

M U N I

VEINS AND LYMPHS

Dentistry II

M U N I

VEINS

CAPILLARIES, SINUSOIDS,
POSTCAPILLARY VENULES

VENULES, VEINS

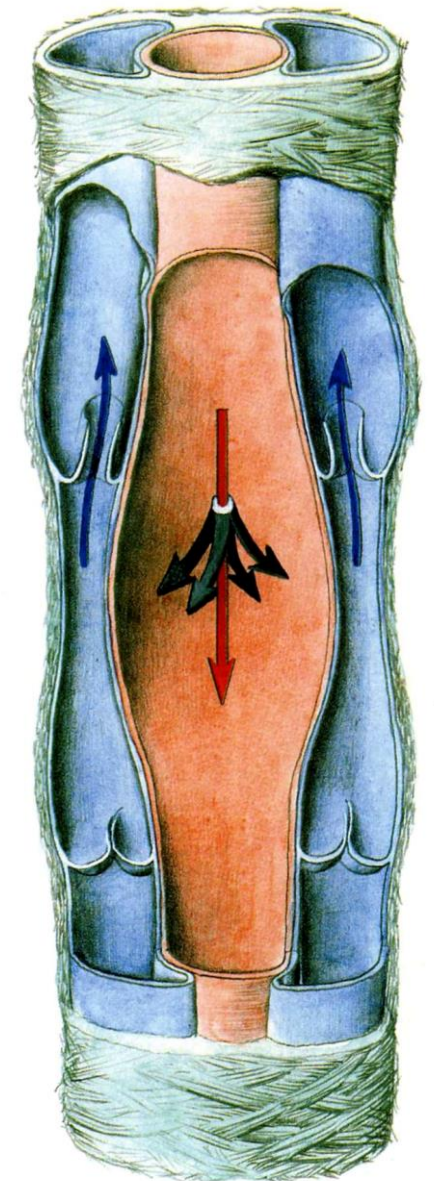
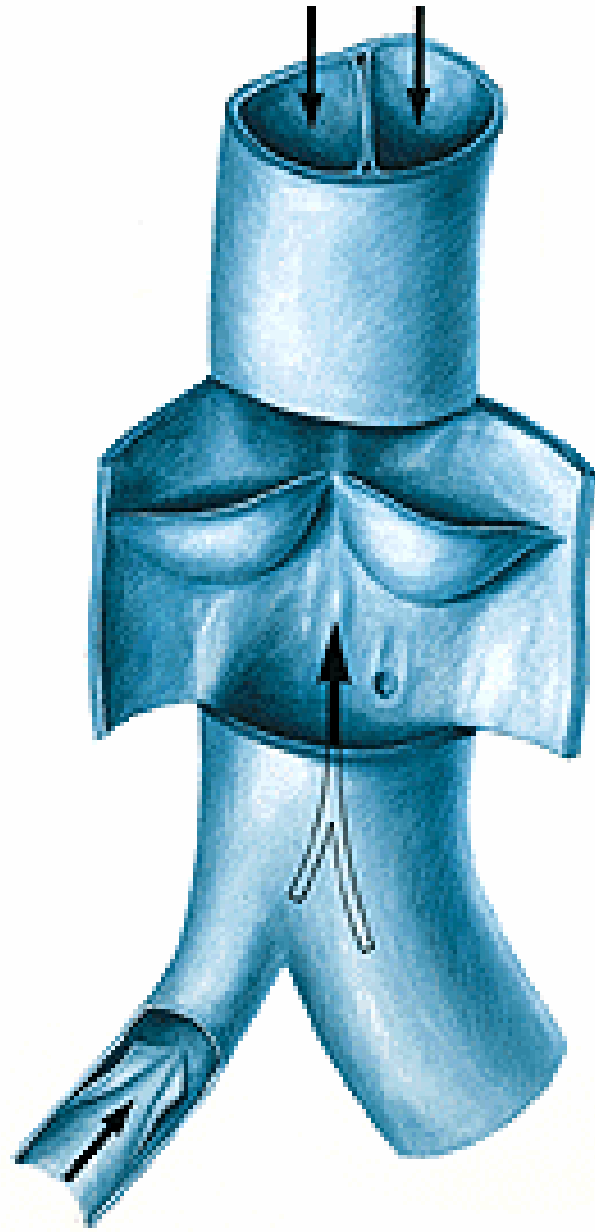
TUNICA INTIMA, MEDIA, ADVENTITIA

VASA VASORUM,
SYMPATHETIC AND AFFERENT NERVES

VALVES, SINUS

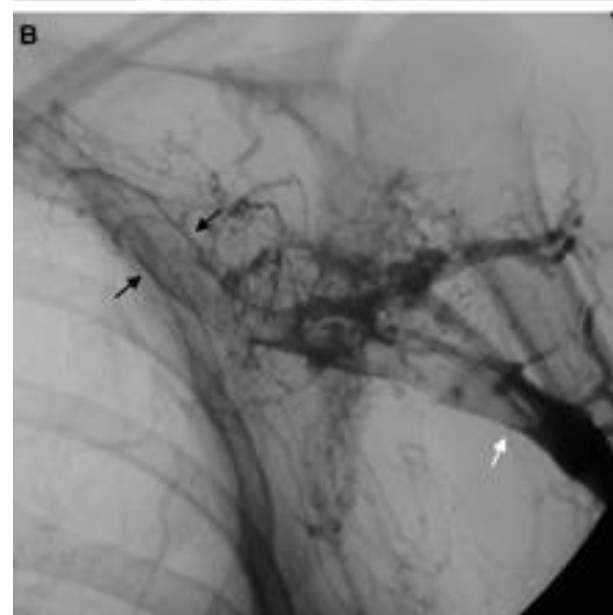
PHLEBOGRAPHY

VENAE COMITANTES



PHLEBOGRAPHY (VENOGRAPHY)

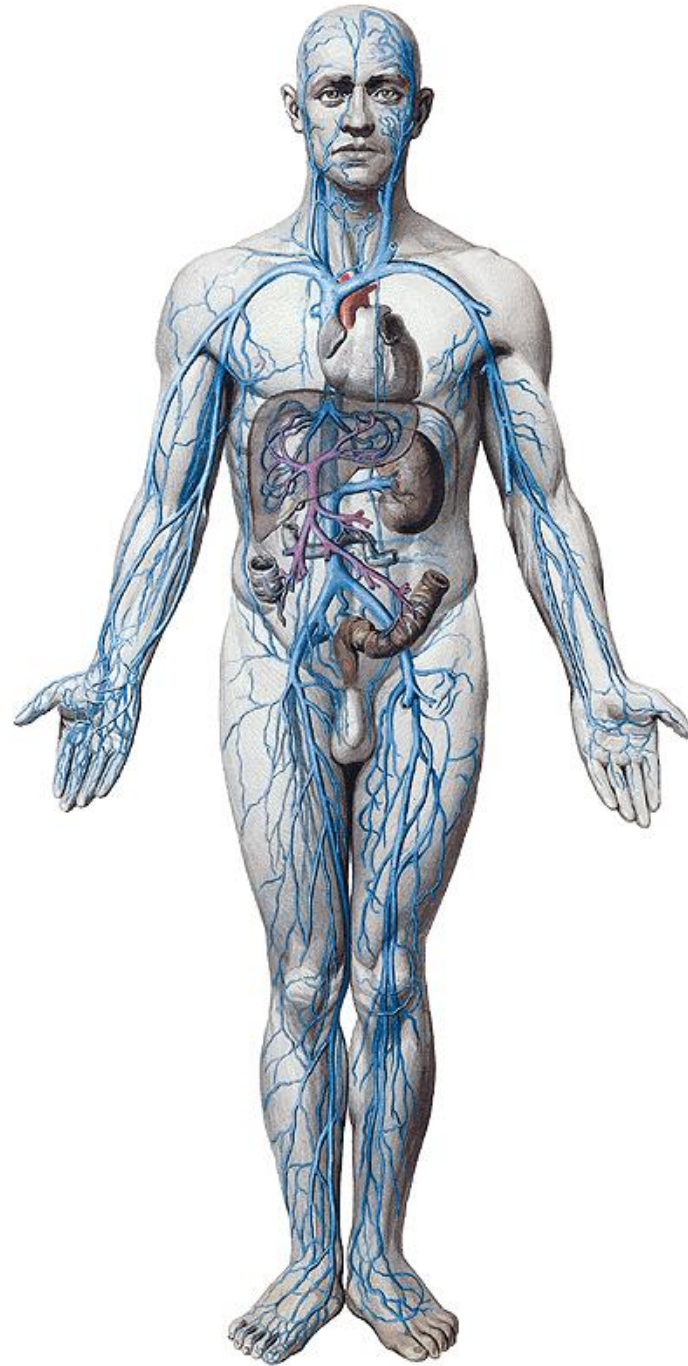
Venous thrombosis surrounded by contrast, the so-called 'tram-track' sign (arrows)



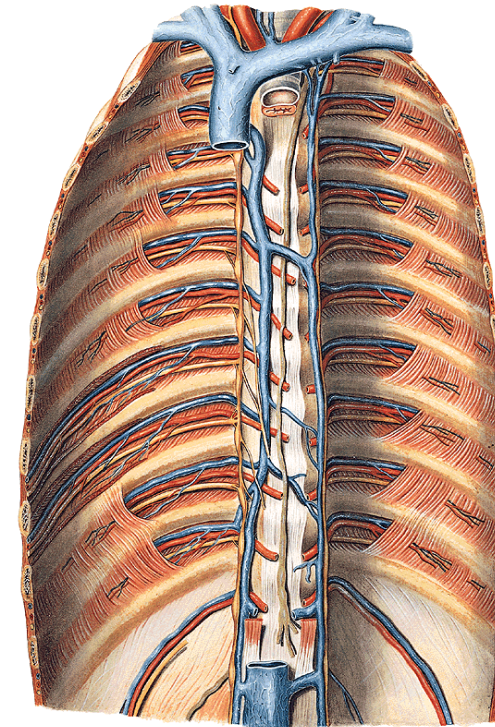
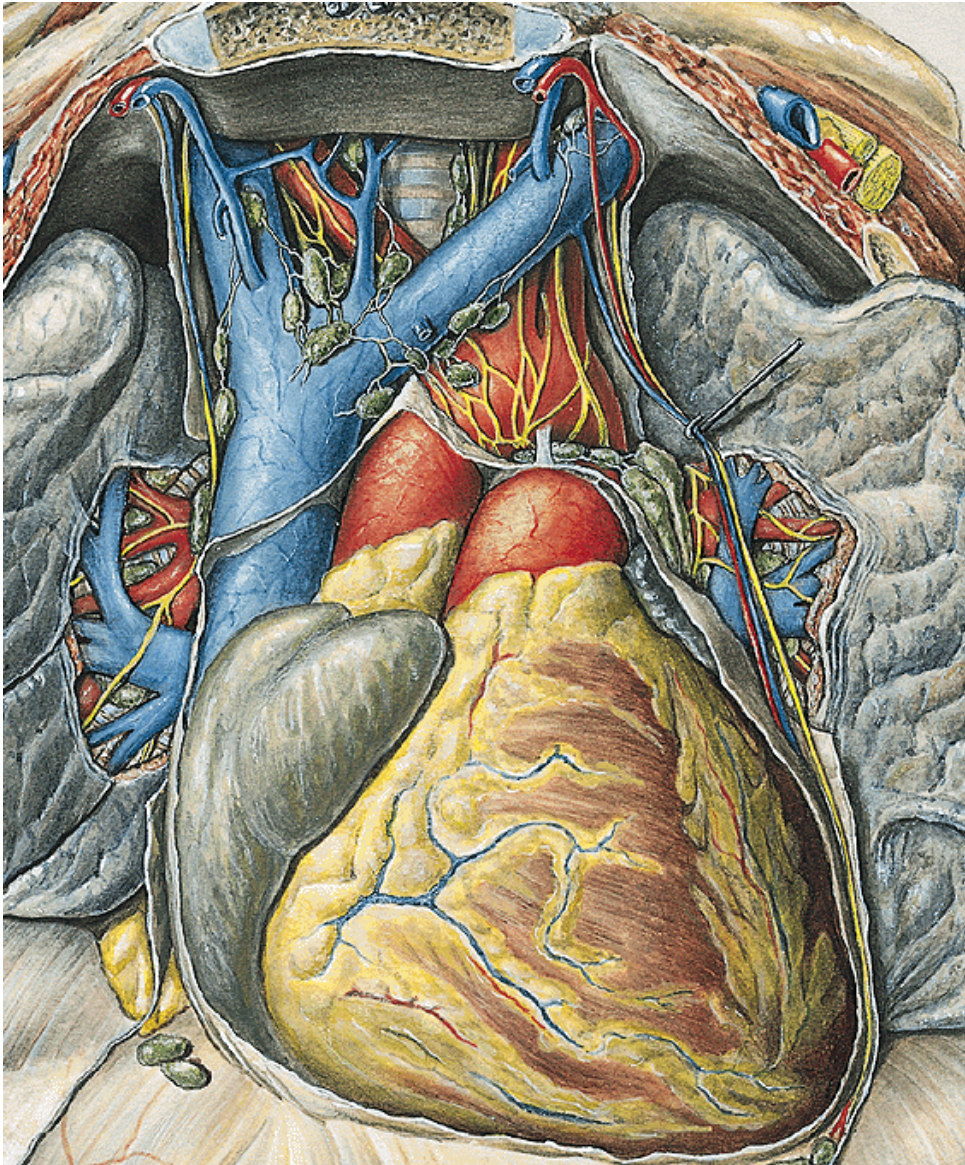
v. cava superior



v. cava inferior



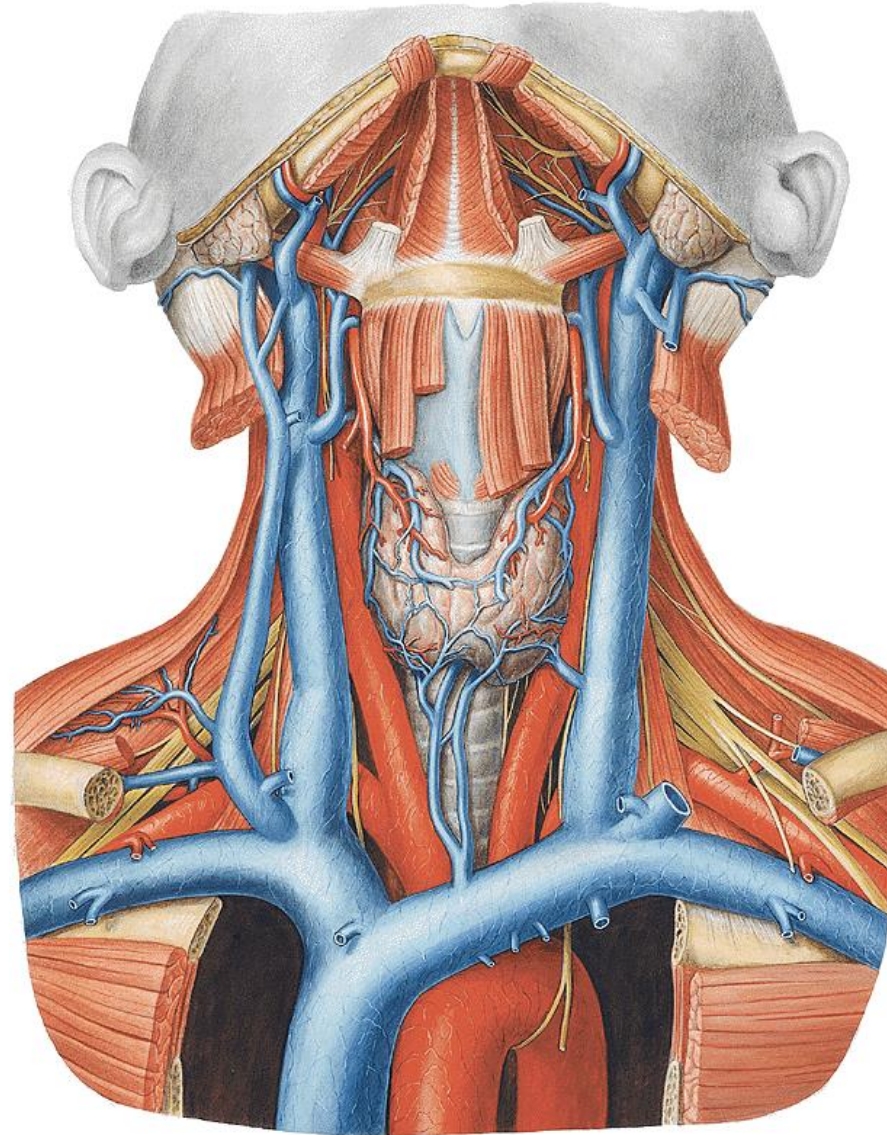
Vena cava superior



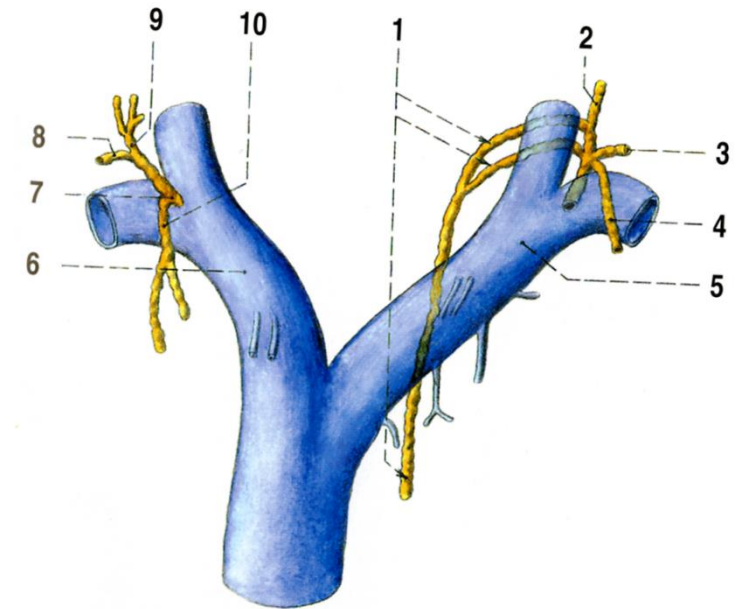
- v. brachiocephalica dx. et sin.
- v. azygos

Venae brachiocephalicae

- v. jugularis int.
- v. subclavia
(angulus venosus)
- v. jugularis ext.
- vv. thyroideae inf.
- vv. thymicae
- vv. tracheales
- vv. mediastinales
- vv. bronchiales
- vv. pericardiacae
- v. vertebralis
- v. thoracica int.
- v. cervicalis prof.
- v. intercostalis sup. sin.
- 1st v. intercostalis post.

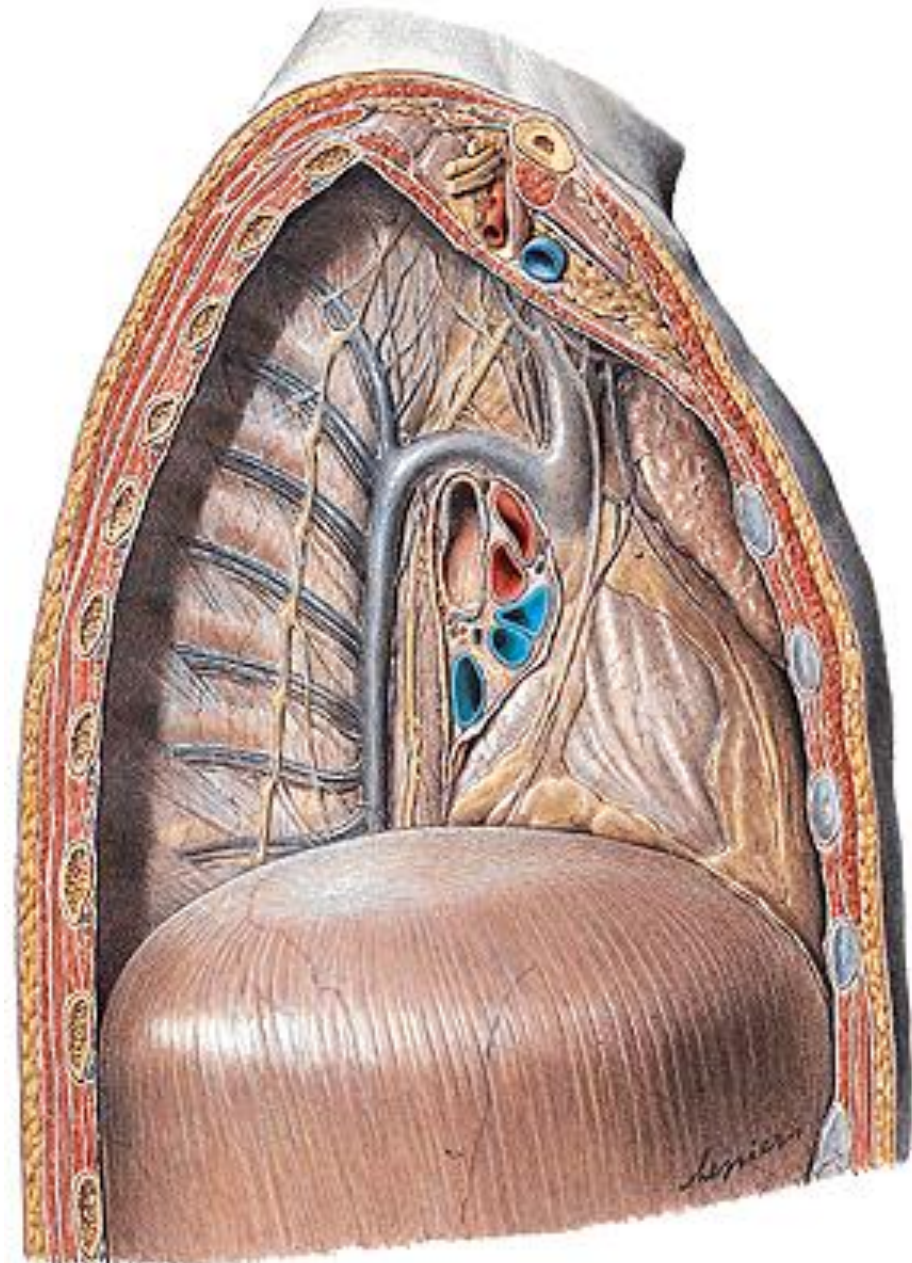
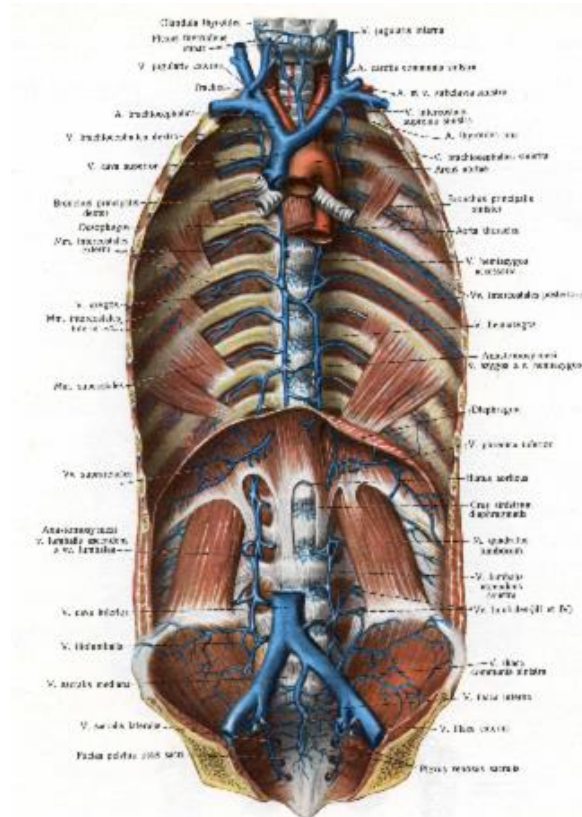


Angulus venosus dx. a sin.



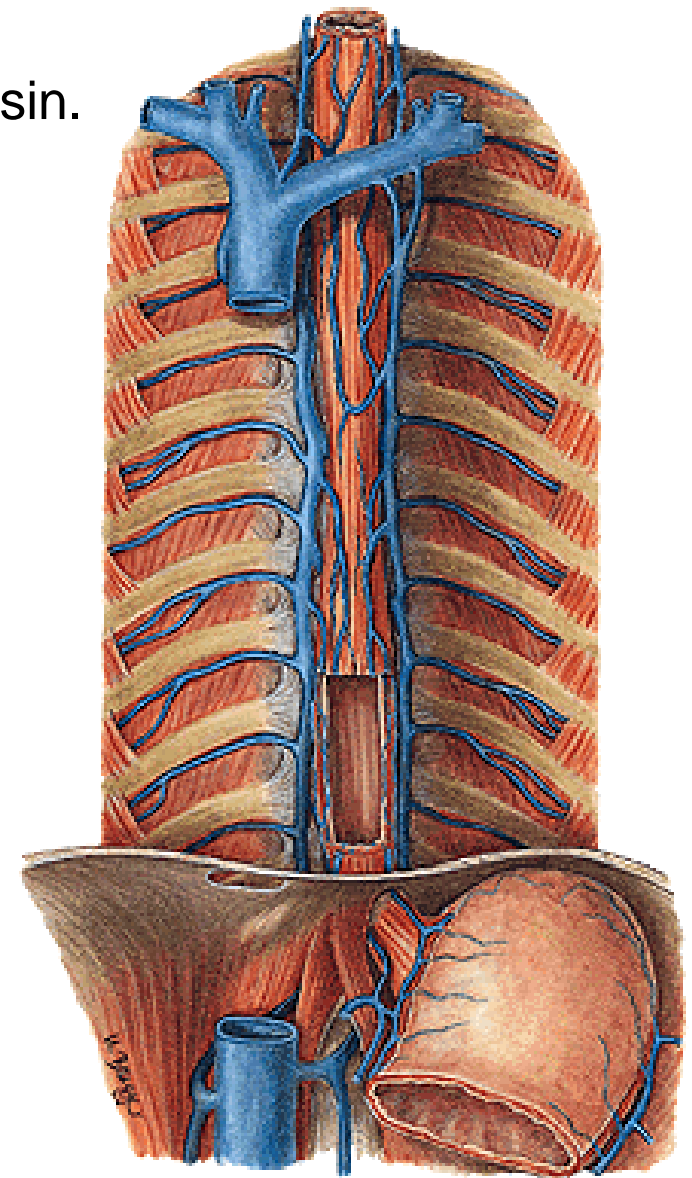
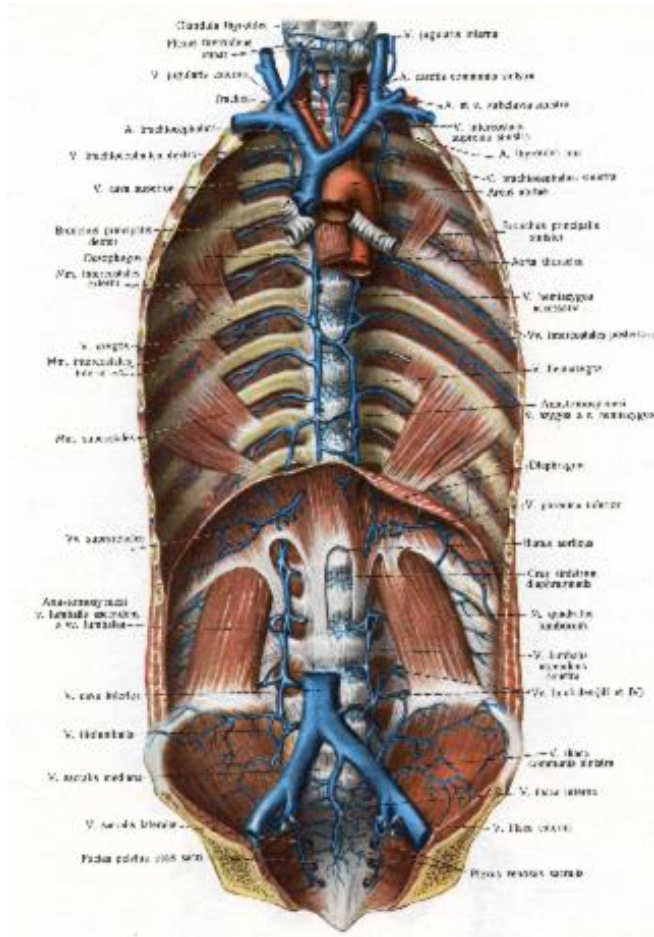
V. AZYGOS

- v. lumbalis ascendens dx. + v. subcostalis dx.
(vv. lumbales dx.)
- v. phrenica sup. dx.
- vv. intercostales post. dx. (5th – 11th)
- v. intercostalis suprema dx. (2nd – 4th)
- v. hemiazygos
- vv. oesophageales, bronchiales,
mediastinales



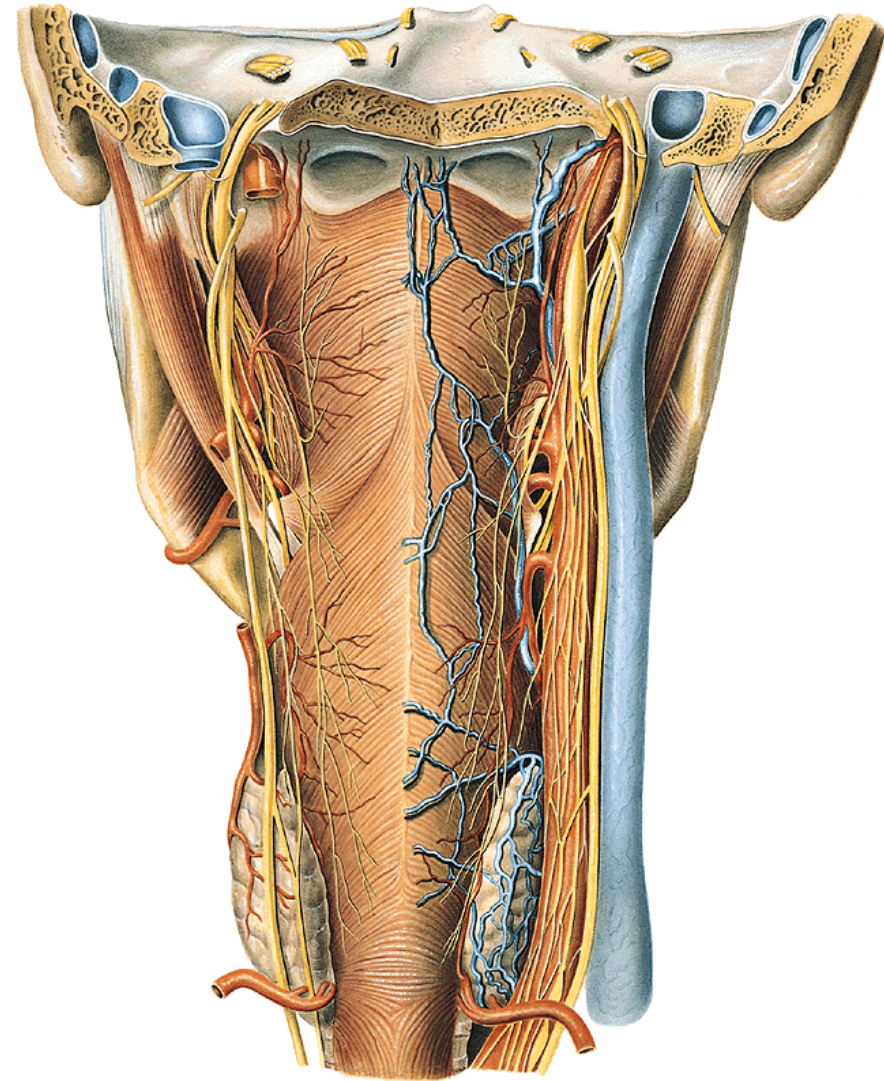
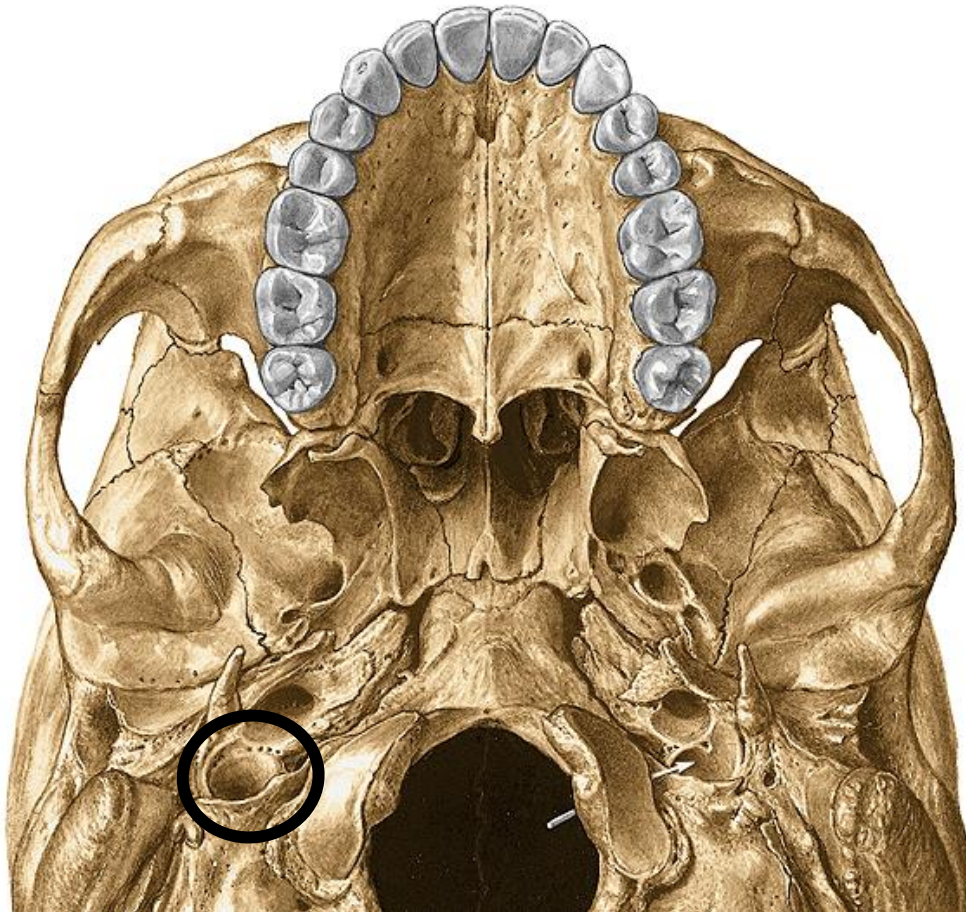
V. HEMIAZYGOS

- v. lumbalis ascendens sin. + v. subcostalis sin.
(vv. lumbales sin.)
- v. phrenica sup. sin.
- vv. intercostales post. sin.
(9th-11th)
- v. hemiazygos accessoria
(vv. intercostales post. sin.
5th – 8th)
- vv. oesophageae
- vv. bronchiales,
- vv. mediastinales

