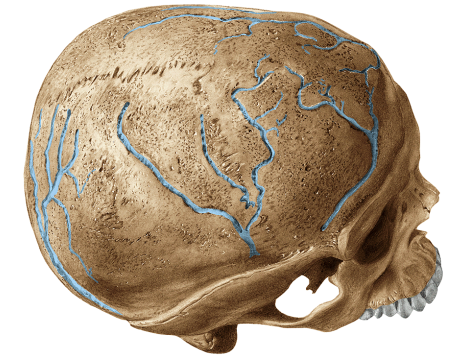
- INTRACRANIAL TRIBUTARIES
(region supplied by a. carotis interna)
- EXTRACRANIAL TRIBUTARIES
(region supplied by a. carotis externa)



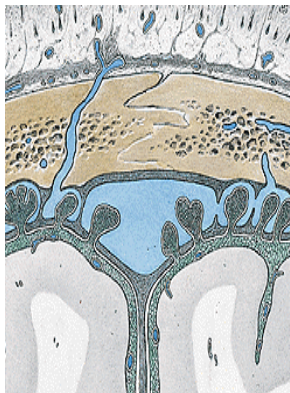
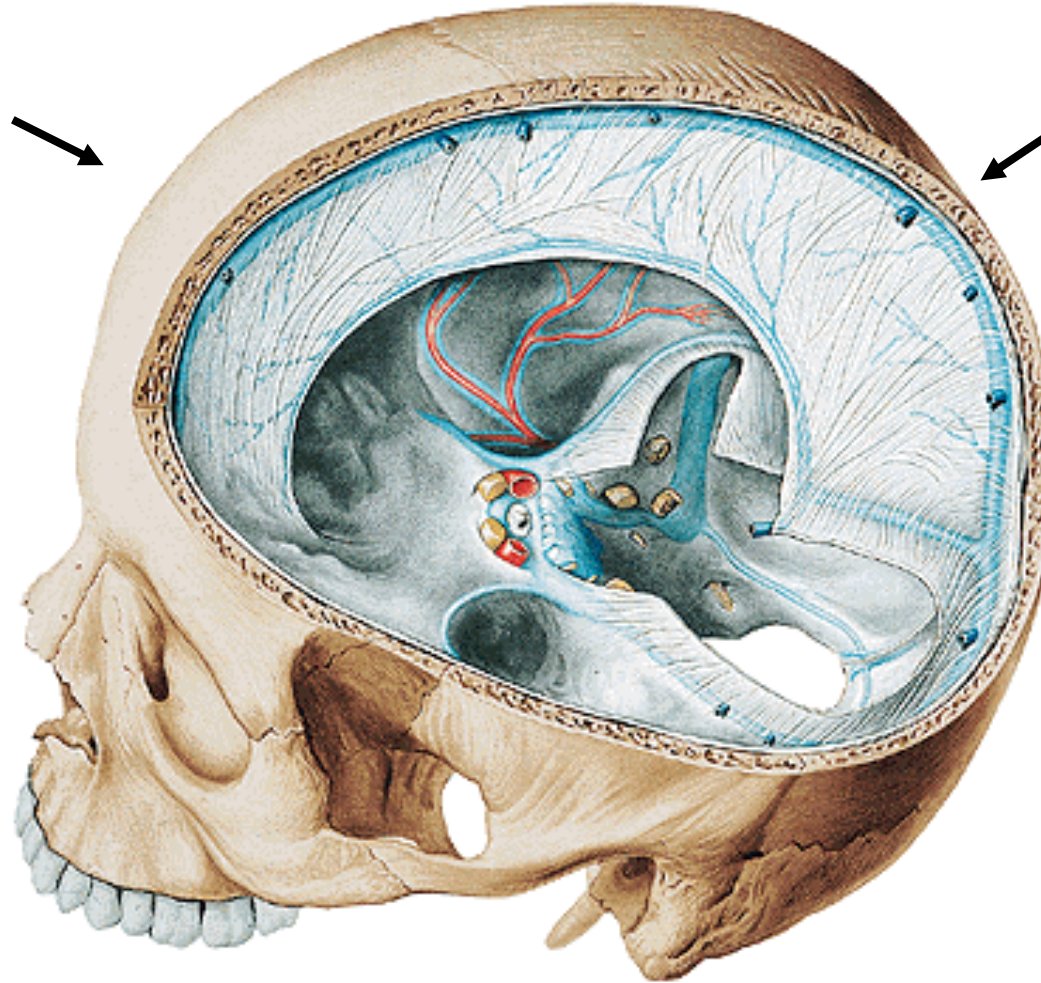
Intracranial tributaries



venae cerebri

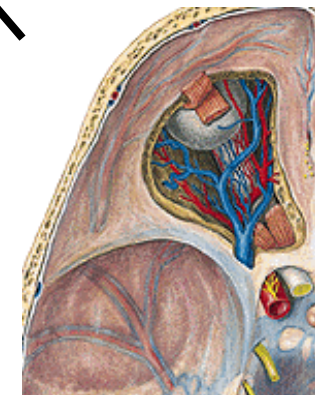


venae diploicae



venae emissariae

- ***sinus durae matris***
(without the smooth muscle
and valves)



venae ophthalmicae



Extracranial tributaries

Anterior (separately, from stem...)

- v. facialis
- v. lingualis
- from thyroid gland, larynx and trachea

Medial (separately)

- v. pharyngea (plexus pharyngeus)

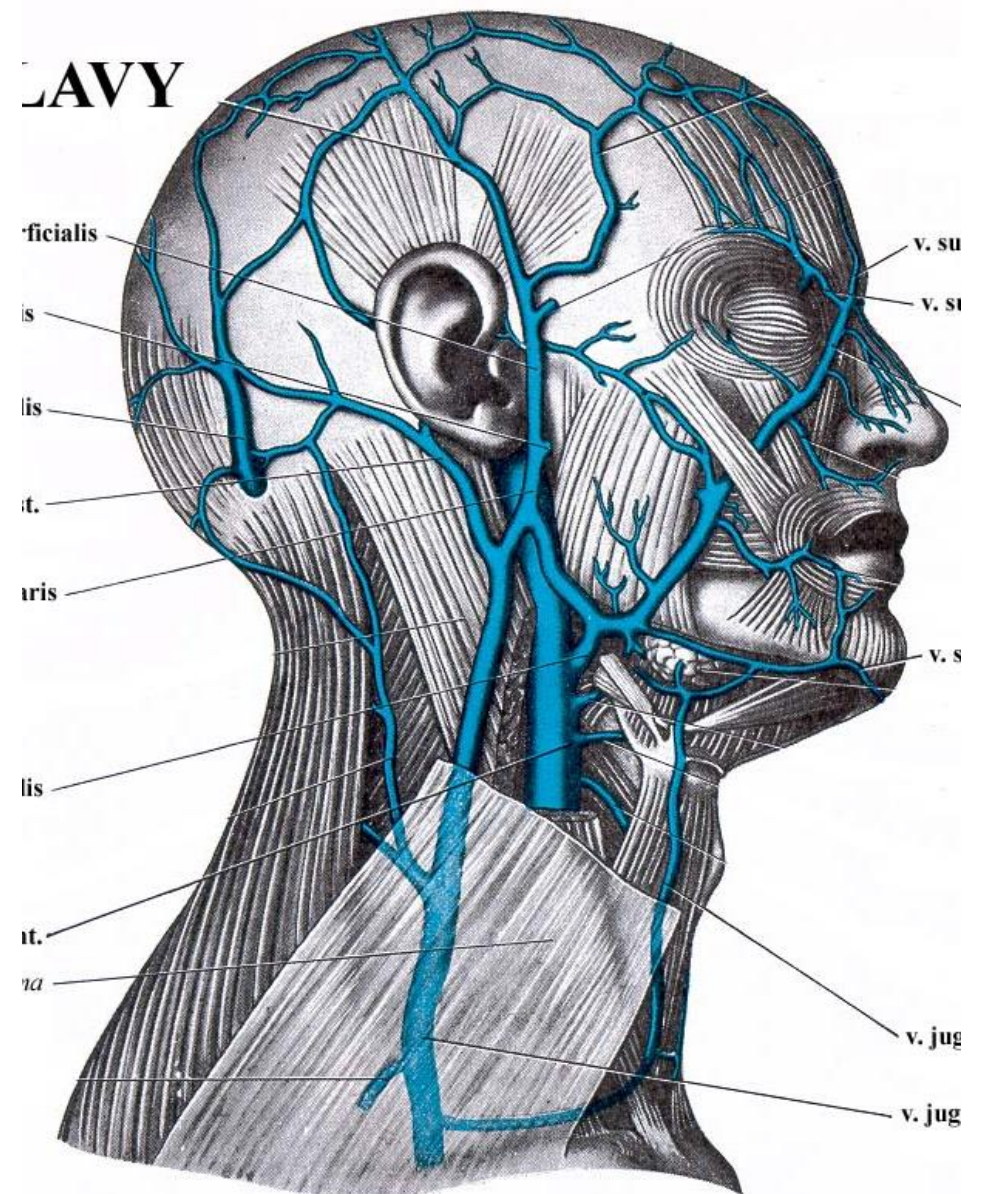
Posterior (vena jugularus externa

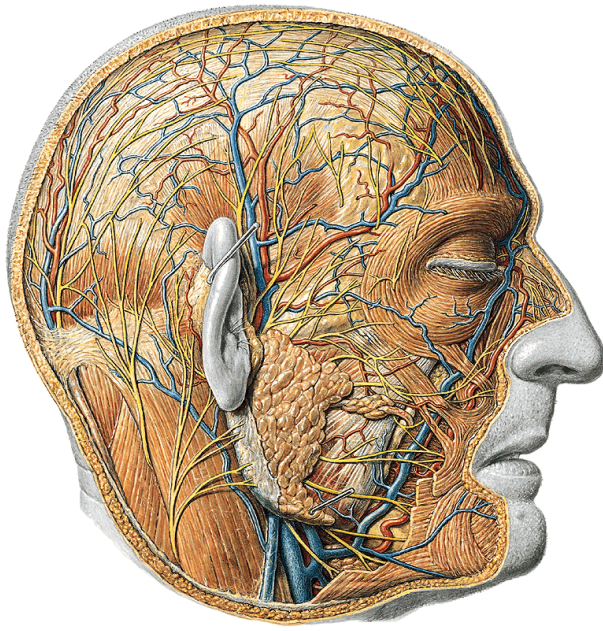
– the subcutaneous vein)

- v. auricularus posterior
- v. occipitalis

Stem (vena retromandibularis)

- v. temporalis superficialis
- v. maxillaris (plexus pterygoideus)

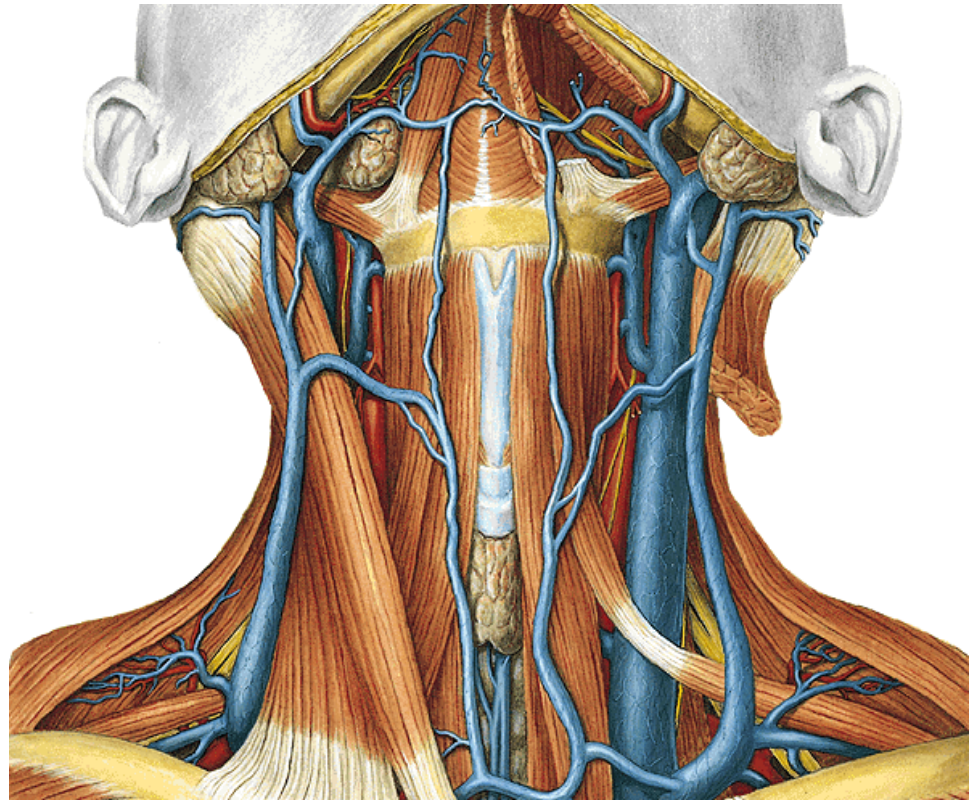




HEAD AND NECK

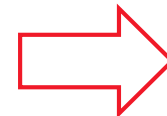
v. jugularis ext.

Originate from fusion
v. occipitalis
v. auricularis post.



tributaries

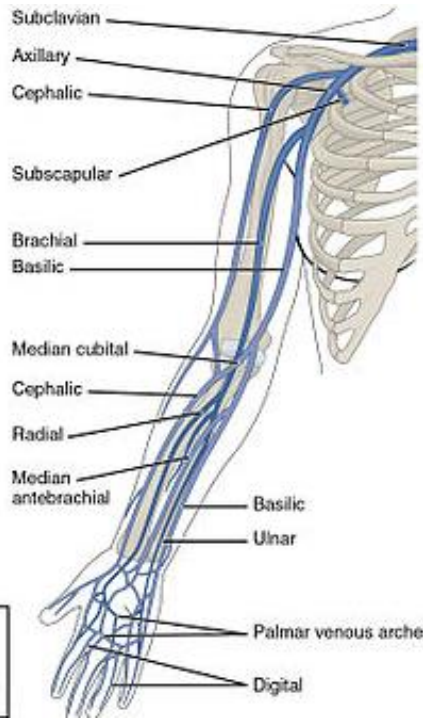
vv. jugulares ant.
(v. transv. colli et
suprascapularis)



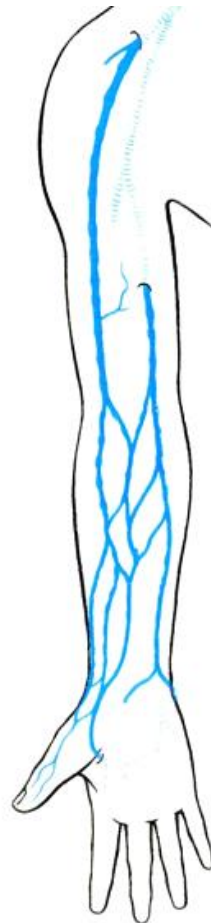
v. jug. int.
v. subclavia
Venous angle



VEINS OF THE UPPER LIMB



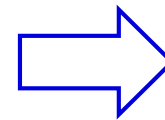
V. cephalica
V. basilica



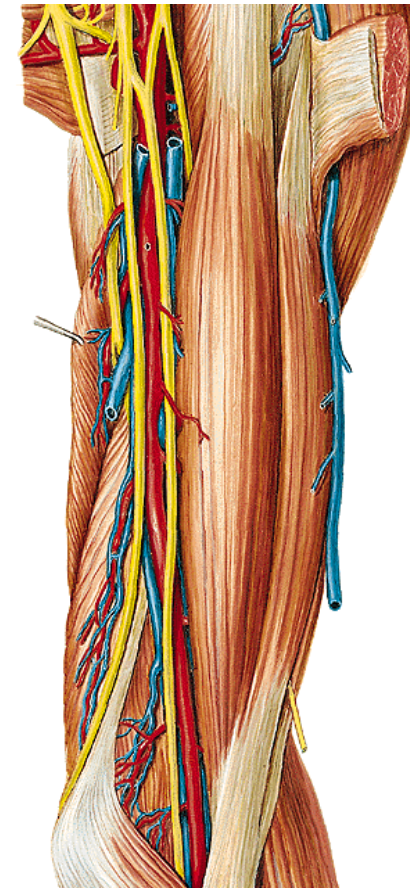
Deep – accompany arteries, same names
Superficial - subcutaneous

They create the subcutaneous nets
(*rete venosum dorsale et palmare manus*)

Vv. digitales
radiales
ulnares
interosseae
brachiales



v. axillaris



Superficial veins

vv. digitales

> vv. metatarsales

> rete venosum dorsale

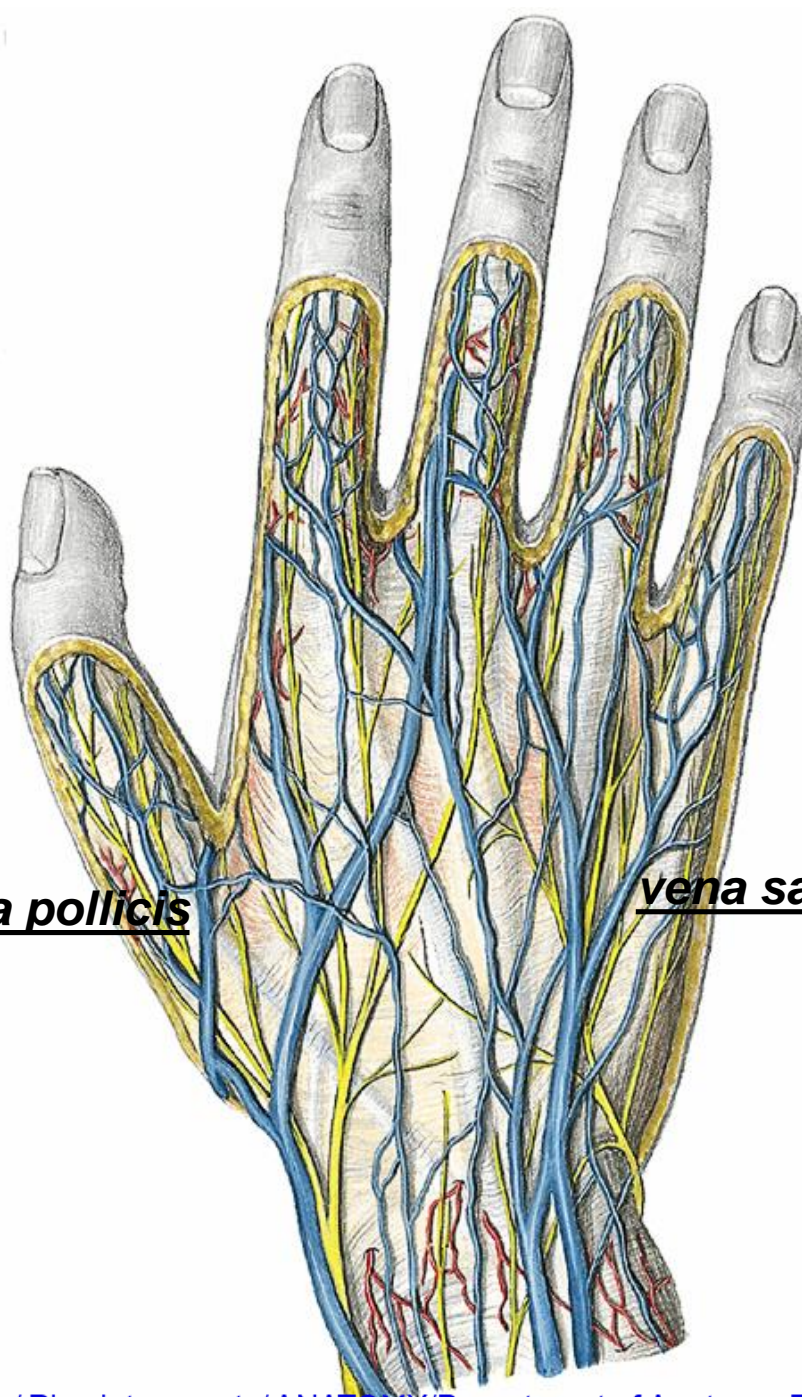
through vv. intercapitulares

Tributaries from rete ven. palmare

Thumb → **v. cephalica**

Small finger → **v. basilica**

These two veins are interconnected through *vena mediana cubiti*, in the region of the cubital fossa



vena cephalica pollicis

vena salvatella



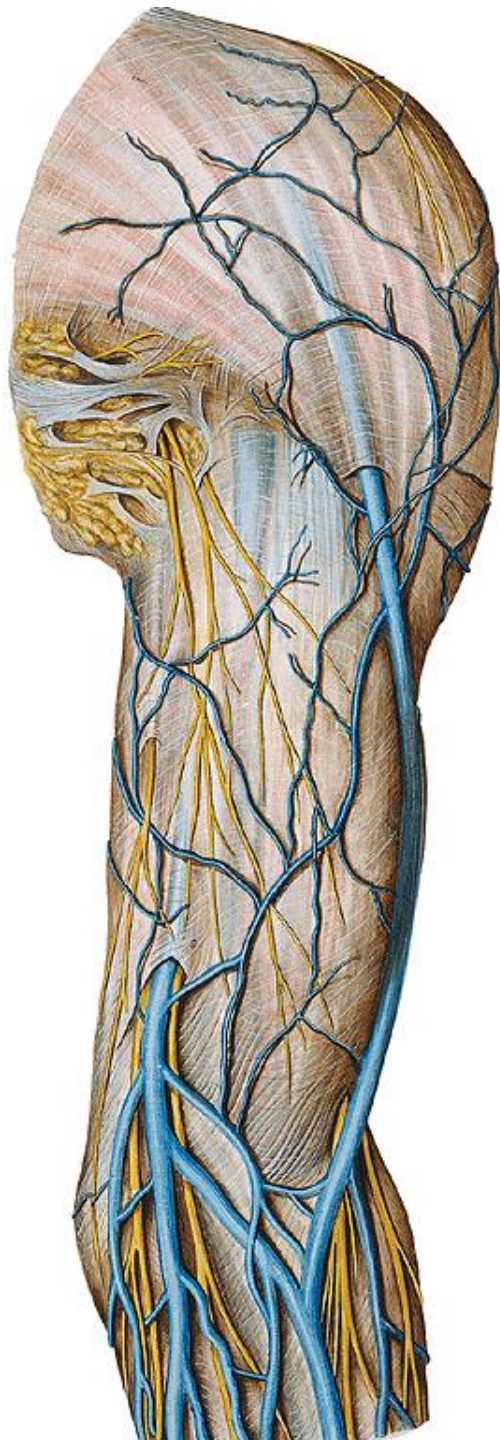


V. mediana cubiti

V. mediana antebrachii – v. mediana cephalica et basilica

Place where to take the blood
i.v. injections application





V. basilica

- sulcus bicipitalis med.