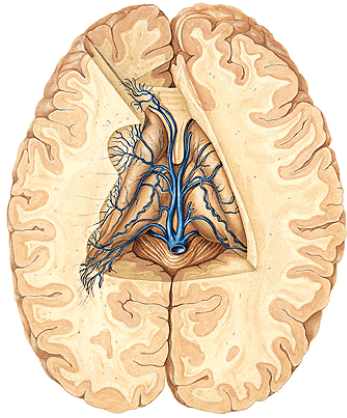


Vena jugularis interna

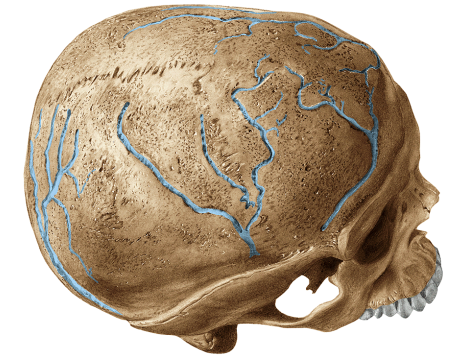
- **INTRACRANIAL TRIBUTARIES**
(region supplied by a. carotis interna)
- **EXTRACRANIAL TRIBUTARIES**
(region supplied by a. carotis externa)



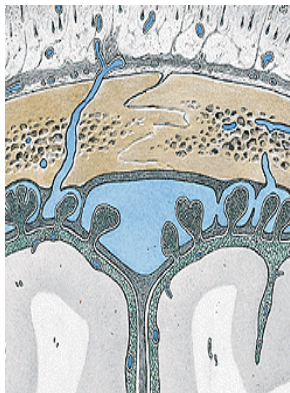
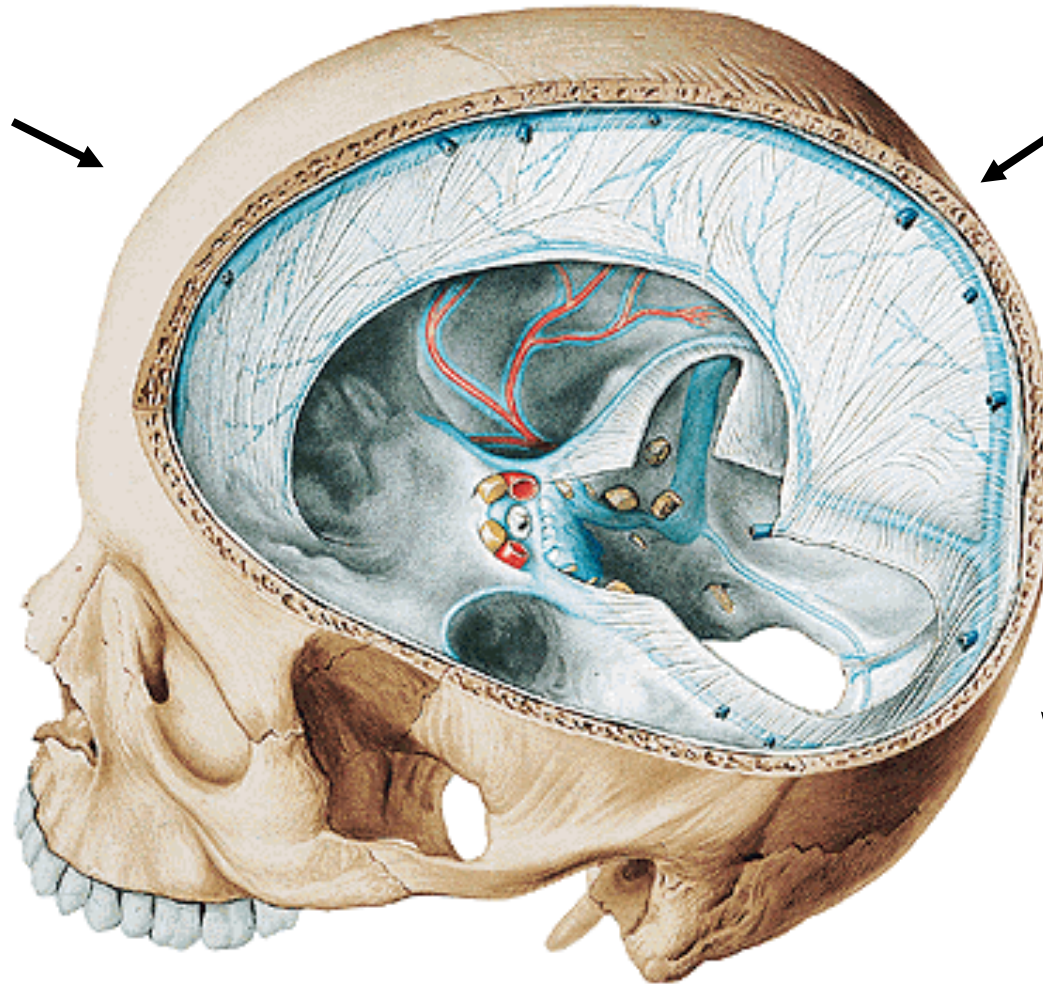
Intracranial tributaries



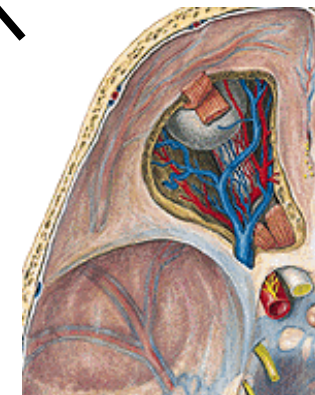
venae cerebri



venae diploicae



venae emissariae



venae ophthalmicae

Extracranial tributaries

Anterior (separately, from stem...)

- v. facialis
- v. lingualis
- v. thyroidea superior
- v. thyroidea media

Medial (separately)

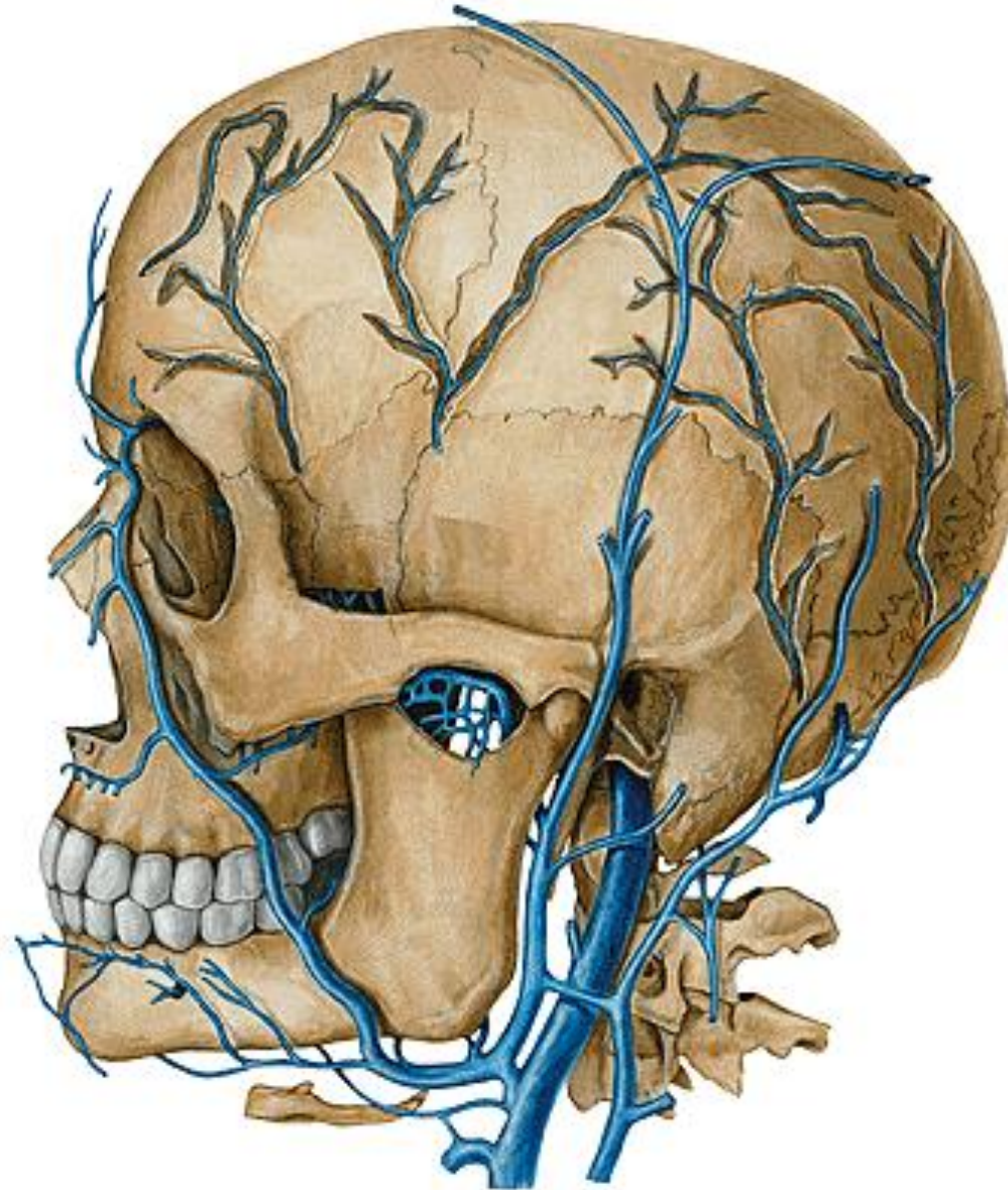
- v. pharyngea (plexus pharyngeus)

Posterior (vena jugularus externa)

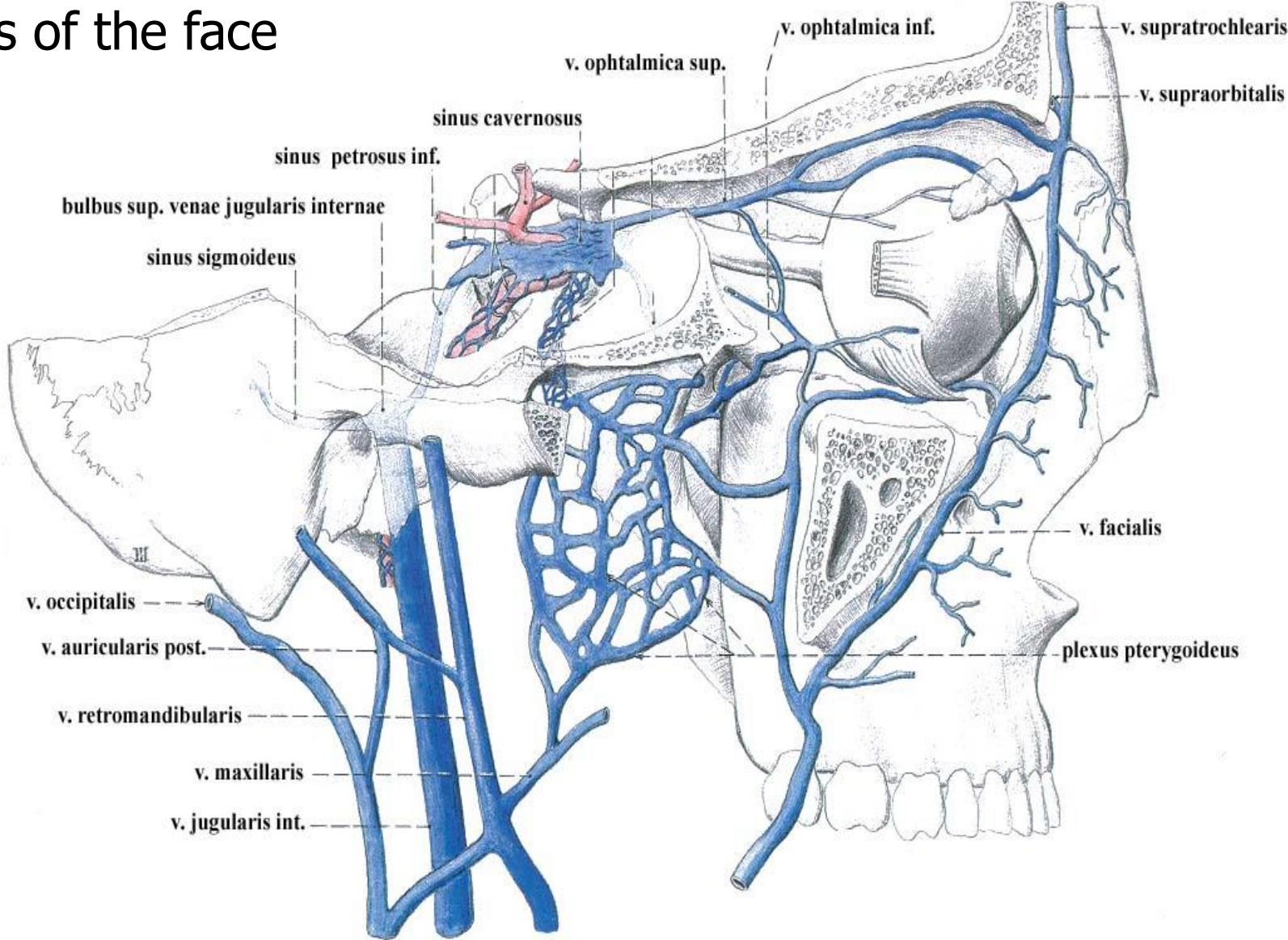
- v. auricularus posterior
- v. occipitalis

Stem (vena retromandibularis)

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

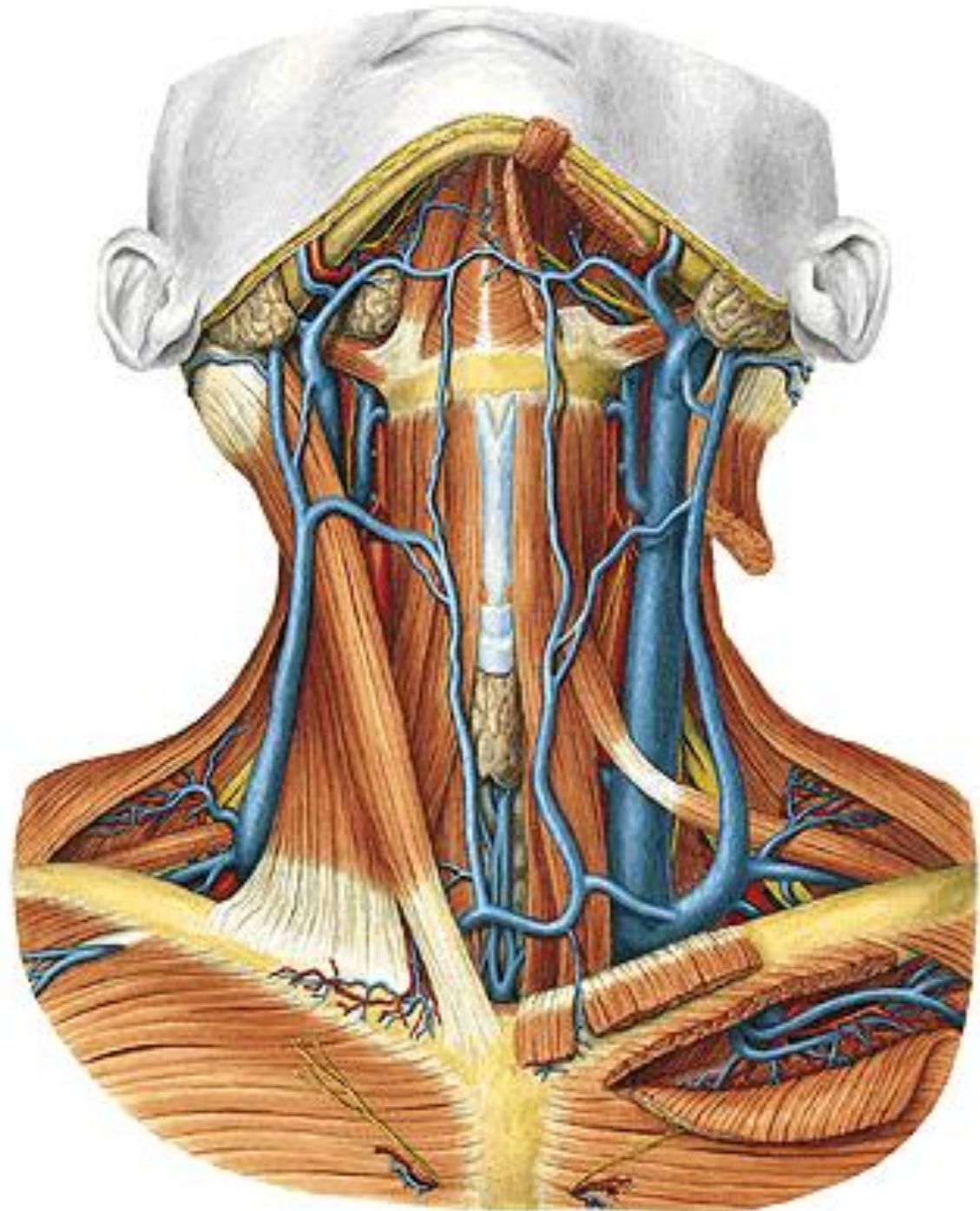


Deep veins of the face



V. JUGULARIS INT.

- vv. pharyngeae
- v. facialis communis
- v. lingualis
- v. thyroidea sup.
- v. thyroidea media

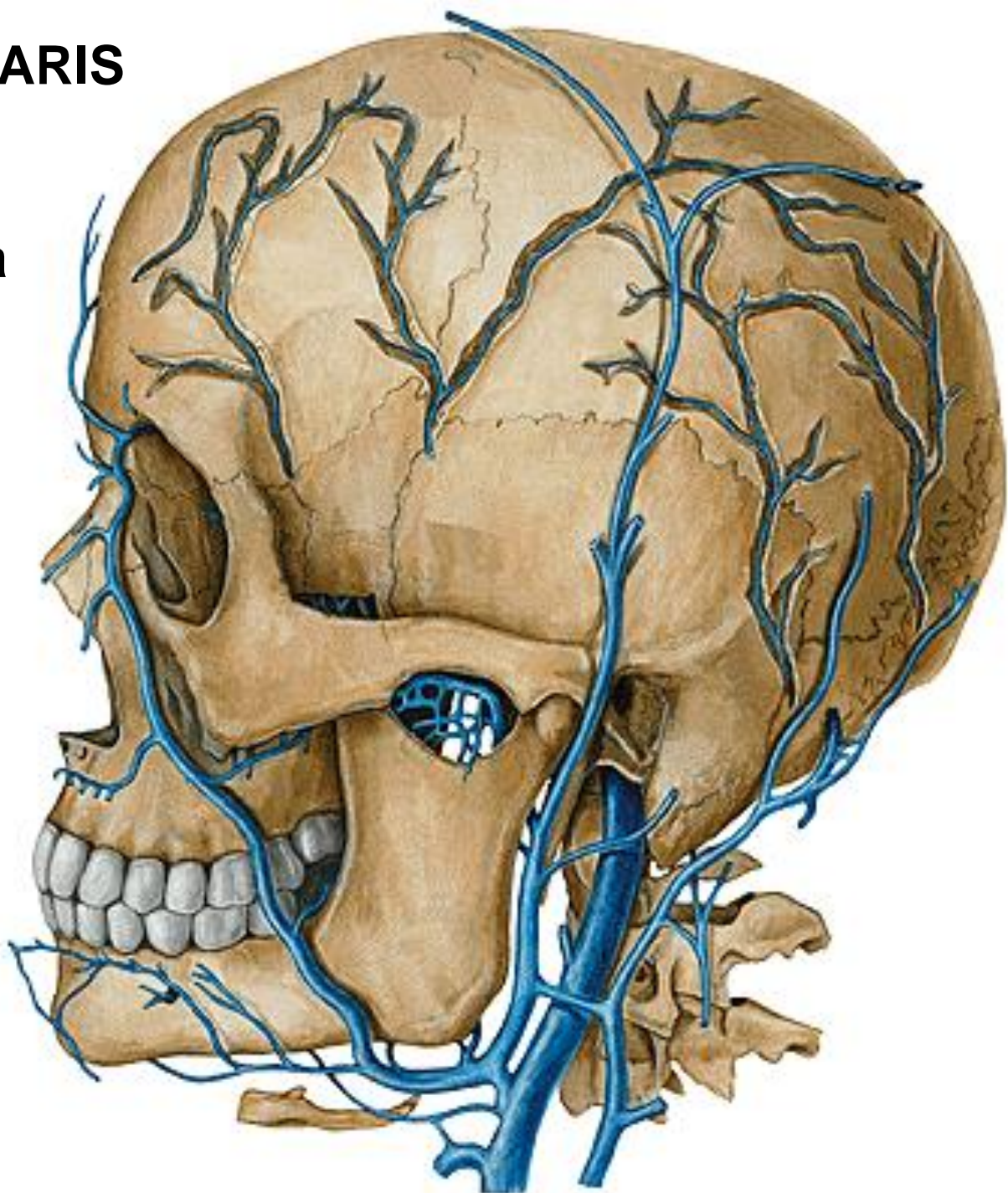


V. RETROMANDIBULARIS

- v. temporalis spf.
- v. maxillaris
- v. temporalis media
- v. transversa faciei

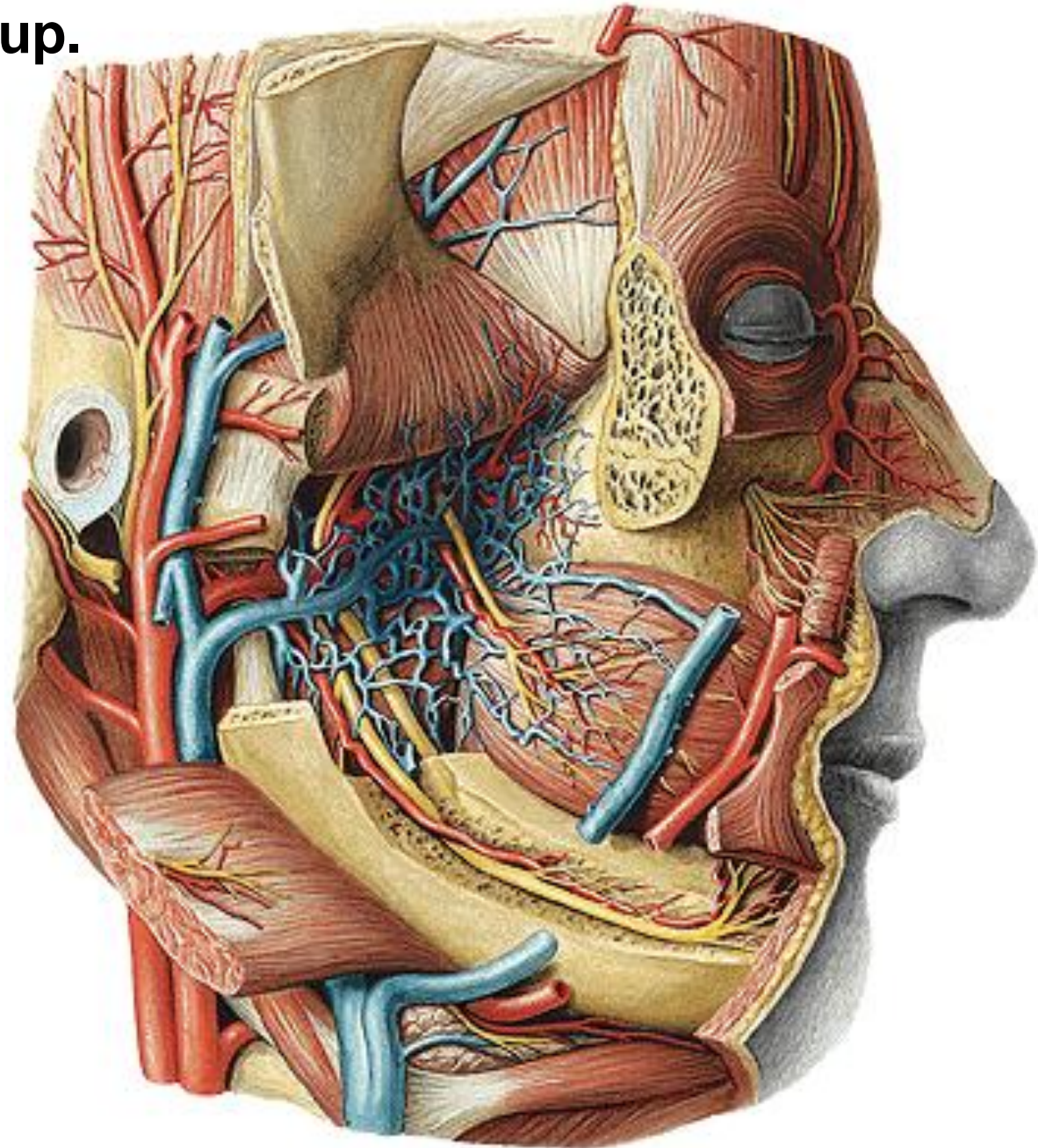
V. FACIALIS

- v. angularis
- v. prof. faciei
- v. palatina ext.



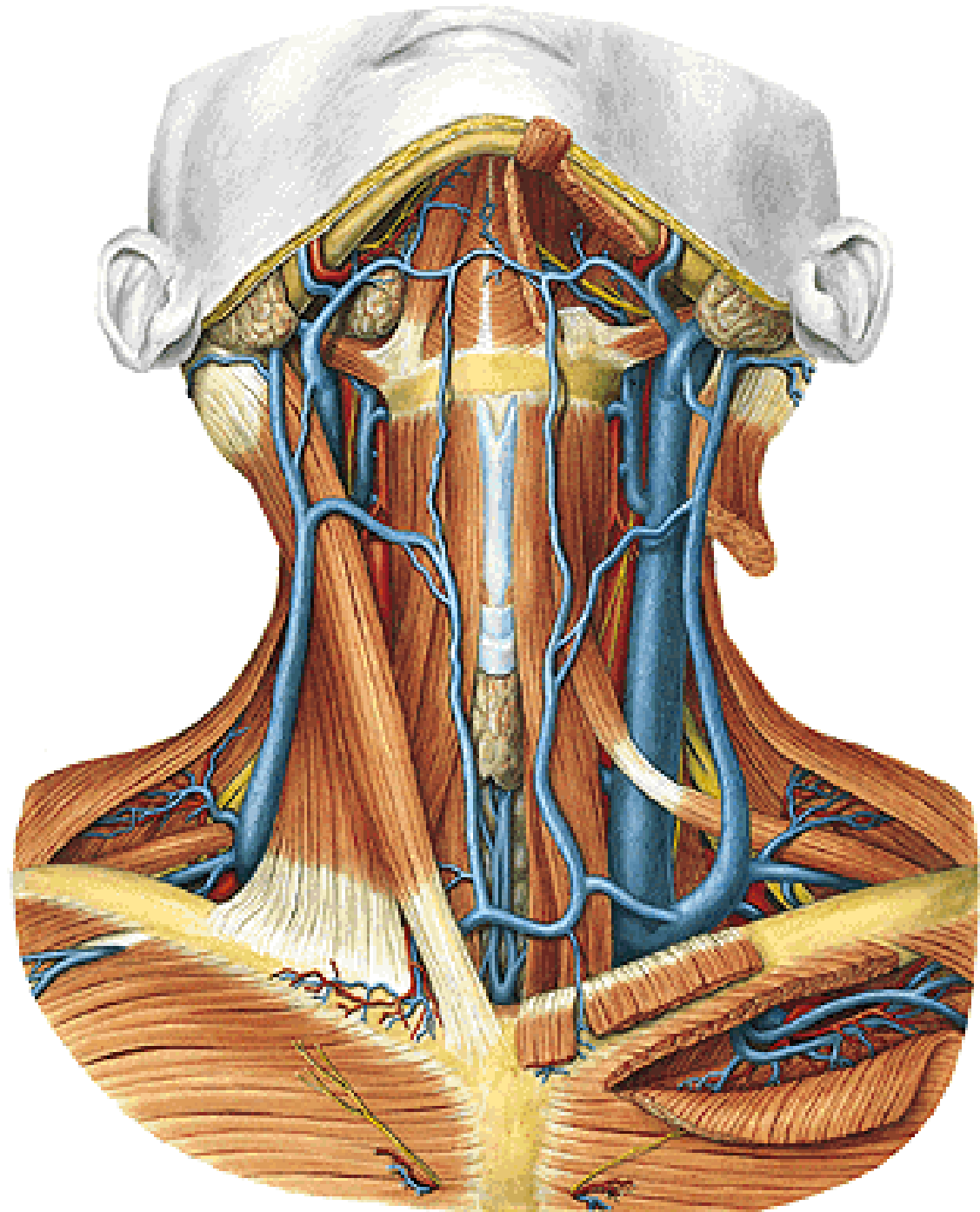
PLEXUS PTERYGOIDEUS

- v. alveolaris inf. et sup.
- v. sphenopalatina
- vv. palatinae

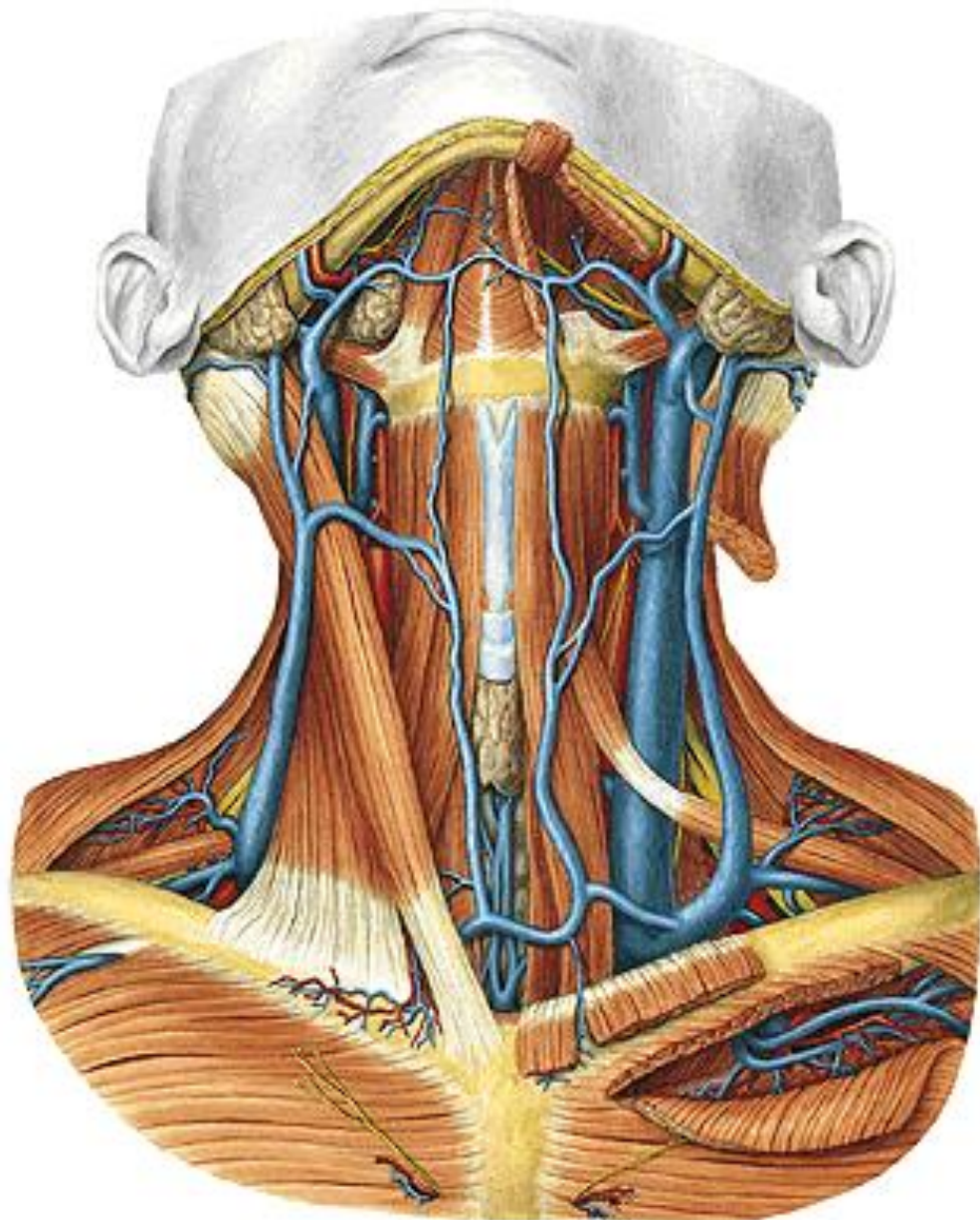


V. JUGULARIS EXT.

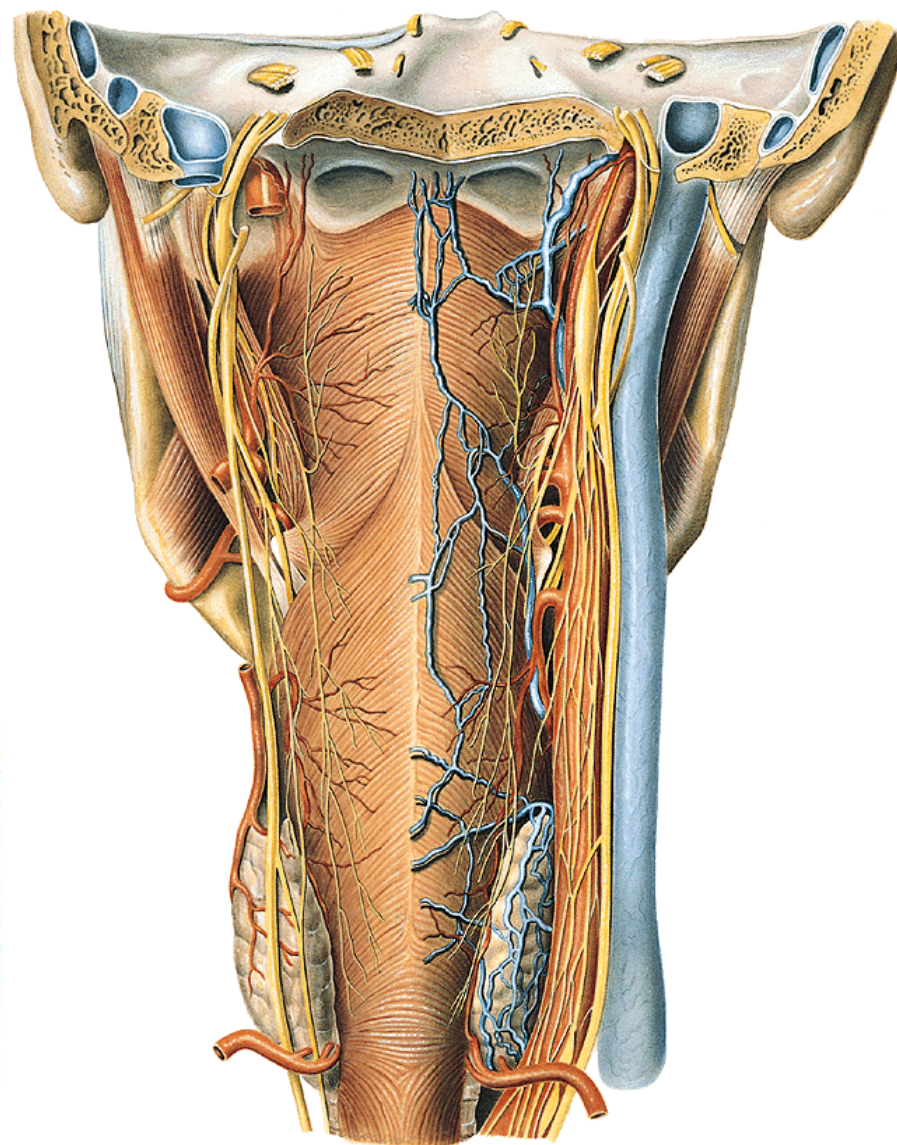
- v. retromandibularis
 - v. auricularis post.
 - v. occipitalis
 - v. jugularis ant.
- arcus venosus juguli**
(- v. mediana colli)
- v. transversa colli
 - v. suprascapularis