→ vv. brachiales

V. cephalica

- sulcus bicipitalis lat.

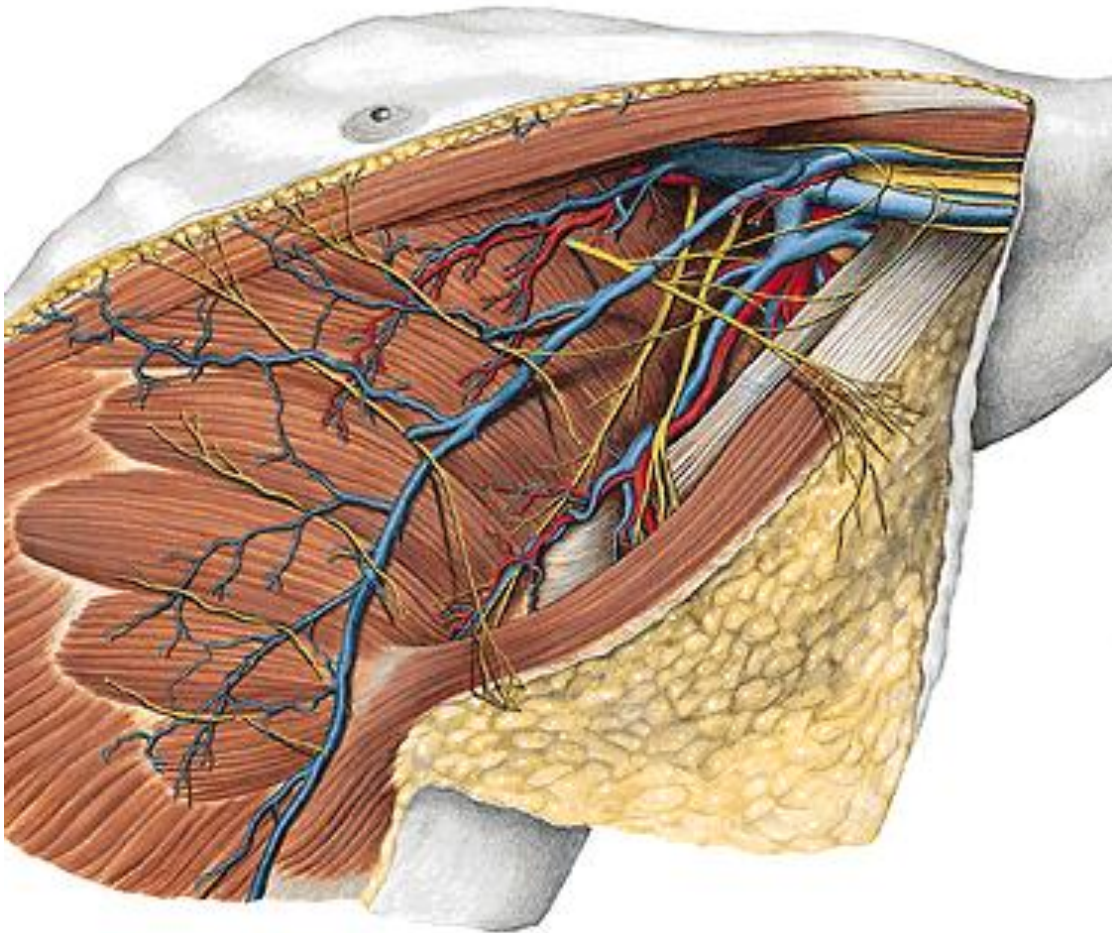
- trigonum deltoideopectorale

→ v. axillaris



V. axillaris

Continuation of vv. brachiales
from collum chirurgicum – Co1



Tributaries

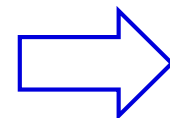
vv. brachiales (truncal branches)

v. cephalica

v. thoracica lat.

v. thoracoepigastrica

venae costoaxillares – join to the
intercostal veins

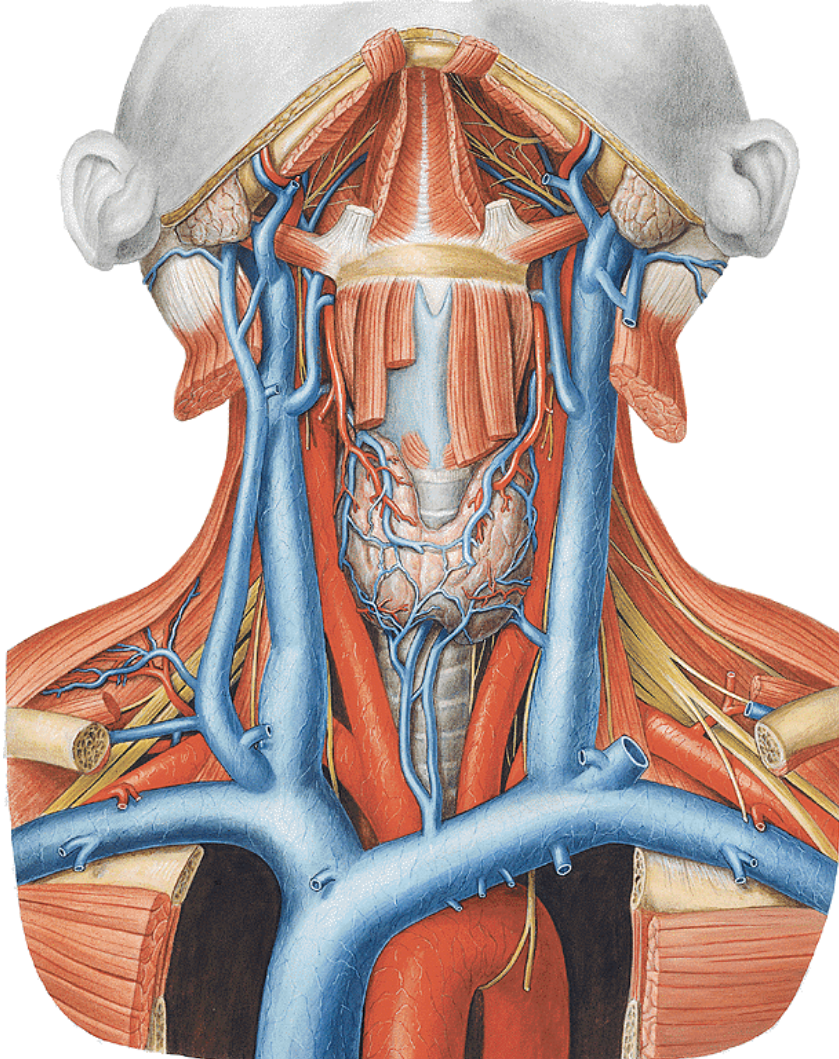


V. SUBCLAVIA



V. subclavia

Co1 – angulus venosus



tributaries

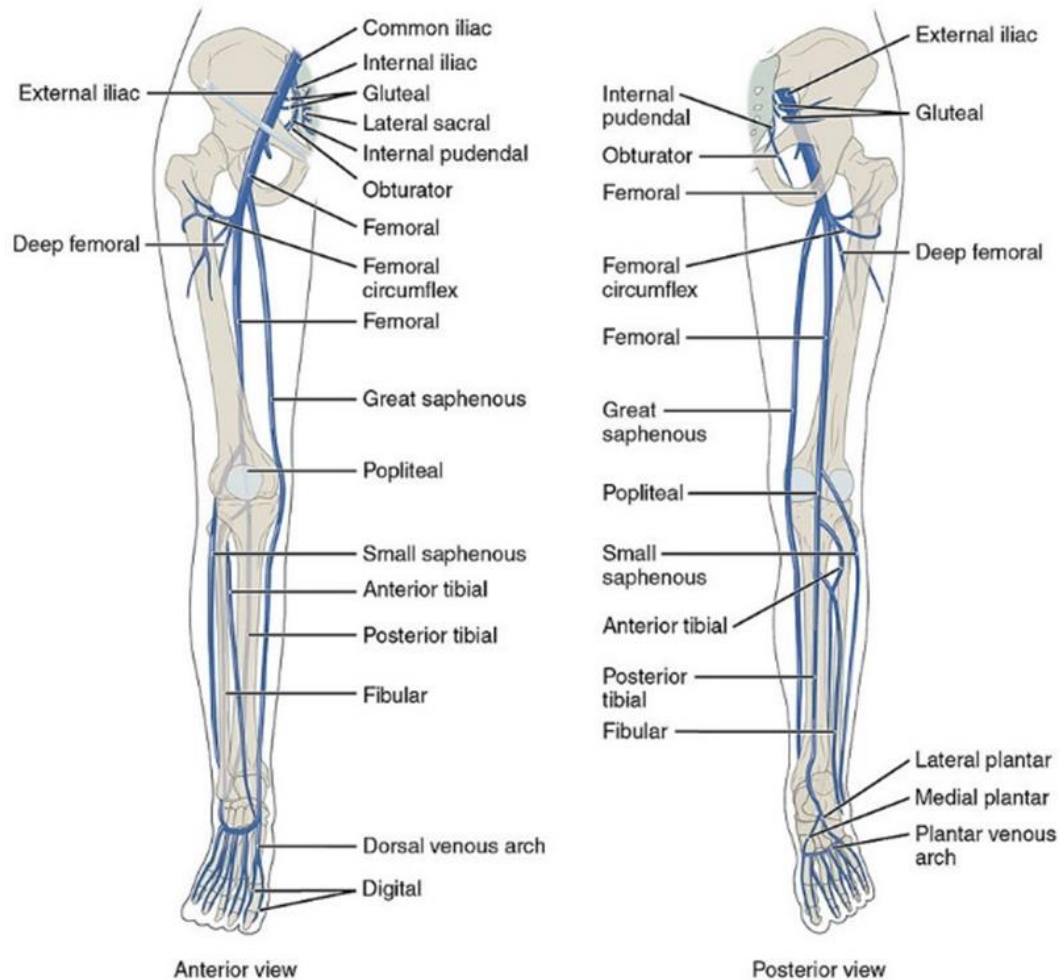
v. jugularis ext.

transversa colli

suprascapularis



VEINS OF THE LOWER LIMB

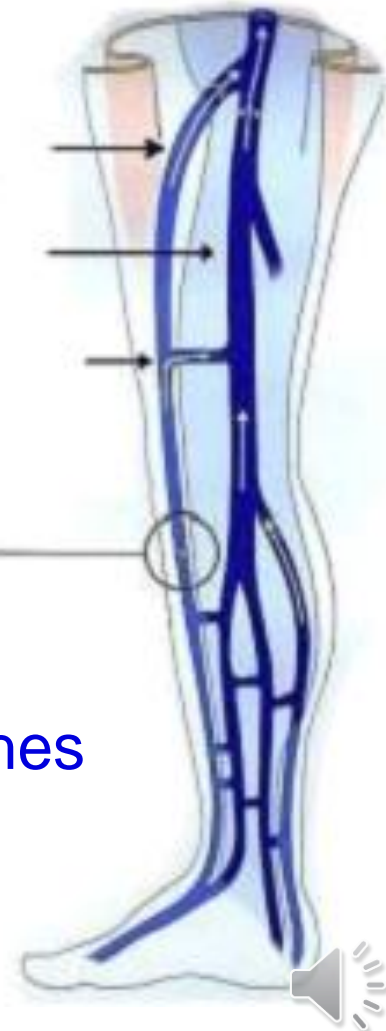


Superficial
v. saphena magna et parva

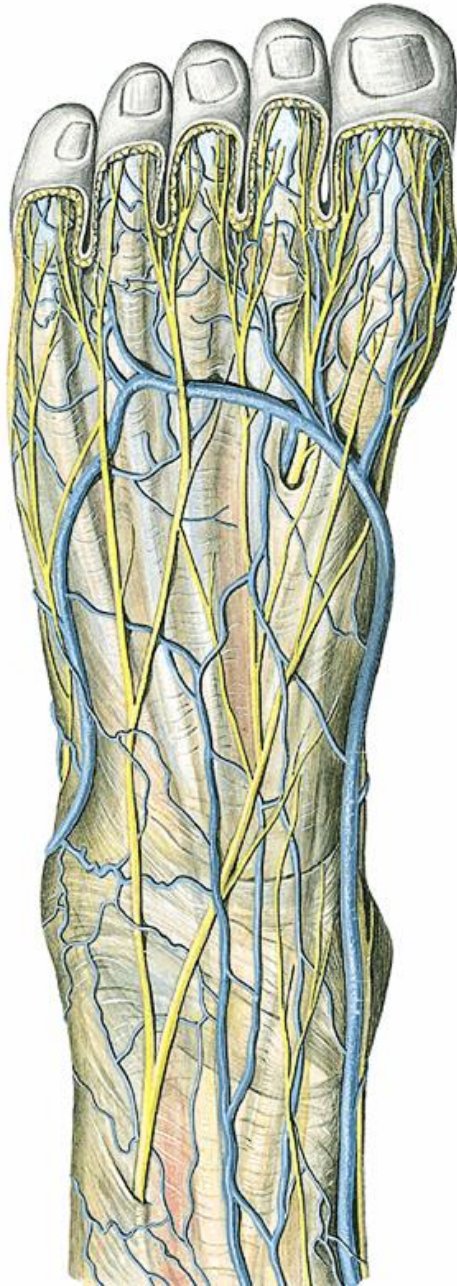
Deep – accompany arteries,
same names

vv. digitales
metatarsales
tibiales
poplitea

connections – perforating branches



➡ **V. femoralis**



Superficial veins

vv. digitales

> vv. metatarsales

> rete ven. dorsale

through vv. intercapitulares

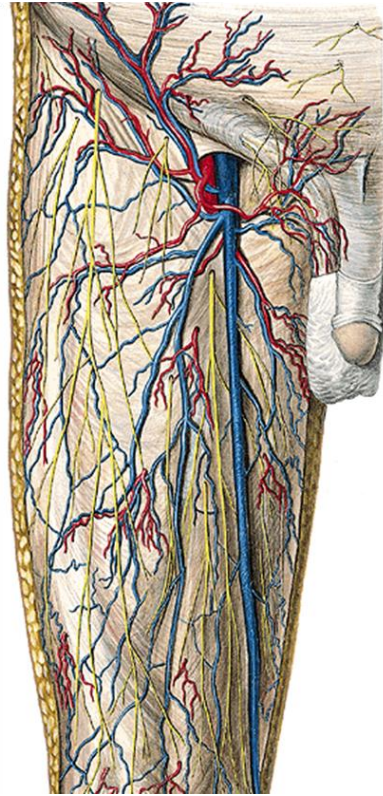
Tributaries from rete ven. plantare

Arcus venosus dorsalis

behind malleolus lateralis - v. saphena parva

In front of the medial malleolus- v. saphena magna





V. saphena magna

vv. pudendae ext.
circumfl. ilium spf.
epigastr. spf.

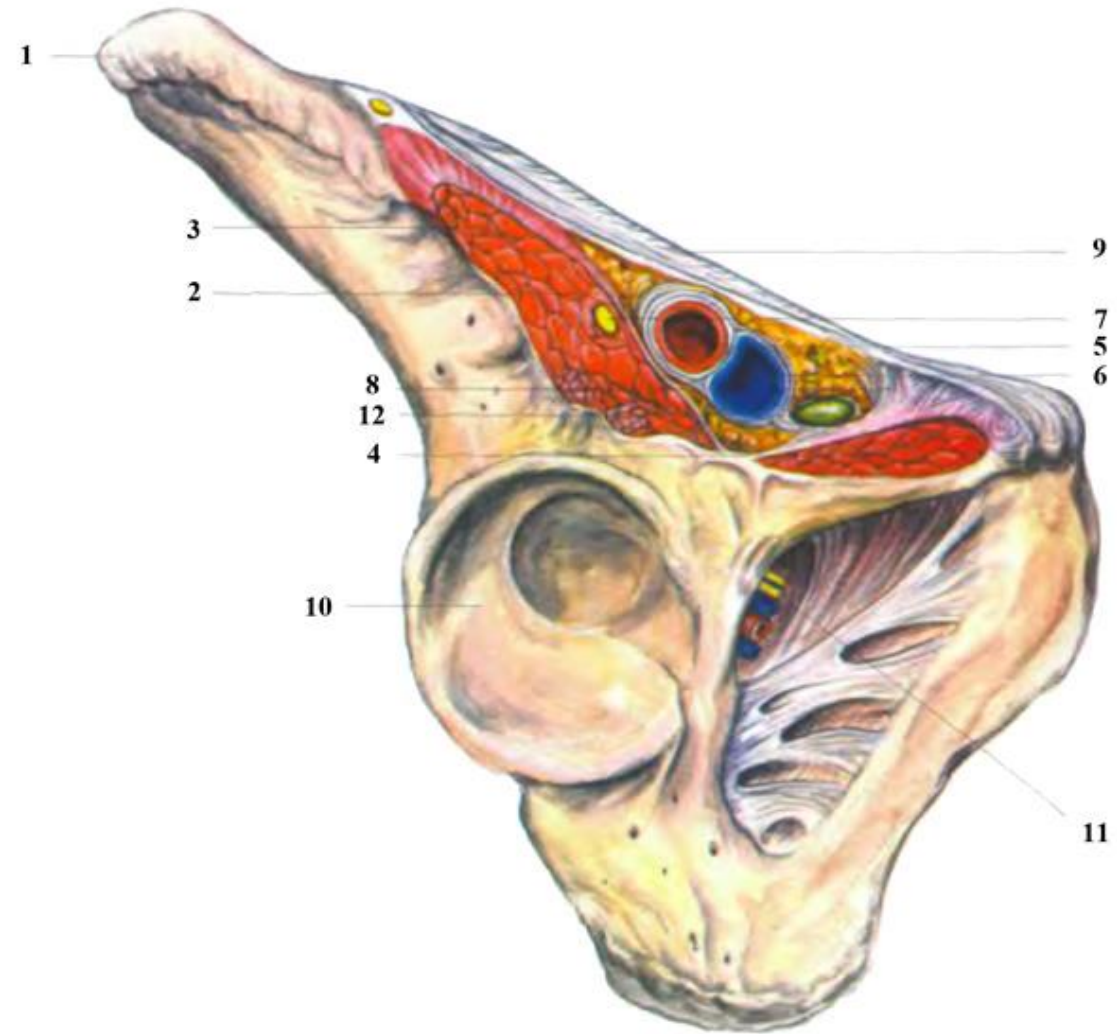
Hiatus saphenus

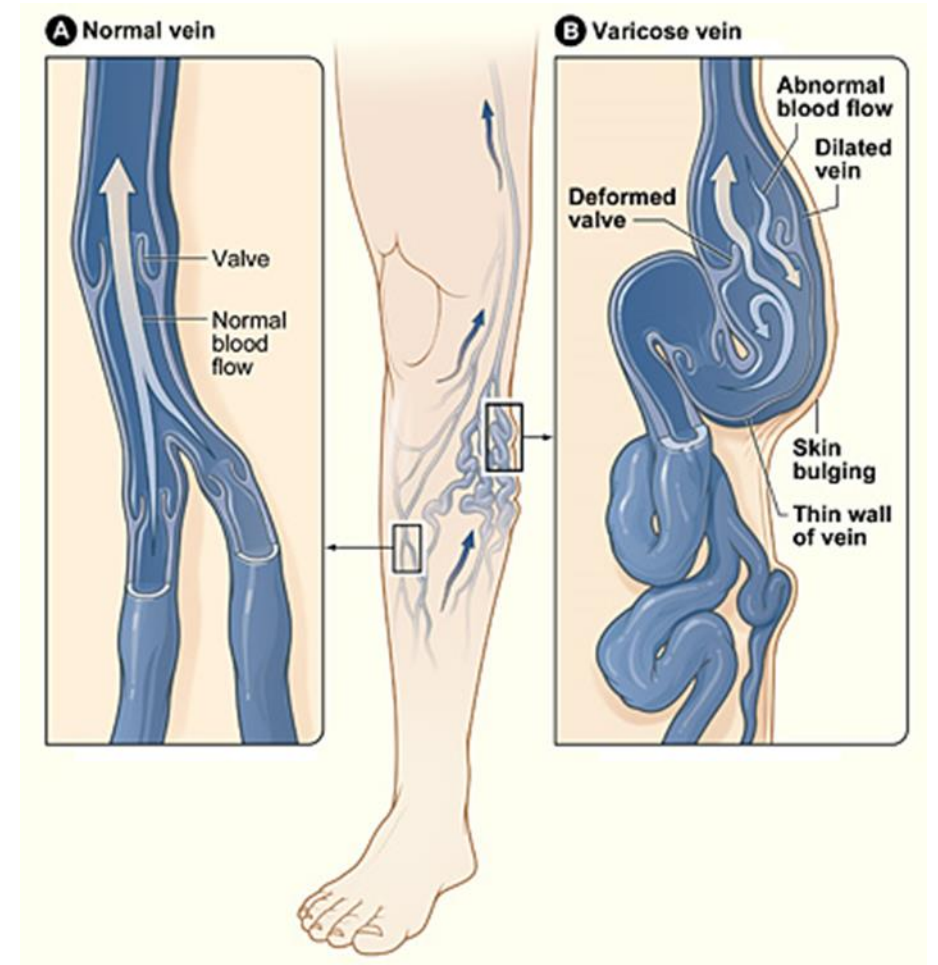
→ v. femoralis

V. saphena parva

→ v. poplitea





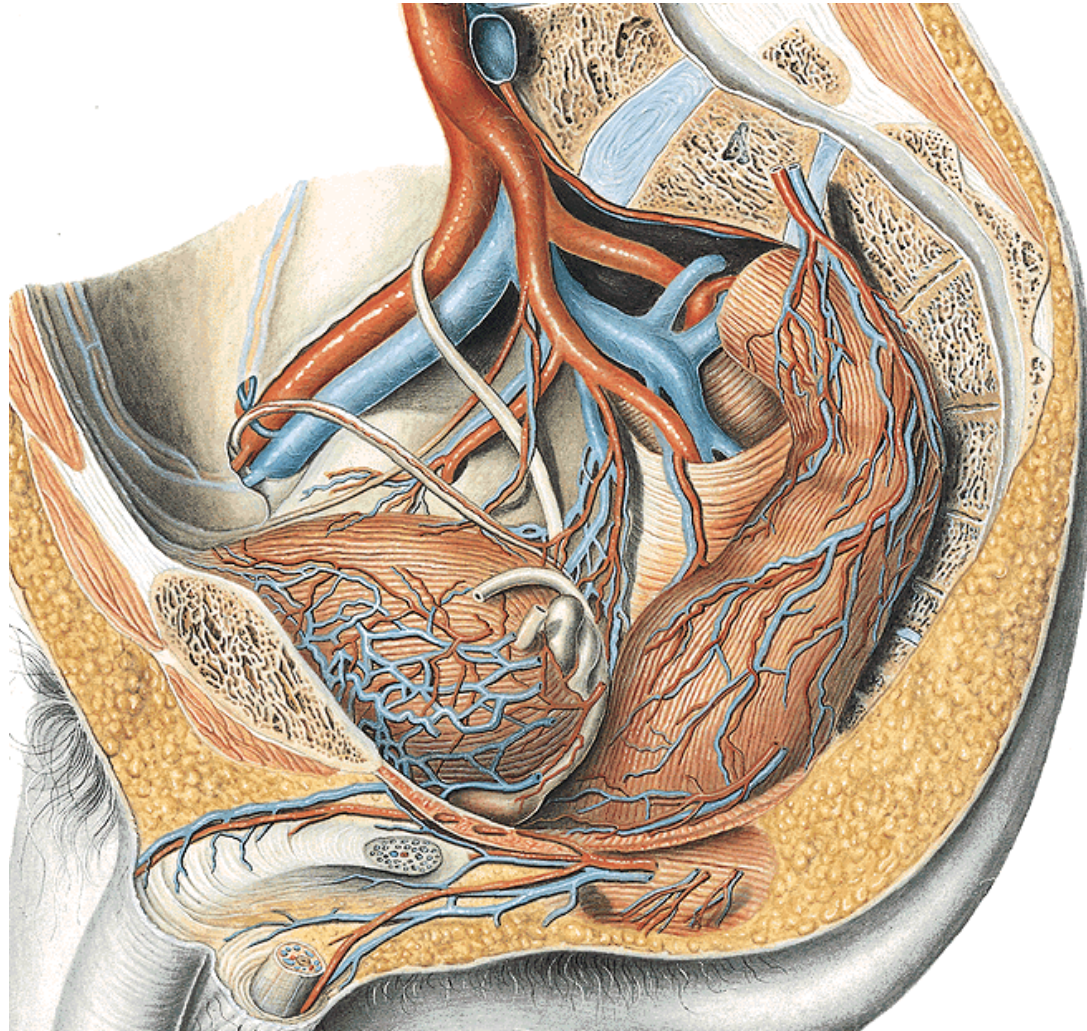


VARICOSE VEINS



V. iliaca ext.

Continuation of v. femoralis
Lacuna vasorum – art. sacroiliaca



tributaries

v. epigastr. inf.

v. circum. ilium prof.



Pelvis

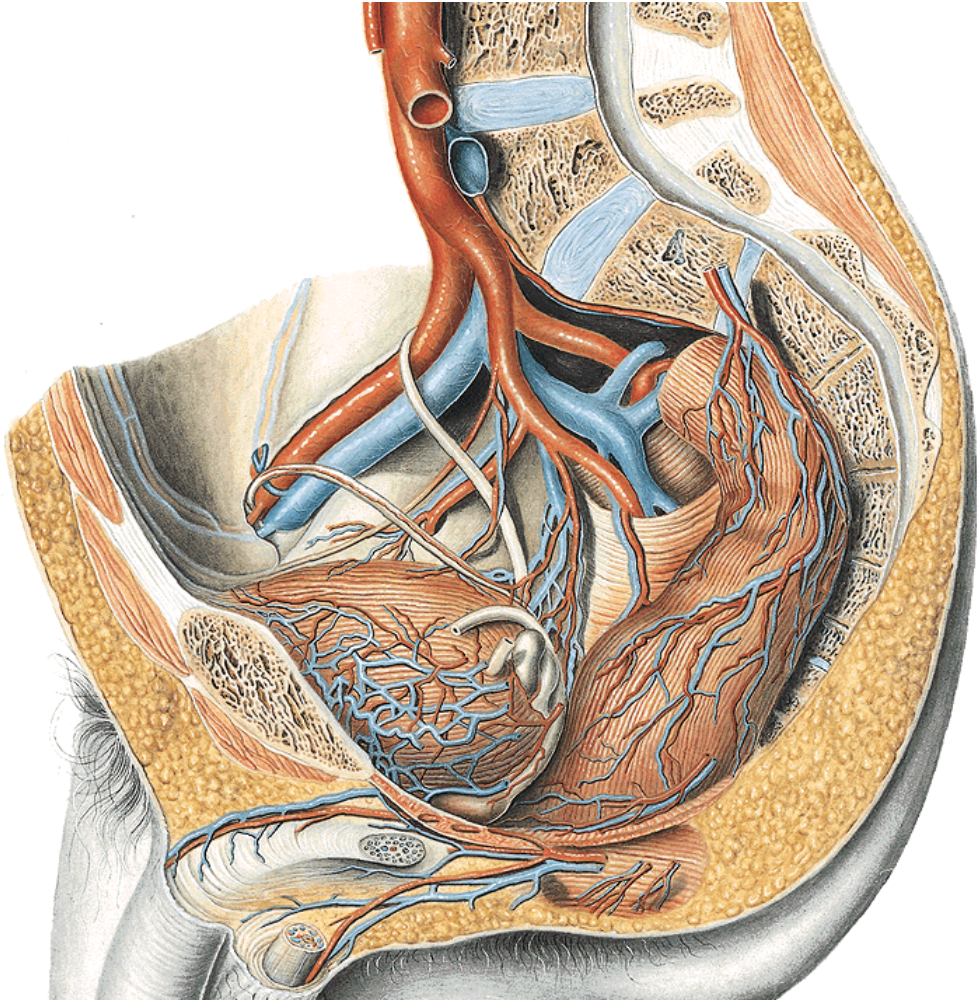
Parietal tributaries – branches from pelvic wall

vv. iliolumbales
sacrales lat.
gluteae
obturatoriae
pudendae int.

Visceral tributaries
plx. venosi vesicalis

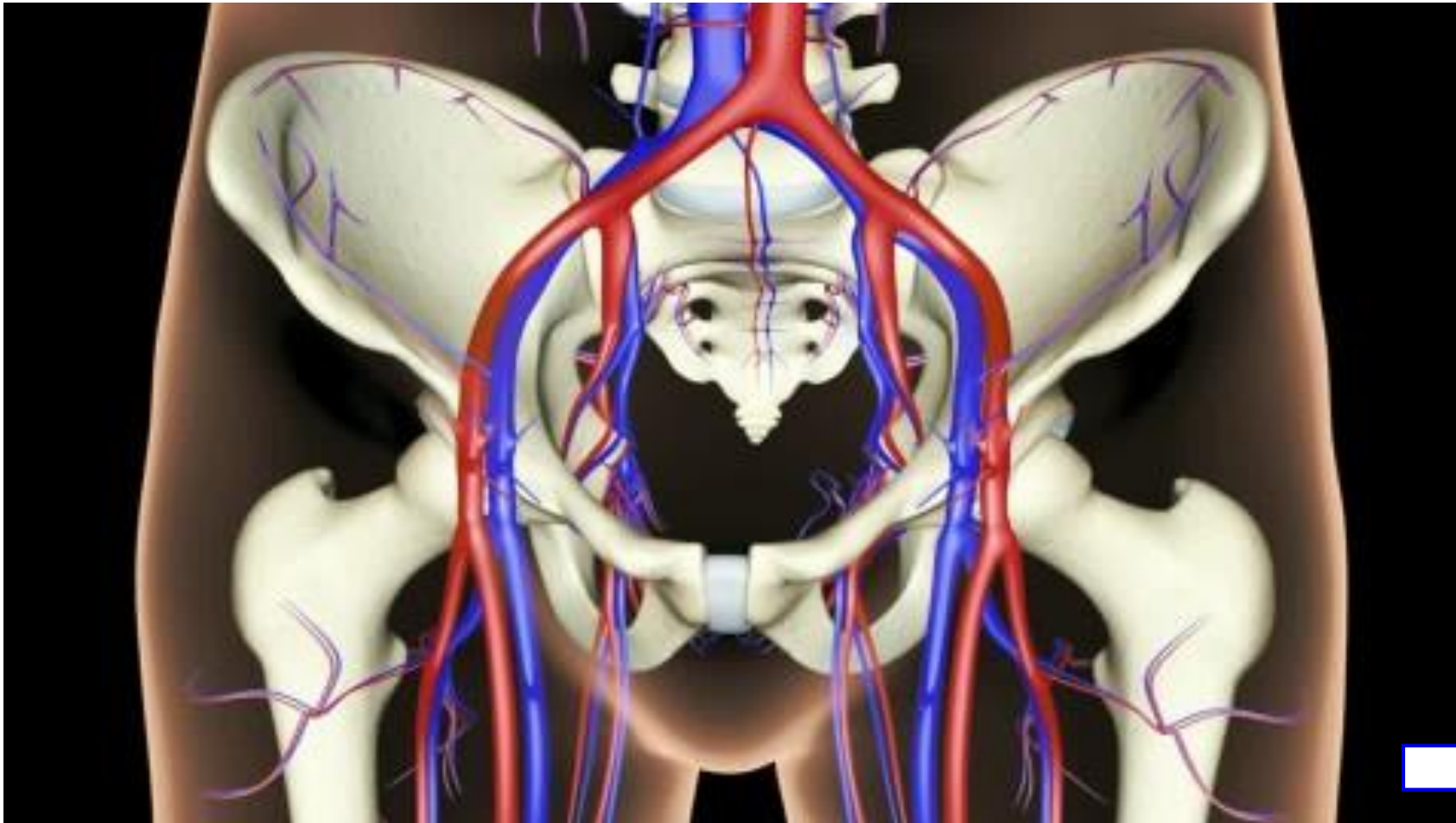
rectalis
♂ prostaticus
♀ uterinus
vaginalis

➔ **V. iliaca int.**



v. iliaca ext. et int. → **vv. iliacae comm.**

vv. iliacae comm. + v. sacralis mediana
→ **v. cava inferior**



v. cava inf



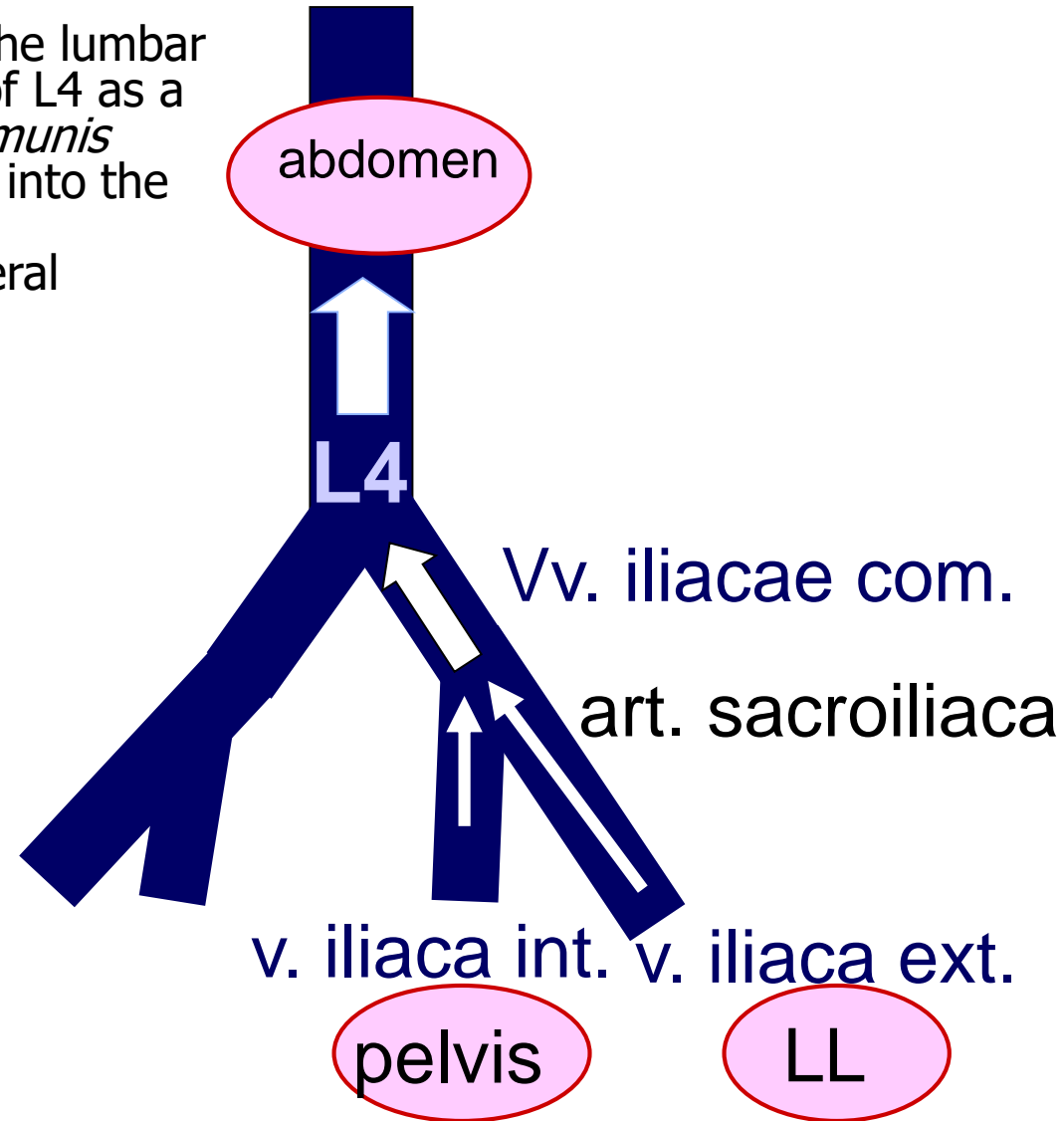
V. CAVA INFERIOR

It begins on the right side of the lumbar vertebral column at the level of L4 as a connection of *vena iliaca communis dextra et sinistra*, it opens out into the right cardiac atrium

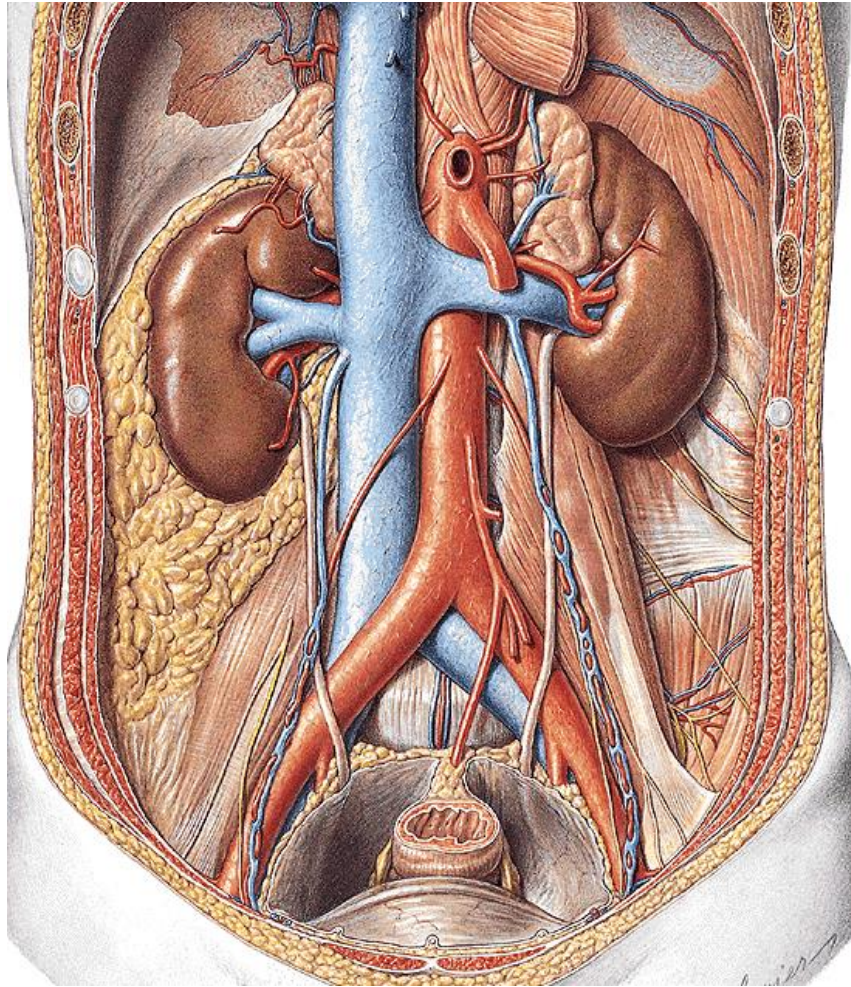
It has the parietal and visceral tributaries

The parietal tributaries

- *venae iliacaes communes*
- from the abdominal wall
- from the diaphragm



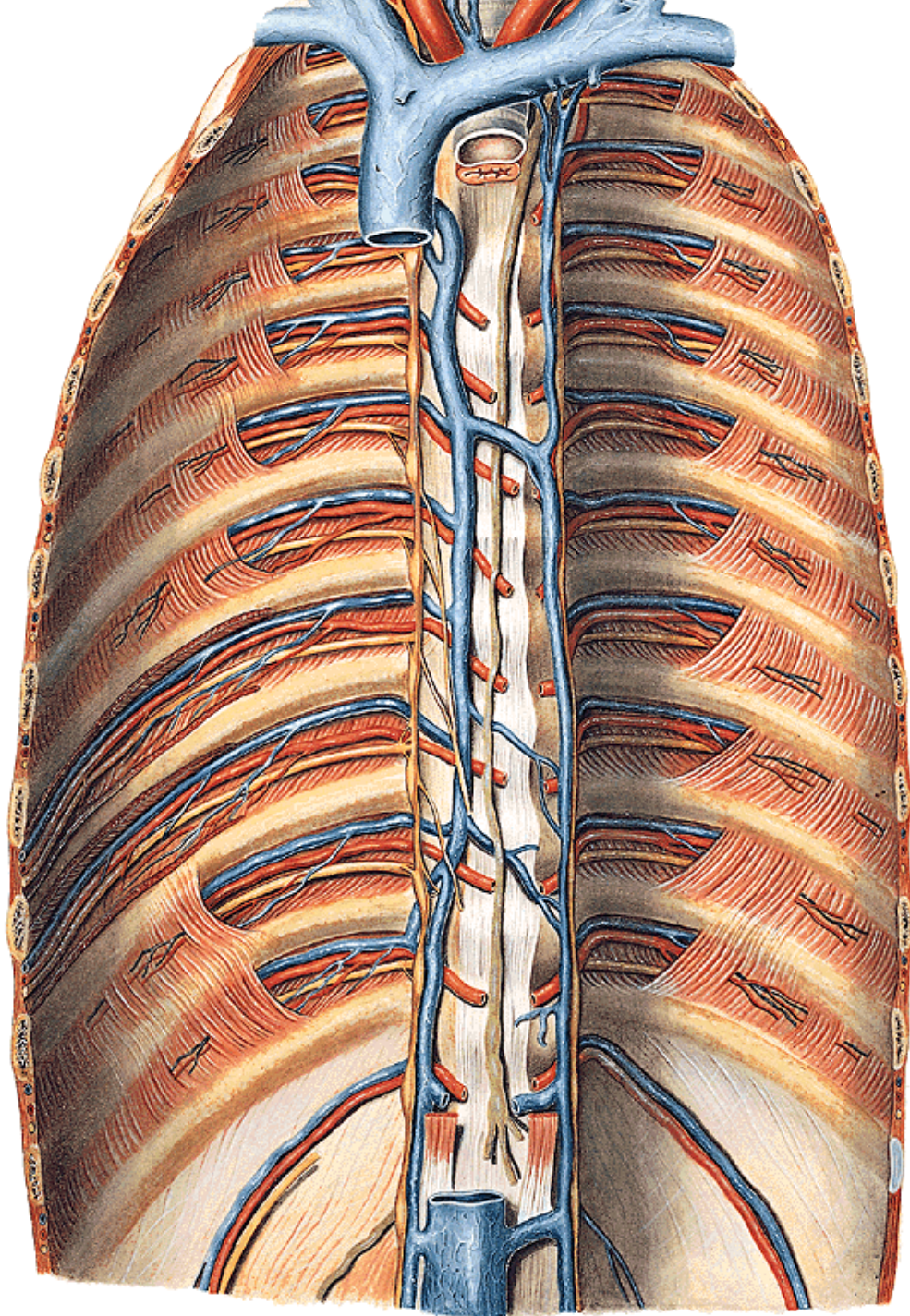
Abdomen



Parietal tributaries
vv. lumbales
phrenicae inf.

Visceral tributaries
vv. test. / ovaricae
renales
suprarenales
hepaticae





Cavo-caval anastomoses

Venous systems in the region of the spine that will connect VCS and VCI.