Vena jugularis anterior

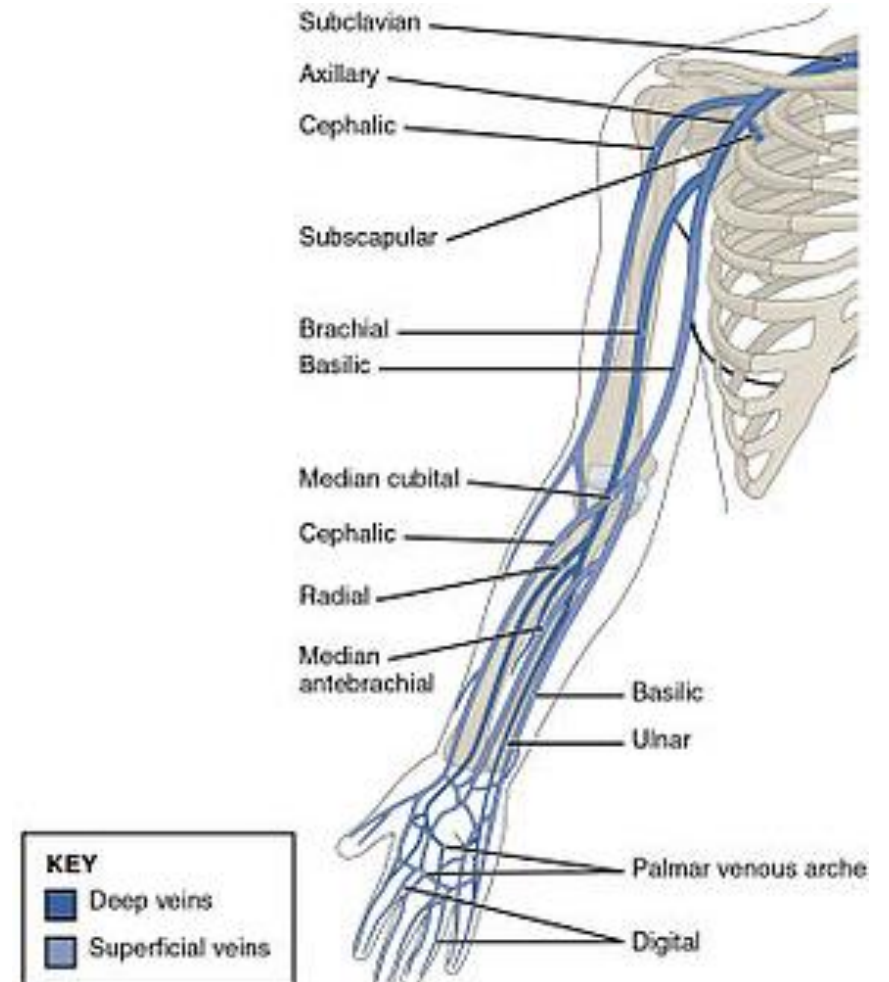


**Venae pharyngeae
(plexus pharyngeus)**

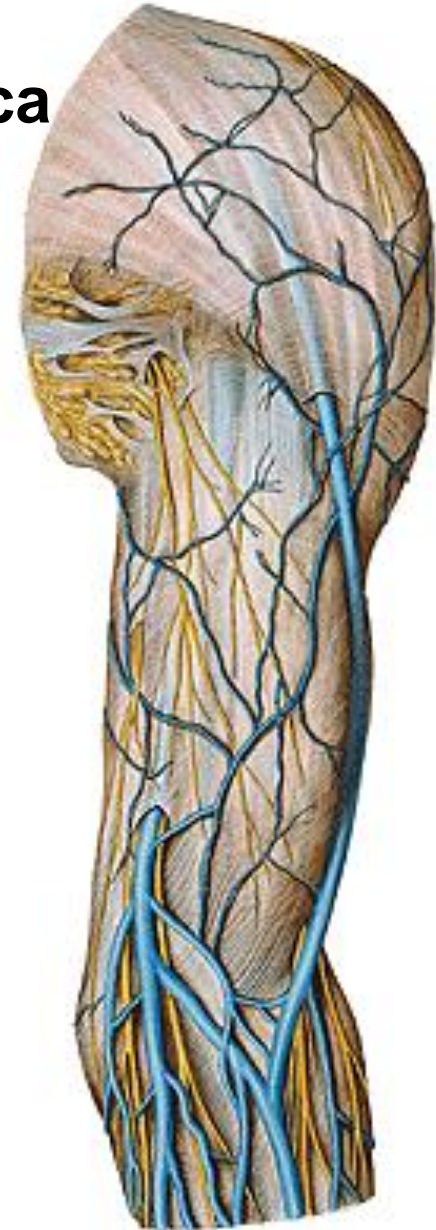
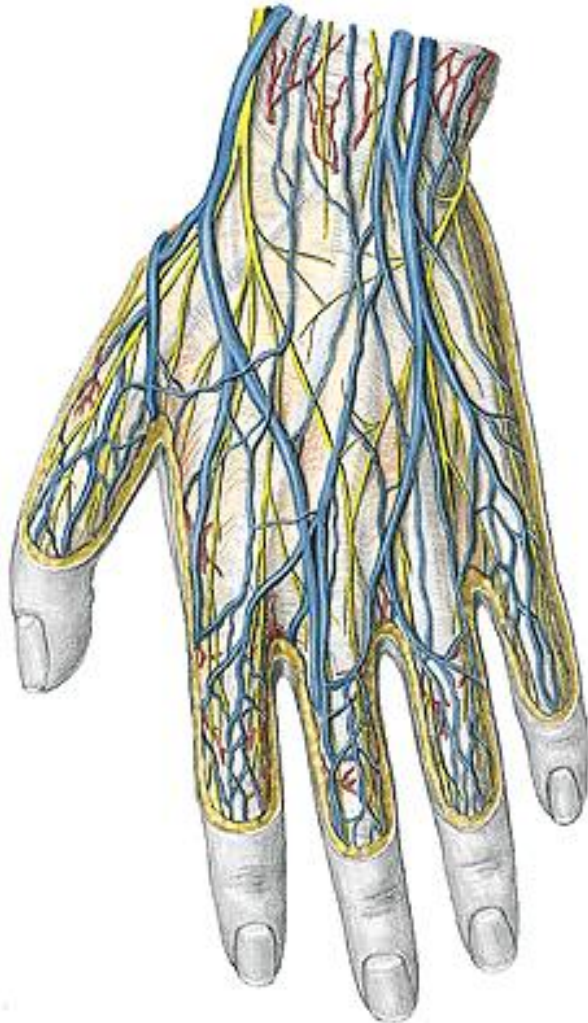


VEINS OF THE UPPER LIMB

Deep – accompany arteries, same names
Superficial

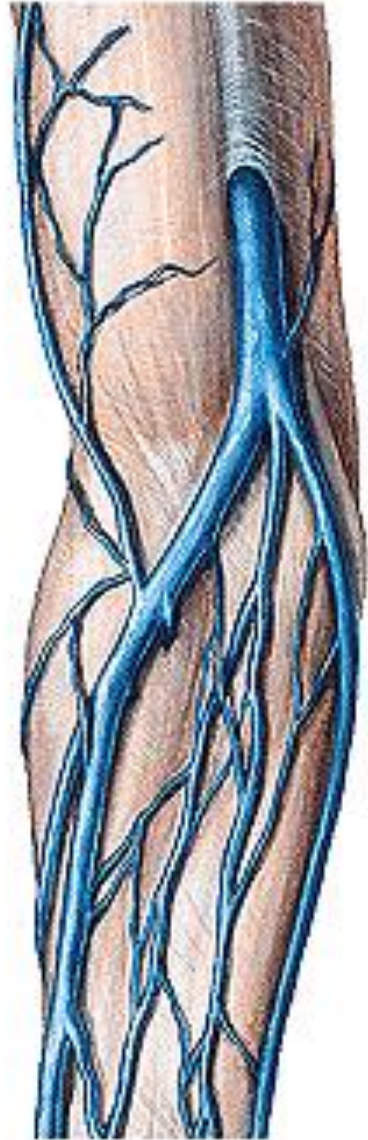


Rete digitale dorsale – vv. metacarpales dorsales – rete venosum dorsale manus (rete venosum palmare manus – vv. intercapitulares)
v. basilica antebrachii (hiatus basilicus) – **v. basilica**
v. cephalica antebrachii – **v. cephalica**



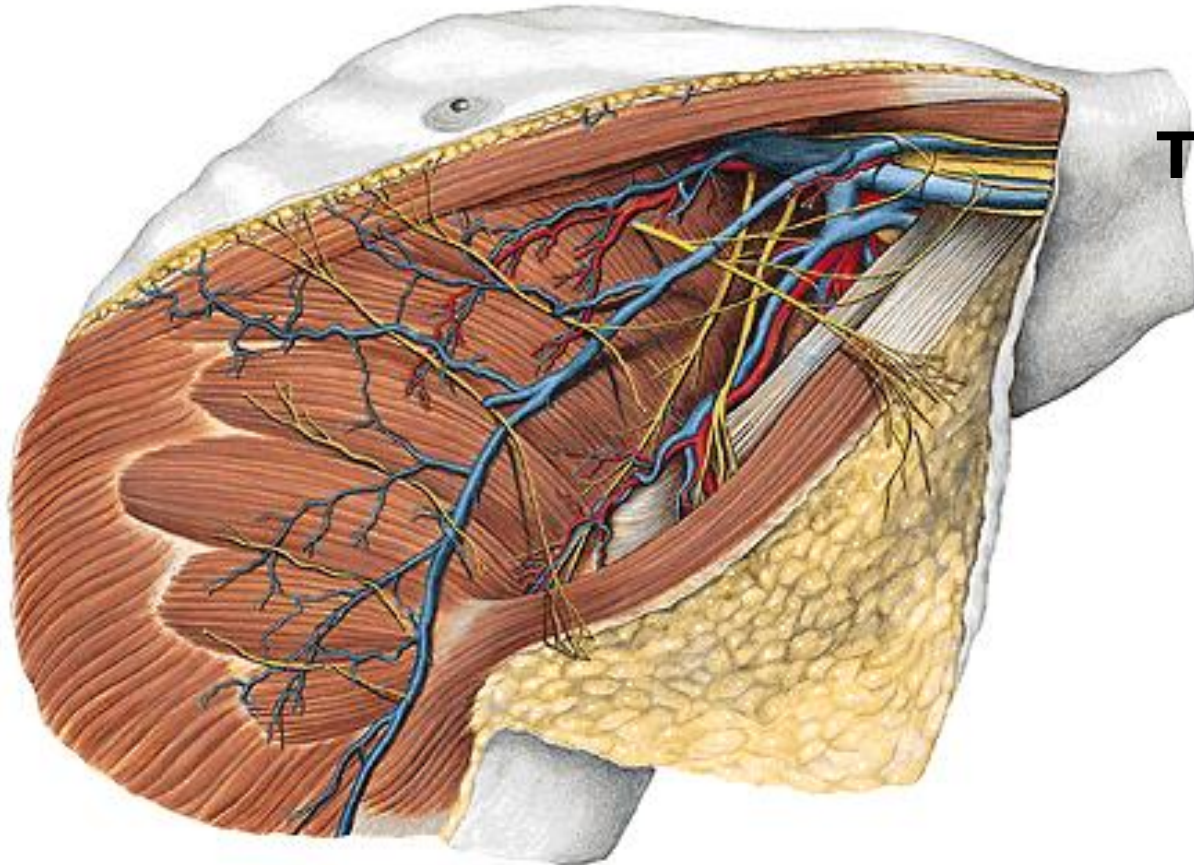
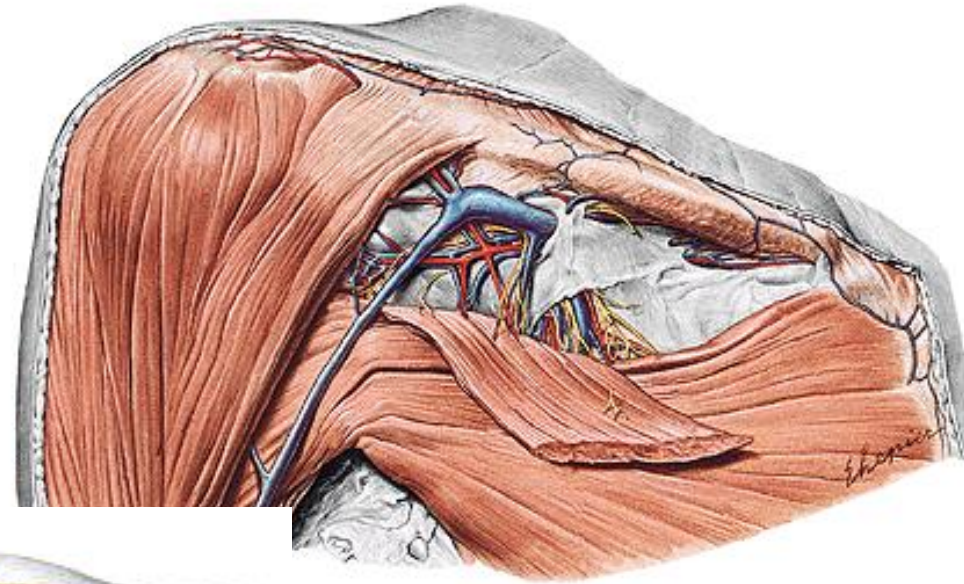
V. mediana cubiti

V. mediana antebrachii – v. mediana cephalica et basilica



V. AXILLARIS

- v. basilica
- vv. brachiales (deep veins)
- vv. thoracoepigastricae
- v. thoracica lateralis
- v. cephalica

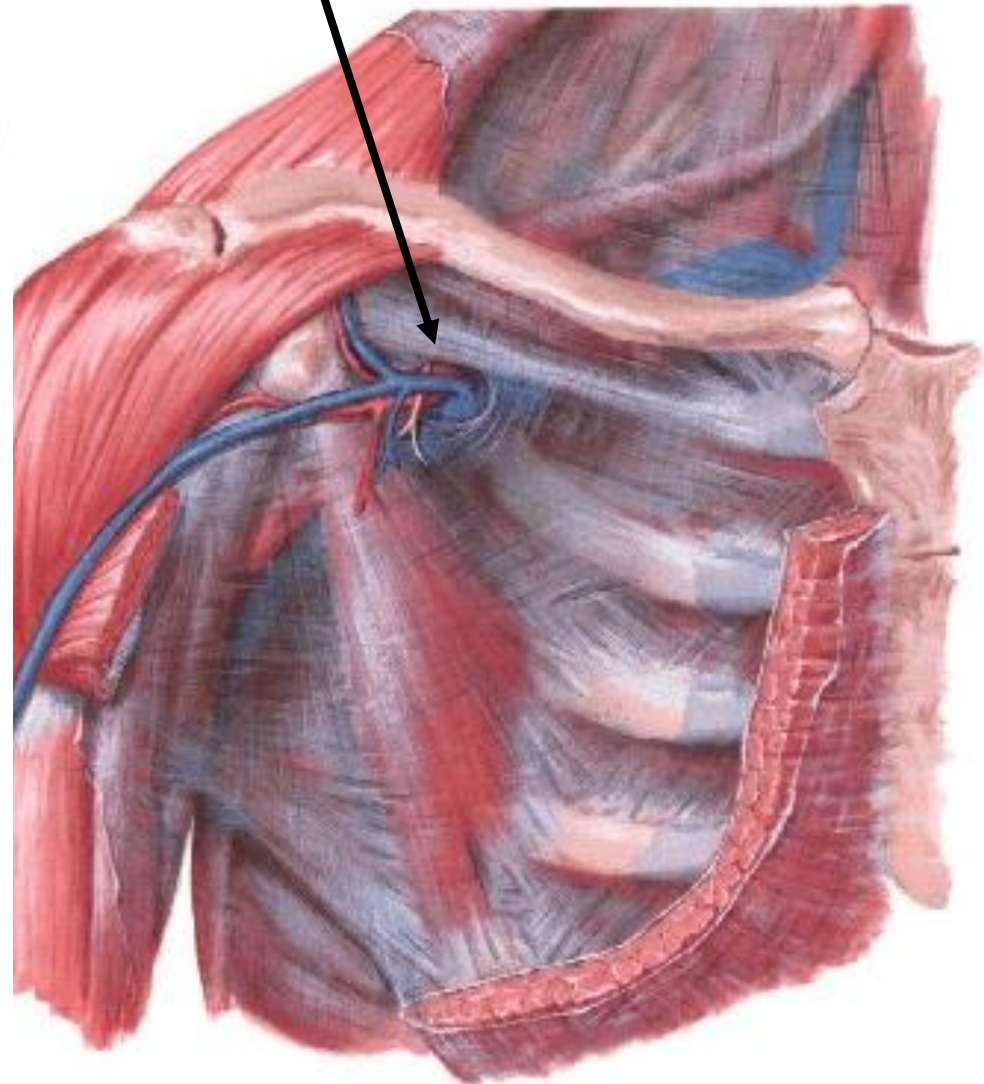


**Trig. clavipectorale
(deltoideopectorale)**

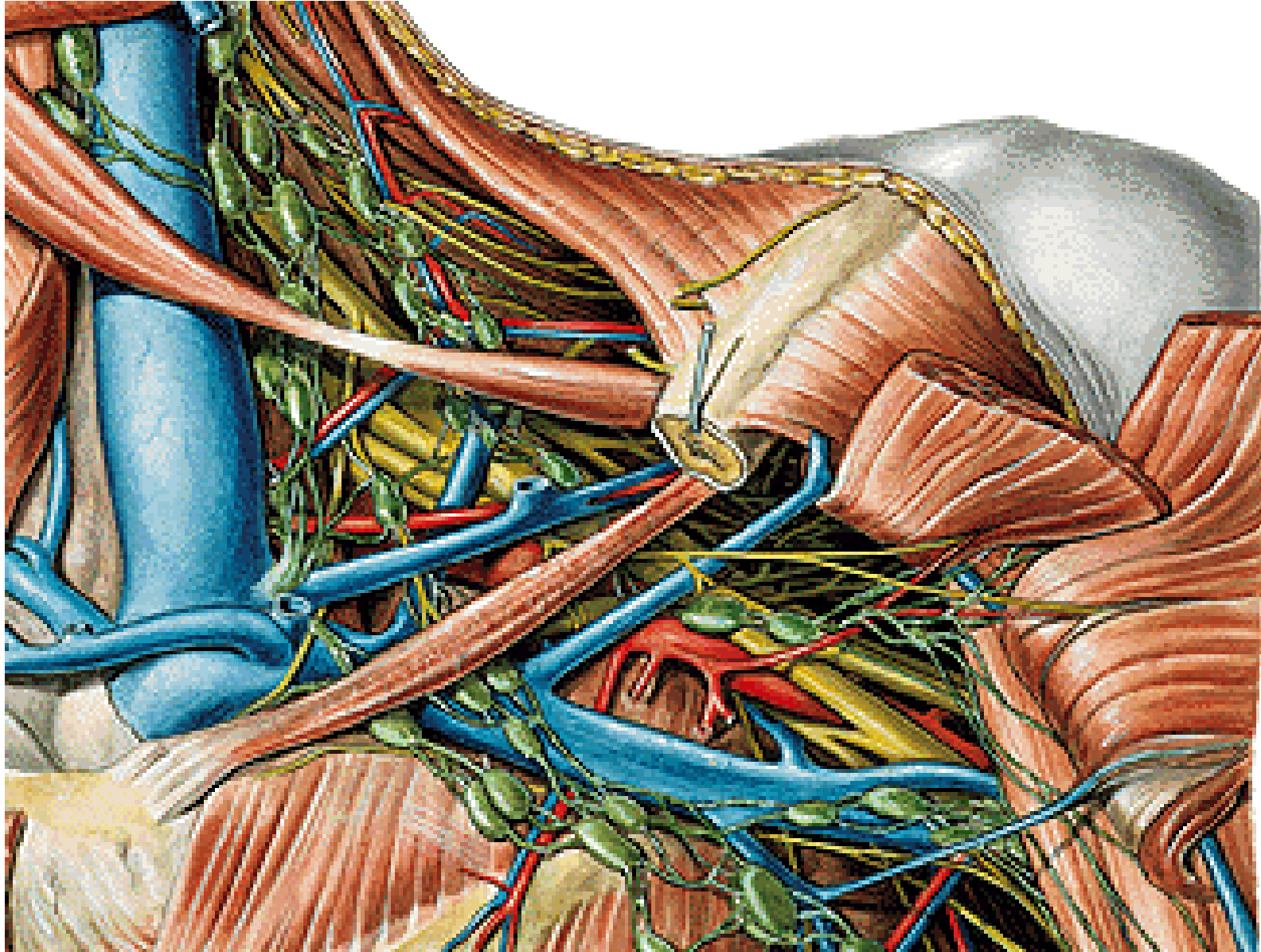
V. cephalica

Trigonum deltoideopectorale

Fascia clavipectoralis

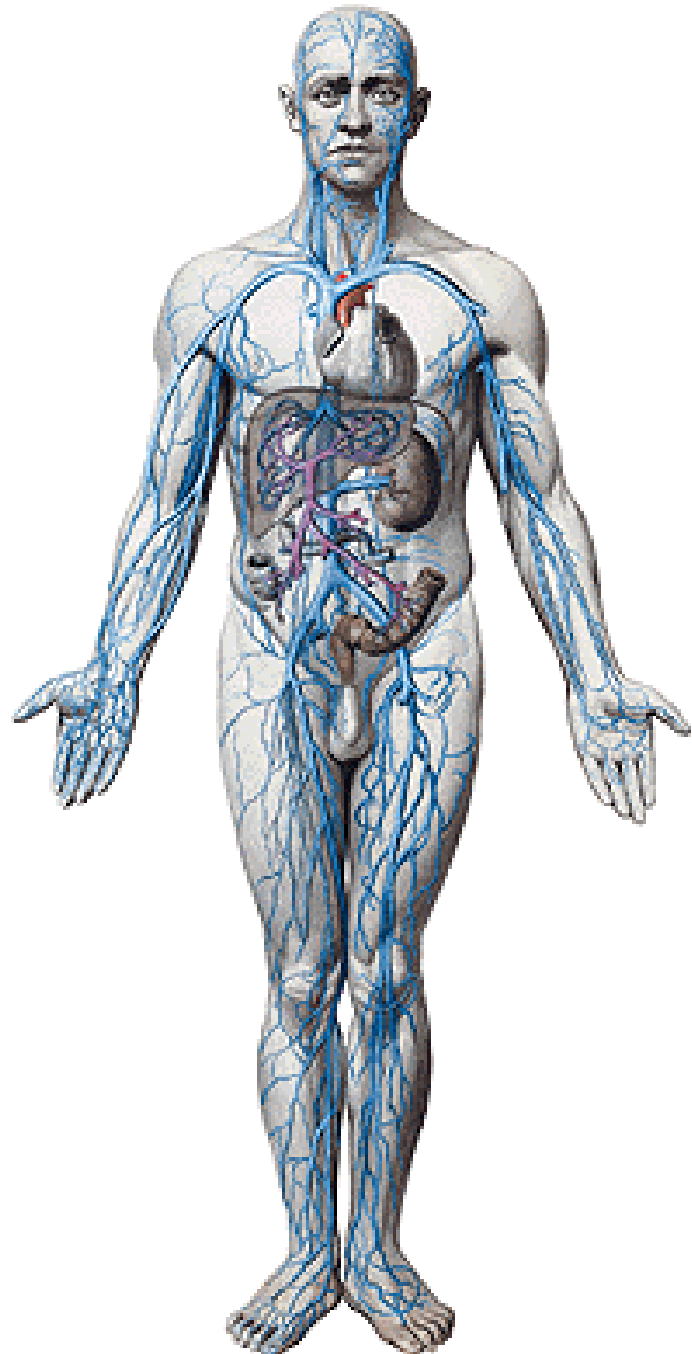
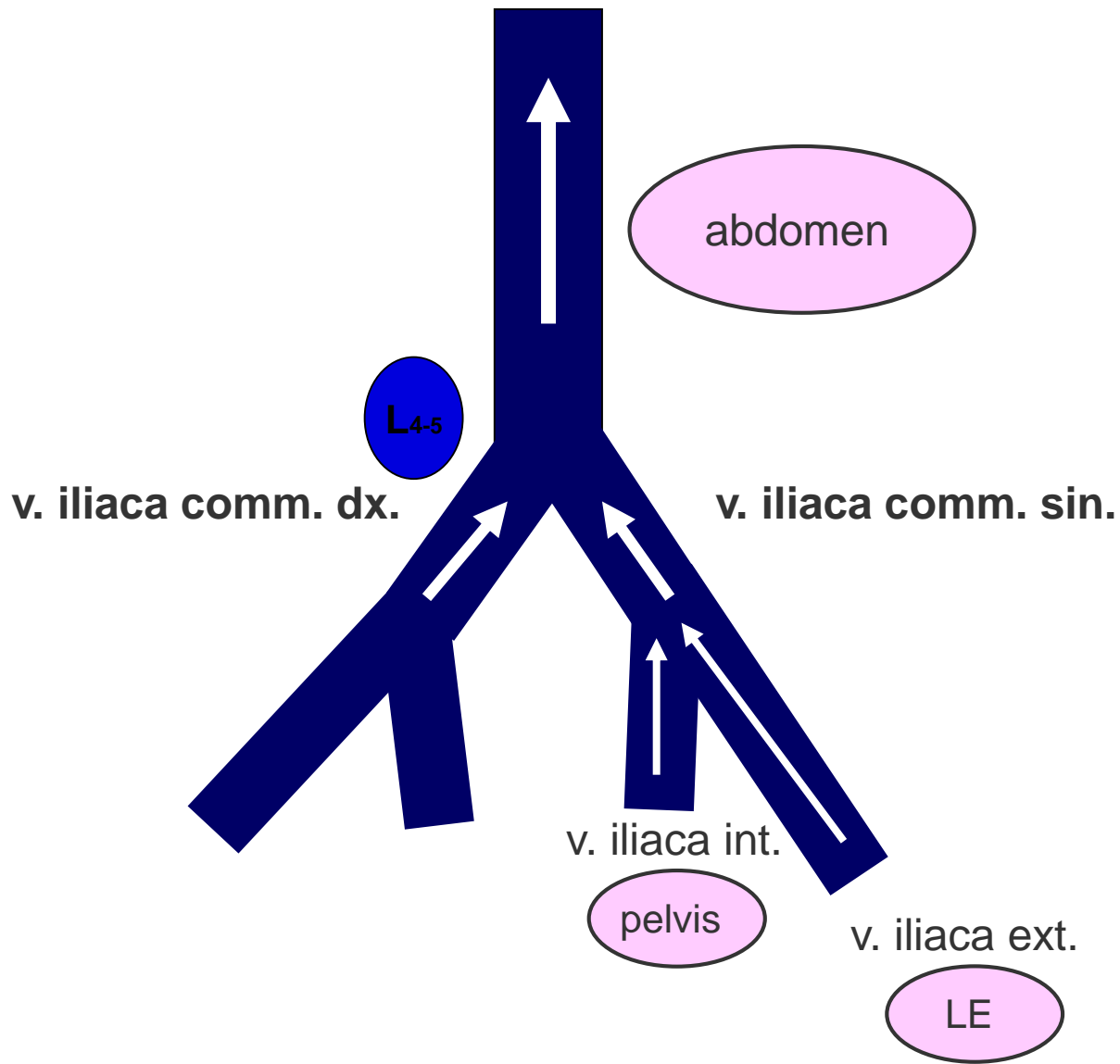


Vena subclavia



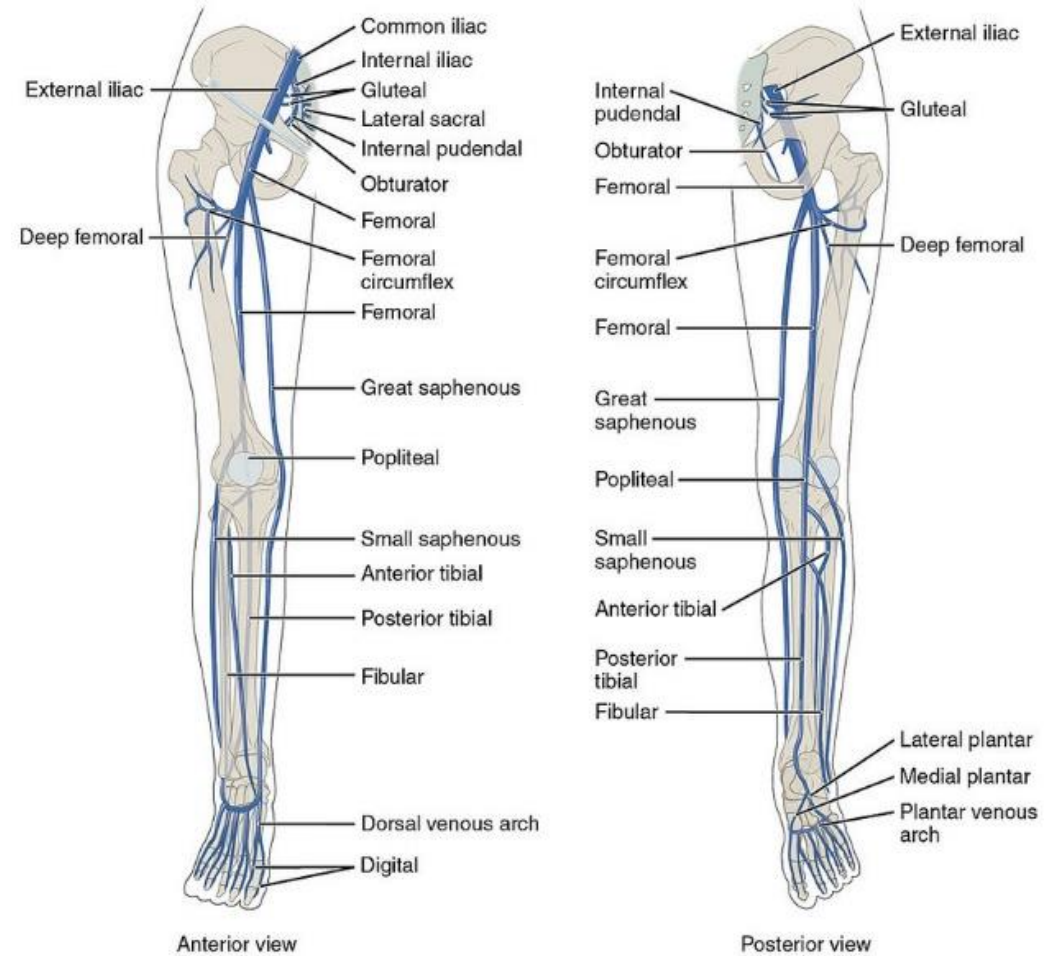
- v. axillaris
- vv. pectorales
- v. scapularis dorsalis