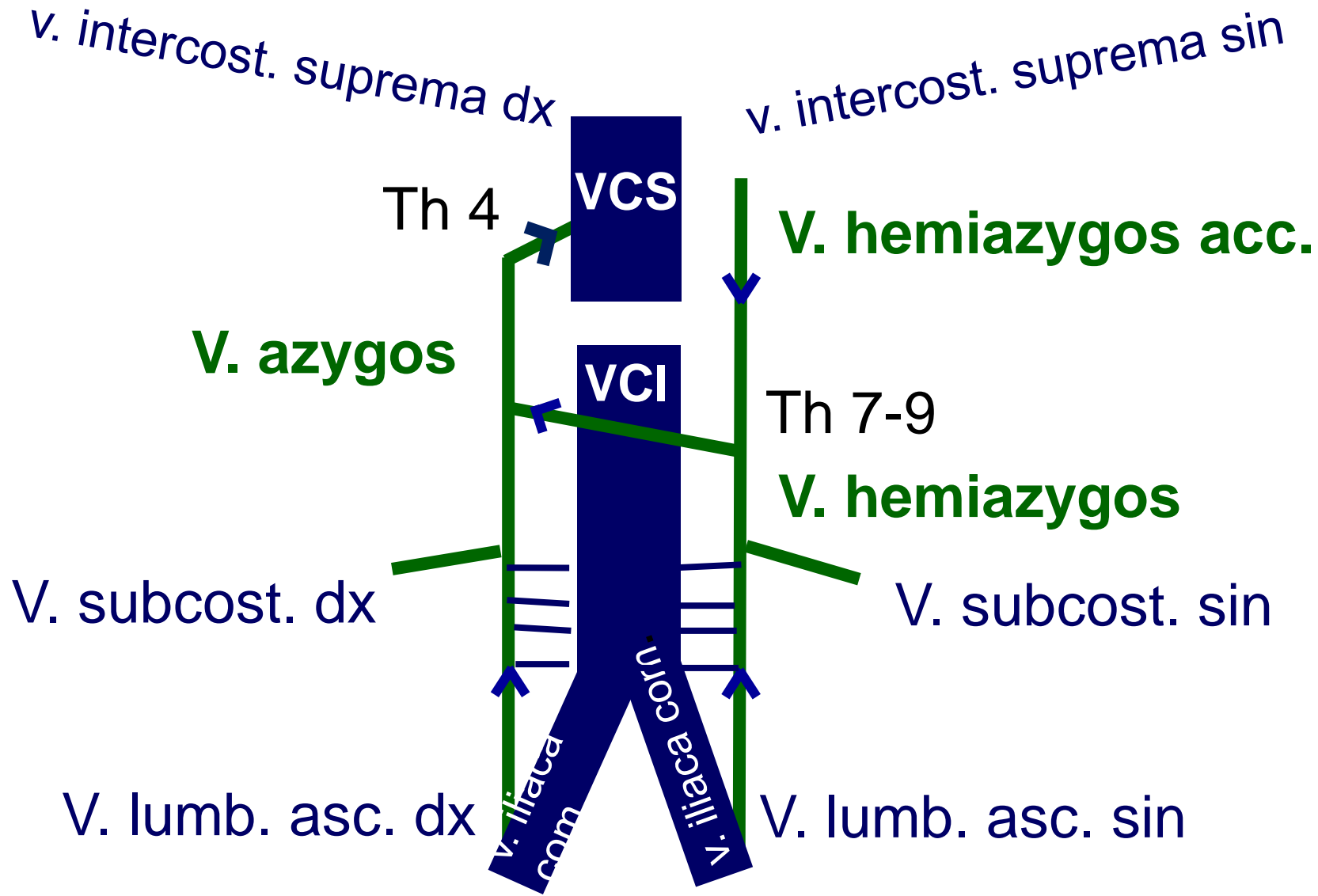
They play a role in the cases of closure of caval veins

V. azygos

V. hemiazygos

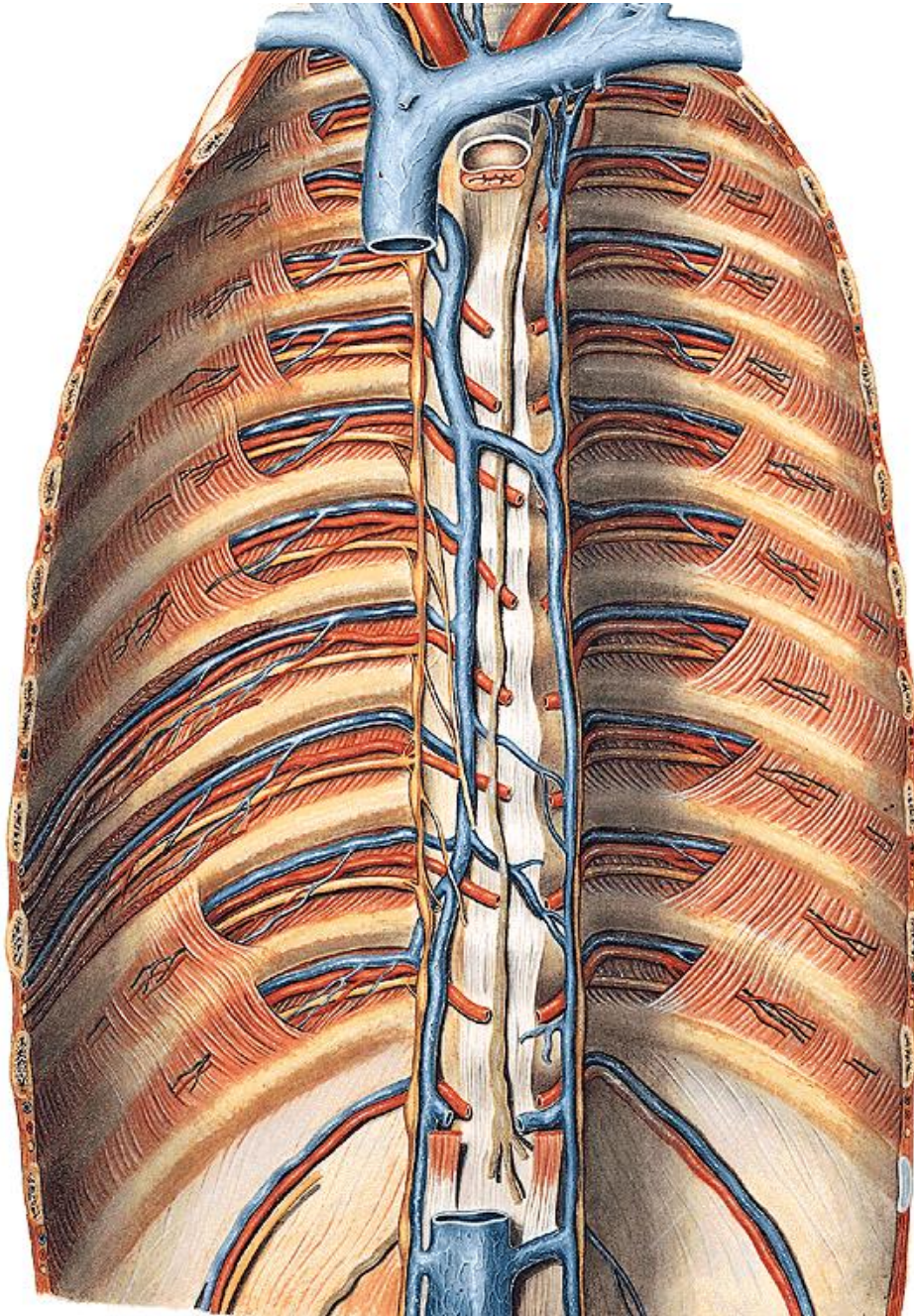
Plx. venosi vertebrales interni et externi





The cavocaval anastomoses





Tributaries of AZYGOS

thorax

vv. intercost. post.

vv. phrenicae sup.

organs of posterior mediastinum

esophagus

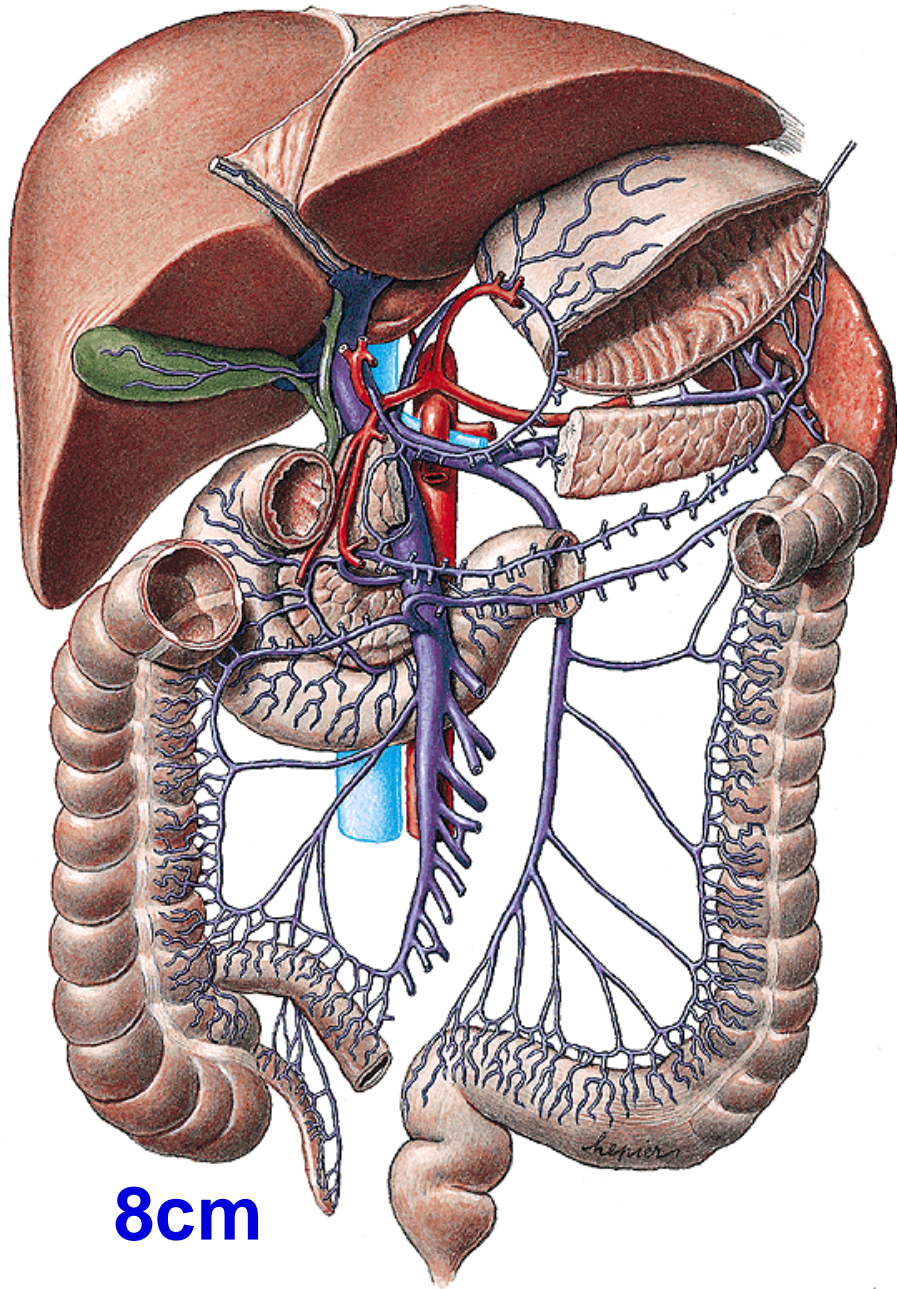
bronchi

pericard

abdomen

vv. lumbales





8cm

V. PORTAE

origin:

V. mesenterica sup.

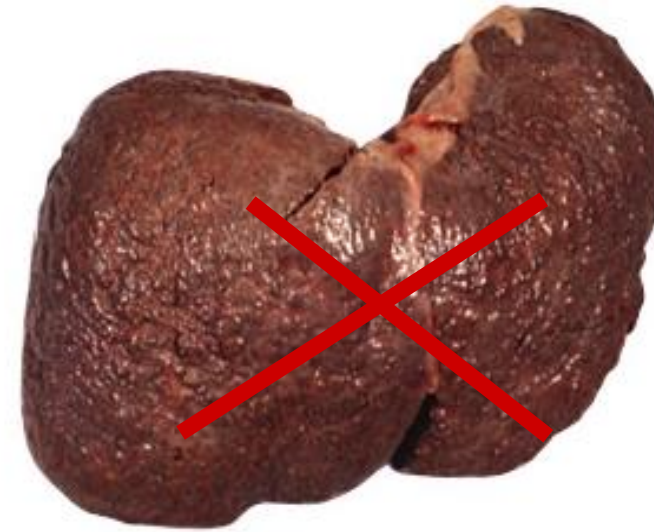
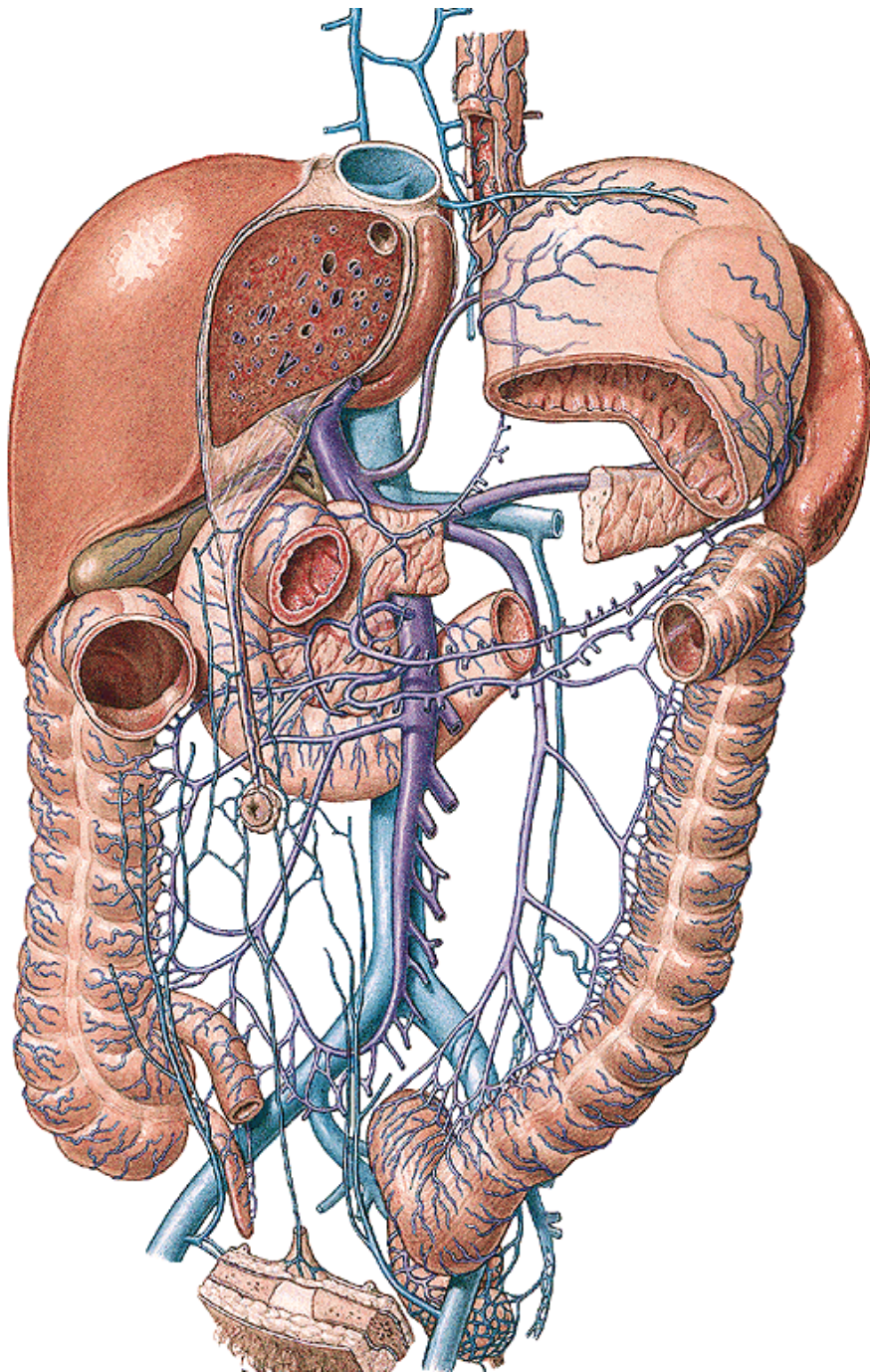
V. lienalis

v. mesenterica inf.

- Behind the caput pancreatis
- Inside of lig. hepatoduod.
- enter porta hepatis
- through vv. hepaticae to v. cava inf.



Porto-caval anastomoses

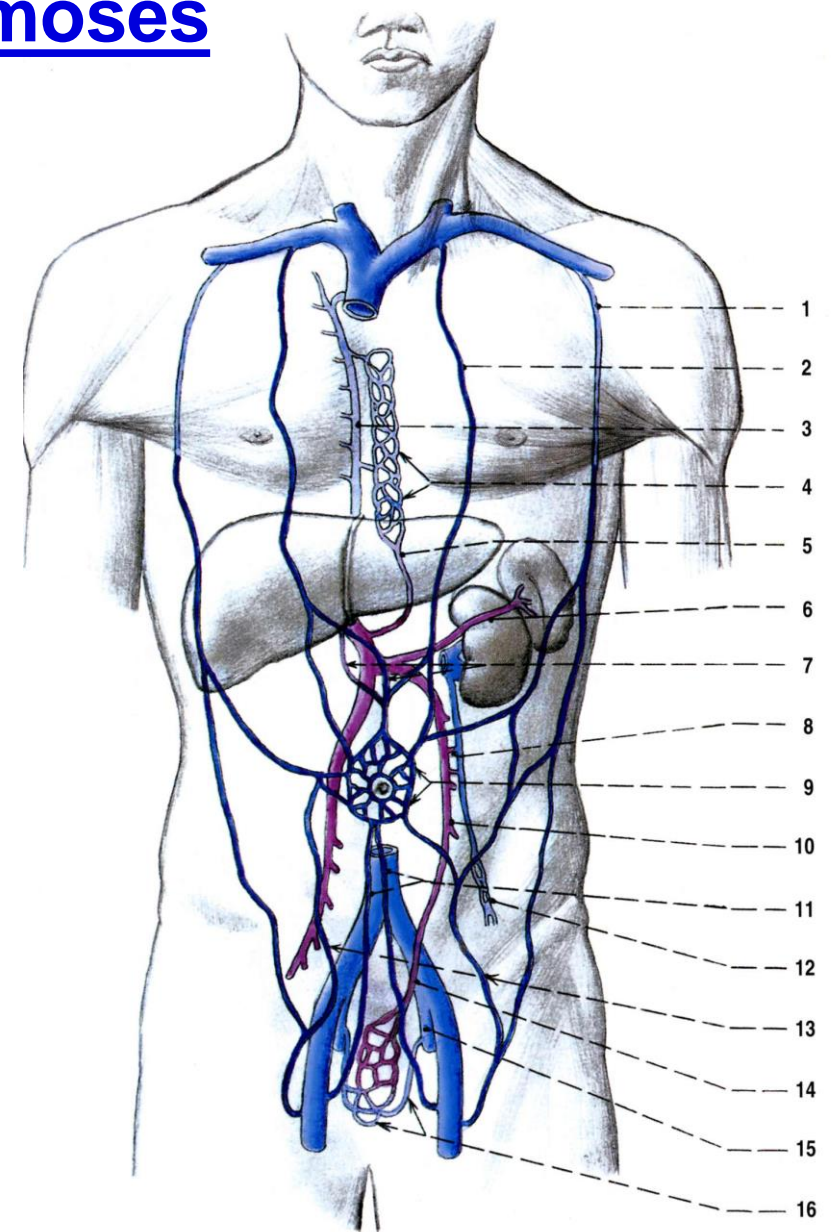


Esophagus
Umbilicus
Rectum



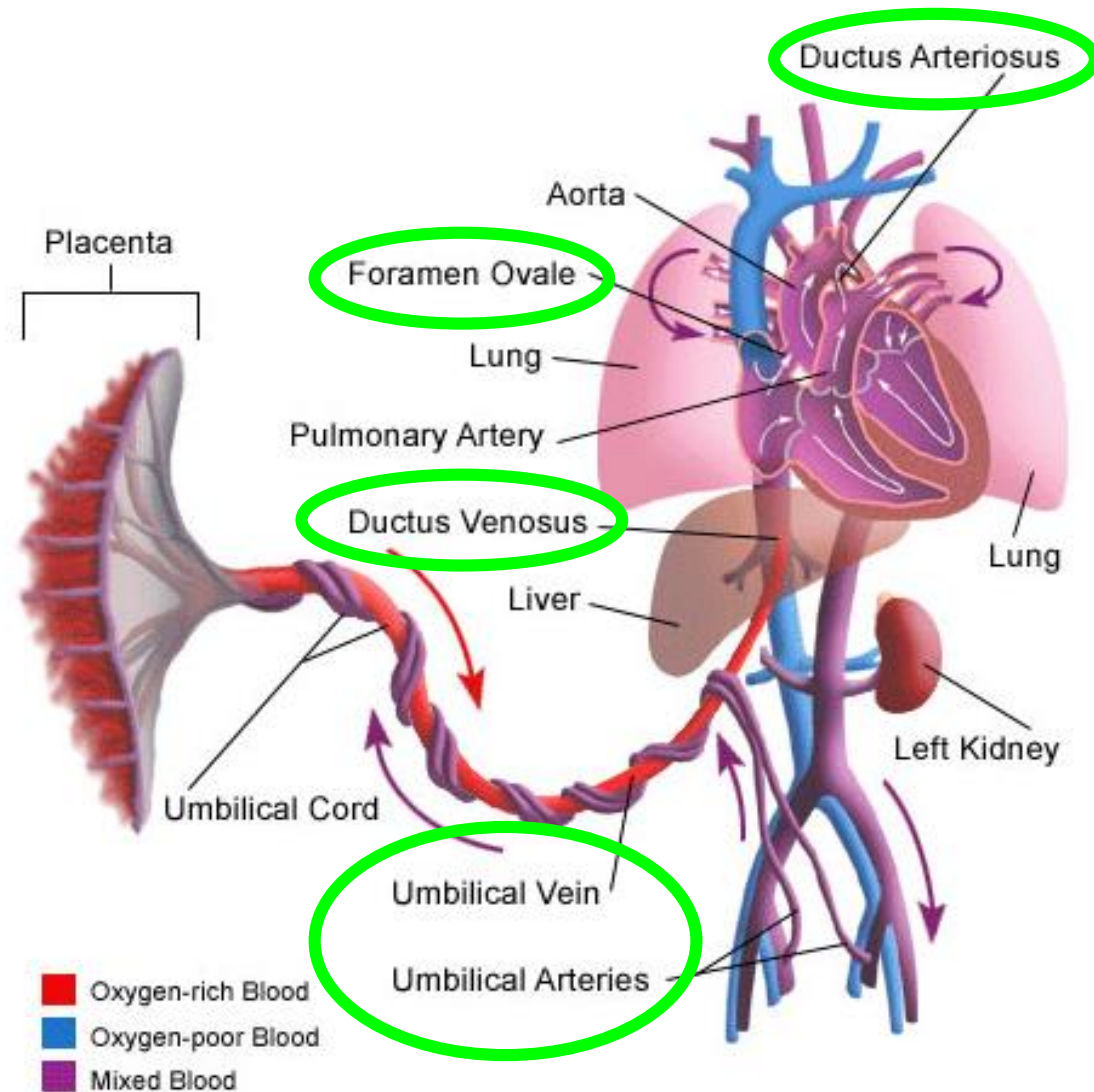
Porto-caval anastomoses

1. Vv. gastricae – vv. oesophageae
2. Vv. paraumbilicales
(caput Medusae, Burrow's veins)
3. Plexus rectalis - hemorrhoids
4. Retzius' veins
5. Vv. hepaticae – vv. phrenicae



Fetal blood circulation

The blood of the fetus is not mixed
With the blood of the mother!!



v. umbilicalis: branch IIA

ductus venosus: to v. cava inferior
(1/2 blood to liver)

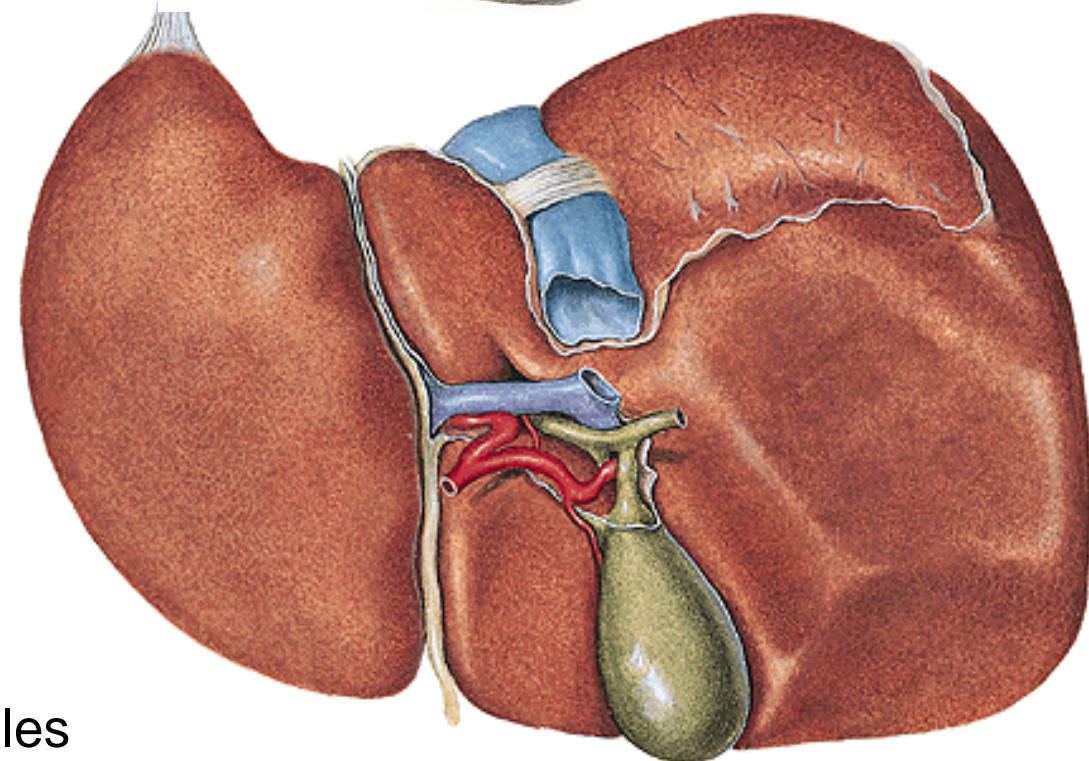
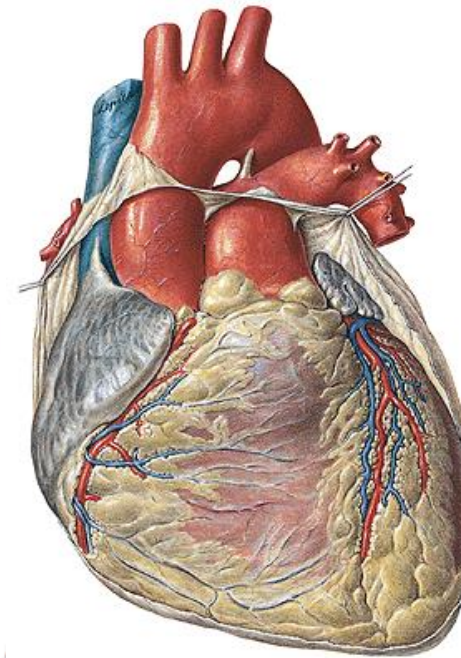
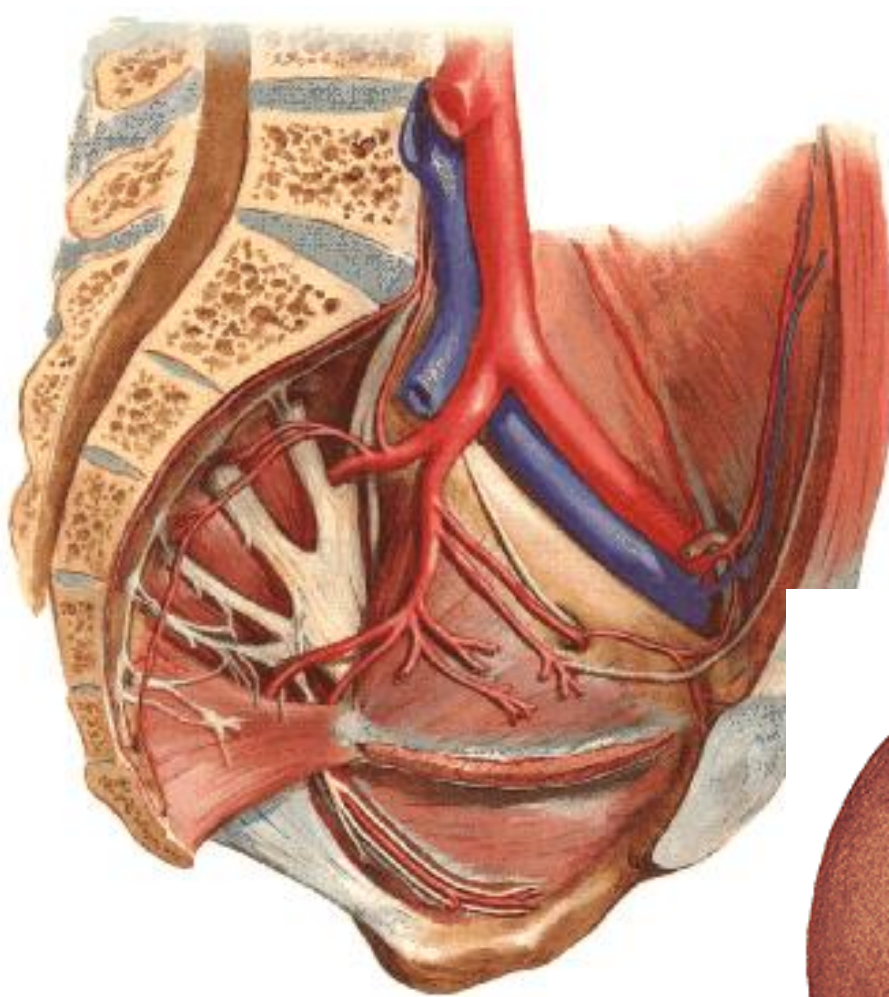
foramen ovale

ductus arteriosus: to arcus aortae

aa. umbicales



After birth



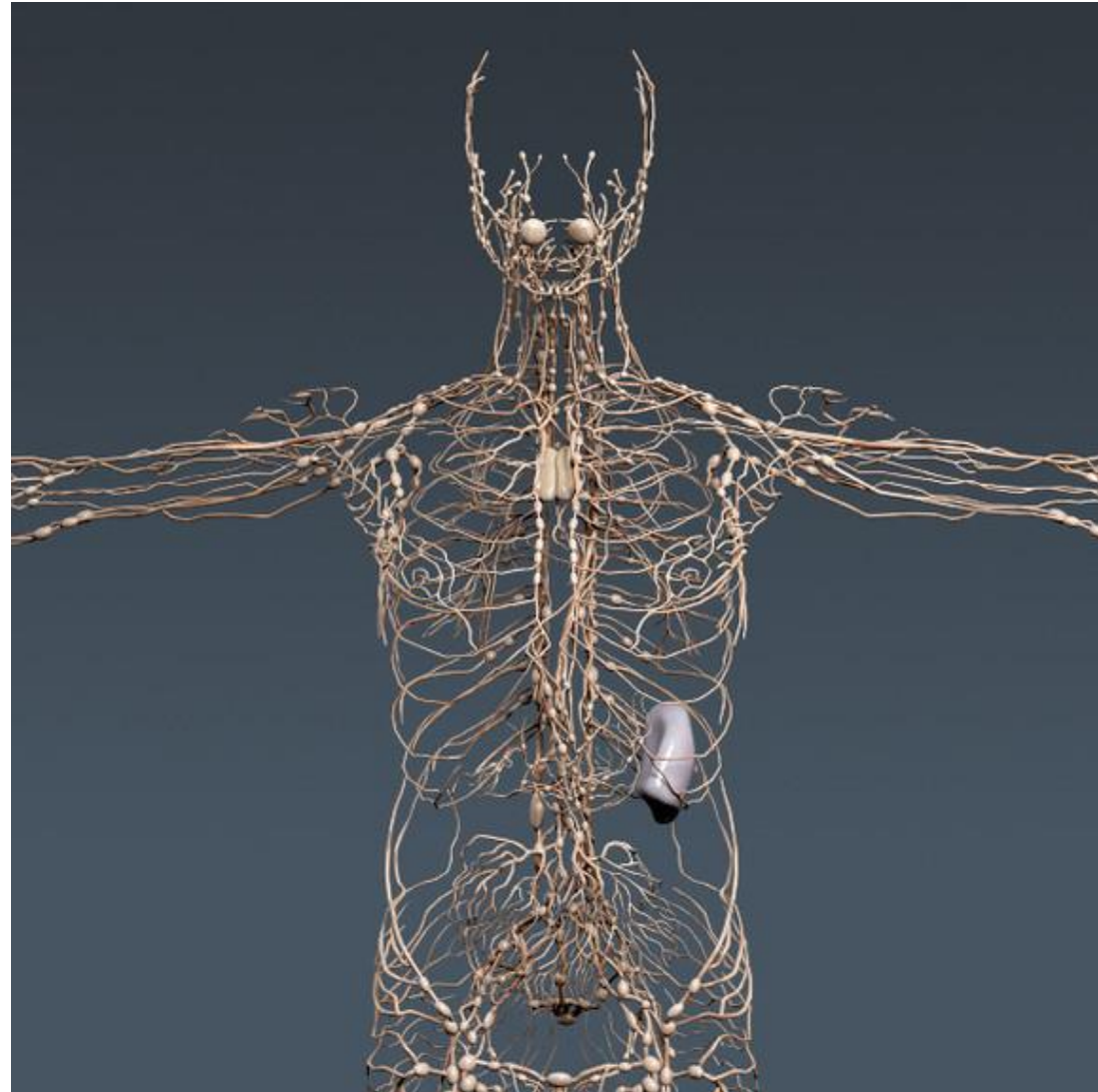
Remnants of the fetal circulation

- v. umbilicalis – lig. teres hepatis
- ductus venosus – lig. venosum
- foramen ovale – fossa ovalis
- ductus arteriosus – lig. arteriosum
- aa. umbilicales – chordae aa. umbilicales



M U N I

LYMPH



FUNCTION

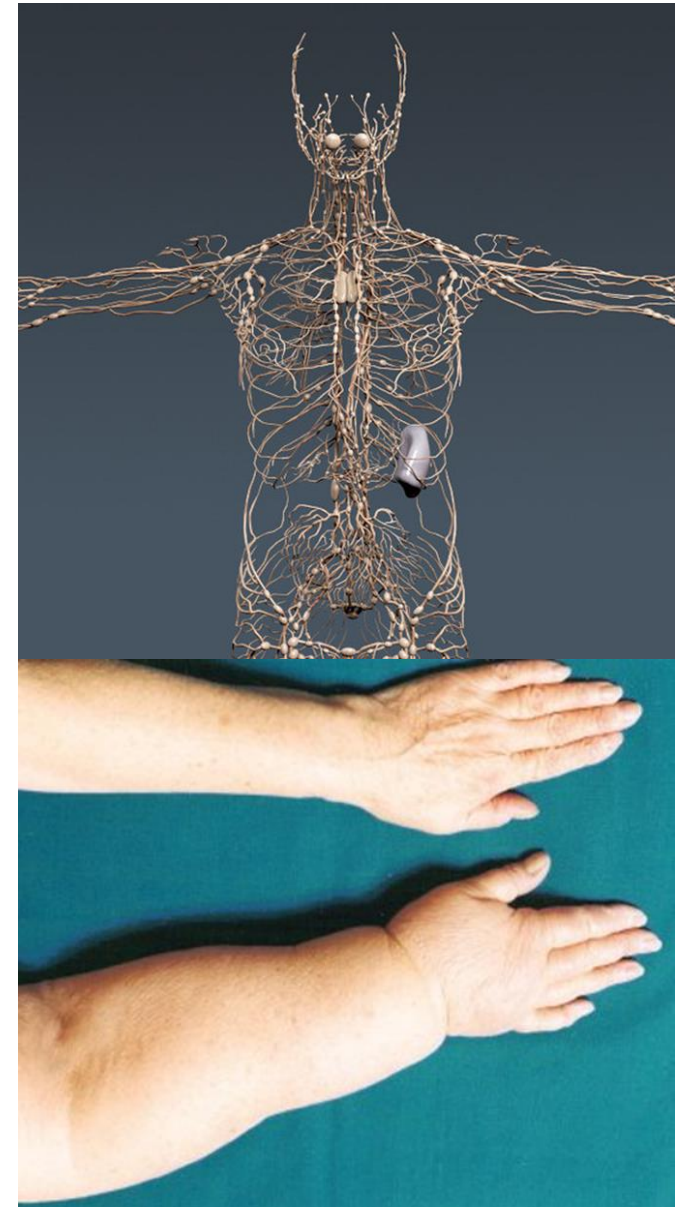
- it begins in the peripheral parts of the body, leads only centripetally and the terminal sections open out into the veins
- it provides the return transport of the water and the metabolites from the interstitial fluid into the blood

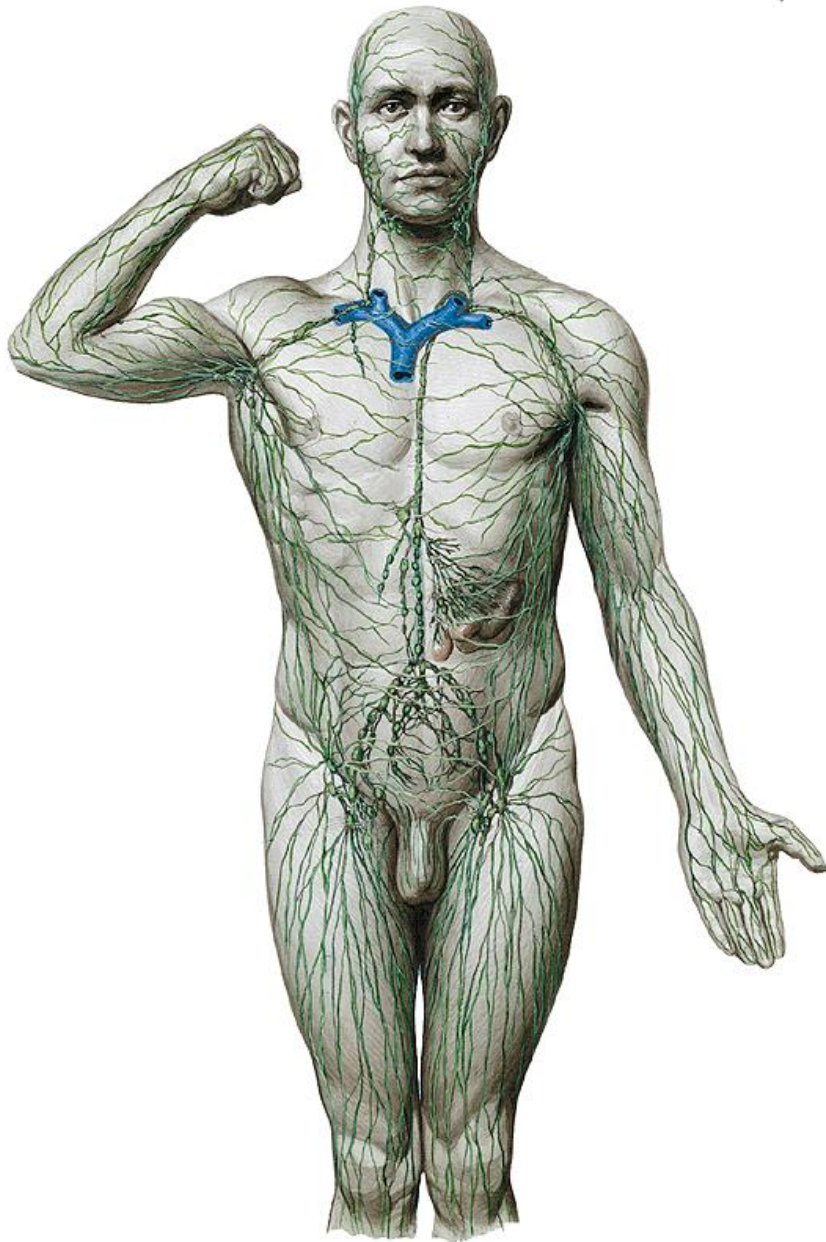
- System- superficial
- deep

- Function- drainage and transport
- immunology

The tissues without the lymphatic vessels:

hair, nails, epidermis, the sclera, the cornea, the lens, the cartilages, the nervous tissue, the bones





Lymph

Lymphoid tissue

Folliculi lymphatici

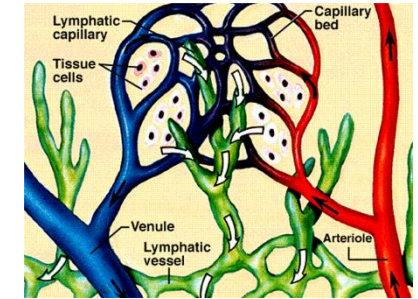
Lymph nodes

Tonsils

Spleen

Thymus

mucosa-associated lymphoid tissue



Vasa lymph. :

capillaries, network
collecting vessels
(superficial and deep)
trunks



Lymphoid tissue

Folliculi lymphatici

Lymph nodes

Tonsils

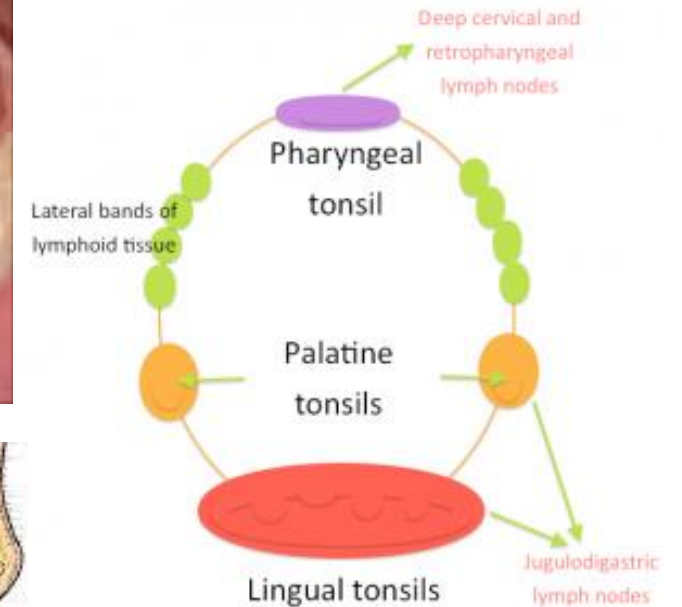
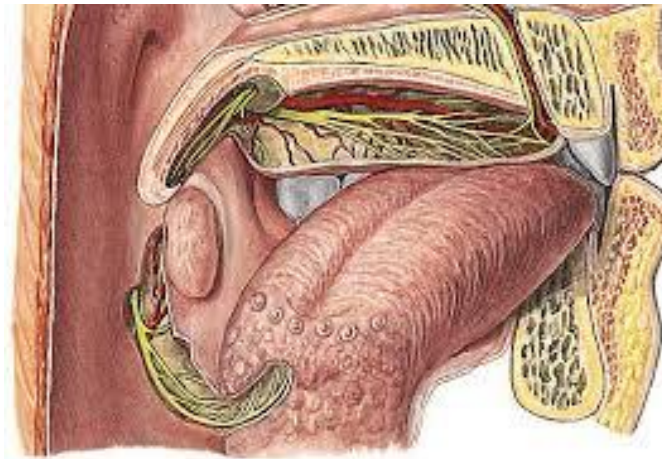
Spleen

Thymus

mucosa-associated lymphoid cells

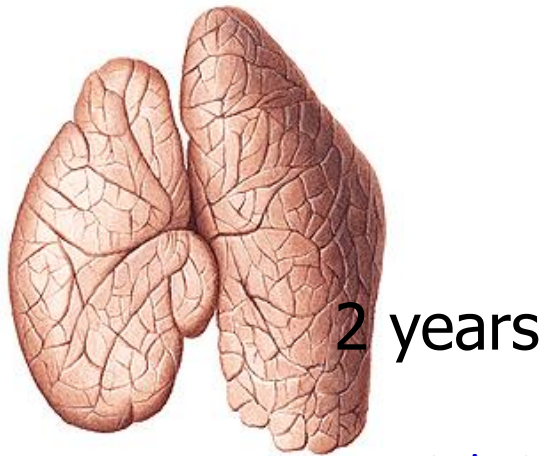
Tonsils (Tonsillae)

- aggregation of the lymphatic tissue below the epithelium
- production of lymphocytes

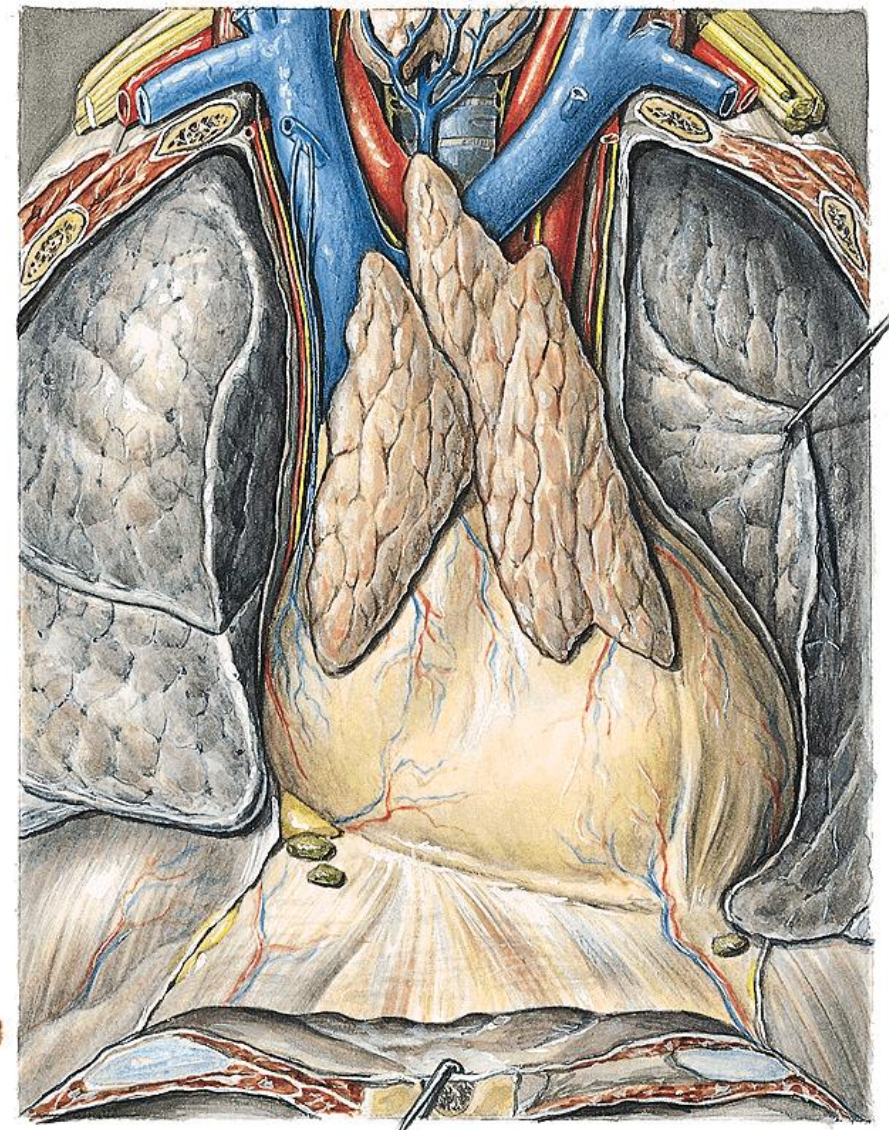


Thymus

- area interpleuralis superior = thymica
- Lobus dexter, sinister
- The lymphatic organ
- capsula thymi ,septa
- cortex, medulla
- T – lymfocytys – differentiation and maturation
- Adipose tissue