v. cava inferior

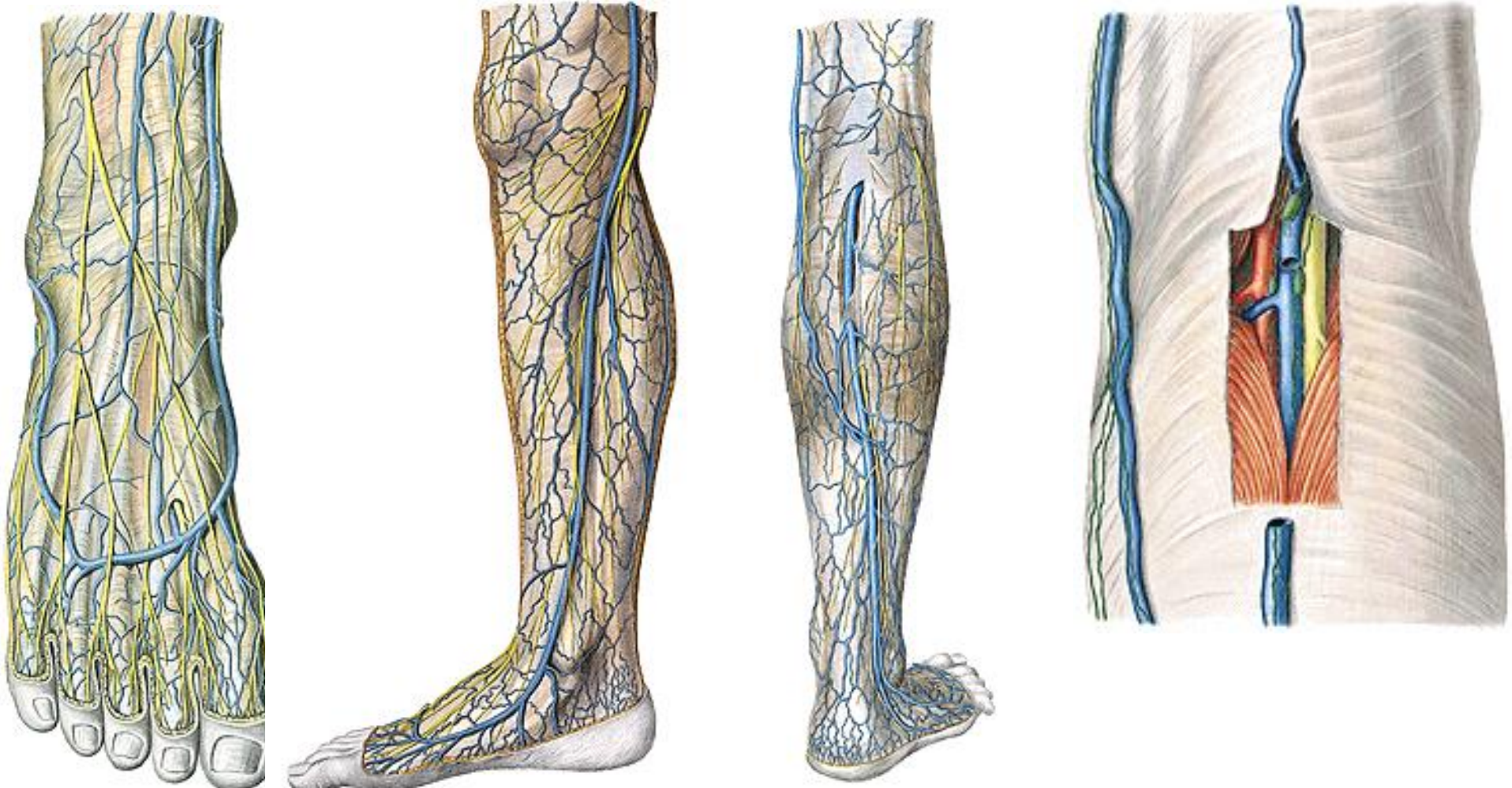


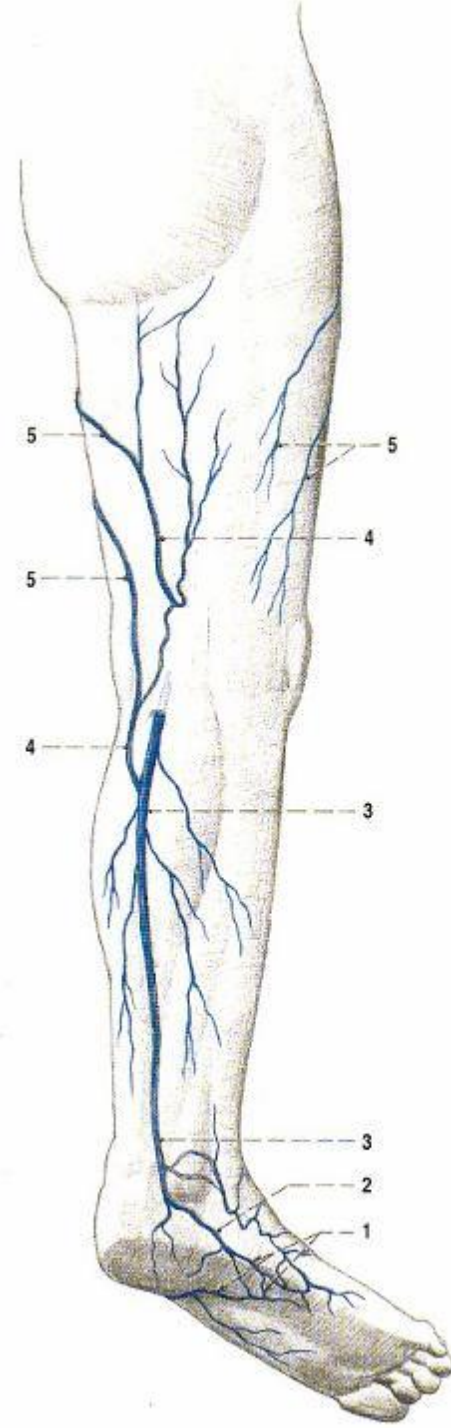
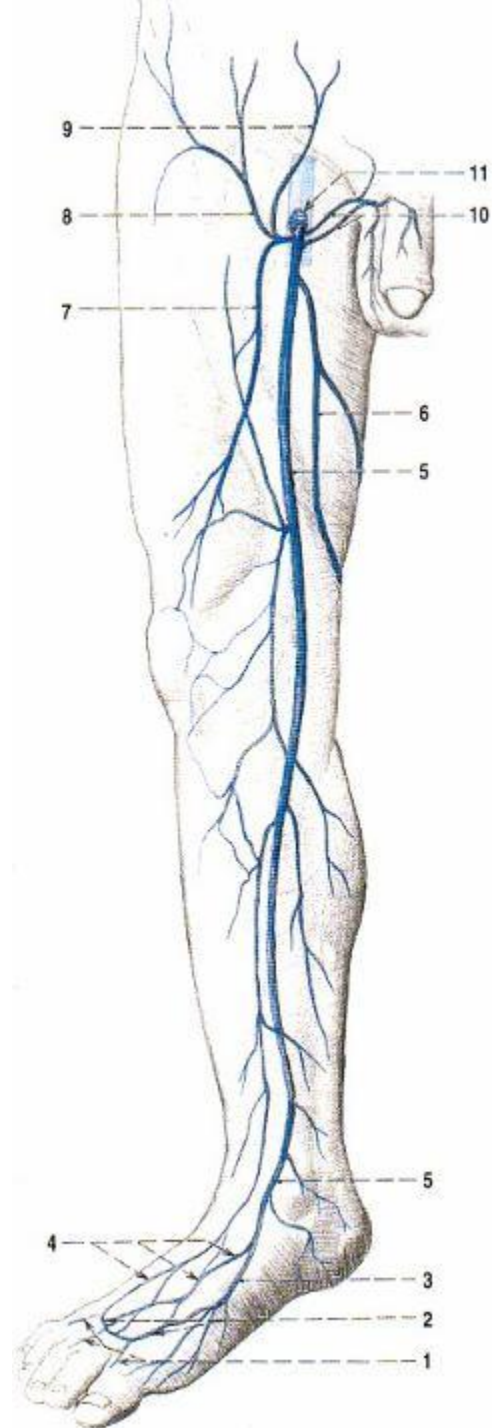
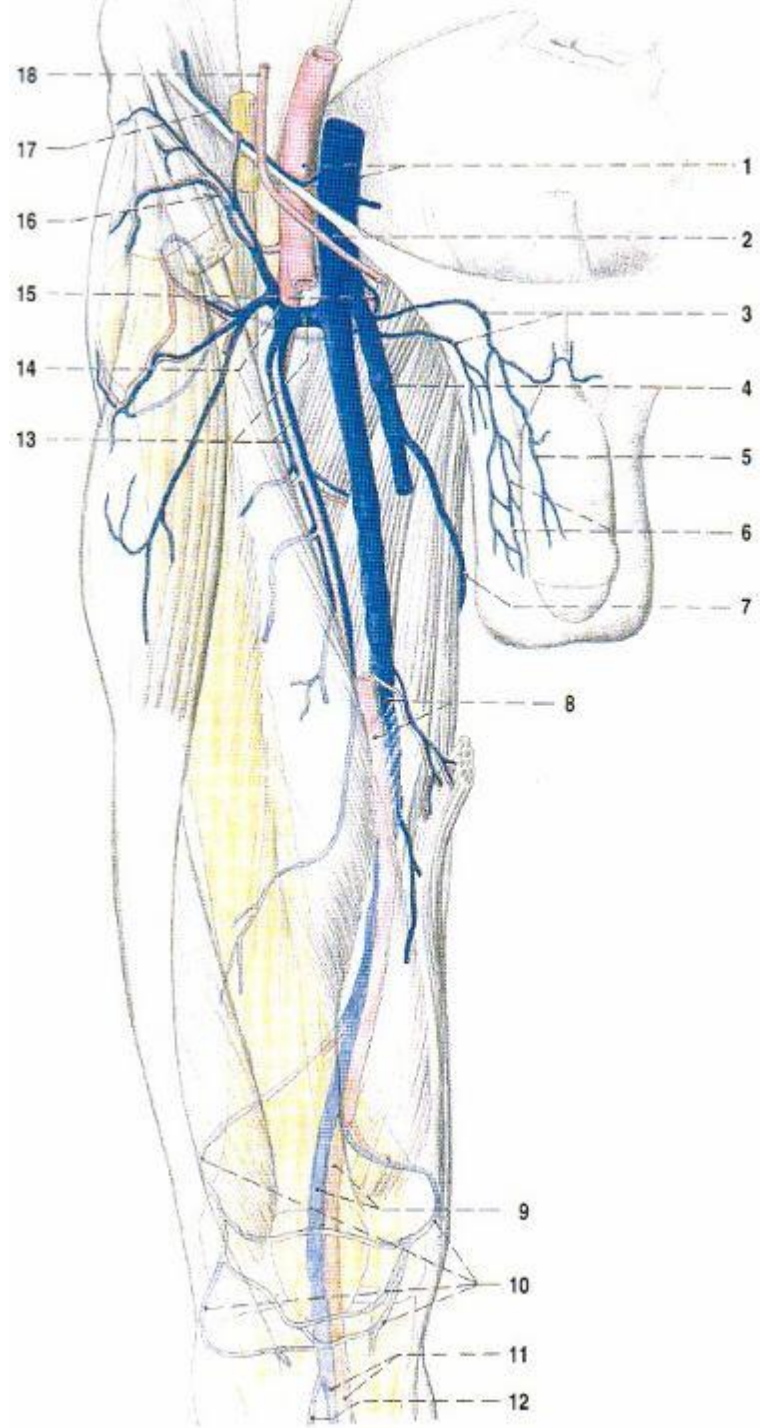
VEINS OF THE LOWER LIMB

Deep – accompany arteries, same names
Superficial



Vv. digitales dorsales – vv. metatarsae dorsales – arcus
venosus dorsalis (rete venosum dorsale pedis)
arcus venosus plantaris (rete venosum plantare pedis)
– vv. intercapitulares
v. marginalis med. – **v. saphena magna**
v. marginalis lat. – **v. saphena parva** (v. femoropoplitea)





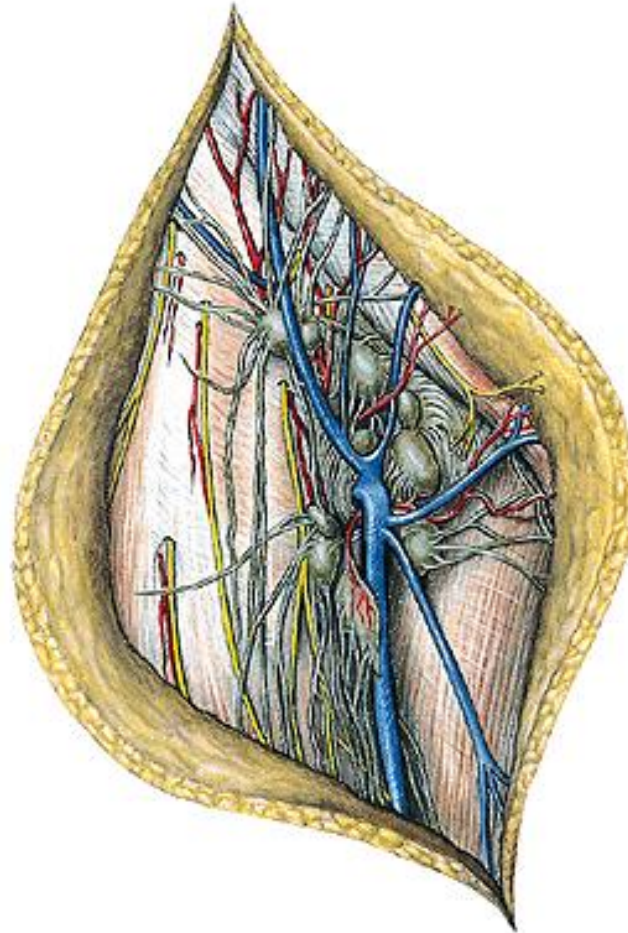
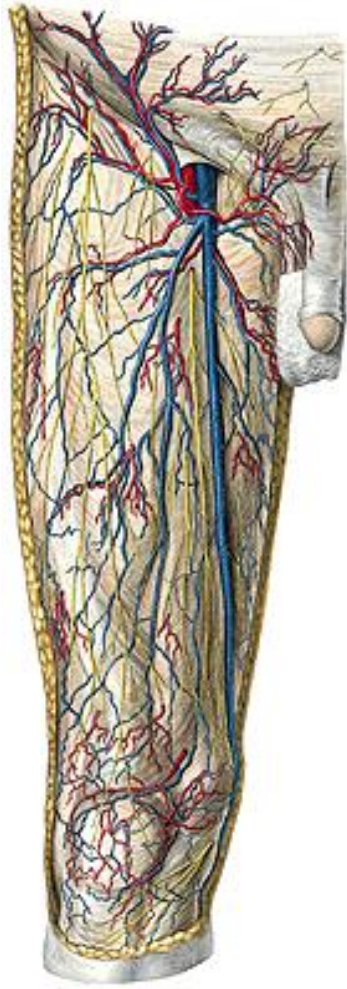
v. saphena magna



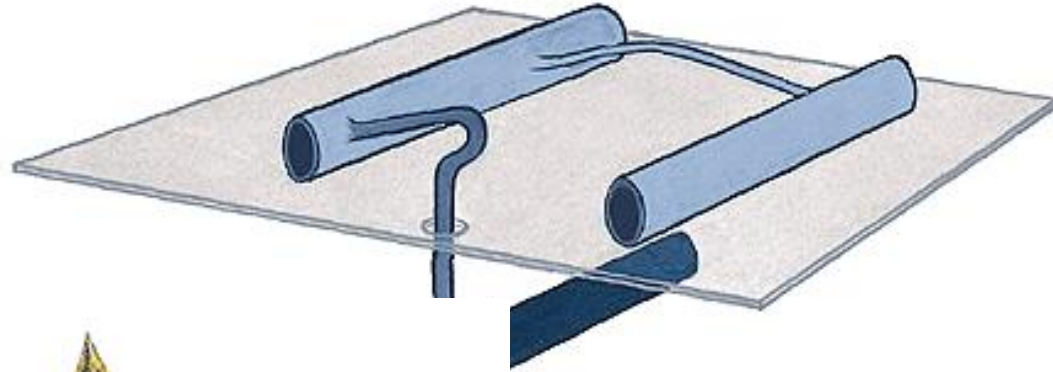
femur

V. SAPHENA MAGNA

- v. saphena accessoria
- v. epigastrica spf.
- v. circumflexa ilium spf.
- vv. pudendae ext.

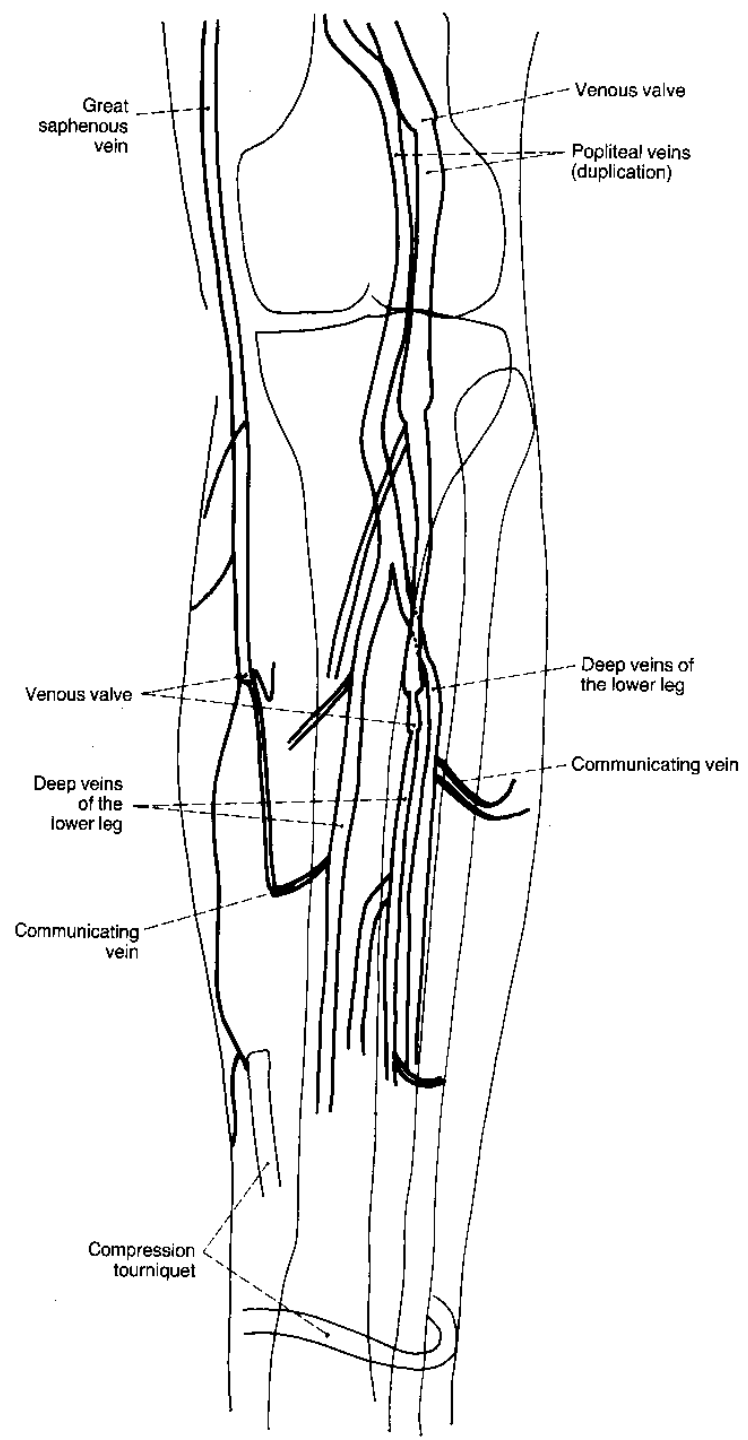
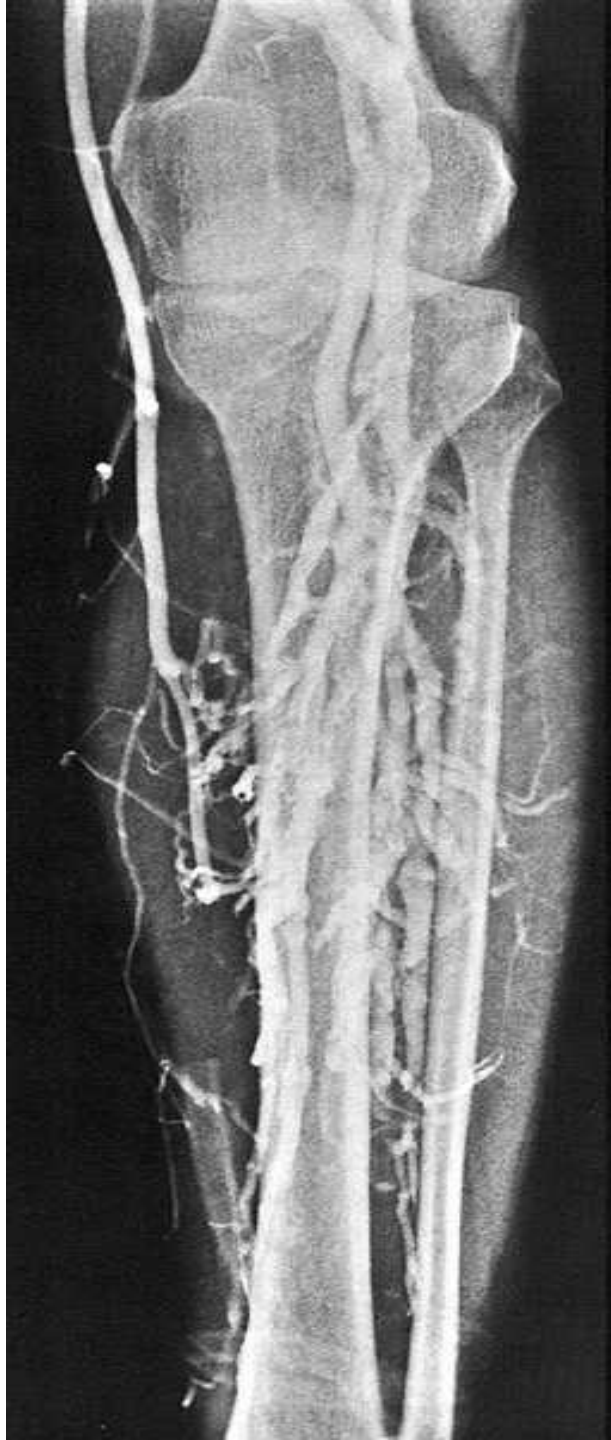


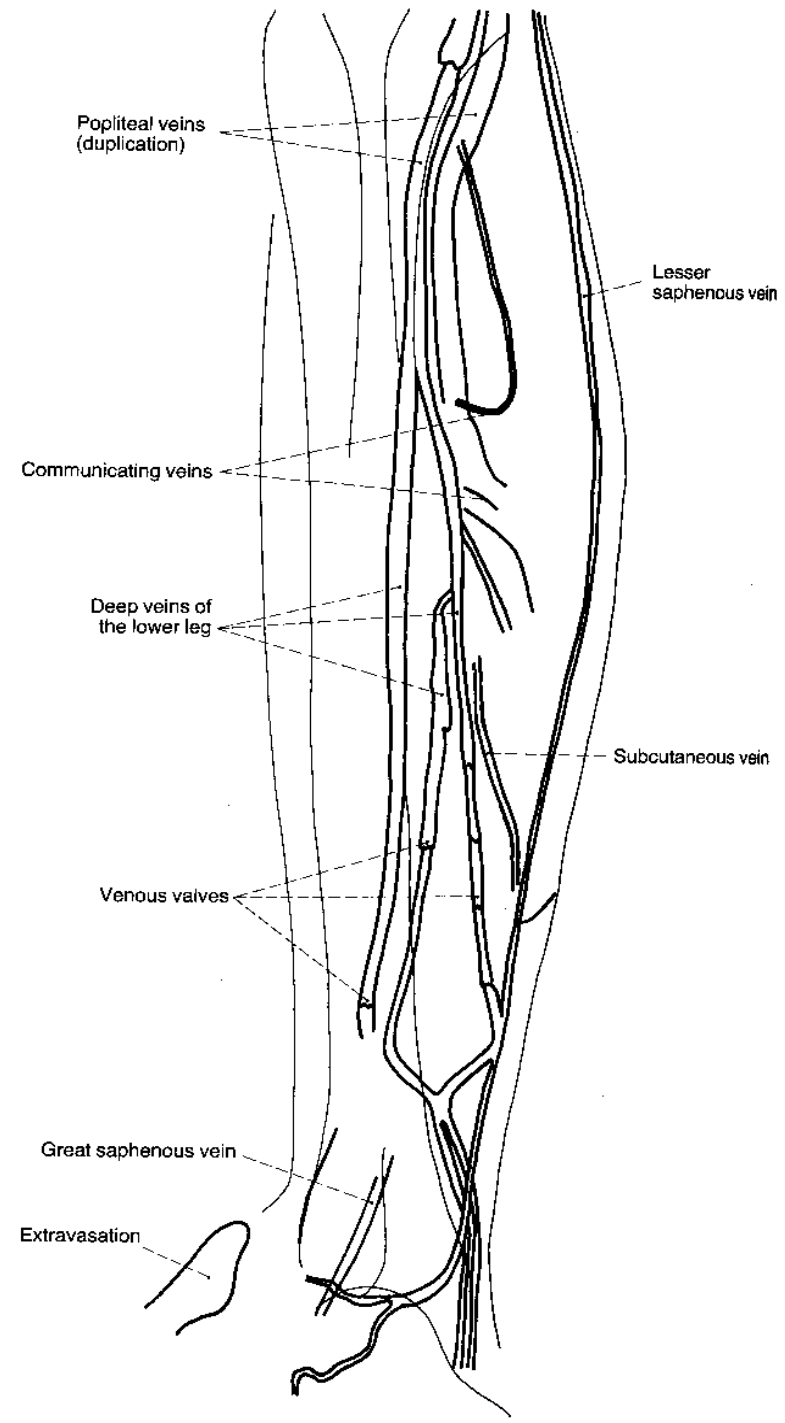
vv. perforantes



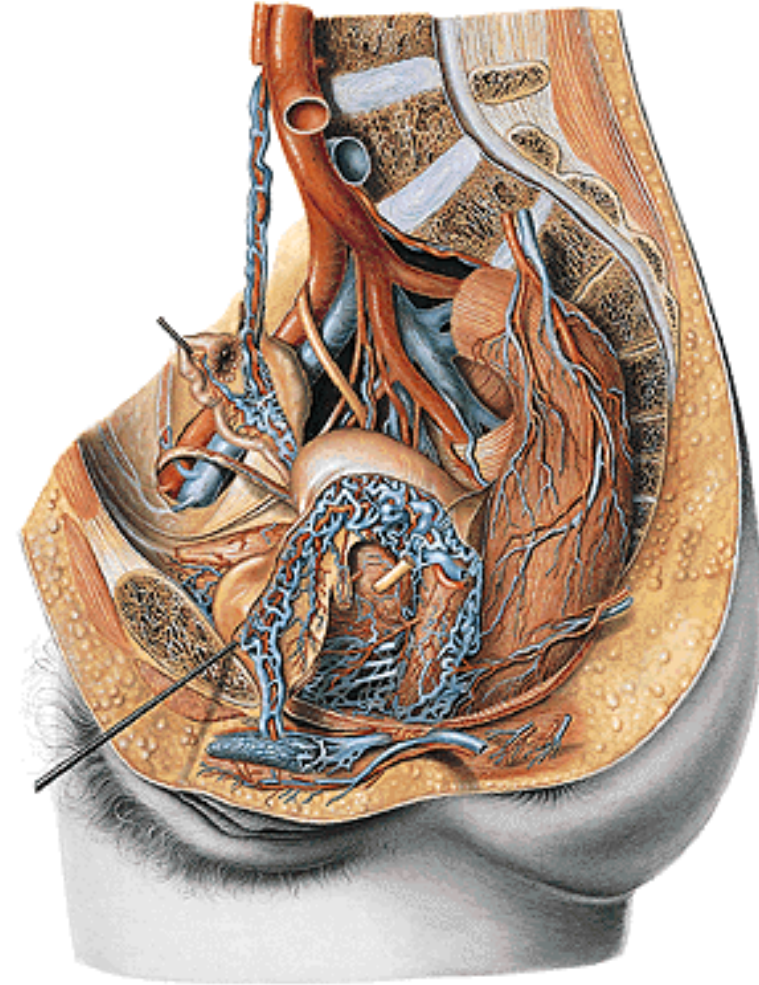
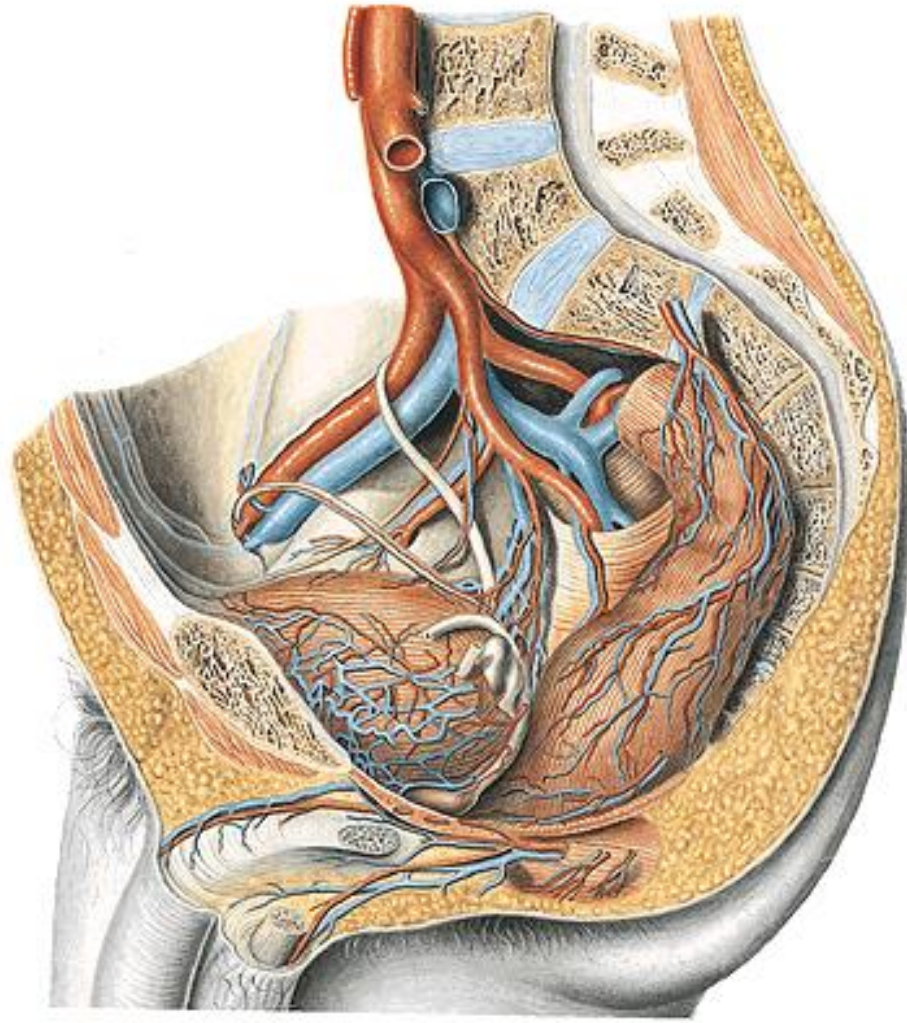


VARICOSE VEINS



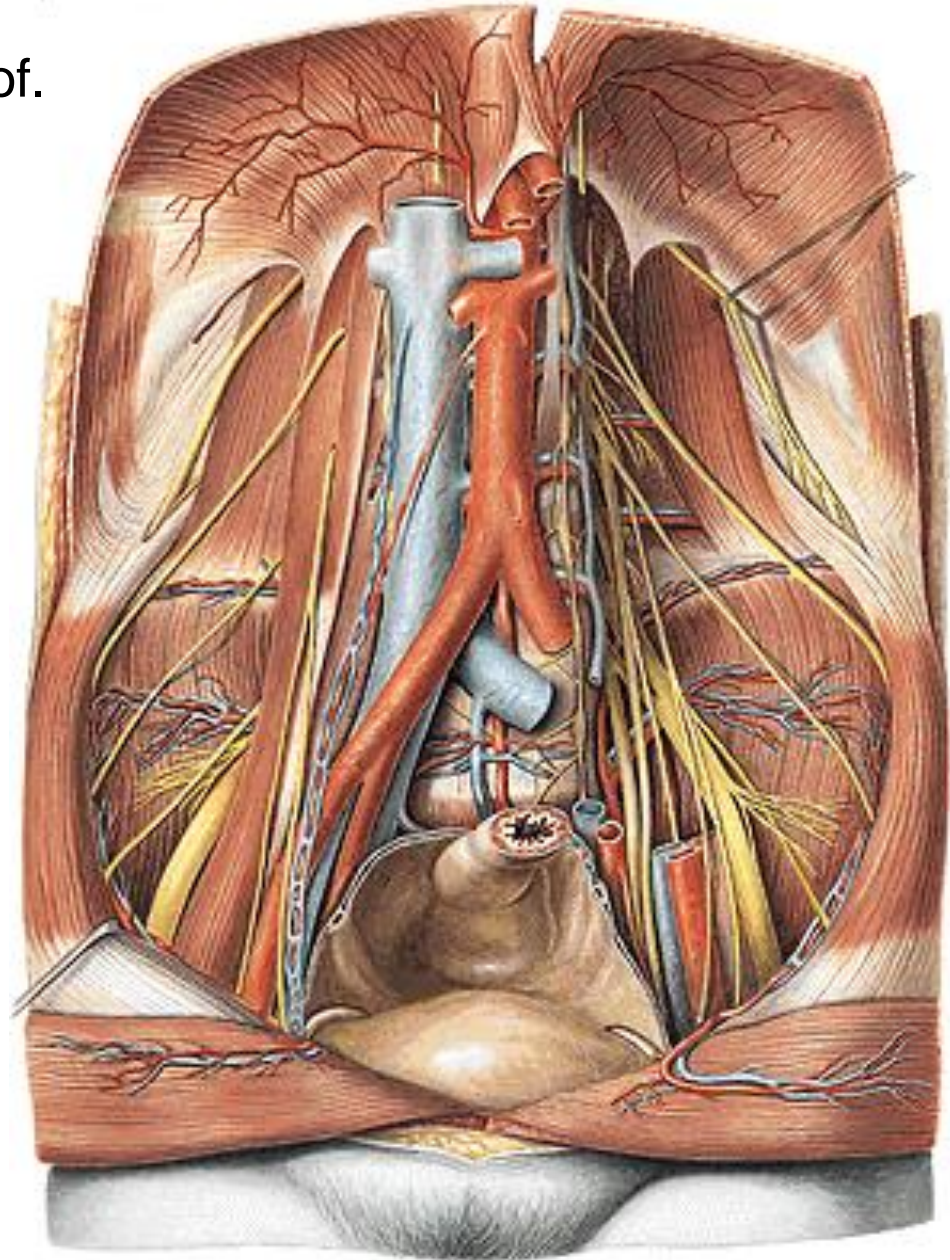
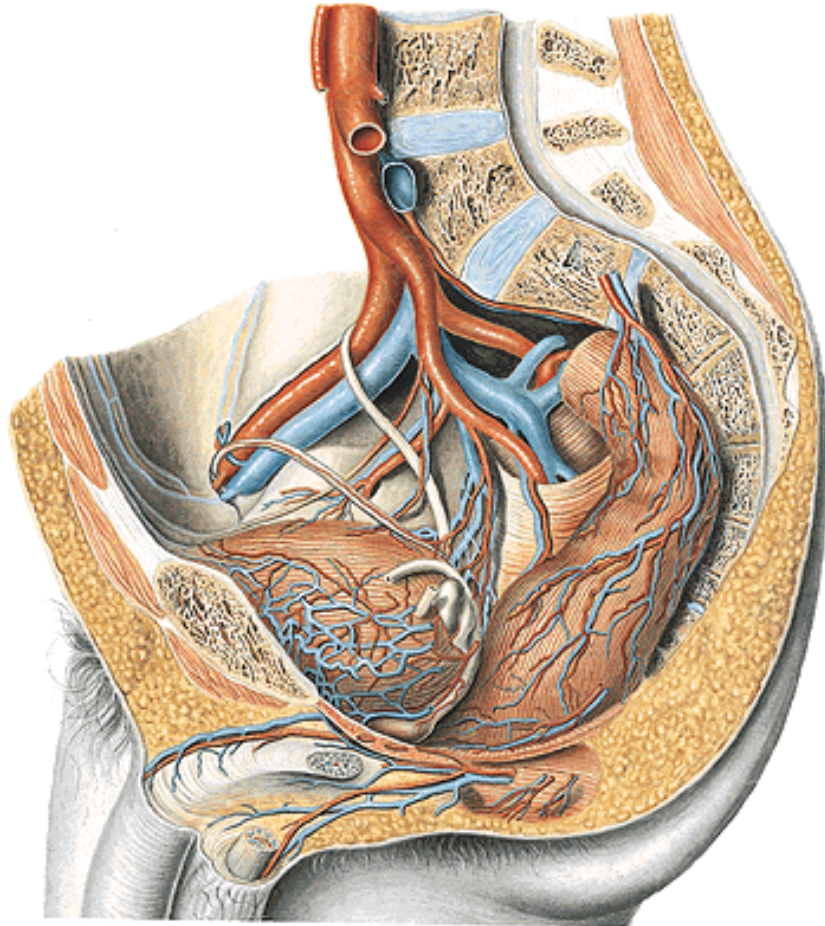


Vena iliacae (comm., externae et internae)



V. ILIACA COMMUNIS

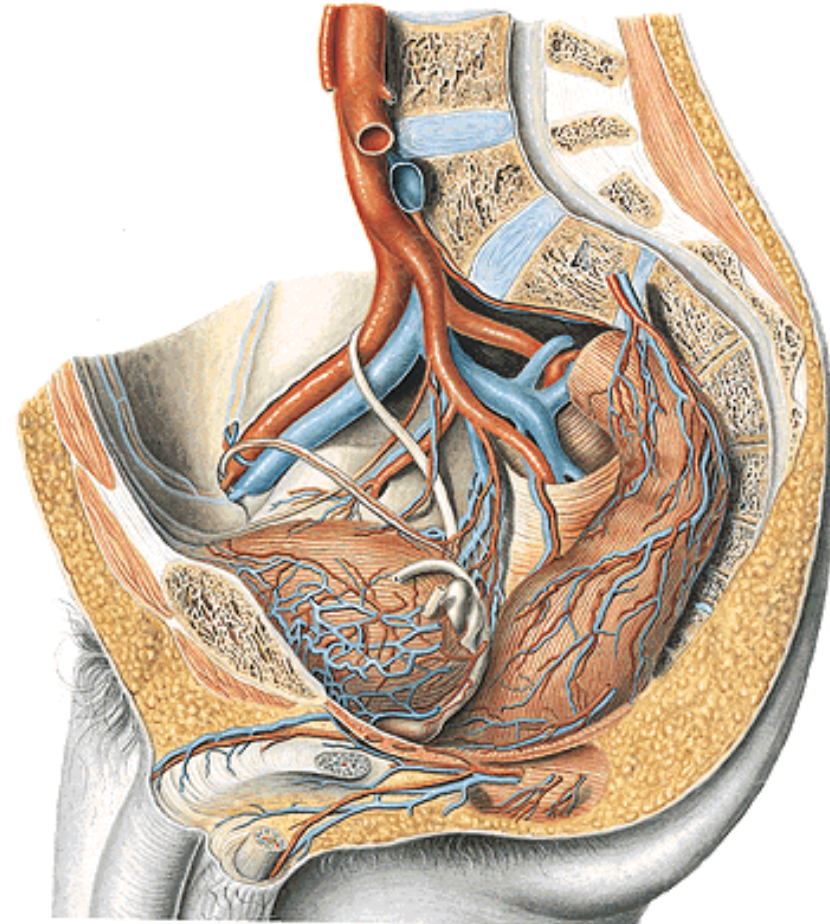
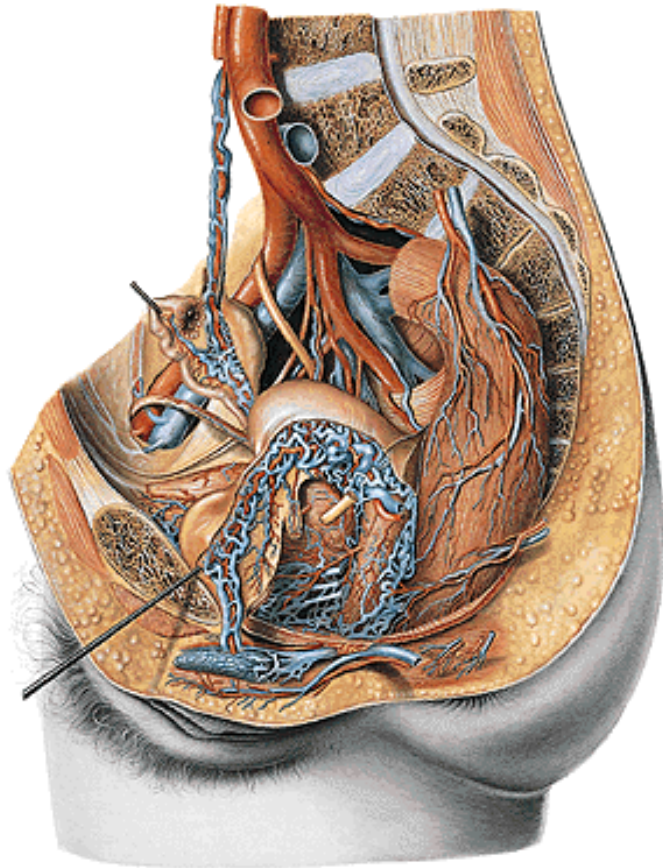
- v. iliaca ext - v. femoralis
 - v. epigastrica inf.
 - v. circumflexa ilium prof.
- v. iliaca int.



V. ILIACA INTERNA

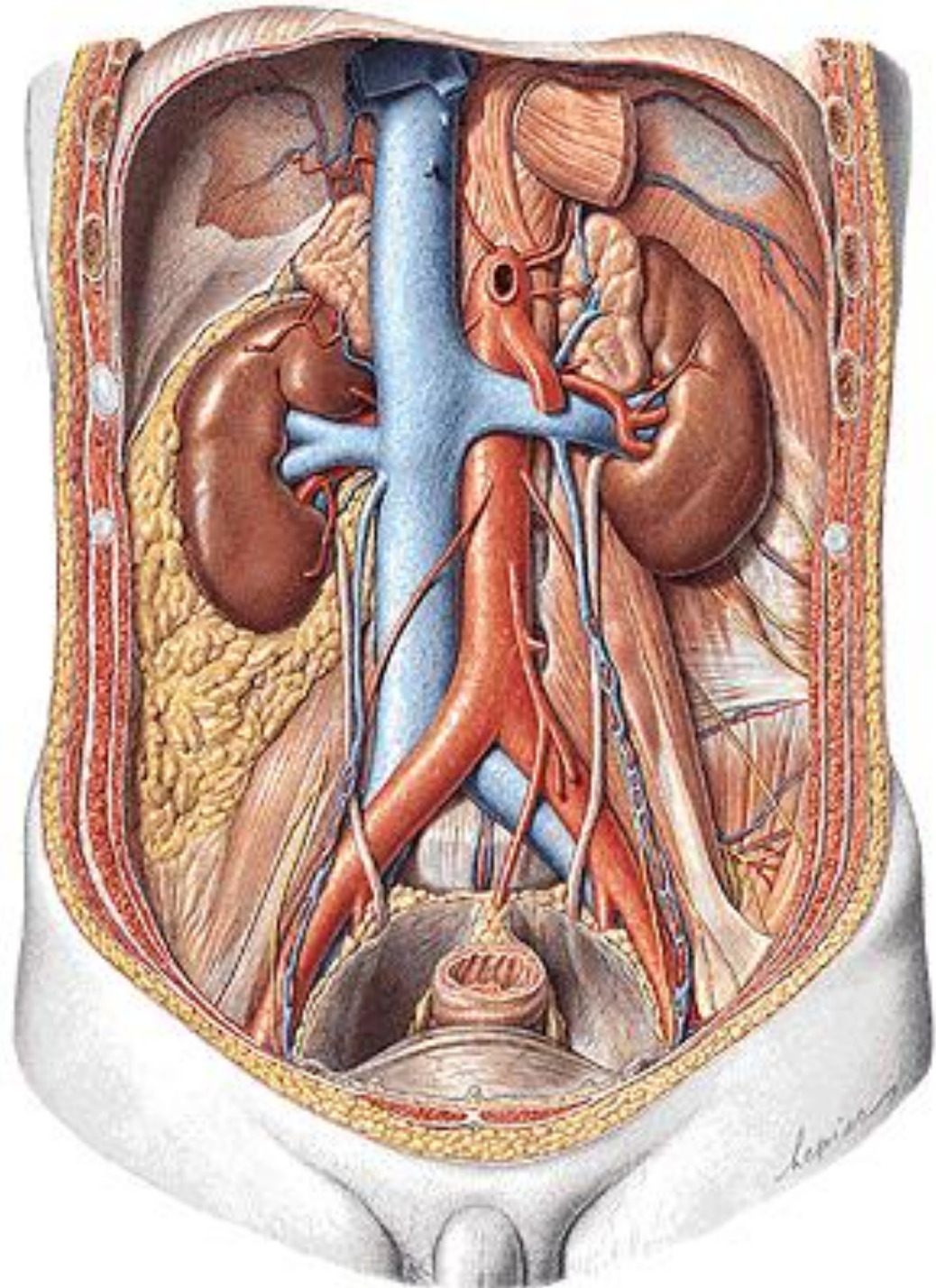
Parietal and visceral tributaries (plexuses)

- plexus venosus vesicalis – vv. vesicales
- plexus venosus prostaticus – v. dorsalis penis prof.
- plexus venosus vaginalis – v. dorsalis clitoridis prof.
- plexus venosus uterinus – vv. uterinae
- plexus venosus rectalis – v. rectalis sup., media, inf.
- plexus venosus sacralis – vv. sacrales lat.



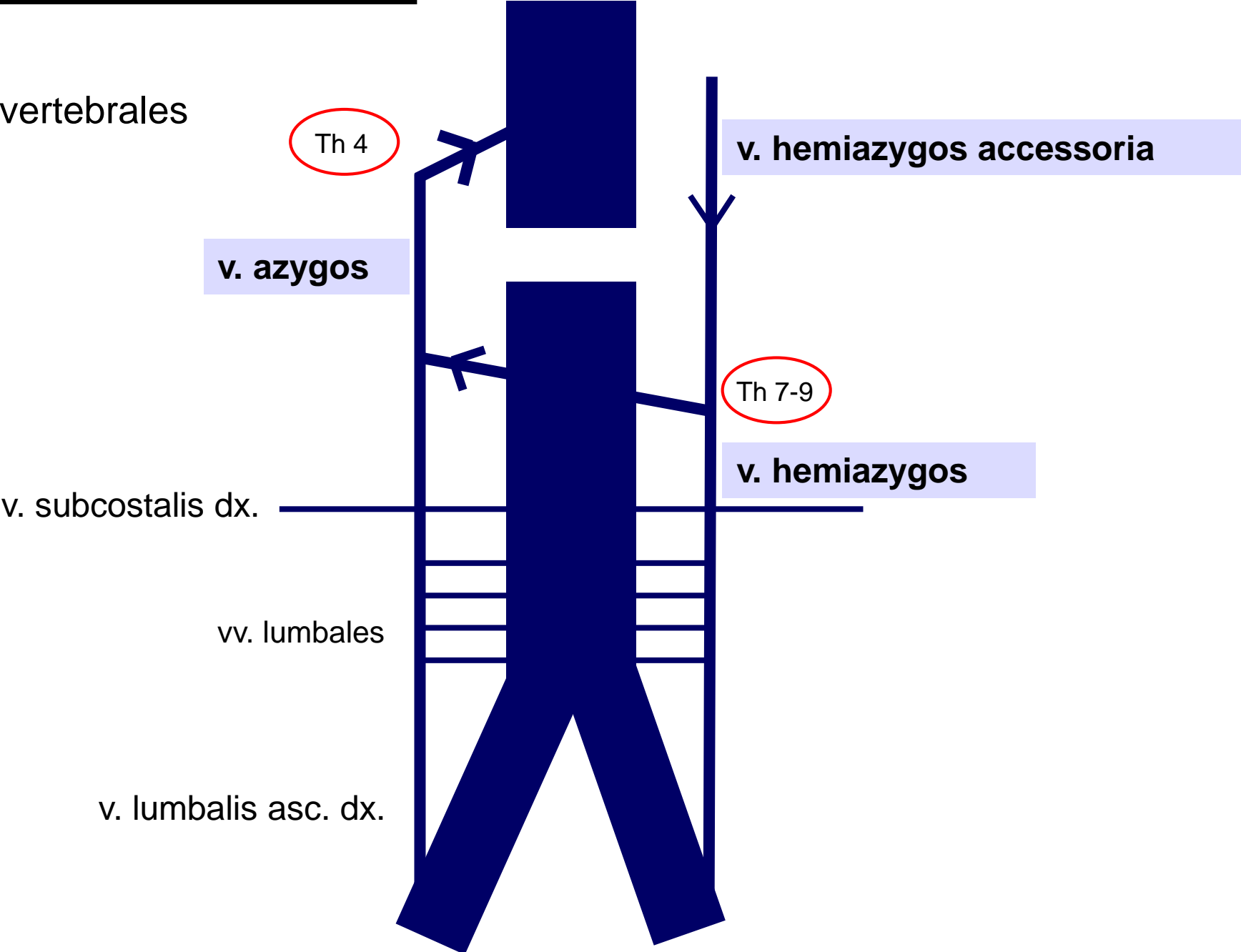
V. CAVA INF.

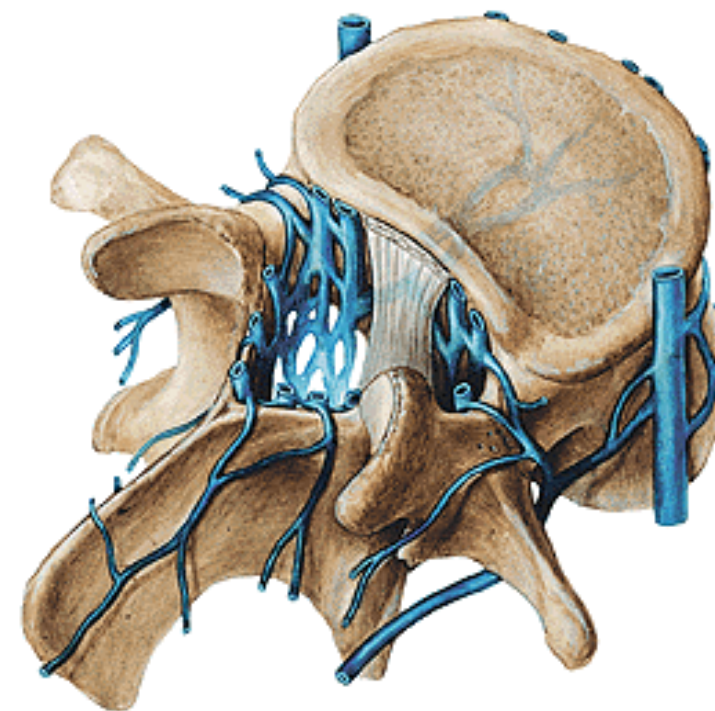
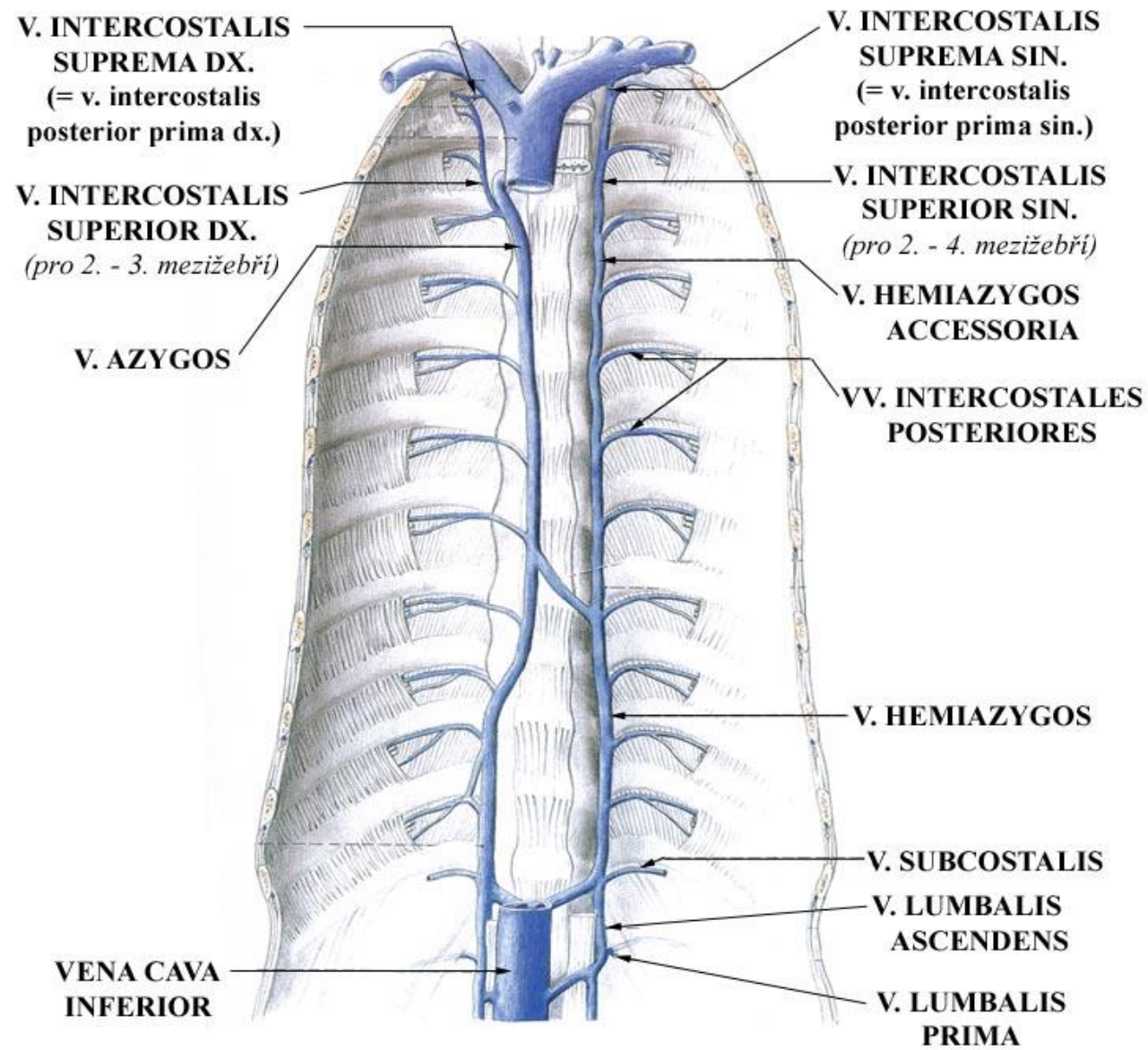
- v. iliaca communis dx. et sin.
- vv. lumbales
- vv. phrenicae inf.
- v. sacralis mediana
- v. testicularis dx.
(- v. ovarica dx.)
- vv. renales
- v. suprarenalis dx.
- vv. hepaticae



Cavo-caval anastomoses

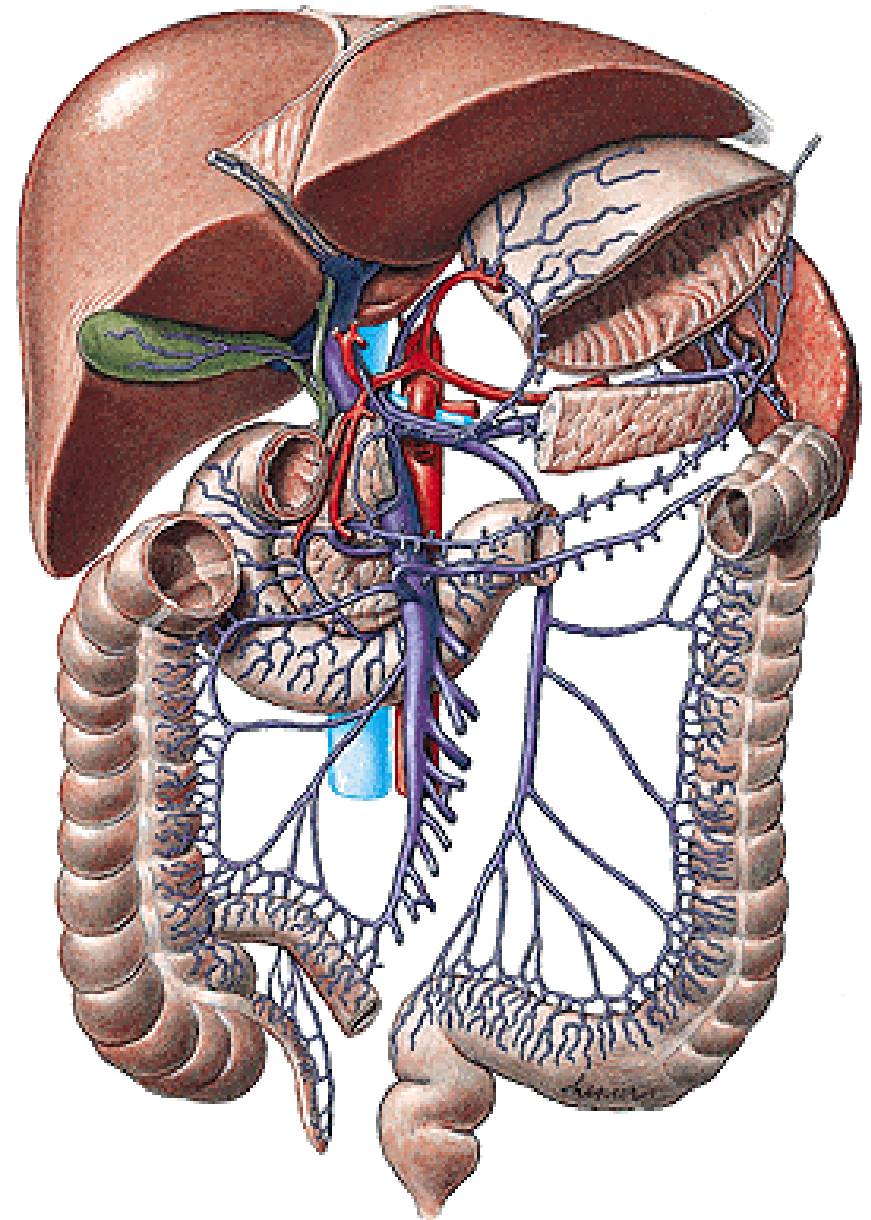
- 1) Plexus venosi vertebrales
- 2) Vena azygos





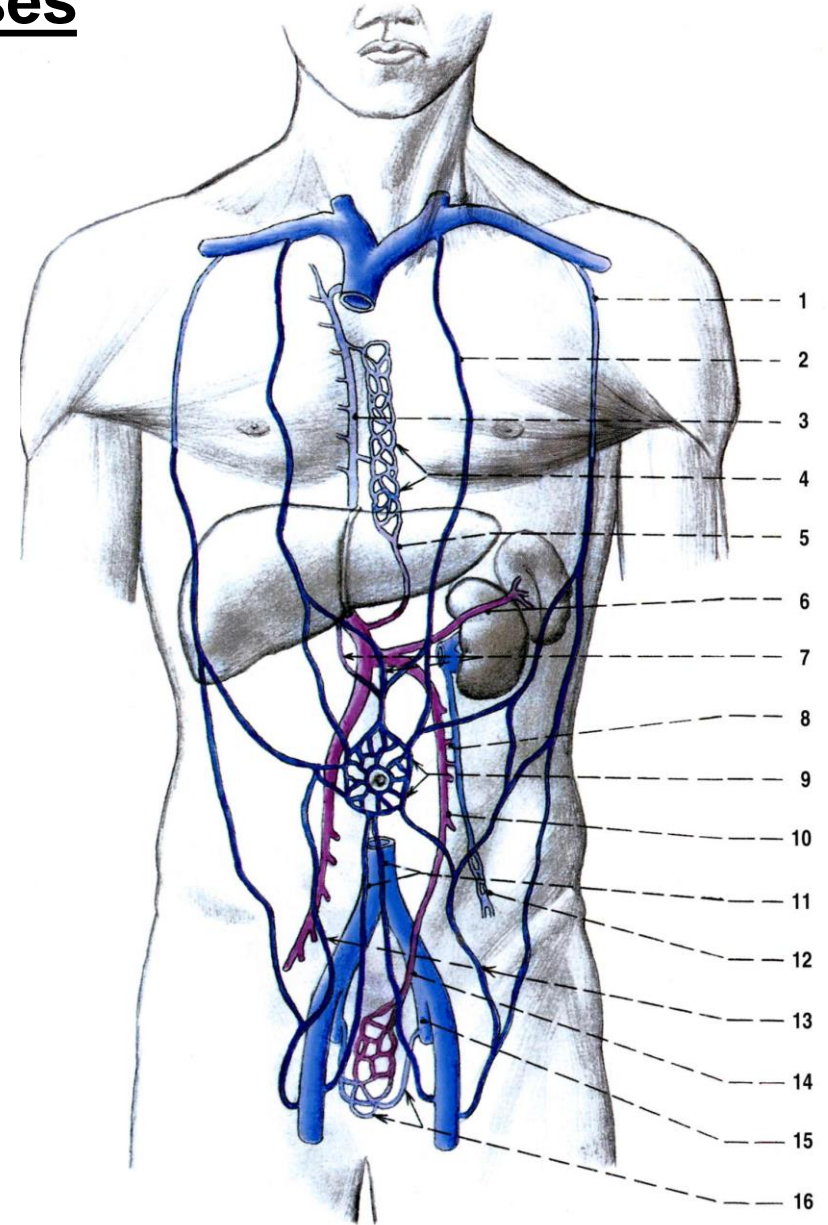
Vena portae

- vv. cysticae
- v. gastrica sin.
- v. gastrica dx.
- v. mesenterica sup.
 - vv. pancreaticoduodenales
 - vv. pancreaticae
 - v. gastromentalis dx.
 - vv. jejunales et ileales
 - v. ileocolica
 - v. colica dx. et media
- v. splenica/lienalis
 - vv. gastricae breves
 - v. gastromentalis sin.
 - vv. pancreaticae
 - v. mesenterica inf.
 - v. colica sin., vv. sigmoideae, v. rectalis sup.



Porto-caval anastomoses

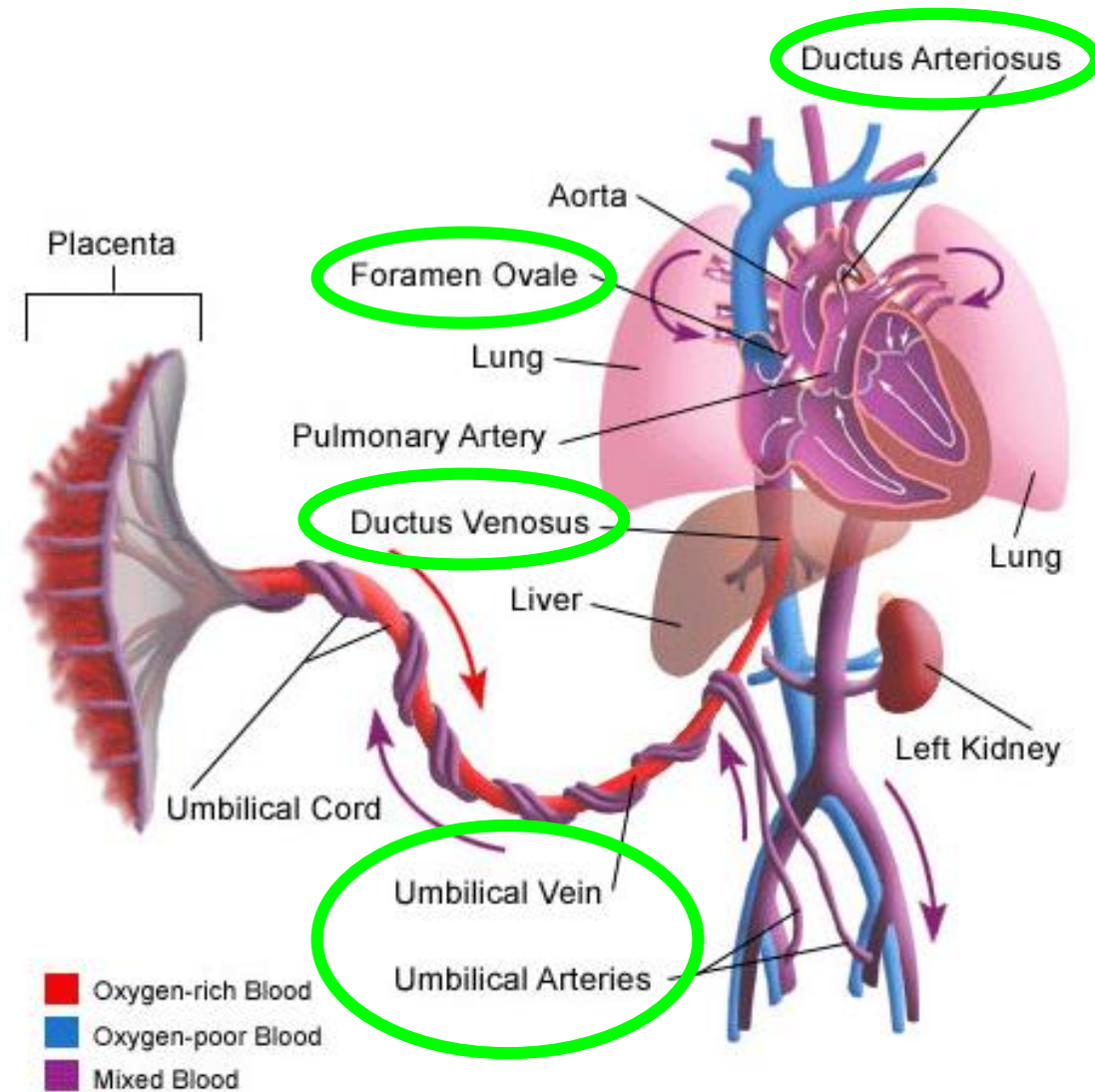
1. Vv. gastricae – vv. oesophageae
2. Vv. paraumbilicales
(caput Medusae, Burrow's veins)
3. Plexus rectalis - hemorrhoids
4. Retzius' veins
5. Vv. hepaticae – vv. phrenicae

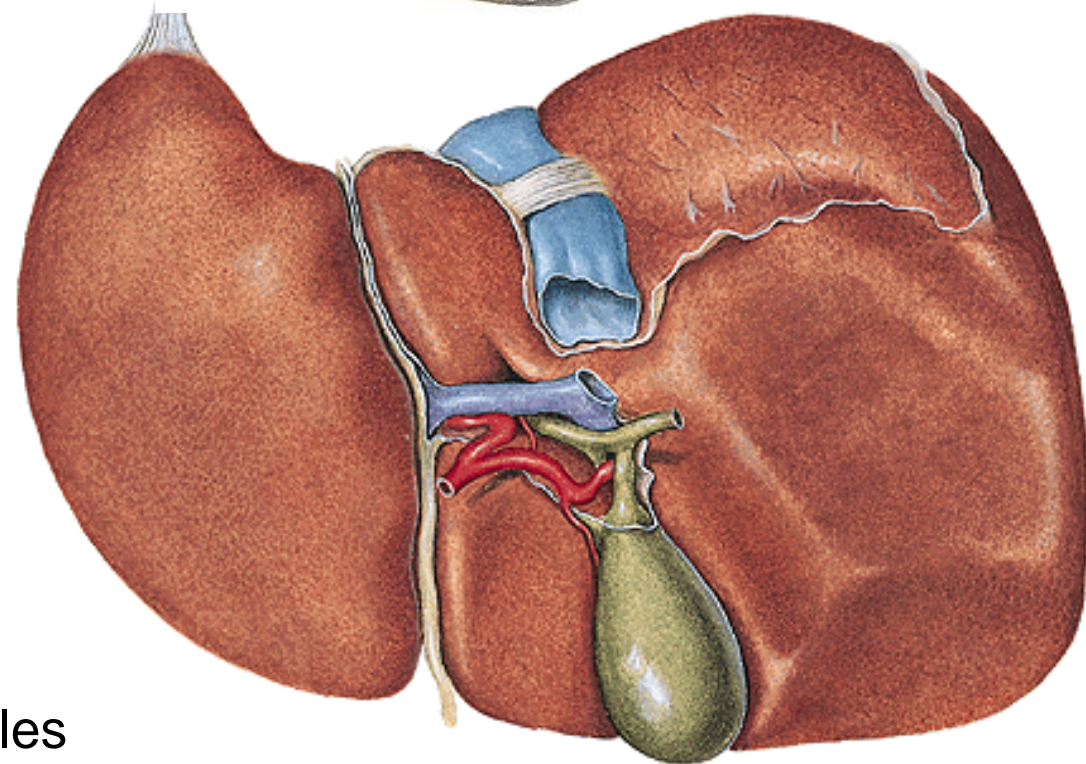
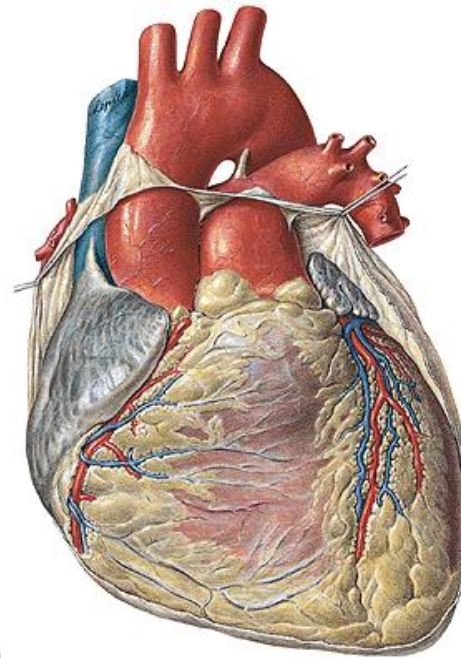
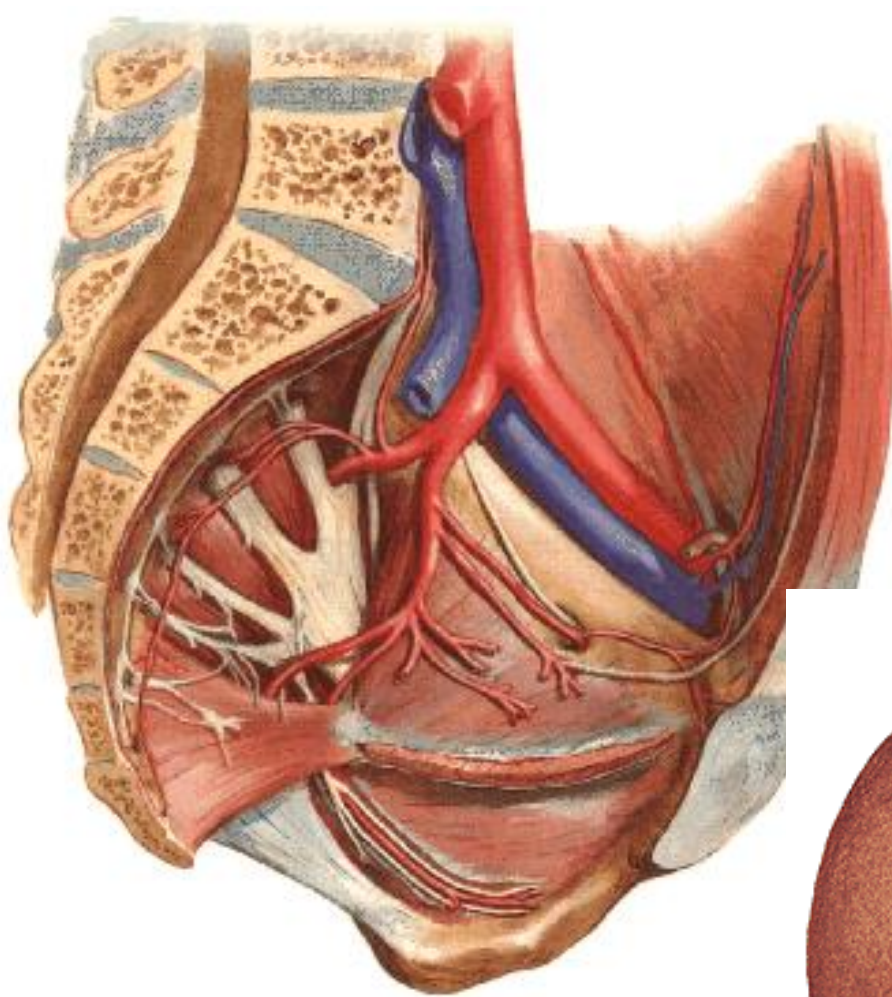


Fetal blood circulation

**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**



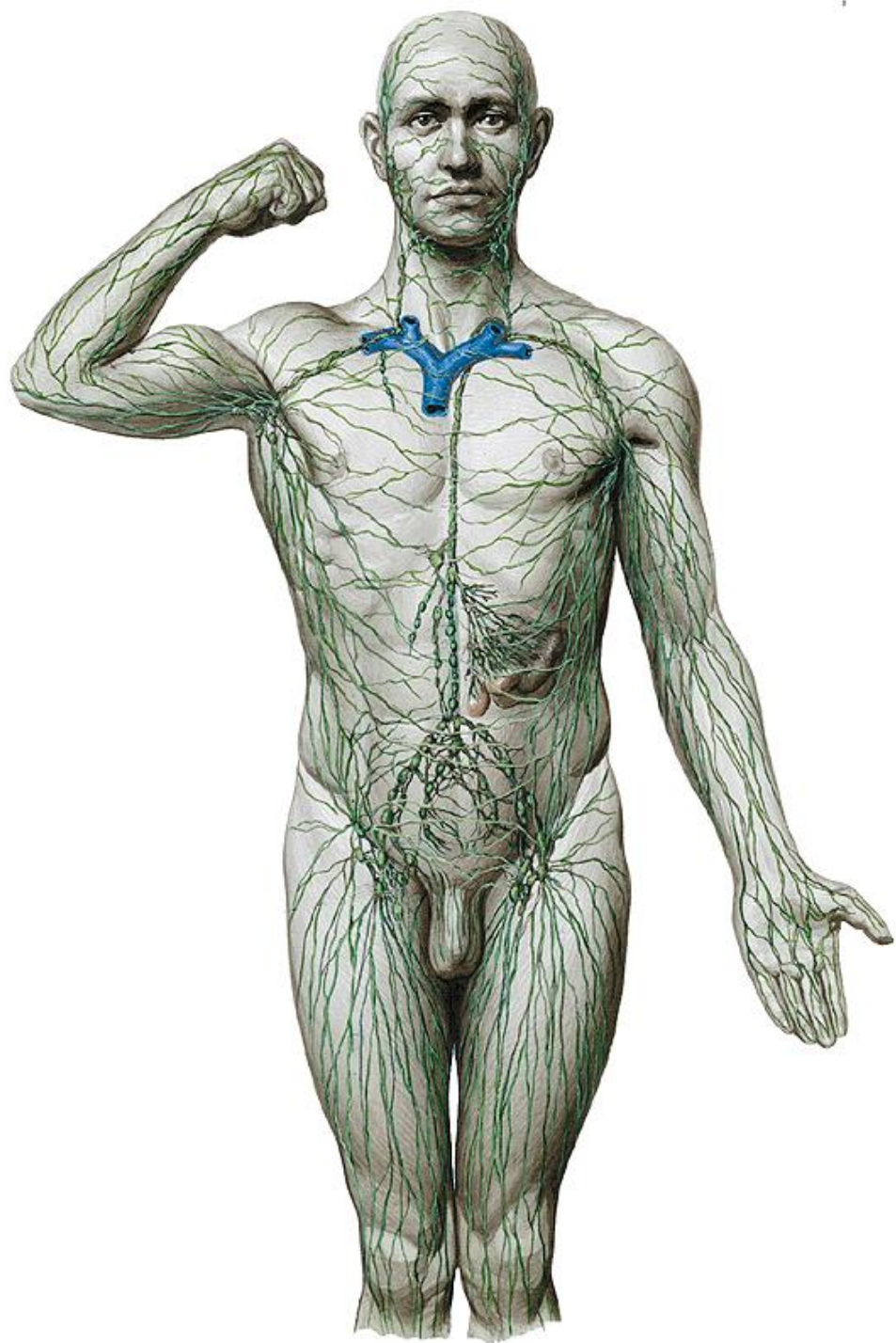


Remnants of the fetal circulation

- 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



Lymph

Lymphoid tissue:

Folliculi lymphatici

Lymph nodes

Tonsils

Spleen

Thymus

mucosa-associated lymphoid tissue

Vasa lymph. :

capillaries, network

collecting vessels

(superficial and deep)

trunks

Without lymphoid drainage:

epithel

cartilage

bone marrow

CNS

placenta

lens, vitreous body, sclera, cornea

hair, nails

Vasa lymphatica

Vasa lymphocapillaria – rete lymphocapillare

Vasa lymphatica – vas afferens, vas efferens

Trunci lymphatici: **ductus thoracicus**
tr. lymphaticus dx.