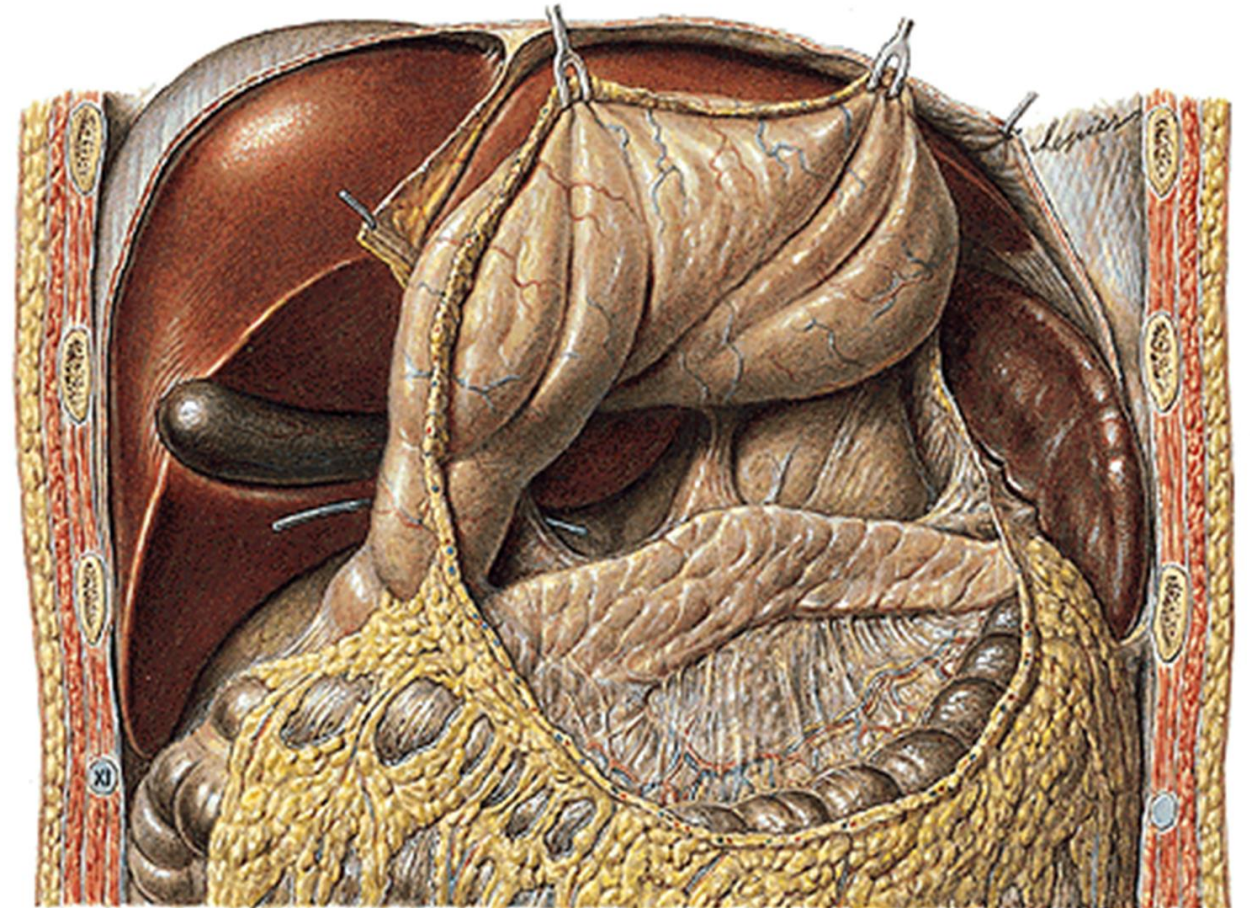
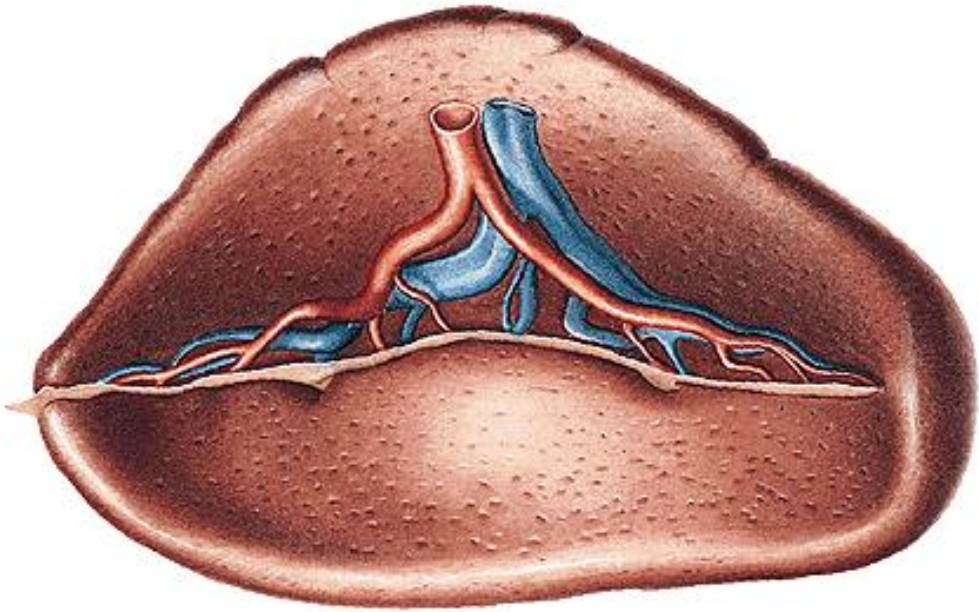


24
years



Spleen

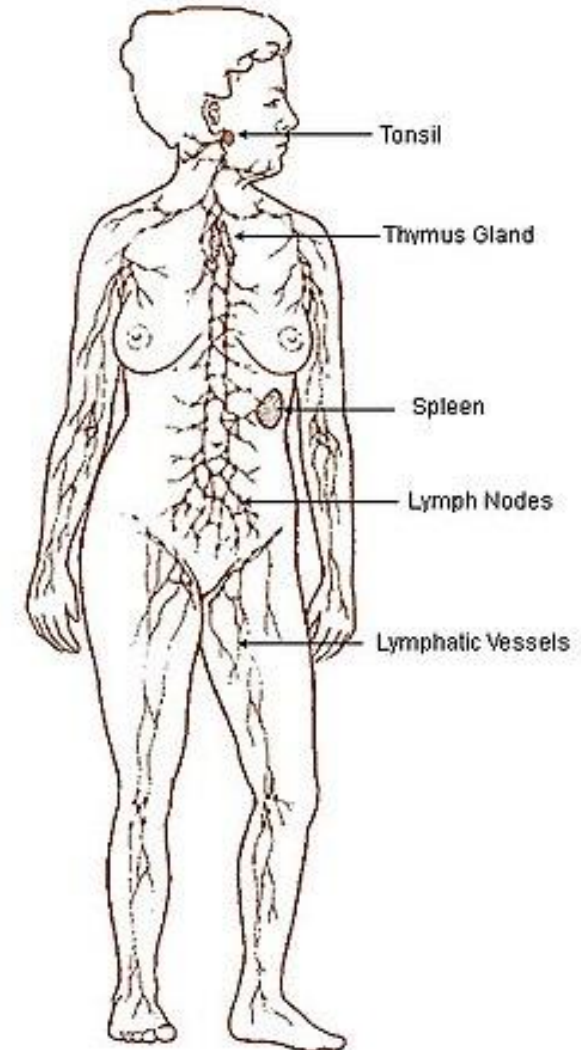
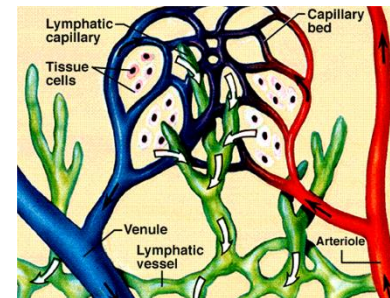
Largest lymph. organ in the body



Lymph

- clear fluid, 1½-2 l daily
 - origin from tissue fluid (+ products of tissue metabolism) and fluid filtered at the arterial end of capillaries
 - composition similar to blood plasma (+ lymphocytes)
- In GIT milky (food fats) = chylus
- the flow direction is centripetal

Pathological circumstances
may cause retrograde flow



Lymphatic vessels

They begin blindly

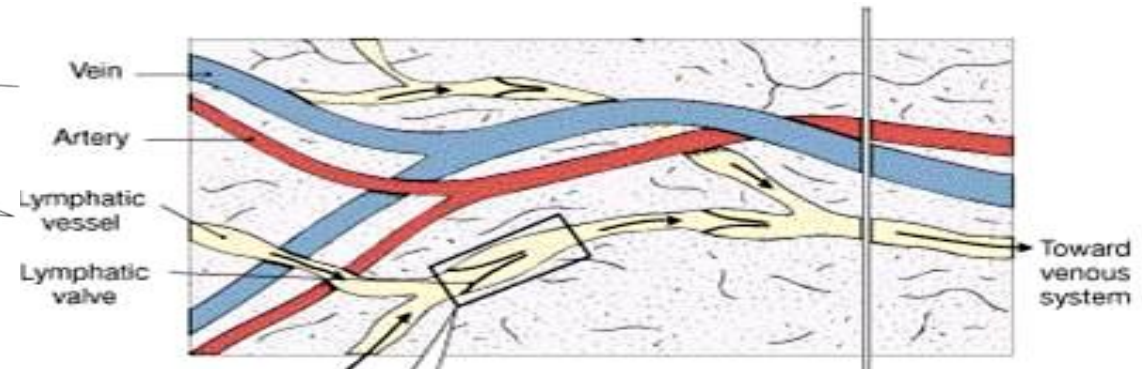
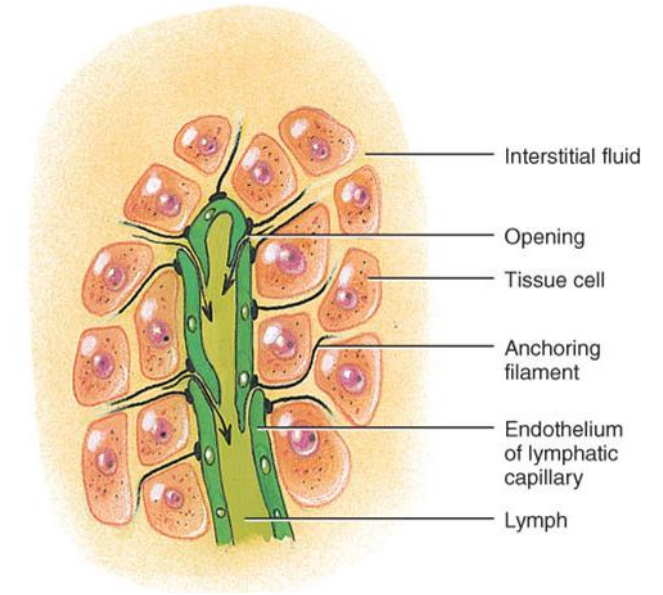
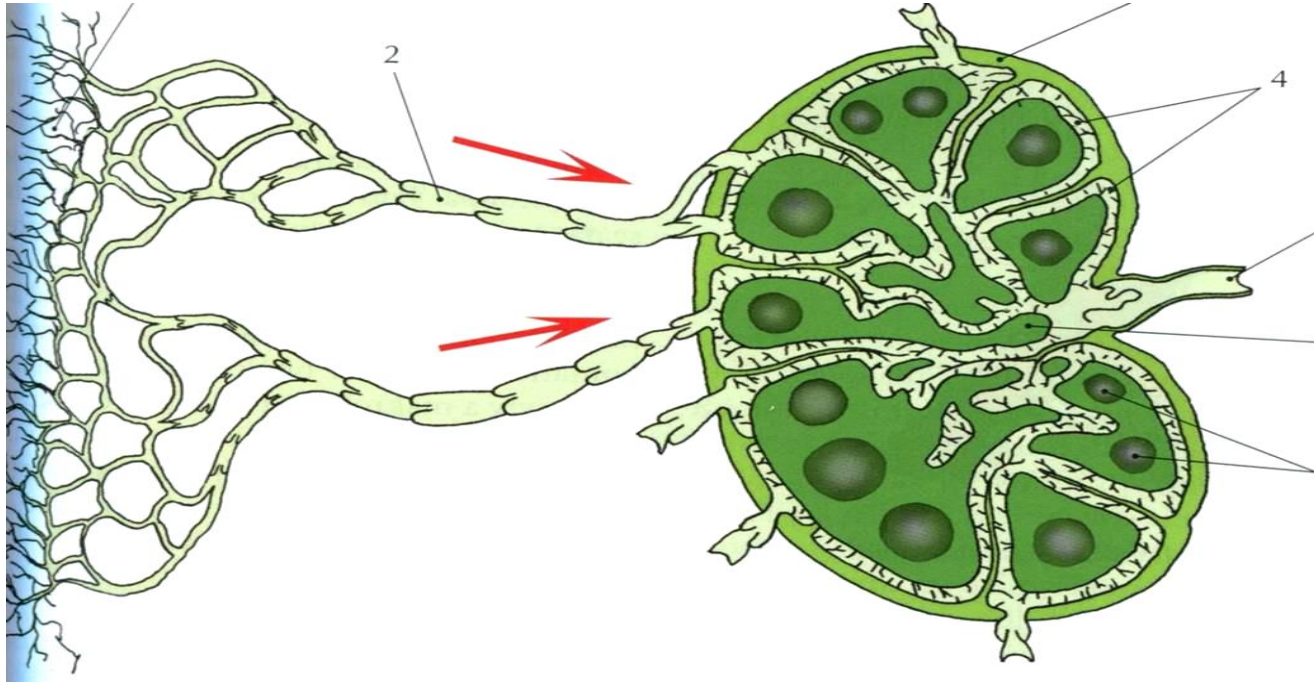
The wall is thin

Numerous valves

Within their course, there are the lymphonodes inserted

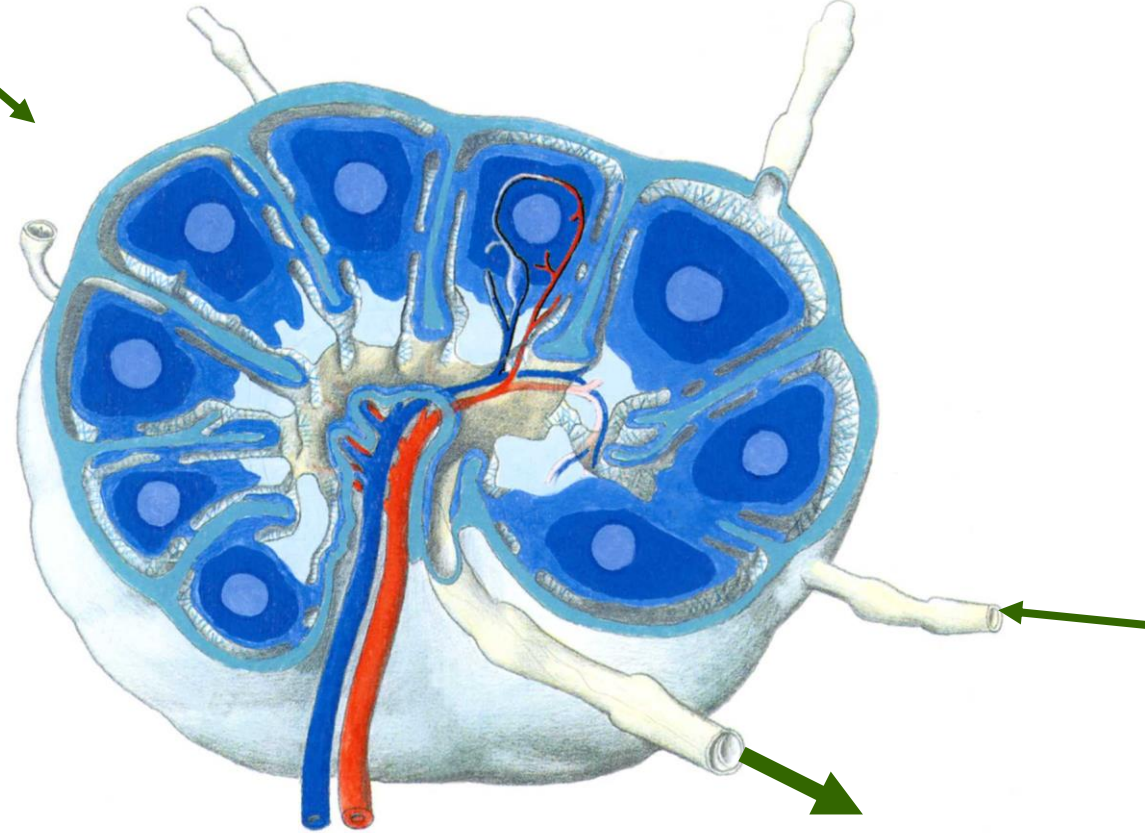
lymphatic capillaries → lymphatic capillary plexuses →

lymphatic vessels → lymphatic plexuses → lymph ducts



The lymph nodes - structure

vas afferens (více)



Tributary region
Sentinel lymph node

capsula (*trabeculae*)

hilus

Cortex – more lymphocytes

medulla – less lymphocytes

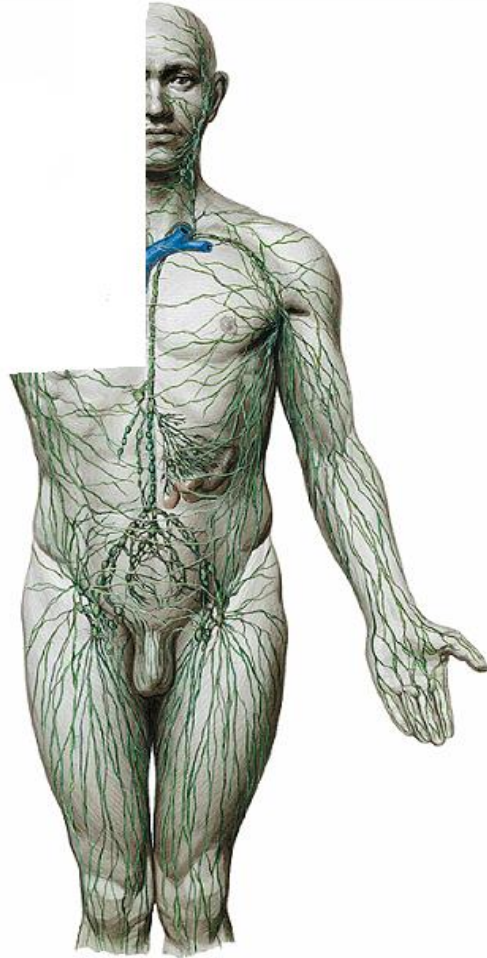
convex part - „afferent“ – vasa afferentia (more)

concave hilus - „efferent“ – vas efferens

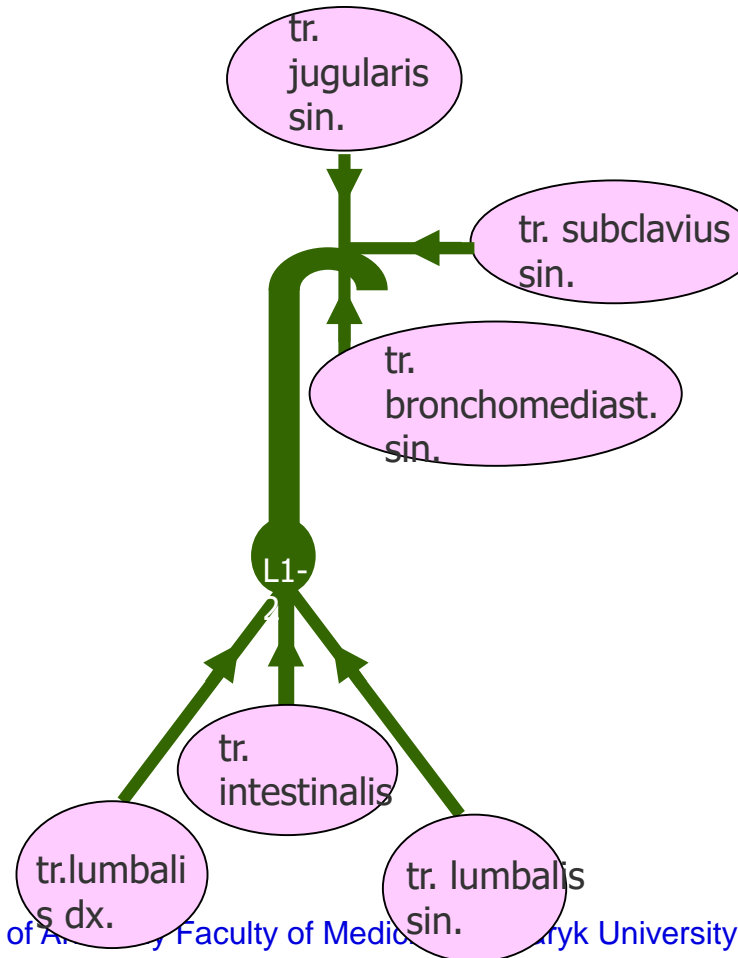
They filtrate the lymph

vas efferens
(1)