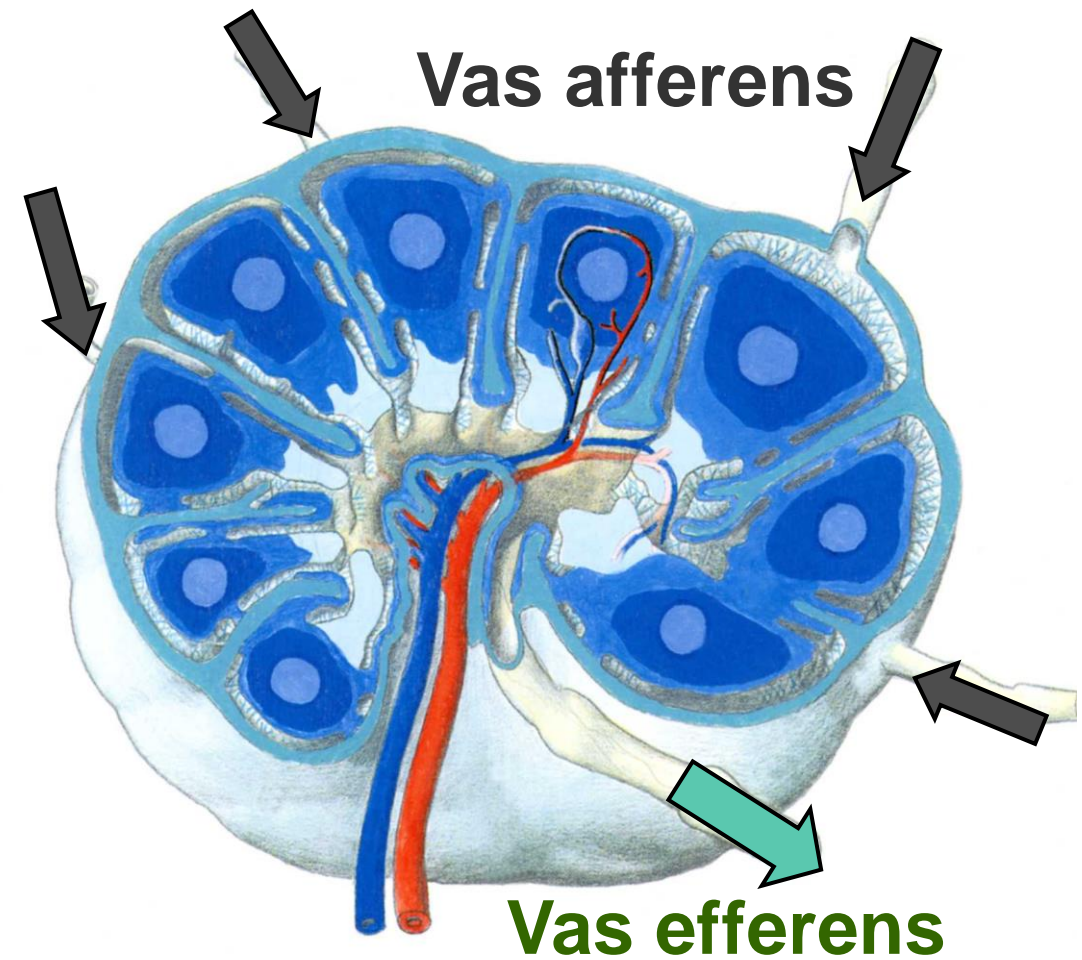


Nodus lymphaticus

- capsula
- trabeculae
- cortex
- medulla
- hilum
- sinus subcapsularis
- sinus corticalis
(peritrabecularis)
- sinus terminalis
(medullaris)

Tributary region

Regional lymph nodes

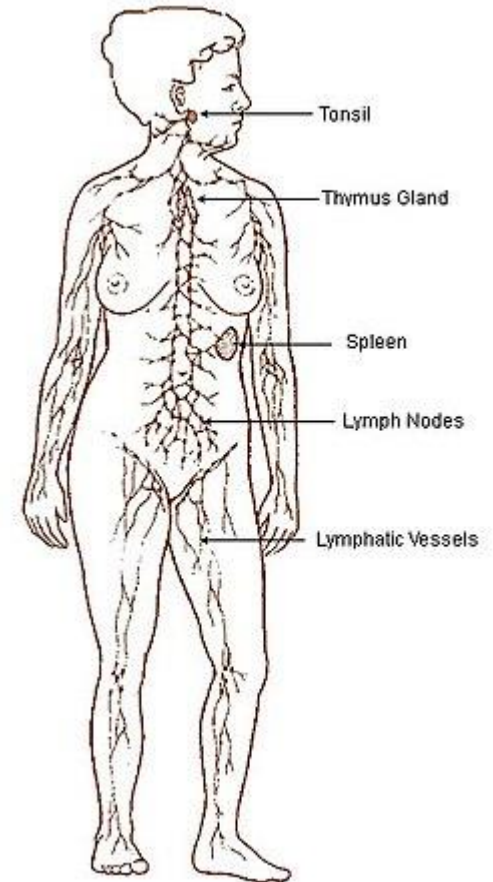


Knowledge is important for understanding of the pathological spread processes!

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



Tonsilla palatina

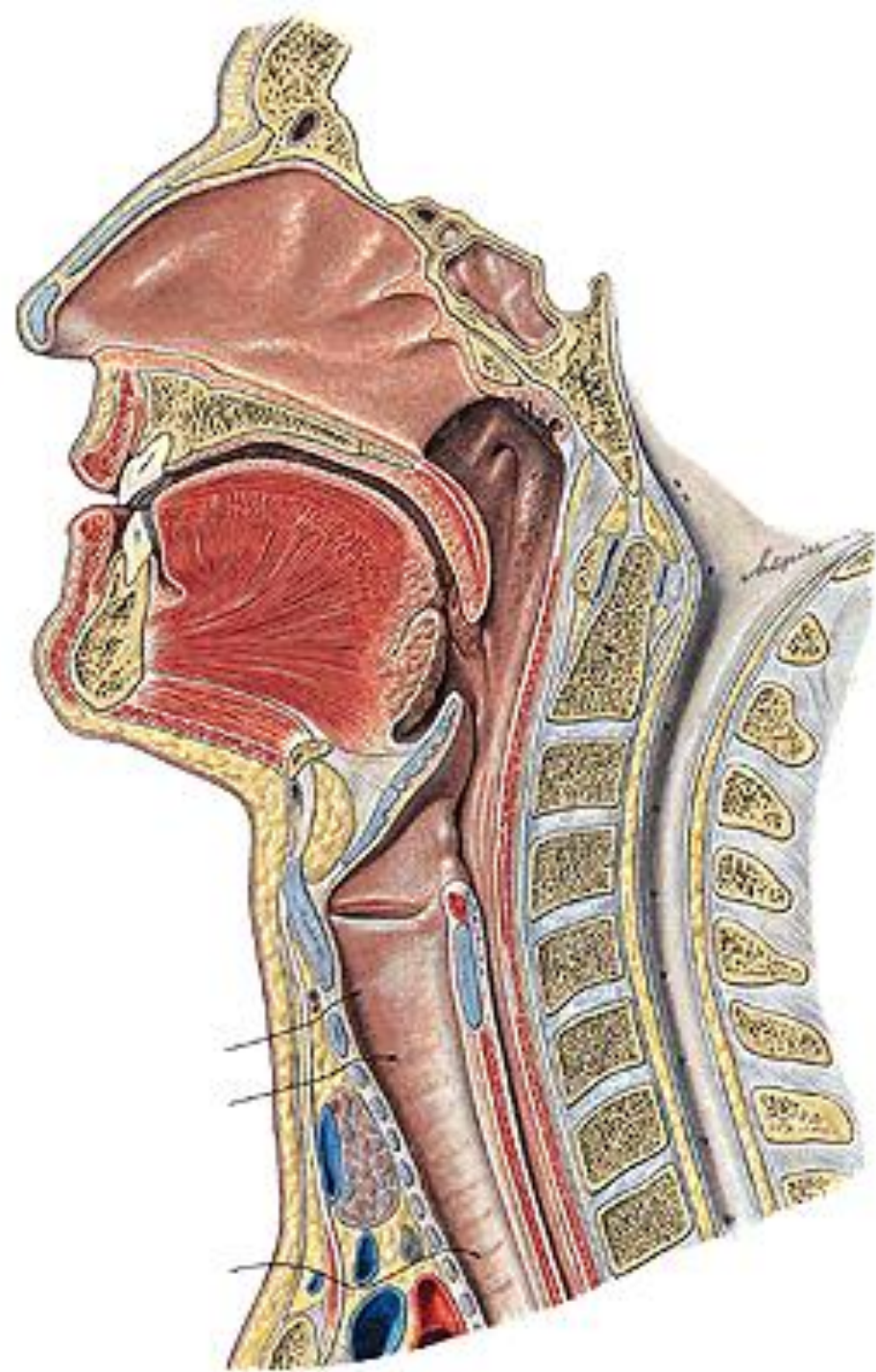


Tonsilla lingualis

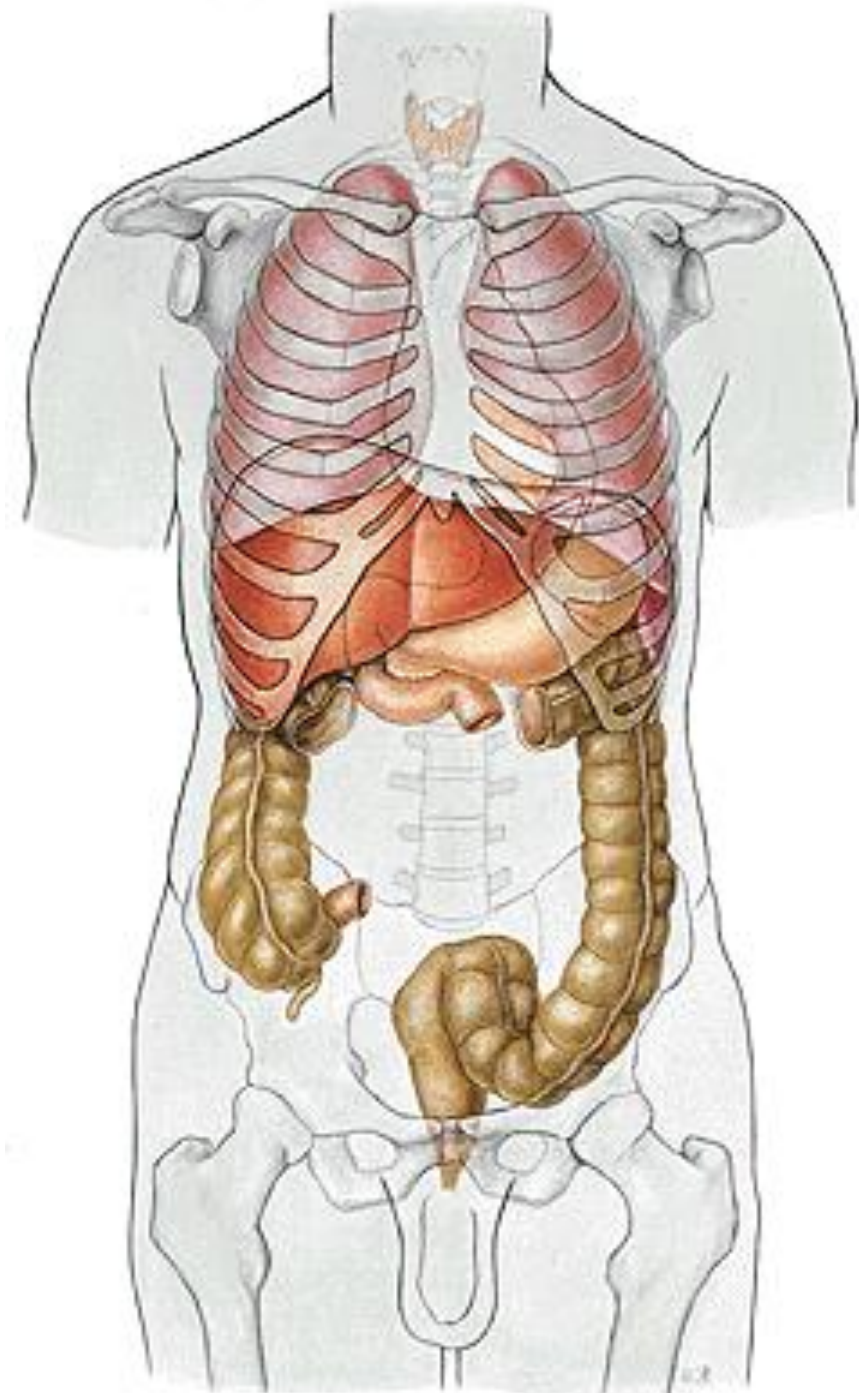


Tonsilla pharyngea
Tonsilla tubaria

Waldeyer's tonsillar ring

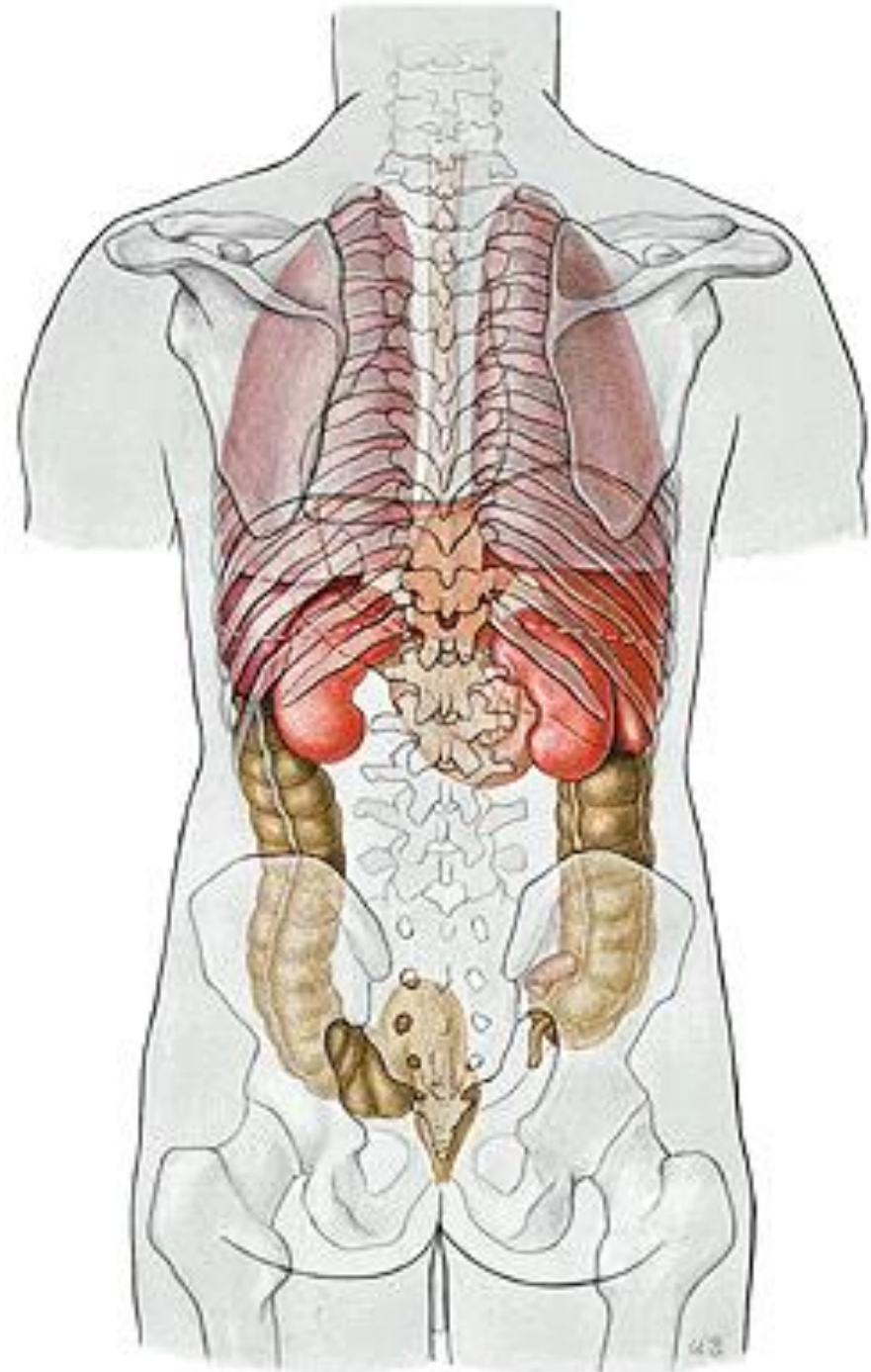


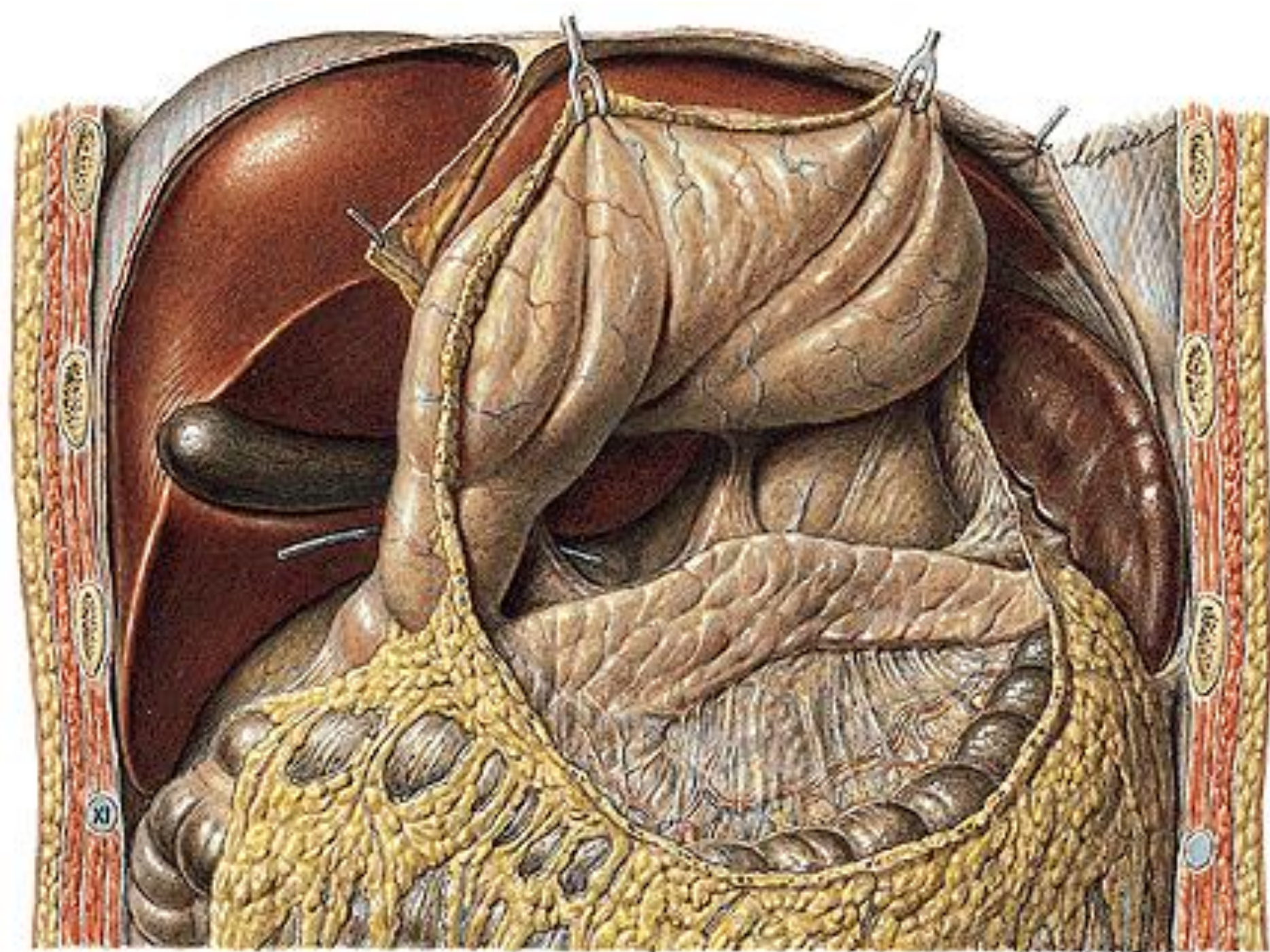
**Tonsilla abdominalis –
appendix vermiformis**

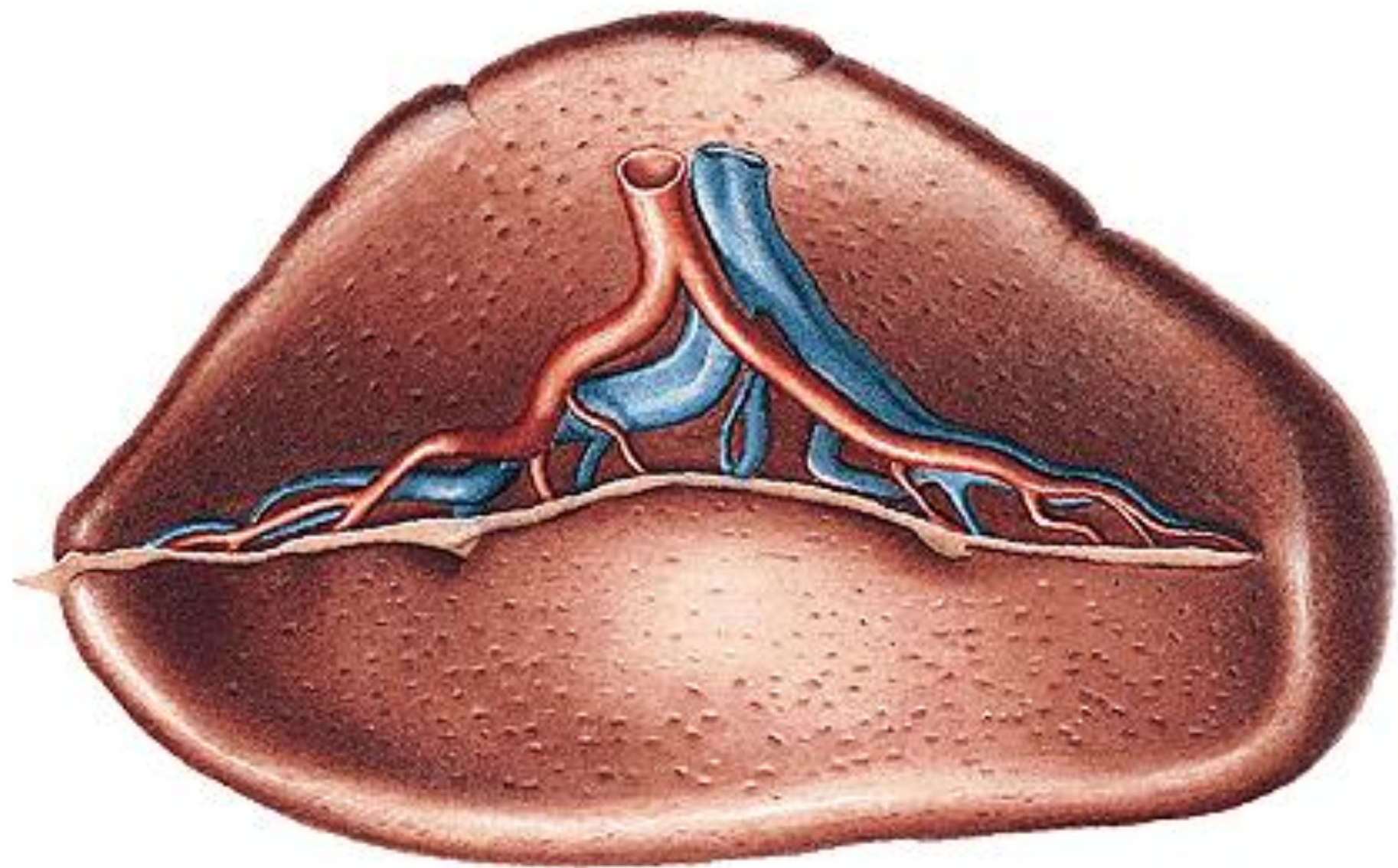


Lien, splen

Largest lymph. organ in the body

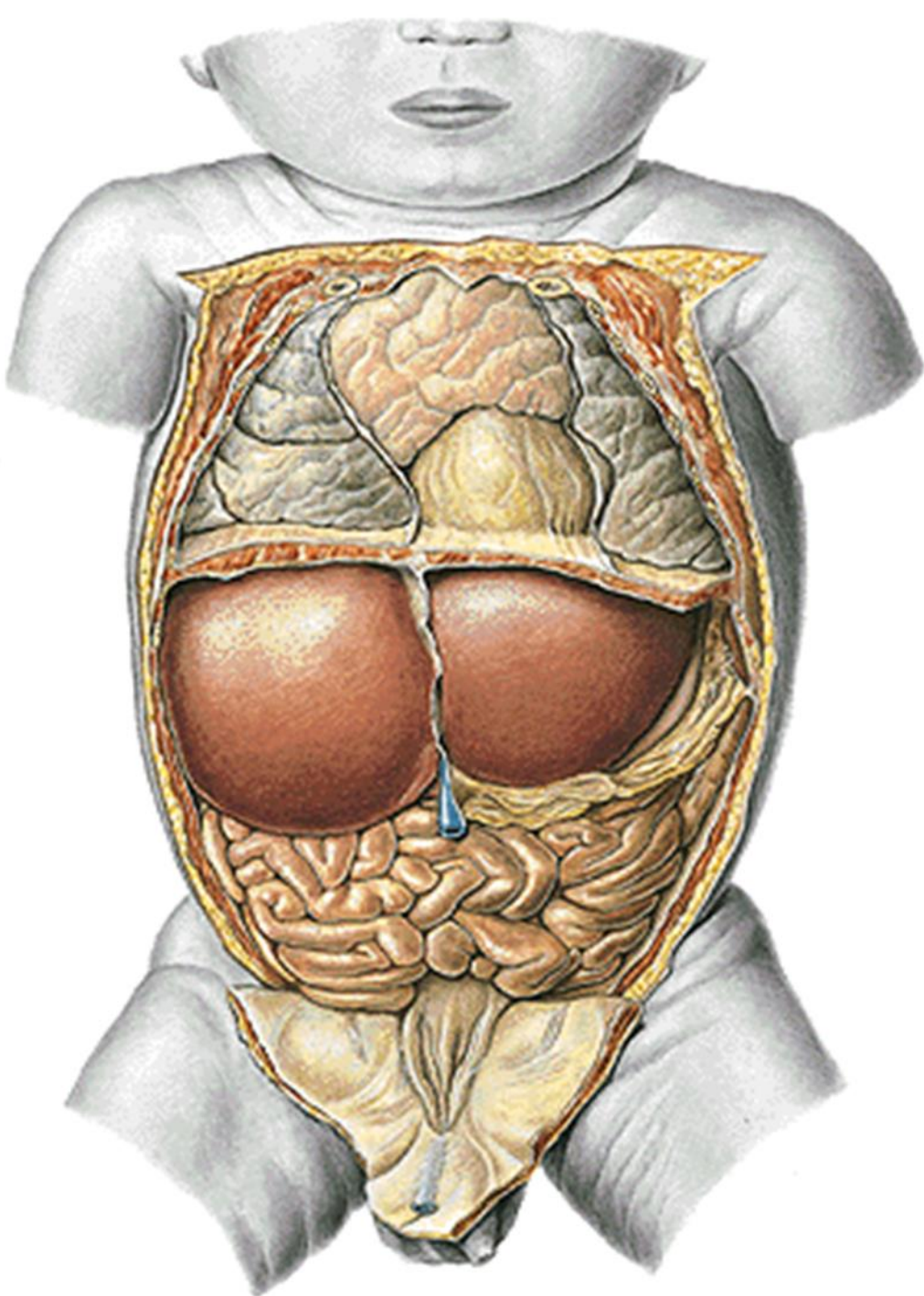








Thymus



**Located in upper
mediastinum (area
thymica)**

Lobus dx. et sin.

**Color: pink, yellowish
soft**

**Changes according to
the age**



2 years



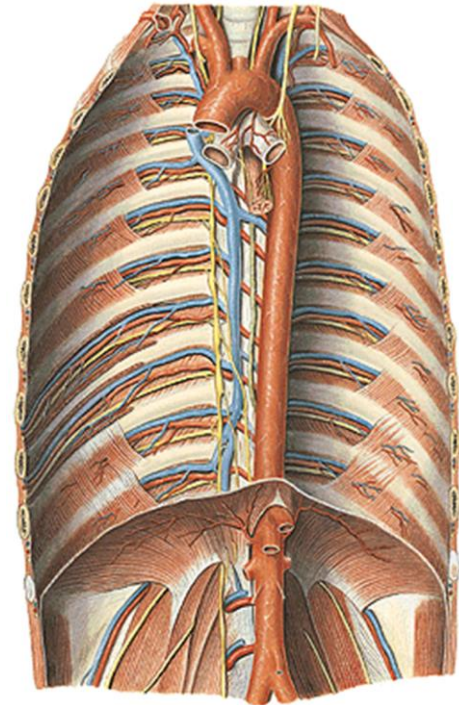
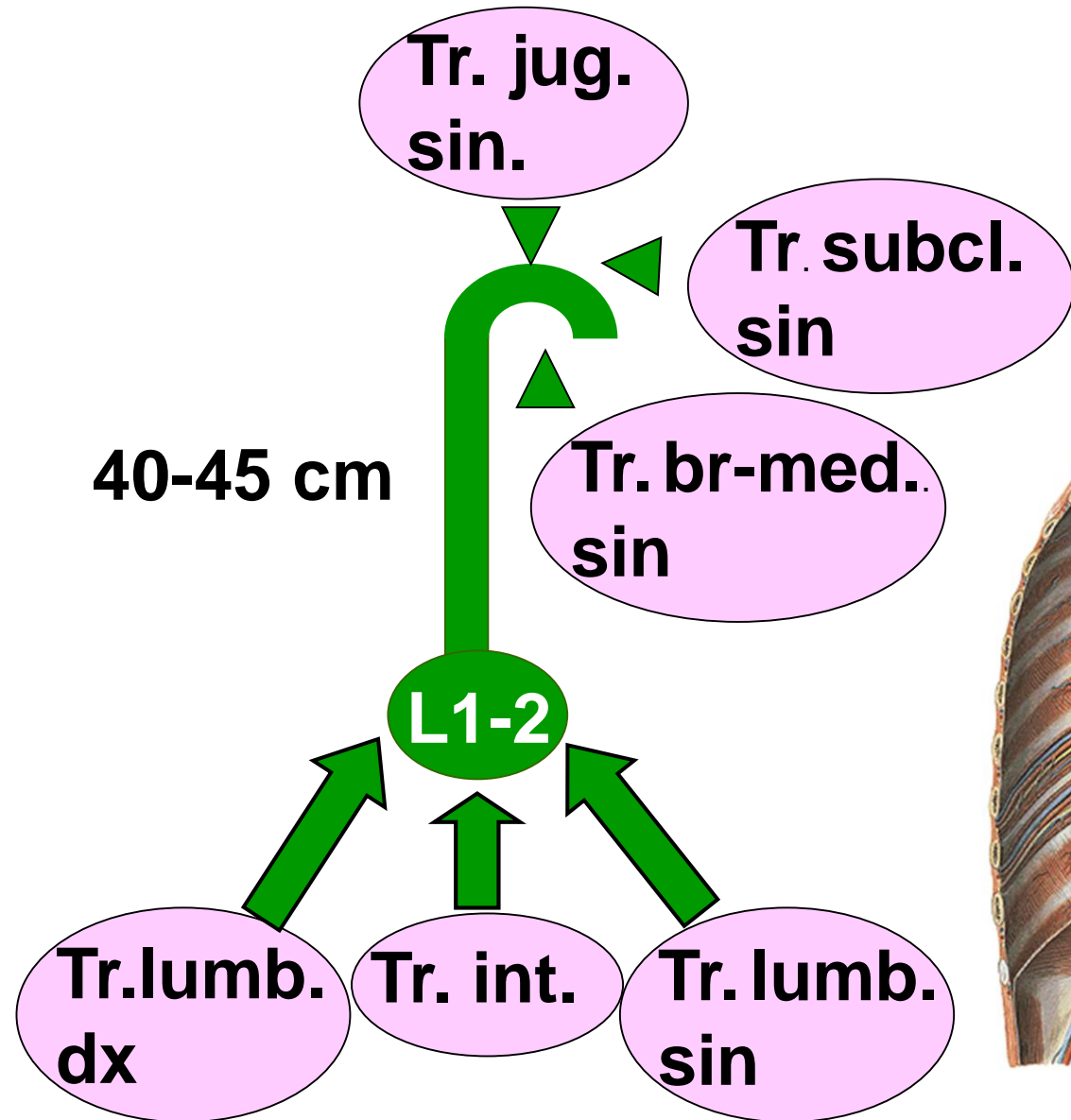
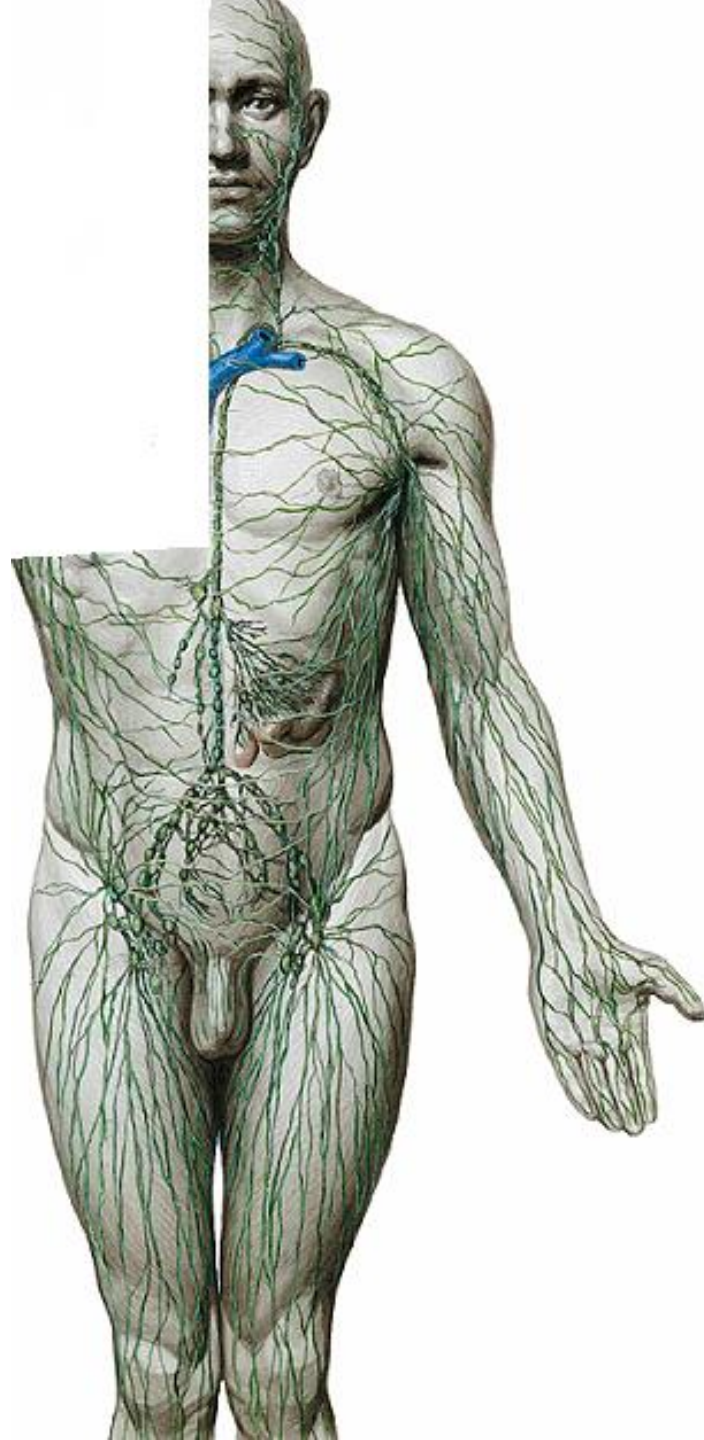
**24
years**

structure:

capsula fibrosa - septa - lobuli (cortex, medulla)

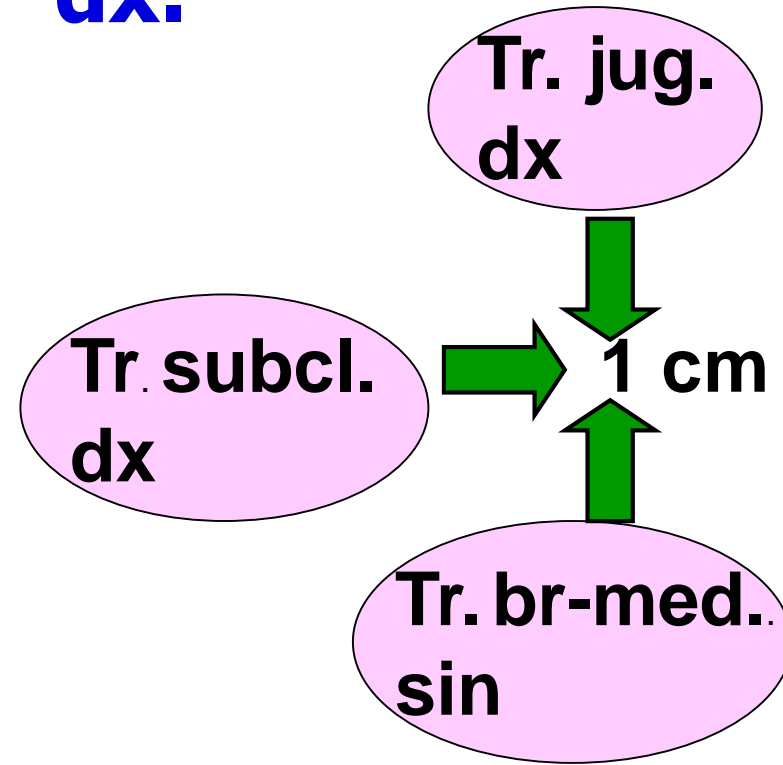
function: differentiation and functional maturation of T lymphocytes and maintaining their adequate circulation and peripheral lymphatic org.

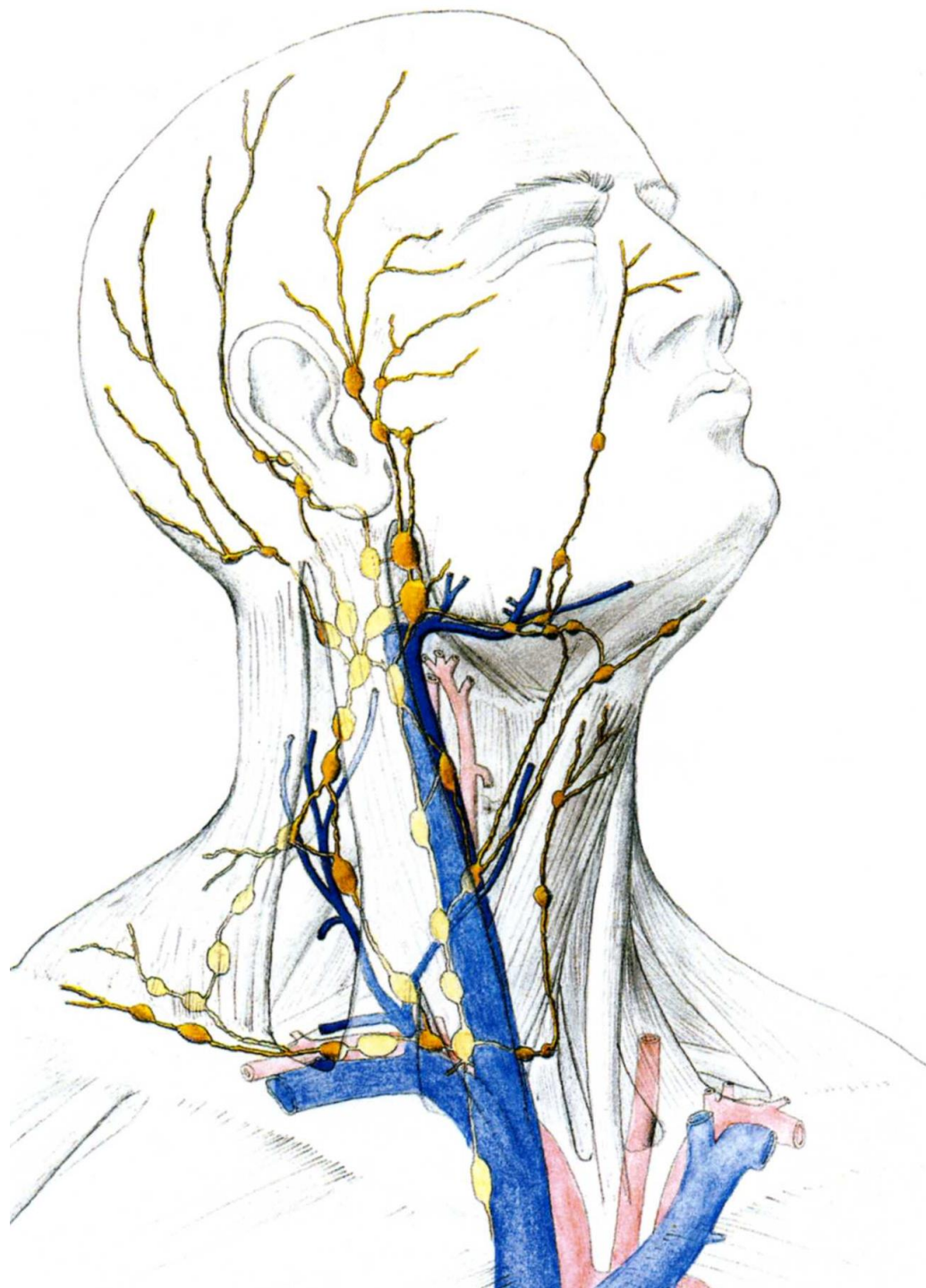
Ductus thoracicus





Ductus lymph. dx.

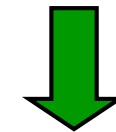




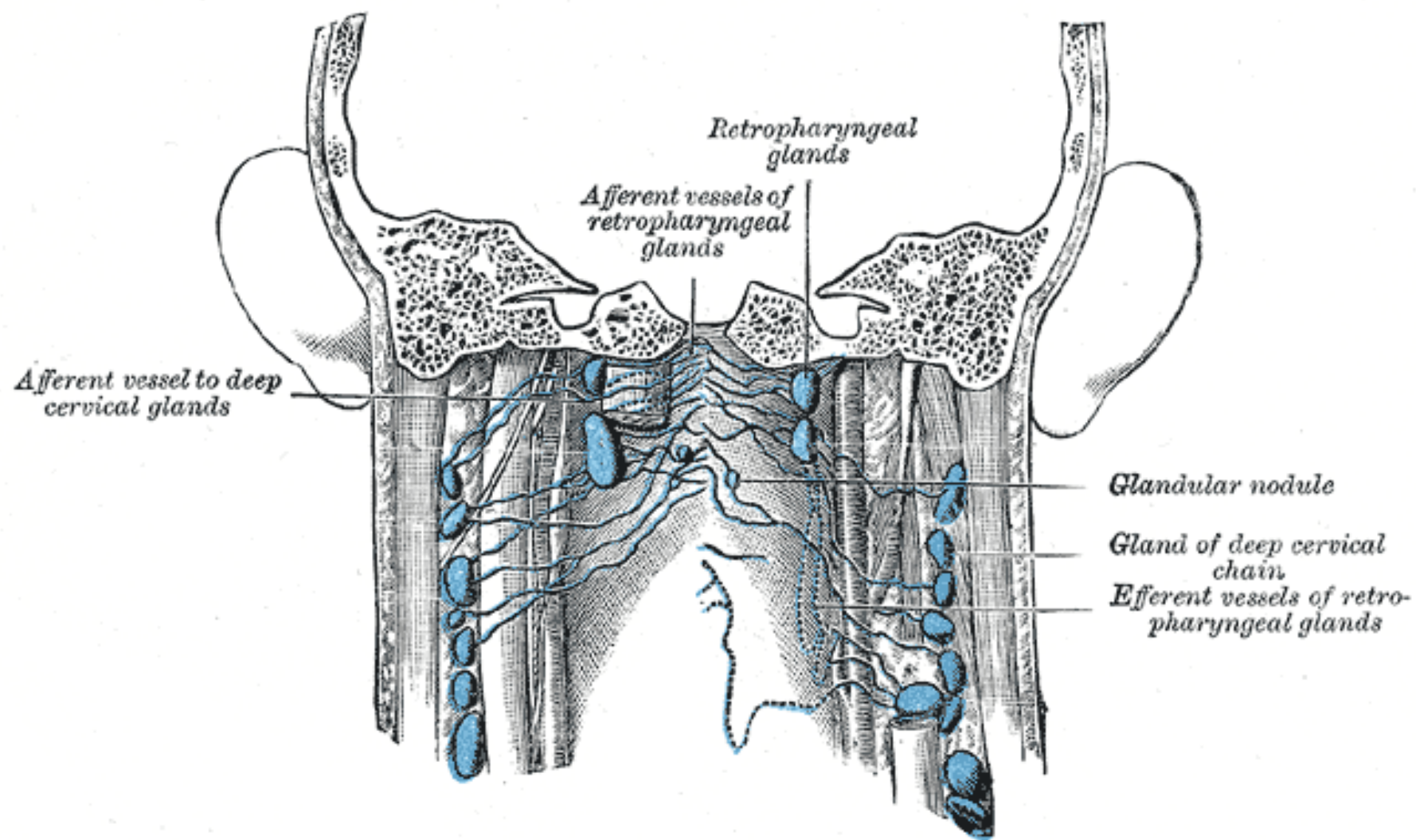
Head

NII.: occipitales
retroauriculares
parotidei
submentales
submandibulares
retropharyngei

NII.: faciales

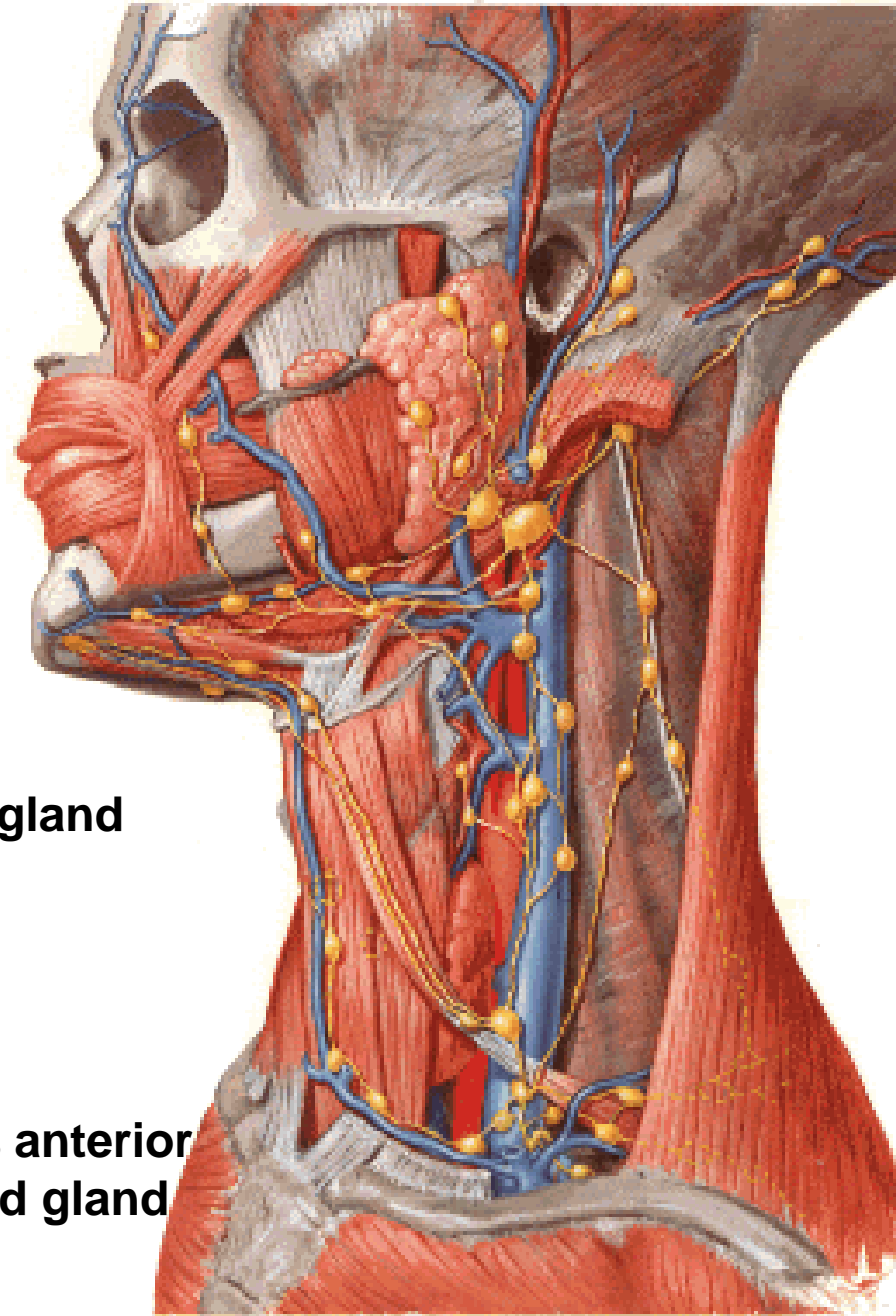


NII. cerv. spf.
NII. cerv. prof.



NECK **Nodi lymphatici cervicales**

- **superficiales**
alongside vena jugularis externa
(alongside v. jugularis anterior)
- **profundi**
alongside vena jugularis interna
alongside nervus accesorius
alongside arteria transversa coli
(supraclavicular)
Along organs larynx, trachea, thyroid gland
- **anteriores**
superficial - alongside vena jugularis anterior
deep – around larynx, trachea, thyroid gland



Lymphatic drainage of the head and neck:

Nodi lymph. occipitales

Nll. retroauriculares

Nll. parotidei

Nll. submandibulares

Nll. submentales

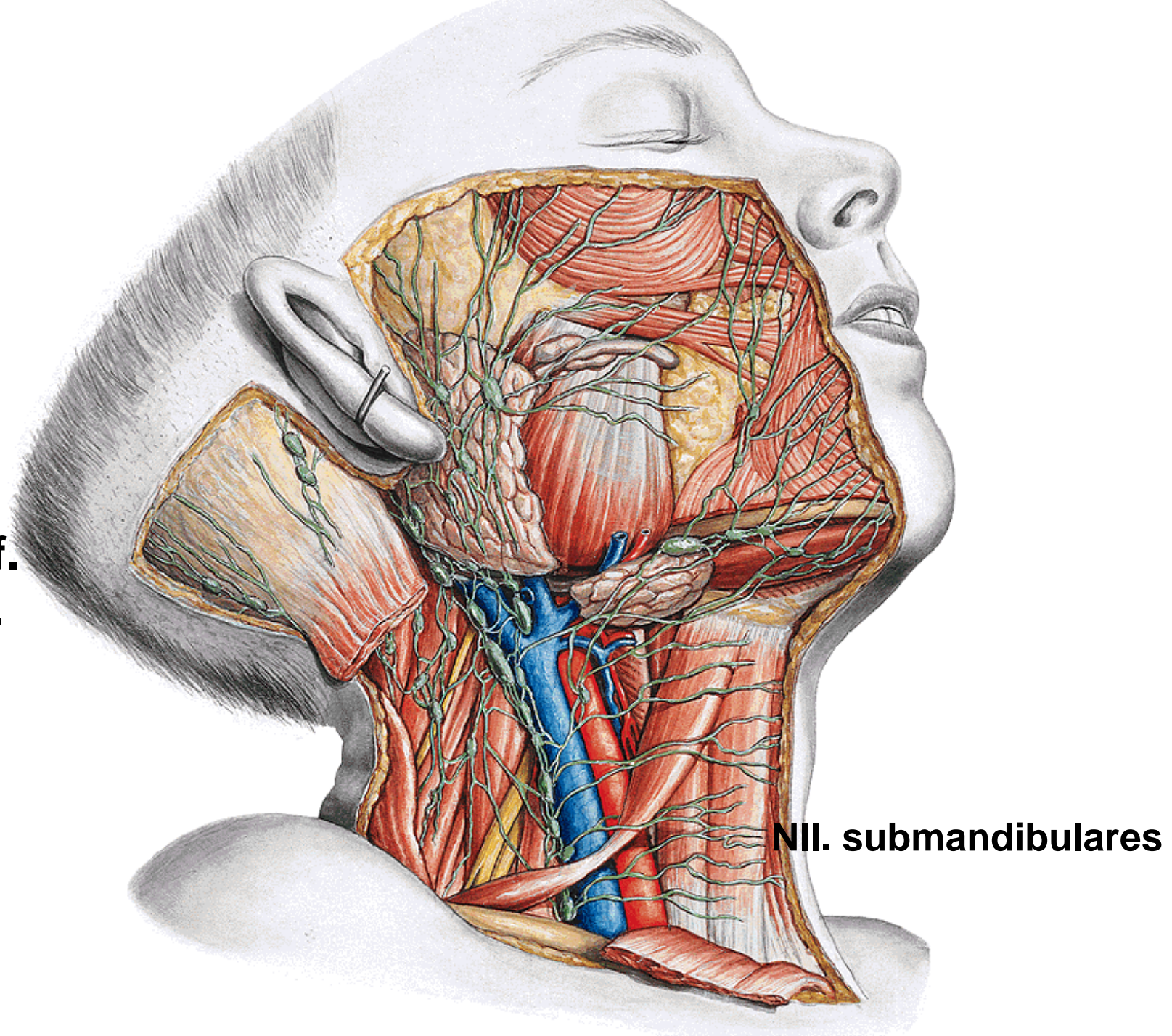
Nll. cervicales ant. spf. et prof.

Nll. cervicales lat. spf. et prof.

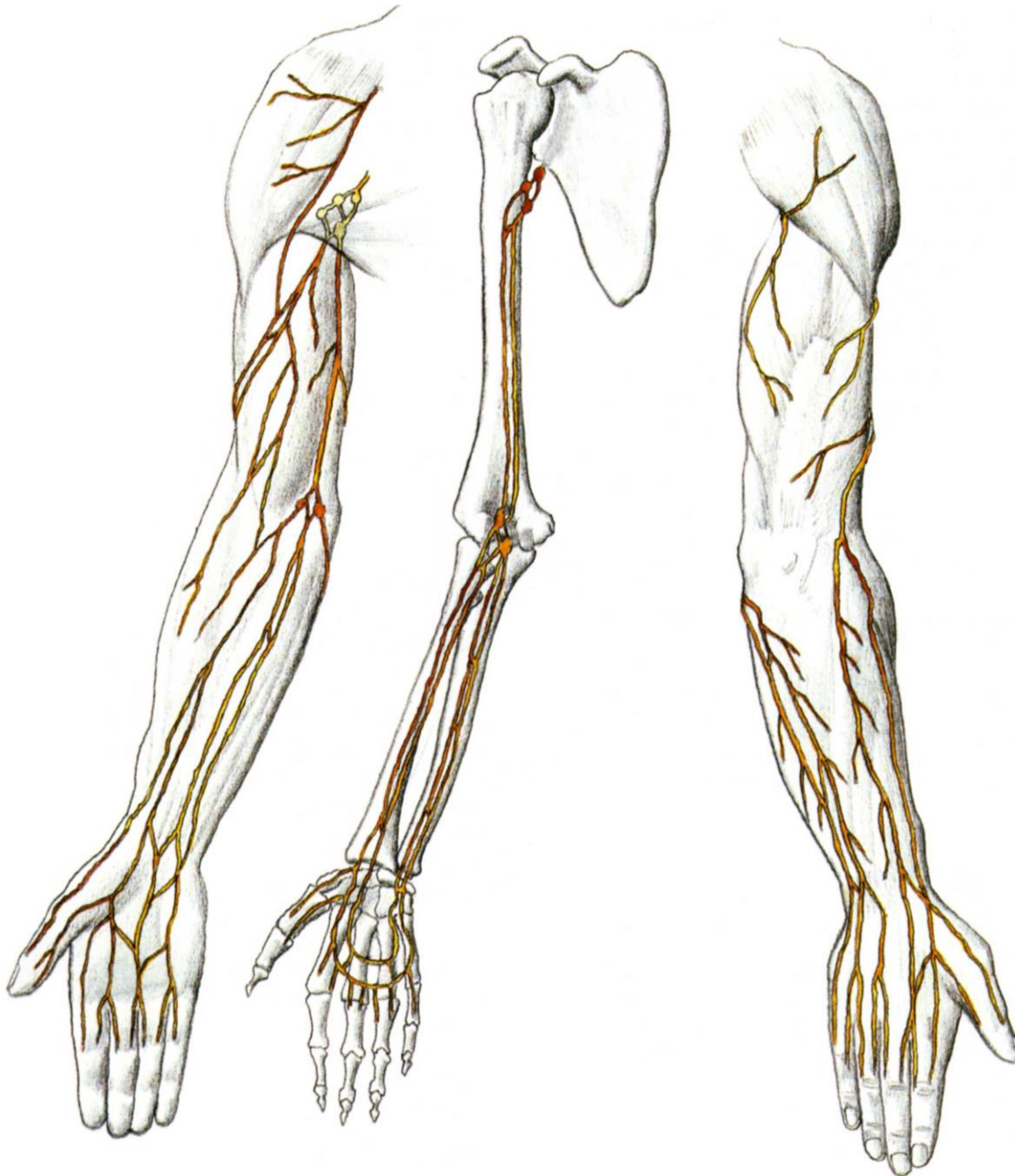
(nll. jugulares int.

nll. supraclaviculares)

→ **tr. jugularis**



Upper limb



Superficial lymph vessels:

- collectors:

lateral (v. cephalica)

medial (v. basilica)

anterior (medii)

III. cubit. spf.

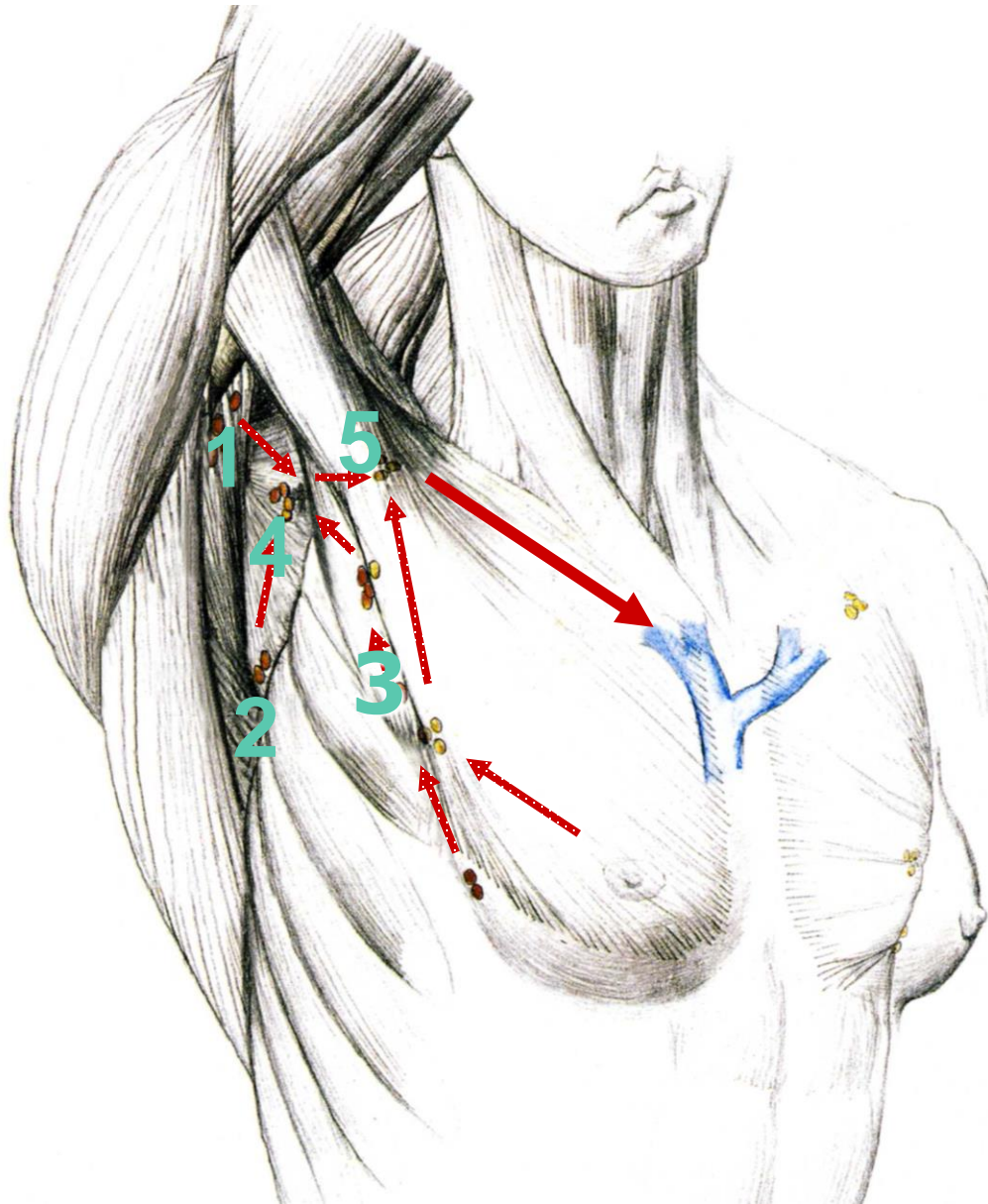
Deep lymph vessels

(along arteries)

III. cubit. prof.

III. axillares

NII. axillares



1 Laterales

(av. brachialis)

2 Subscapulares

(av. subscap.)

3 Pectorales

(av. thoracica lat.)