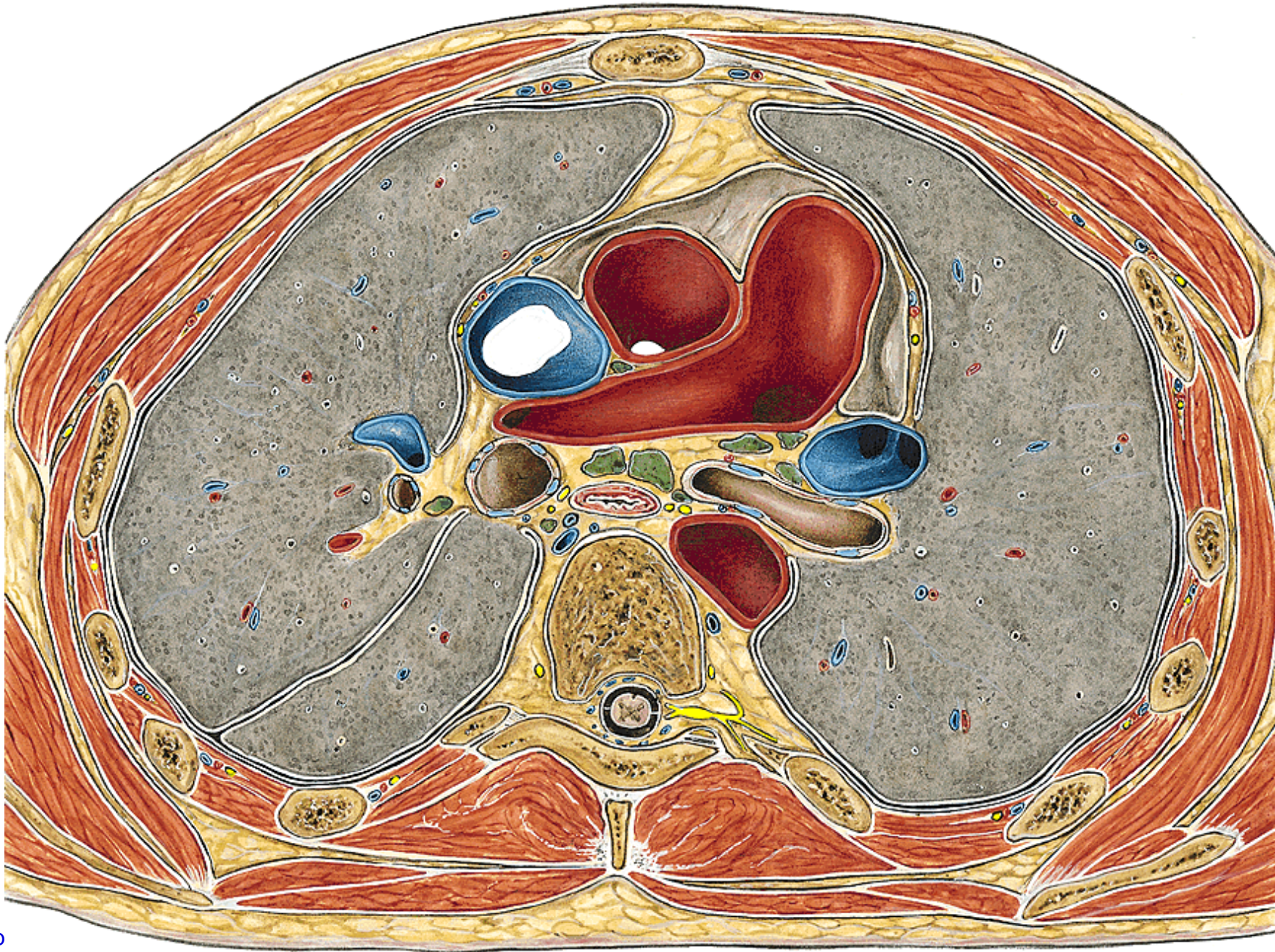
Main lymph ducts



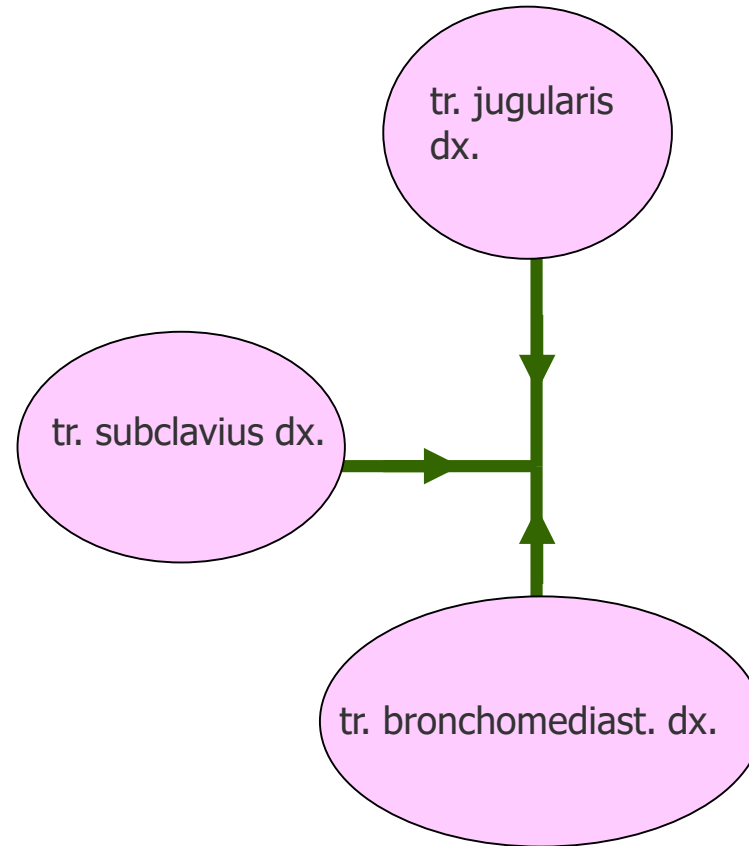
Ductus thoracicus



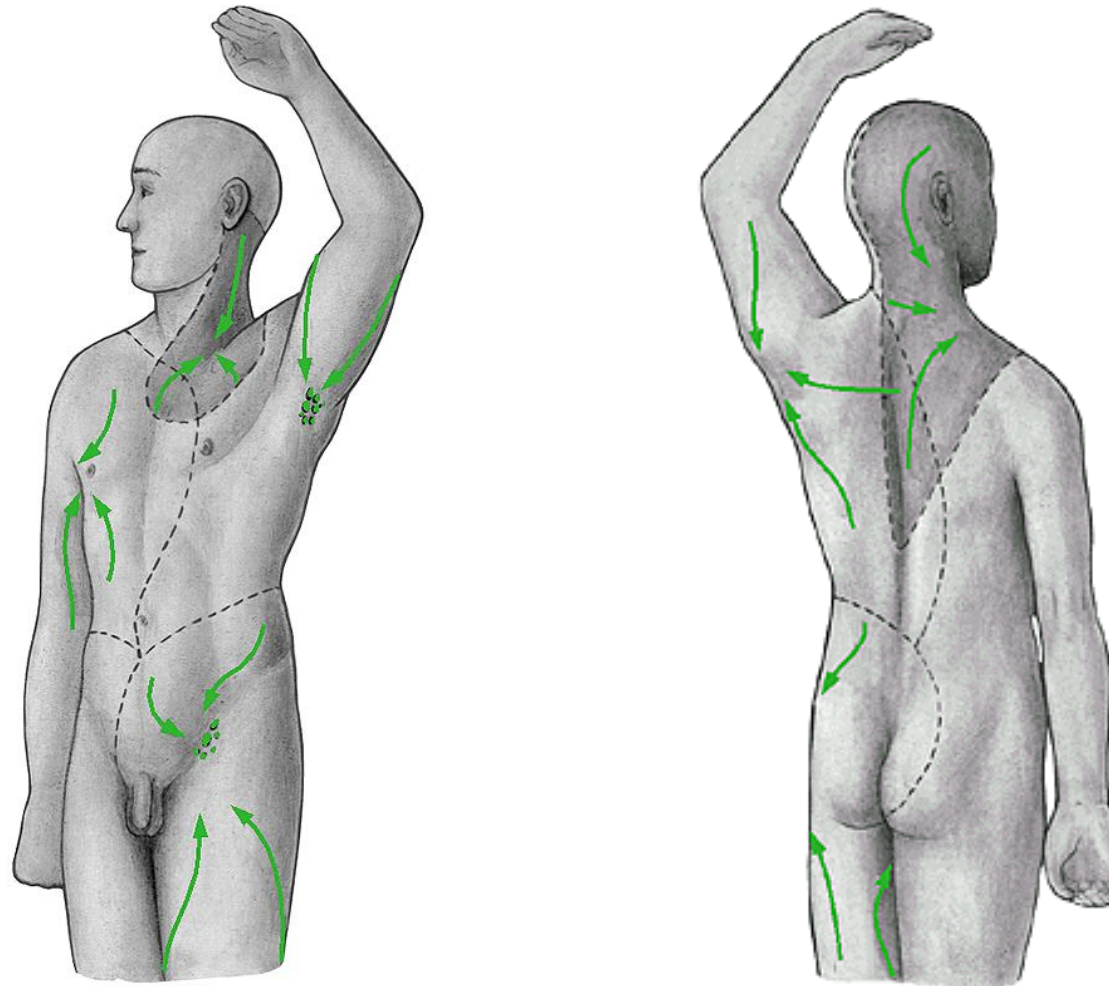
- pars abdominalis (retroperitoneally)
- pars thoracica (mediastinum posterius, aorta and the esophagus)
- pars cervicalis (angulus venosus sinister C7) takes tr. jugularis sin. and tr. subclavius sin., tr. bronchomediastinalis sin.



Truncus lymphaticus dx



Watersheds of lymph

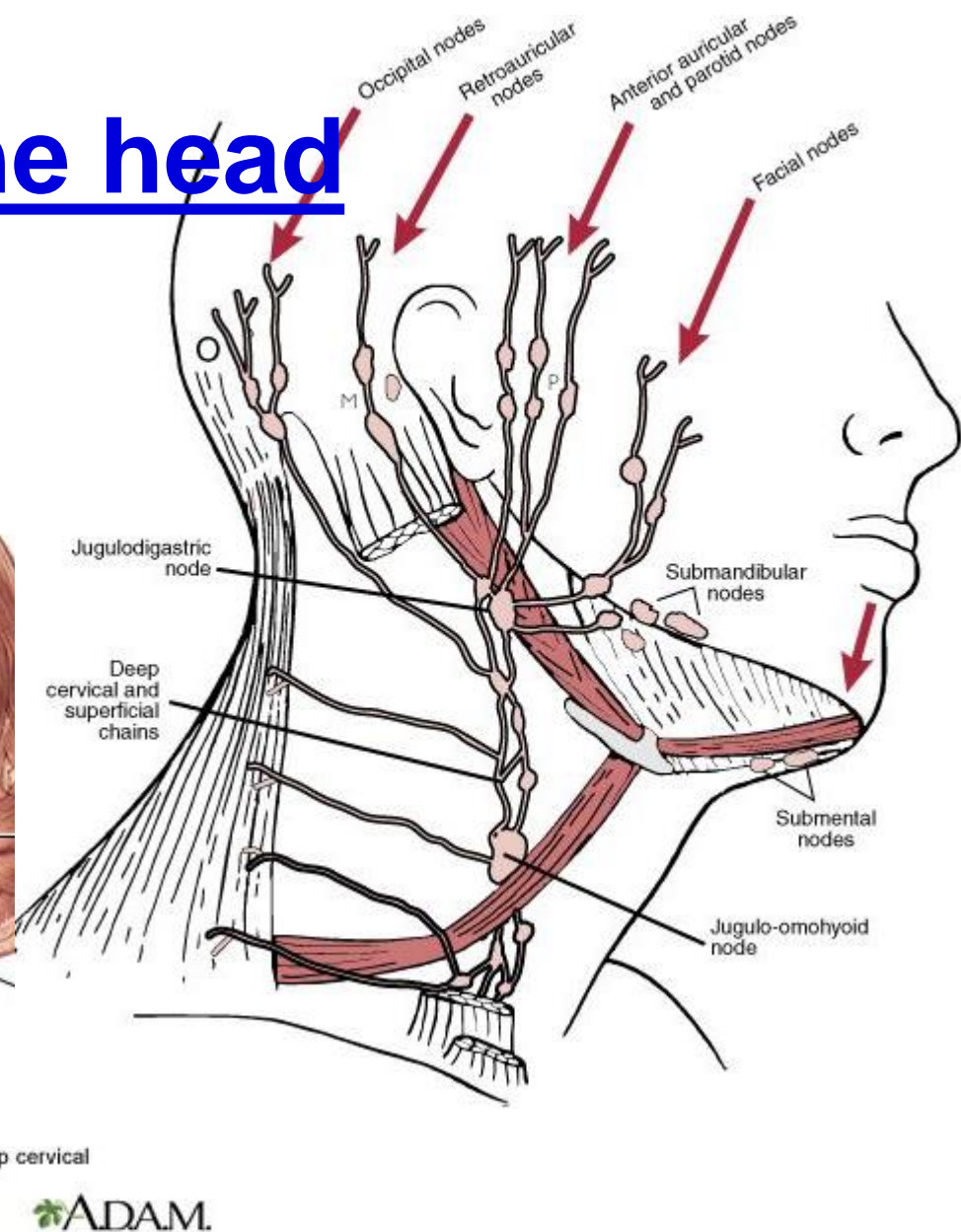
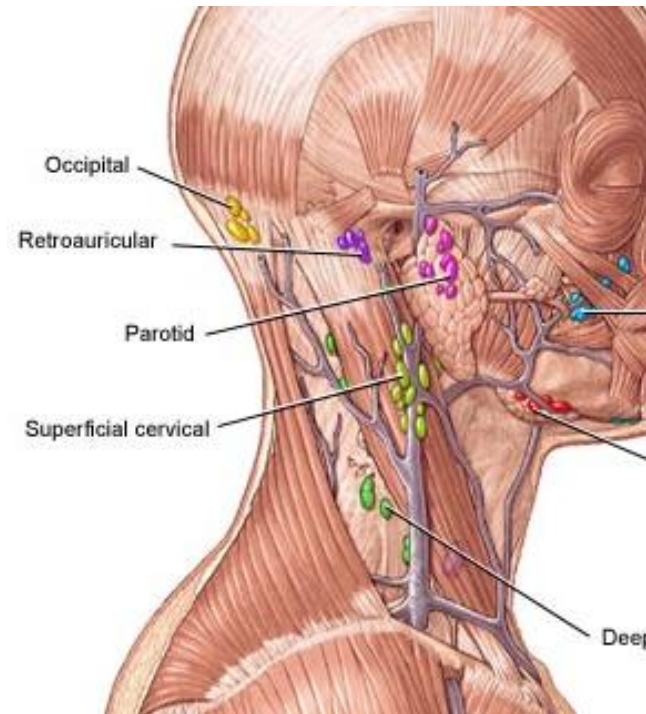


The lymphatic drainage of the head

n.l. parotidei
n.l. retroauriculares
n.l. occipitales
n.l. submandibulares
n.l. submentales



N.l. cervicales profundi



ADAM

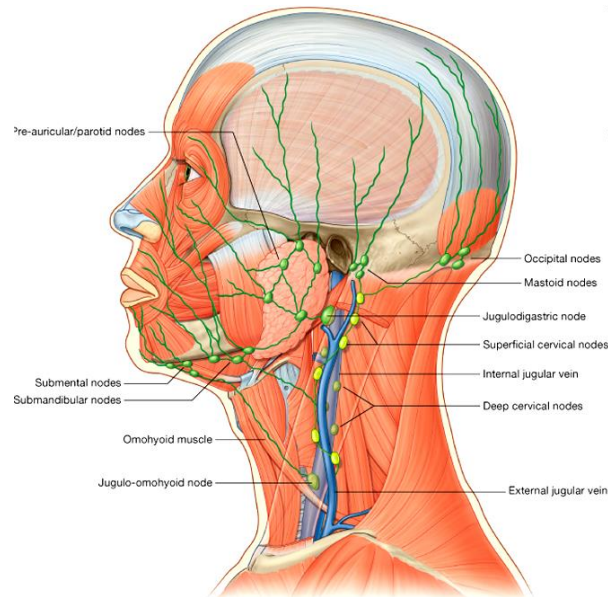
The lymphatic drainage of the neck

1. N.I. cervicales superficiales

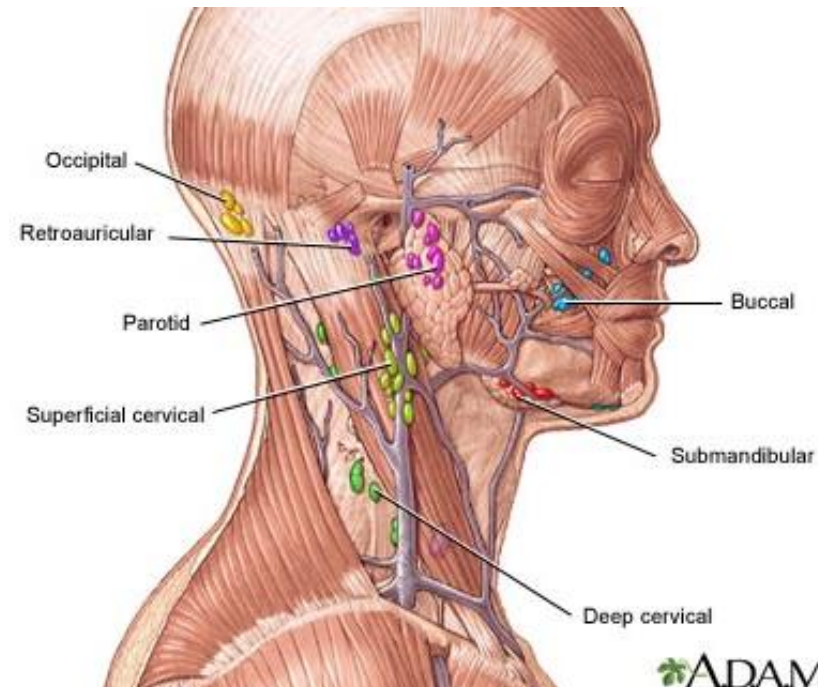
- Along v. jugularis externa
- vassa efferentia into n.l. cervicales profundi

2. N.I. cervicales profundi—> truncus jugularis

- 15-30, Wood's lymphnode, along v. jugularis int., n. accesorius, nodi supraclaviculares



Drake: Gray's Anatomy for Students, 2nd Edition.
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ADAM.

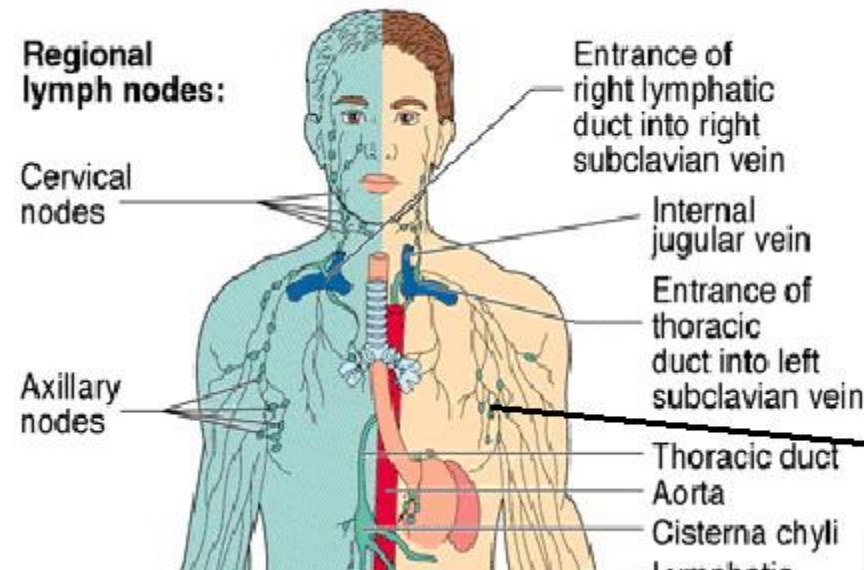
The lymphatic drainage of the thorax

1. The thoracic walls

- Superficial layer → nodi axillares
- Inner side of wall → nodi parasternales et intercostales

2. The thoracic organs:

- Organs of the mediastinum → nodi tracheobronchiales sup. et. inf. → truncus bronchomediastinalis



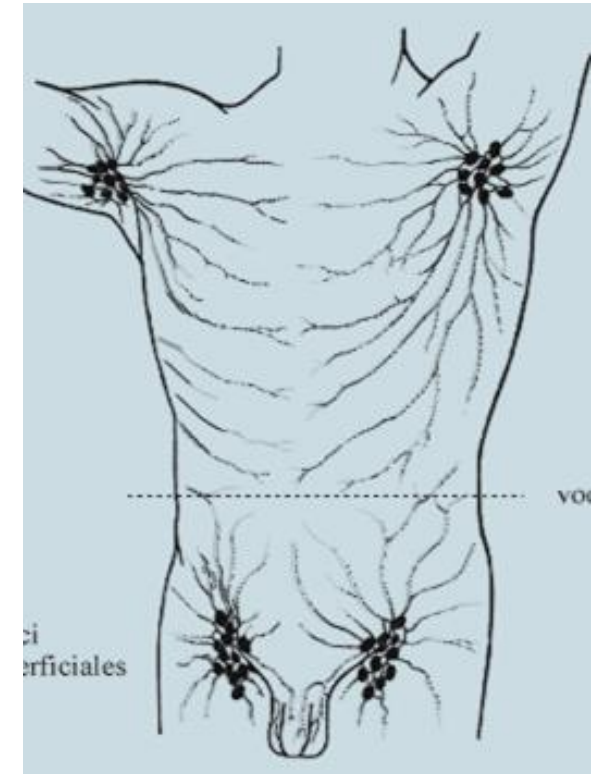
The lymphatic drainage of the abdomen

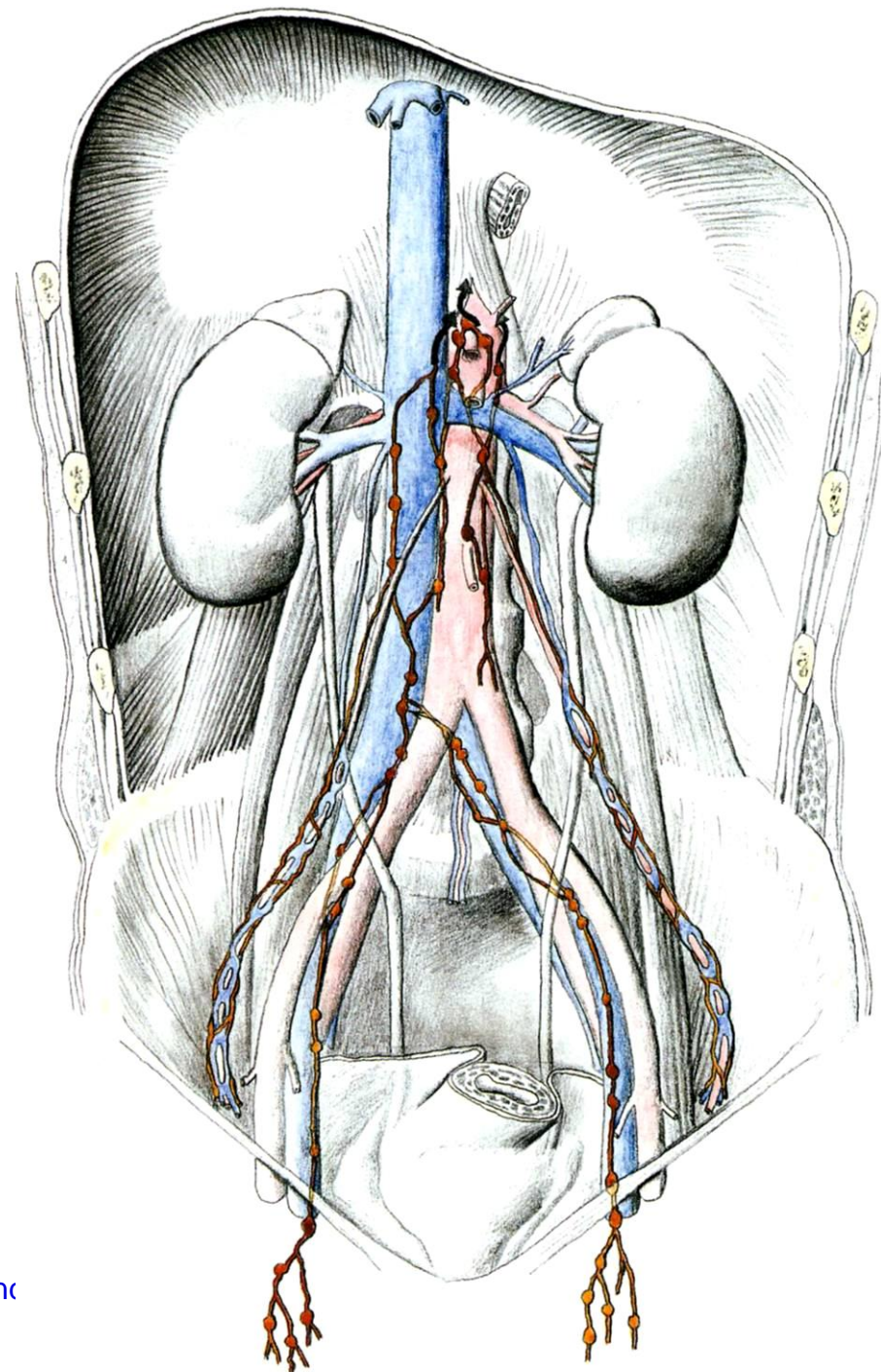
1. The superficial system– *nodi axillares* - *nodi inguinales*

- The border line is at the level of the umbilicus

2. The deep system

- parietal – along the large vessels
- visceral – unpaired and **paired** abdominal organs (around the unpaired branches of the aorta)





The lymph nodes along the large vessels (retroperitoneally):

Nodi lumbales—>*tr. lumbalis*



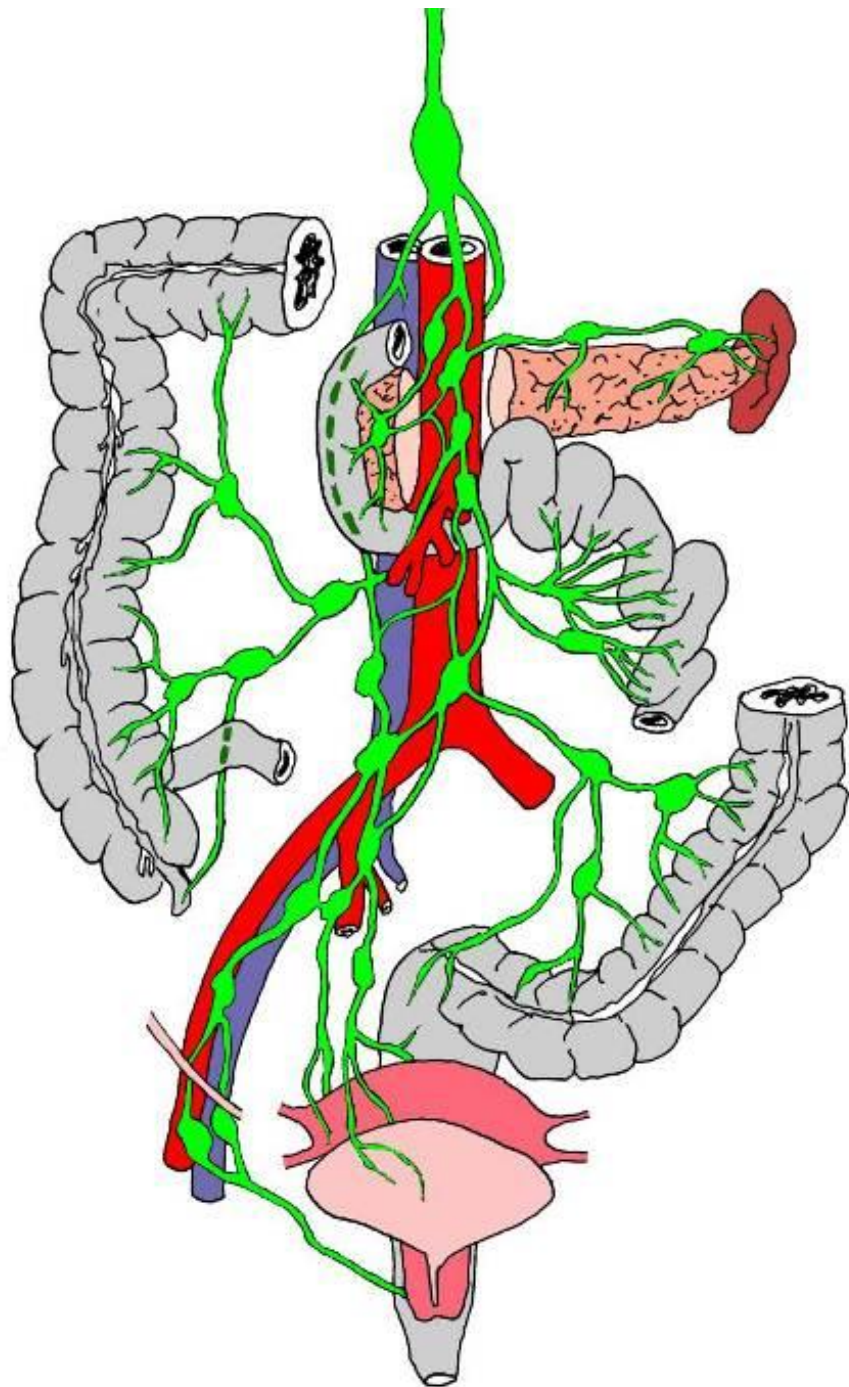
Nodi iliaci communnes



Nodi iliaci externi

Nodi iliaci interni

*Nodi parauterini (Bayer)/
nodi retroprostatici*



Truncus intestinalis



Nodi coeliaci (in front of the aorta)



Nodi gastrici

Nodi pylorici

Nodi pancreaticolienales

Nodi pancreaticoduodenales

Nodi hepatici

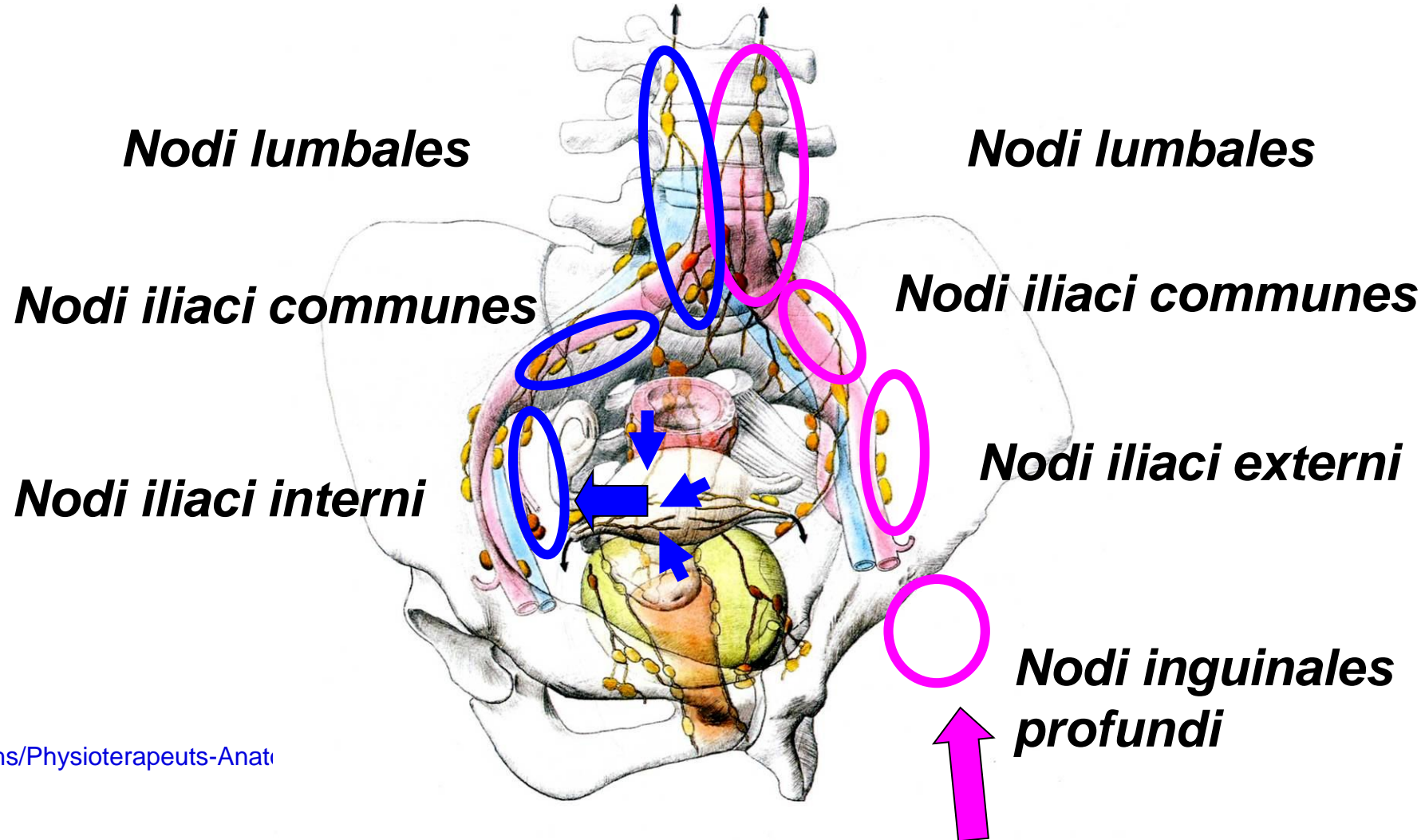
Nodi mesenterici

Nodi colici et paracolici

Nodi rectales et pararectales

The lymph from the pelvic organs – *nodi iliaci interni* – *nodi iliaci communes* – *nodi lumbales* – *truncus lumbalis* – *ductus thoracicus*

The lymph from the lower limb – *nodi inguinales profundi* – *nodi iliaci externi*



The lymphatic drainage of the UL

Superficial collectors

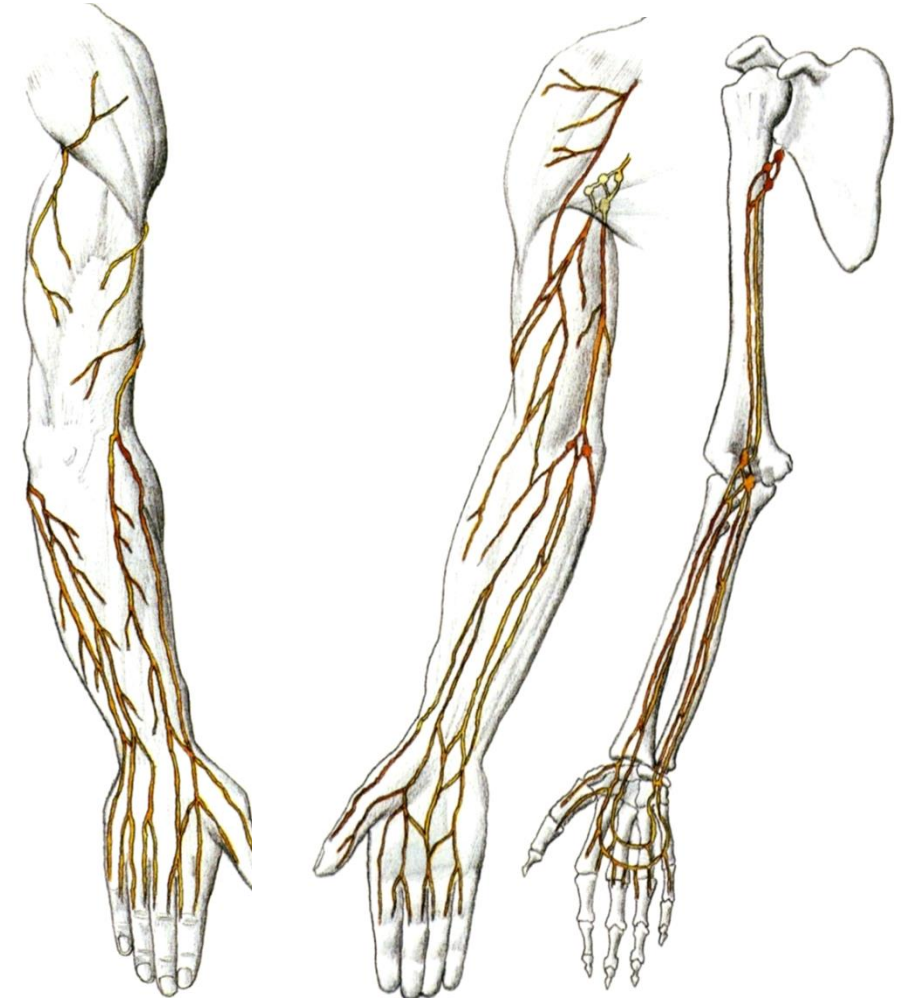
- anterior
- lateral
- medial

**nll. cubitales
superf.**

Deep systém – along large vessels

**nll. cubitales prof.
nll. axillares**

truncus subclavius
↑
pl. lymphaticus axillaris
↑
nodi axillares
↑
nodi brachiales
n. l. cubitales profundi



Axilla

nodi lymphatici:

- pectorales (Sorgius) 40 lymph nodes
 - subscapulares
 - interpectorales
 - laterales (humerales) 6 groups
 - centrales
- ↓
- apicales (infraclaviculares)



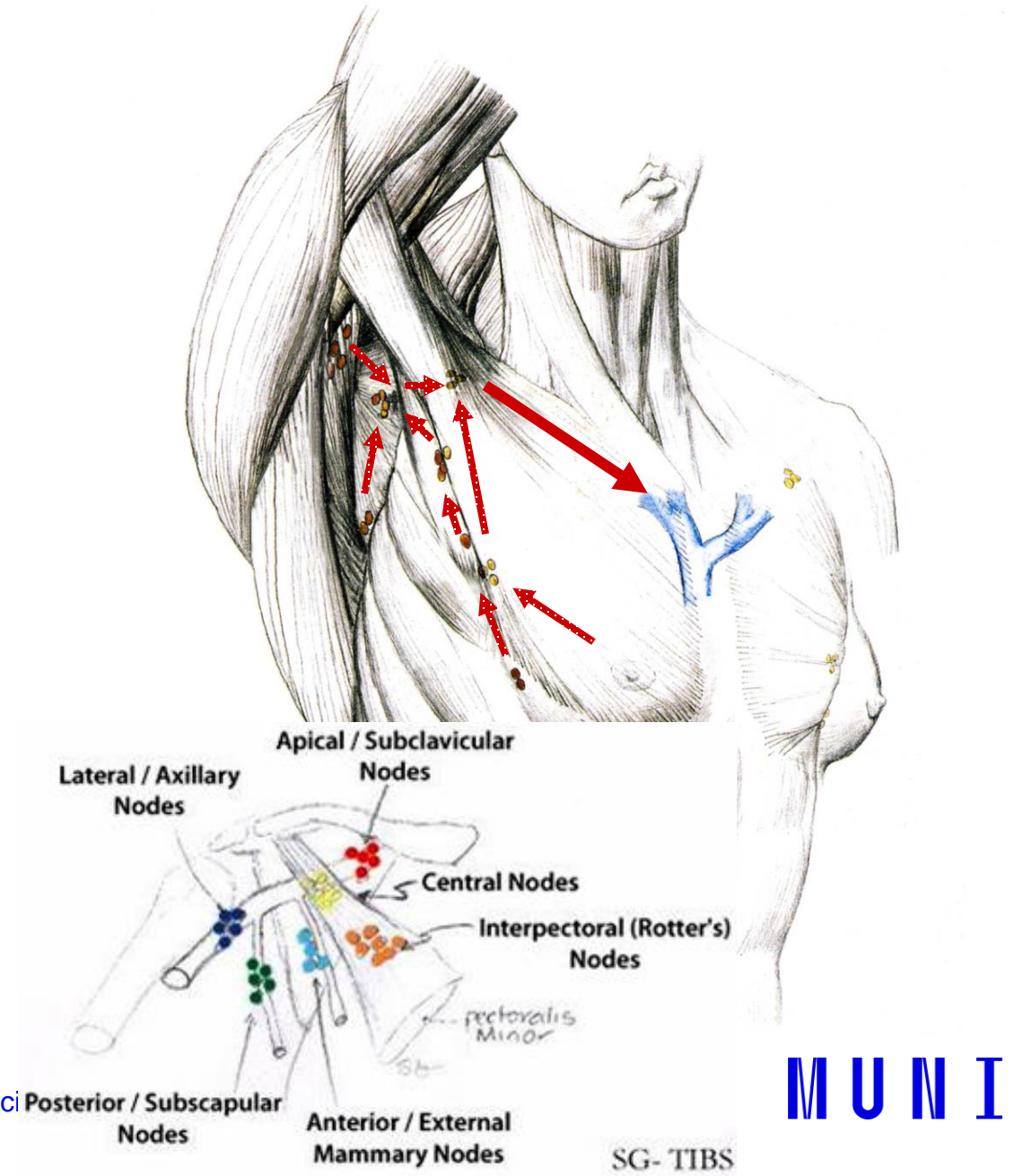
plexus lymphaticus axillaris



Truncus subclavius



ductus thoracicus
ductus lymphaticus dexter



The lymphatic drainage of the LL

The superficial collectors

Medial

**nll. poplitei superf.
nll. inguinales
superf.**

Lateral

Posterior

The deep system

**nll. poplitei prof.
nll. inguinales prof.**

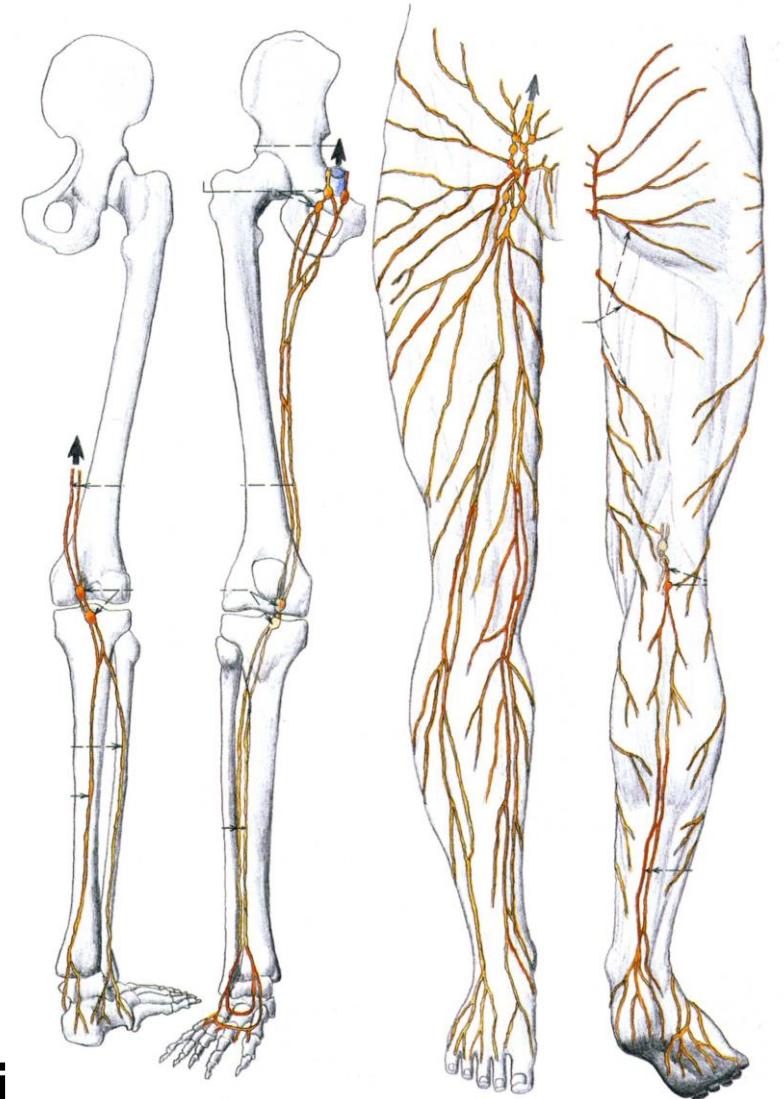
nodi lumbales



nodi iliaci externi

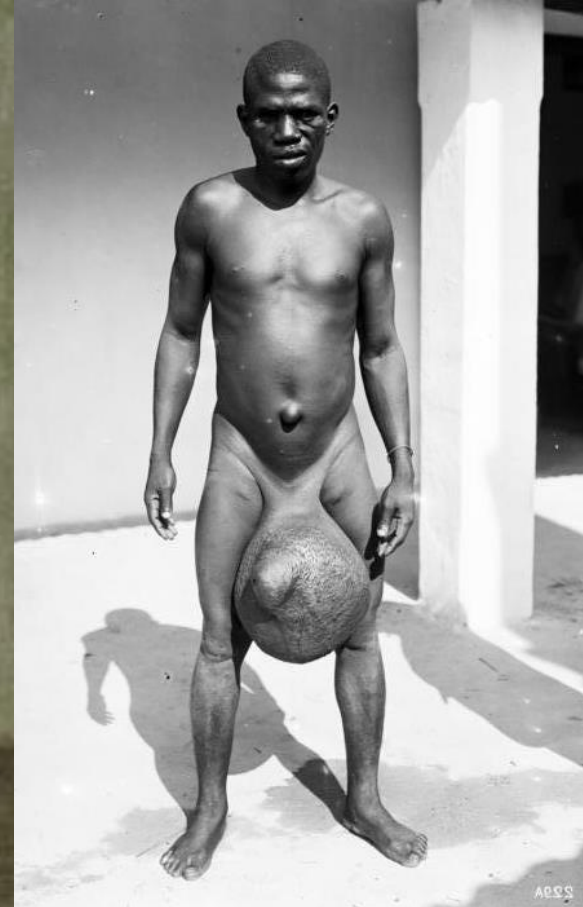


**nodi lymf. inguinales profundi
(lymphonodus Cloqueti)**



Lymfedema

- The stopping of the drain of the
- lymph → lymphoedema



Lymphatic drainage massage



Thank you for your attention

Illustrations were copied from:

Atlas der Anatomie des Menschen/Sobotta.

Putz,R., und Pabst,R. 20. Auflage. München:

Urban & Schwarzenberg, 1993)

Čihák R: Anatomie 2 (Splanchnologia). Avicenum,

zdravotnické nakladatelství, Praha, 1988.

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