4 Centrales cca 10

5 Apicales (infraclav.)

(av. subclavia cca 12)

> **Tr. subclavius**



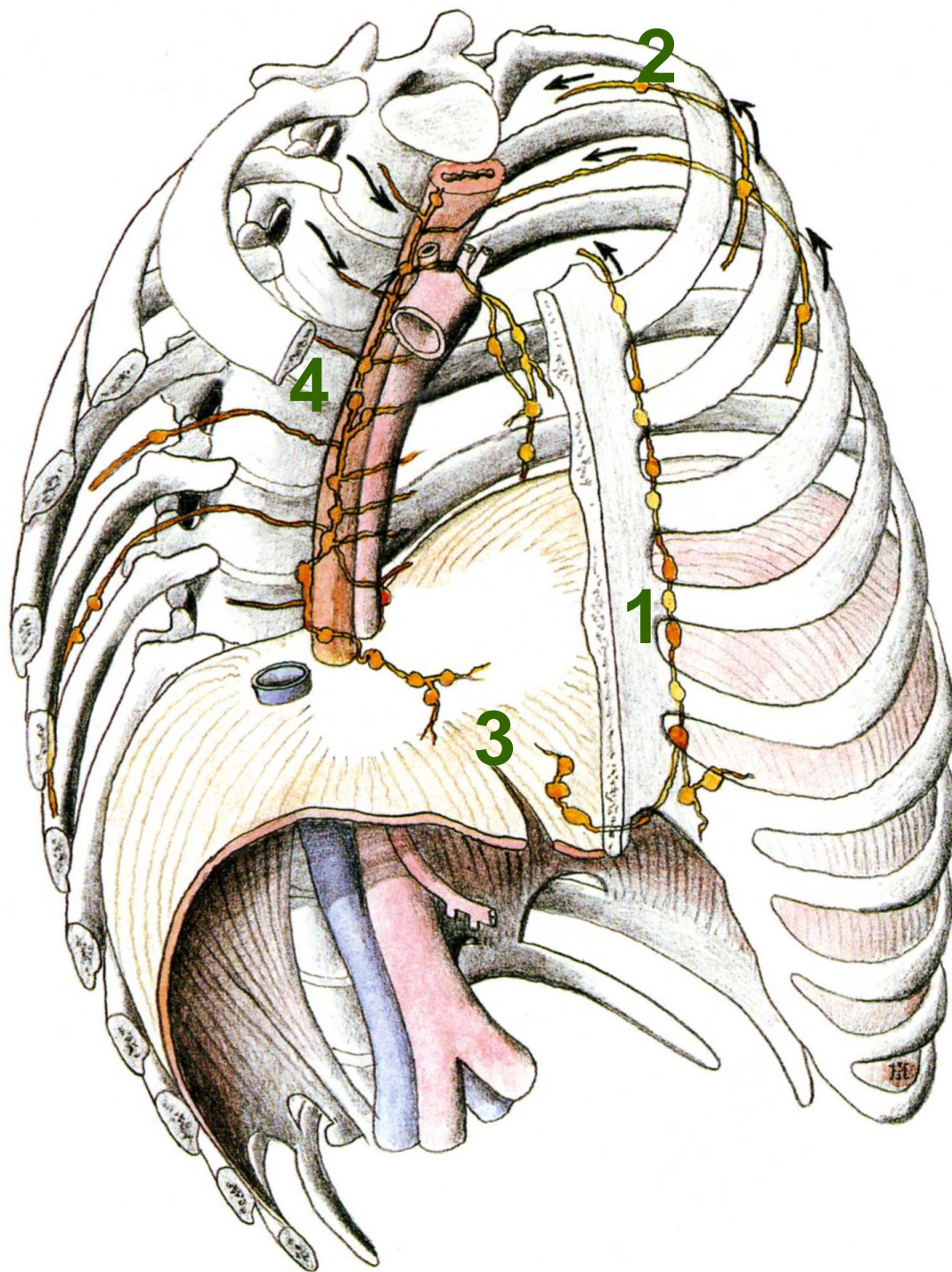
THORAX

Wall of the thorax and diaphragm

Organs of mediastinum

Region of the hilum pulmonis

➤ **Tr. bronchomediast.**



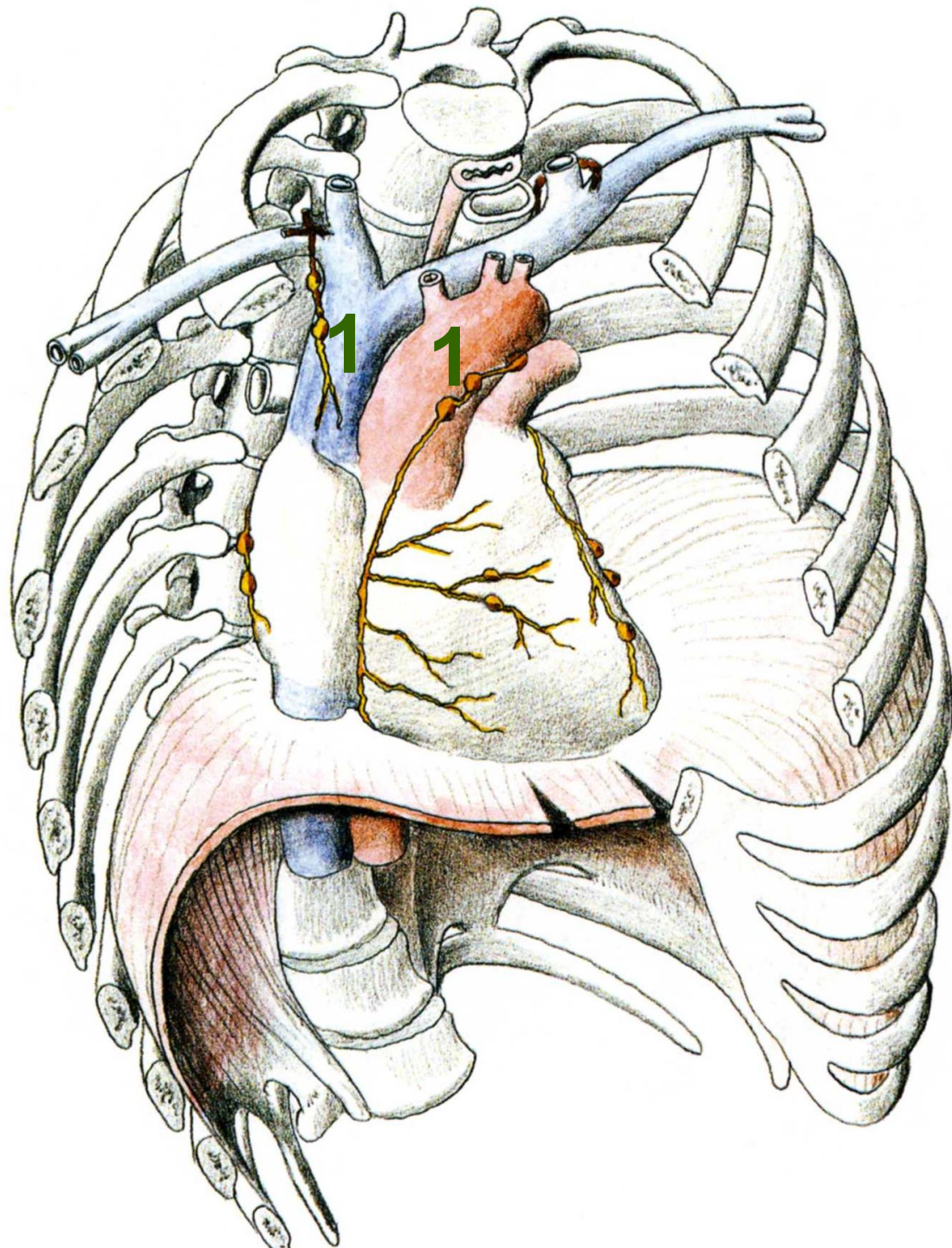
Wall of the thorax and diaphragm

1 NII. parasternales
(vasa thoracica int.)

2 NII. intercostales

3 NII. phrenici sup.

4. NII.
praevertebrales

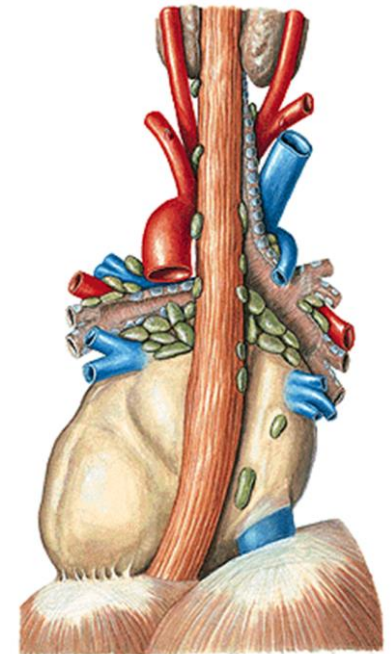


Organs of mediastinum

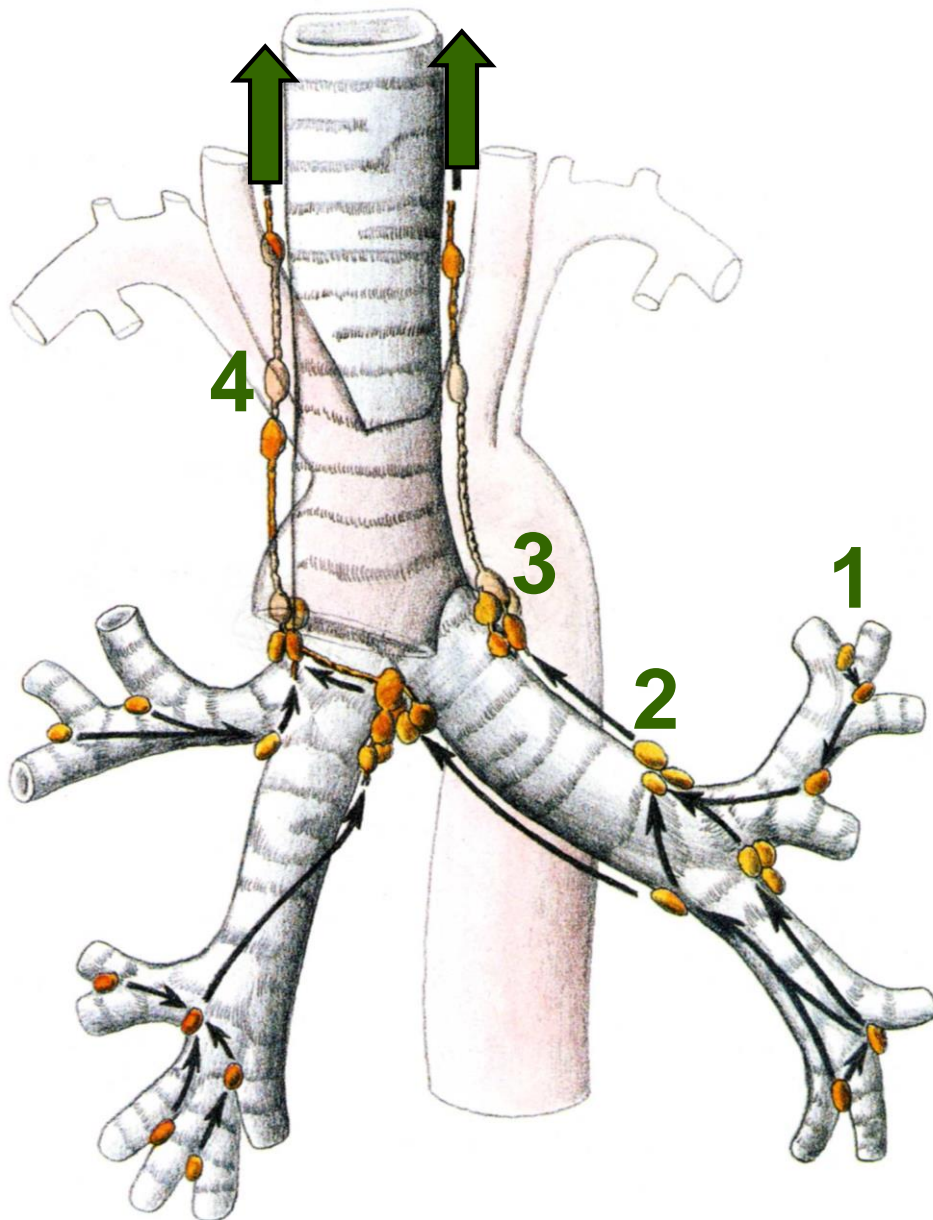
1 Nll. mediast. ant.

(along: v. cava inf.
arcus aortae
nn. phrenici)

Nll. mediast. post.



Tr. bronchomediast.
sin. dx.

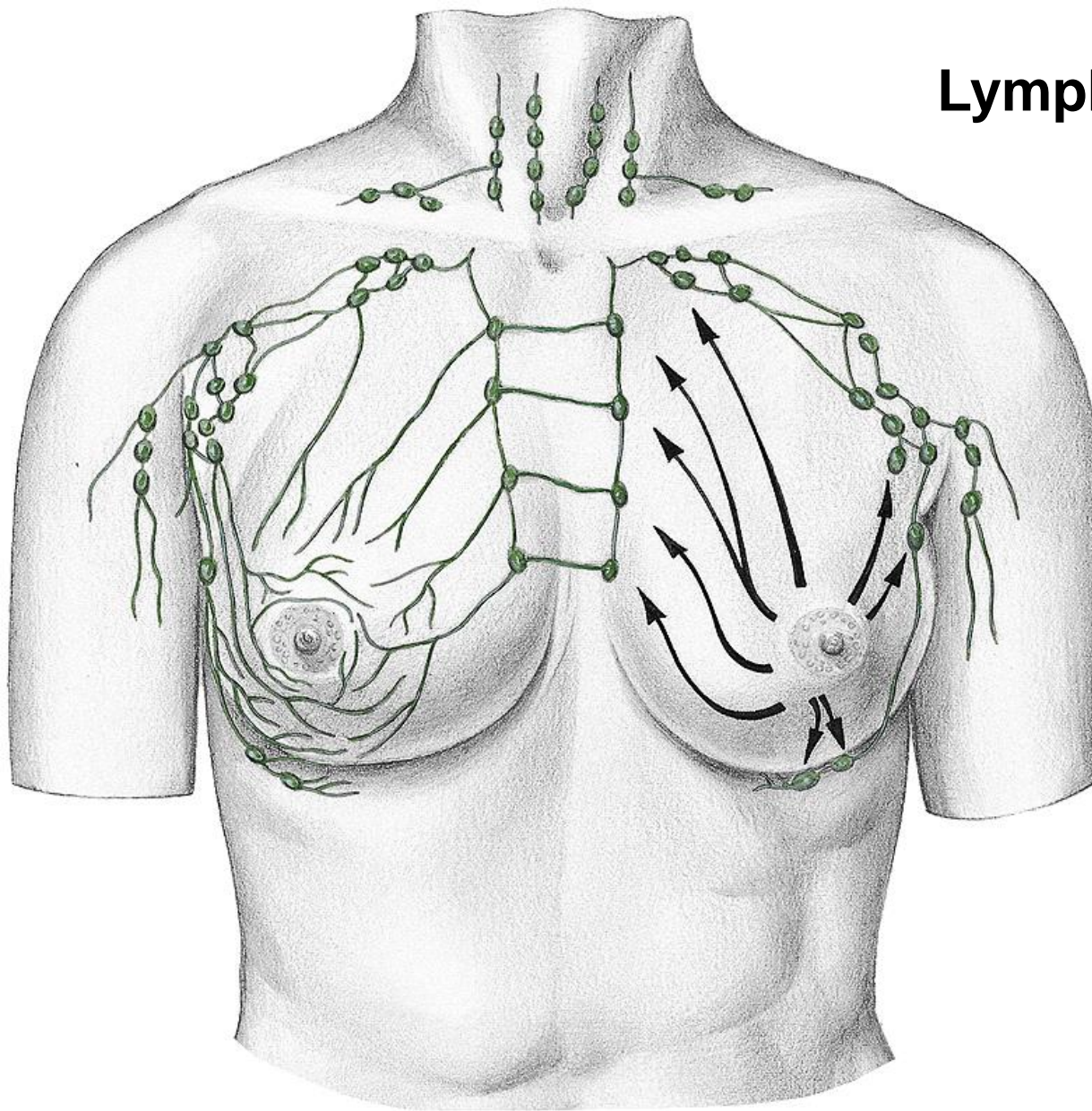


Region of the hilum
pulmonis:

- 1 Nll. pulm.
- 2 Nll. bronchopulm.
- 3 Nll. tracheobronch.
- 4 Nll. paratrach.

→ tr. bronchomediastinalis

Lymph drainage of the breast



NII. axillares

NII. parasternales

NII. supraclavicul.

NII. intercostales

NII. mediastinales ant.

Epigastric way

Abdomen and pelvis



Truncus intestinalis

from unpaired abdominal organ

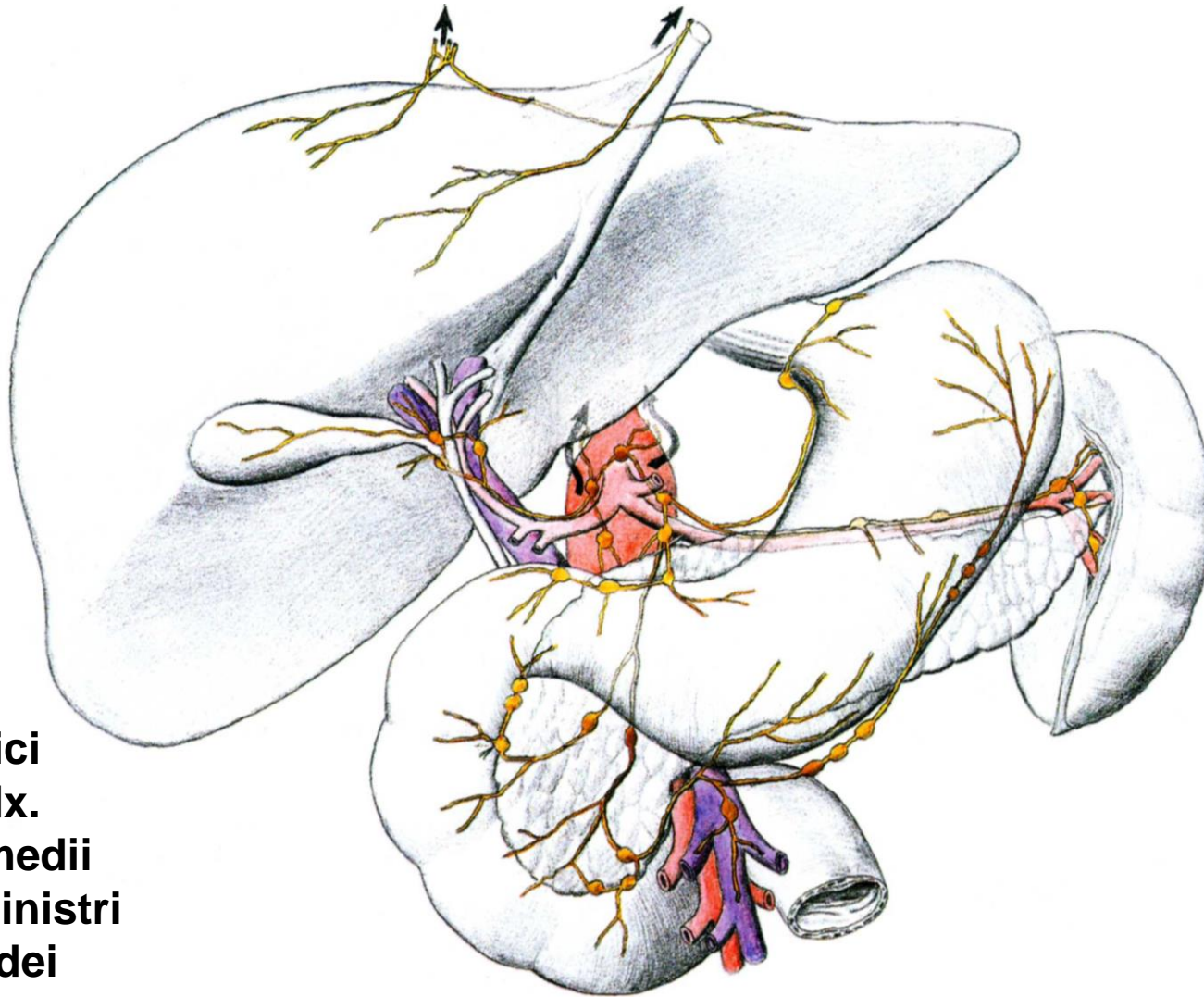
Trunci lumbales

from the abdominal and pelvic wall
from paired abdominal organ from pelvic organ (and from LL)

Nll. gastrici dx. et sin.
Nll. gastroepiploici dx. e
Nll. pancreaticoduoden
sup. et inf.
Nll. lienales
Nll. coeliaci
Nll. hepatici
Nll. pancreatici
sup. et inf.

> cisterna chyli > dct. thoracicus

Origin of tr. intestinalis



Nll. coeliaci

liver

stomach

spleen

pancreas

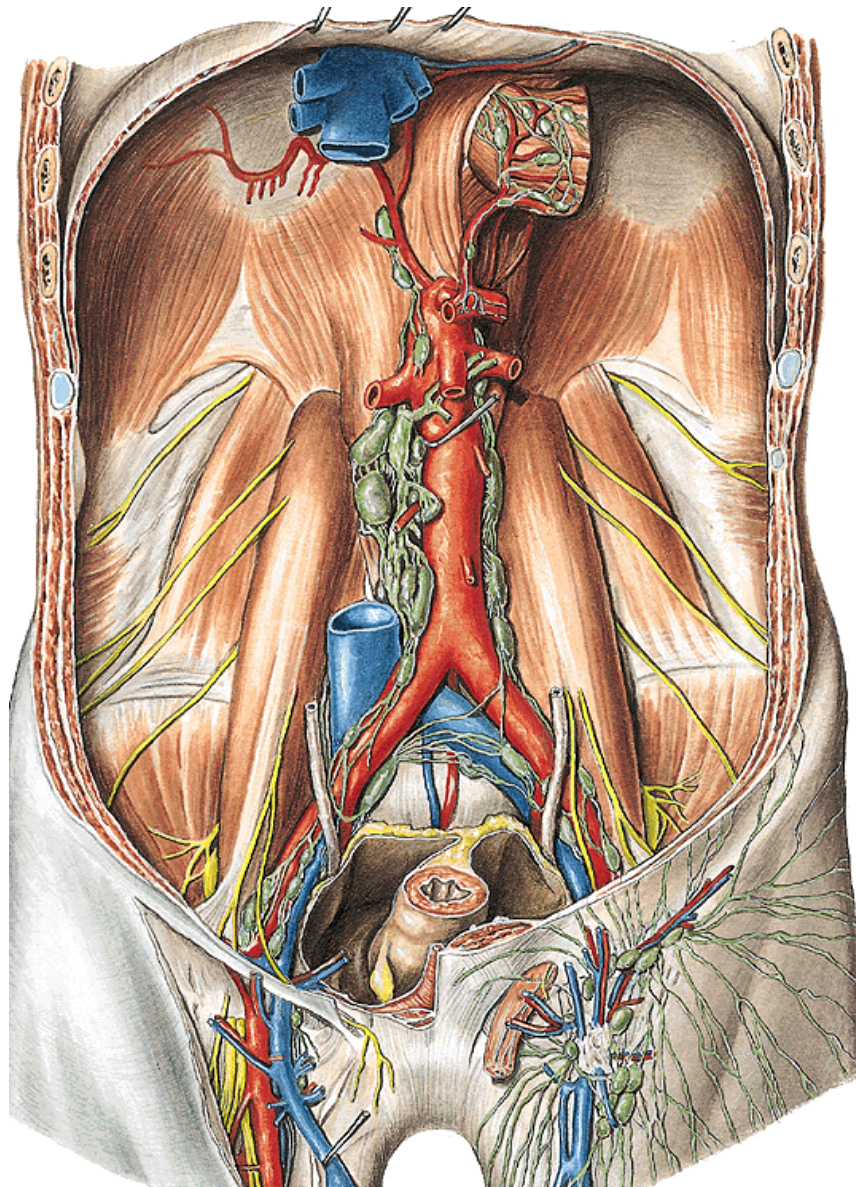
duodenum

small intestine

large intestine

Nodi ileocolici
Nodi colici dx.
Nodi colici medii
Nodi colici sinistri
Nodi sigmoidei
Nodi rectales sup.
Nodi mesenterici sup.
Nodi mesenterici inf.

vasa efferentia > **Tr. intestinalis**



Origin of trr. lumbales

NII. iliaci ext. (from LL)

NII. iliaci int.

(wall+ unpaired pelvic org.:
urinary bladder
uterus, vagina

NII. sacrales (rectum, unpaired.
org.)

> **NII. iliaci comm.**

> **NII. lumbales**

(posterior abdominal wall+
paired. org., lumbar region)

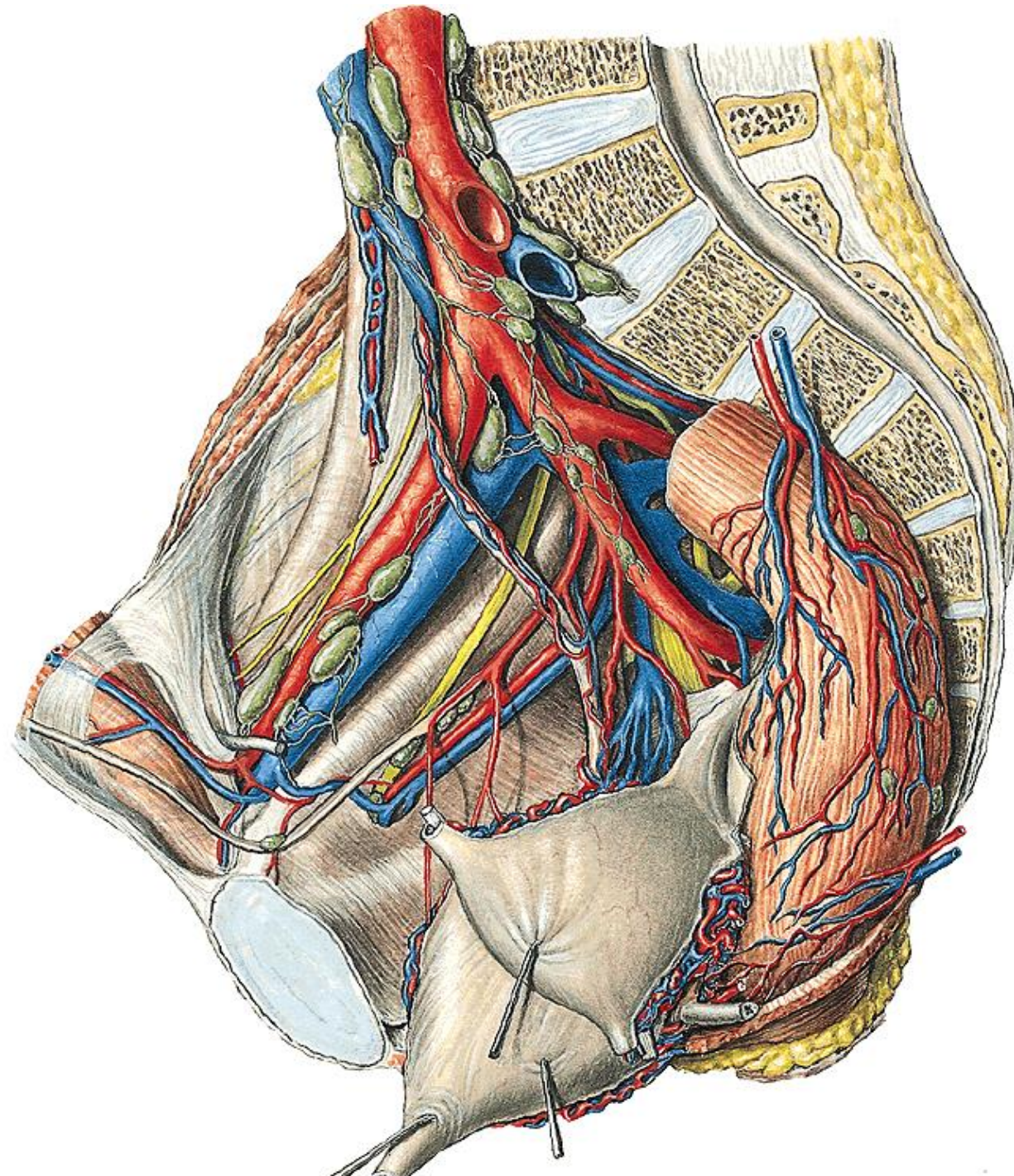
vasa efferentia > **Tr. lumb. dx. et sin.**

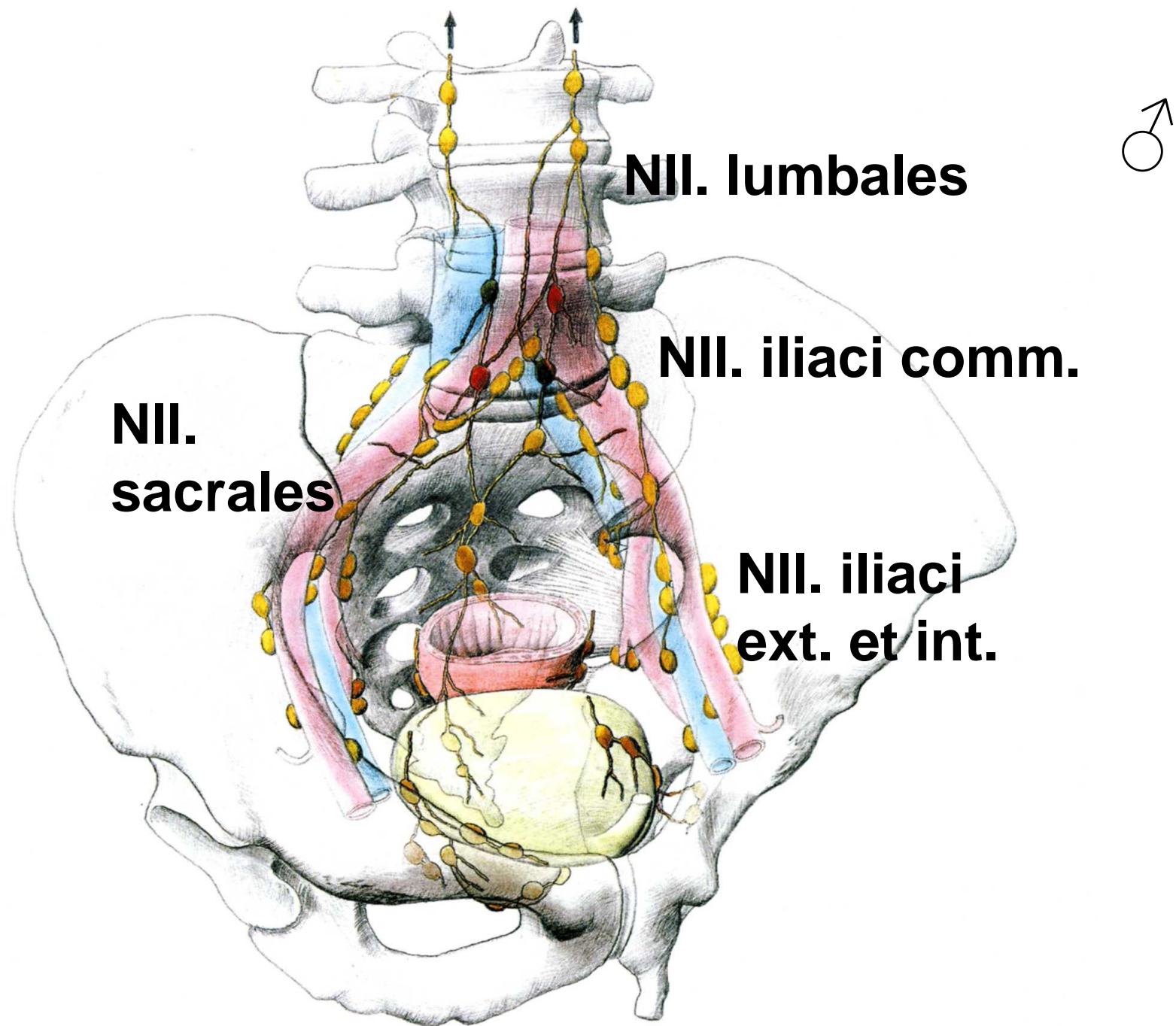
Nll. iliaci interni

- nll. paravesicales
- nll. paravaginales
- nll. parauterini
(Bayer)
- nll. pararectales
- nll. glutei sup. et inf.
- nll. sacrales

Nll. iliaci externi

Nll. iliaci communes





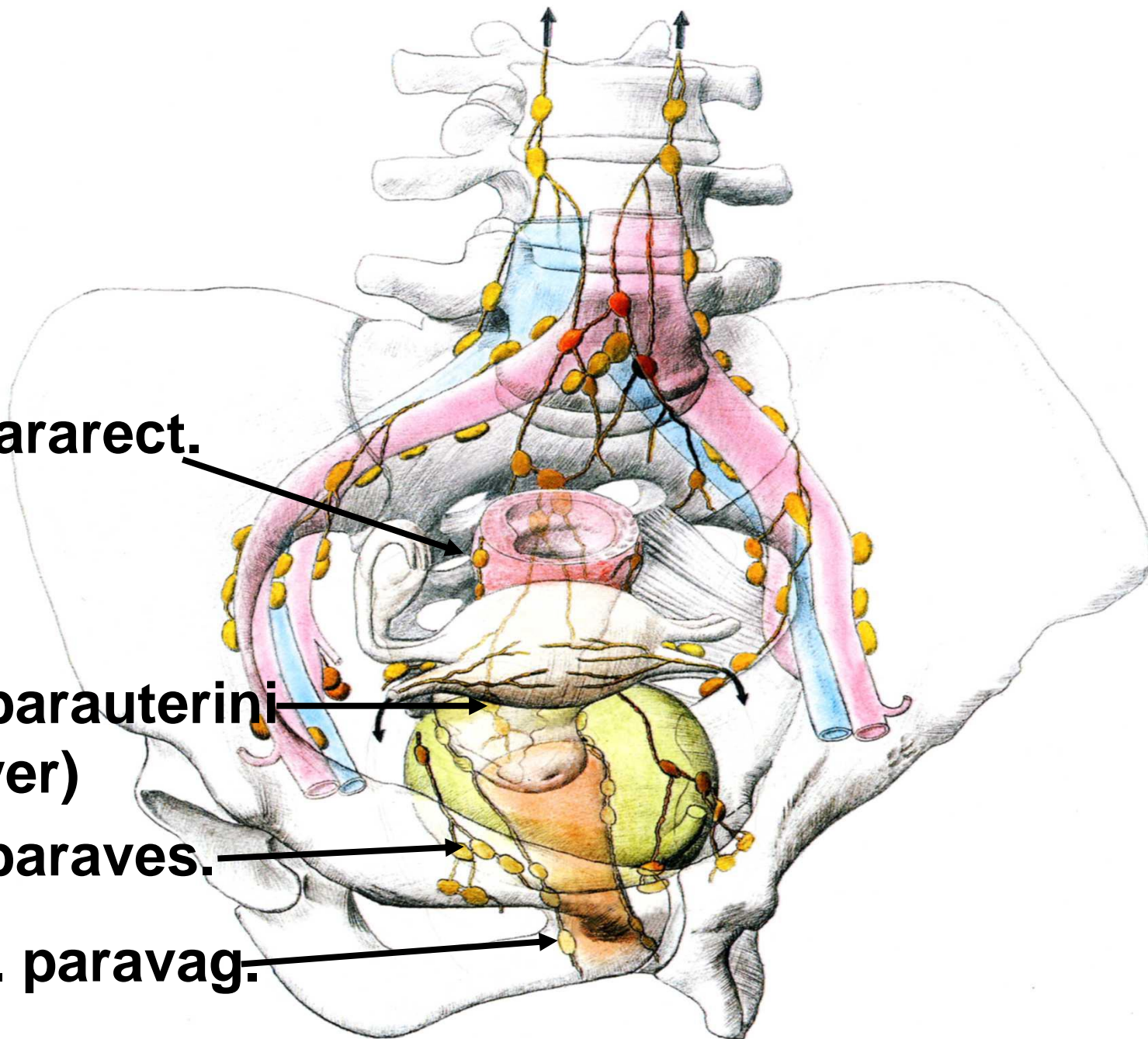
♀

NII. pararect.

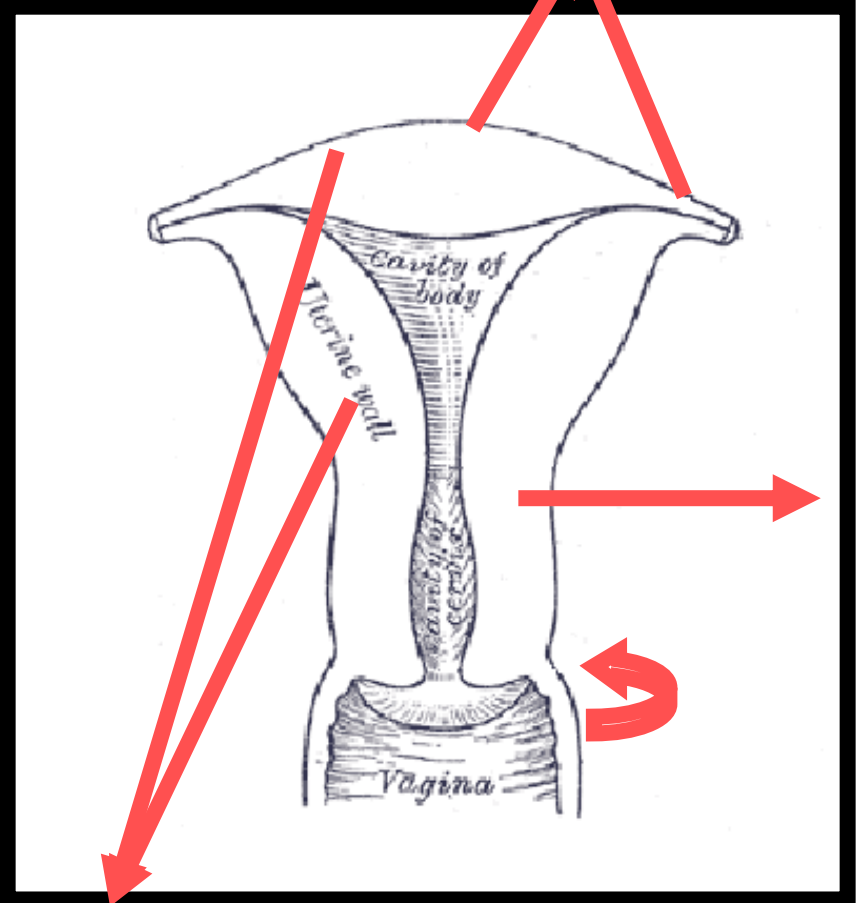
**NII. parauterini
(Bayer)**

NII. paraves.

NII. paravag.



NII. lumbales

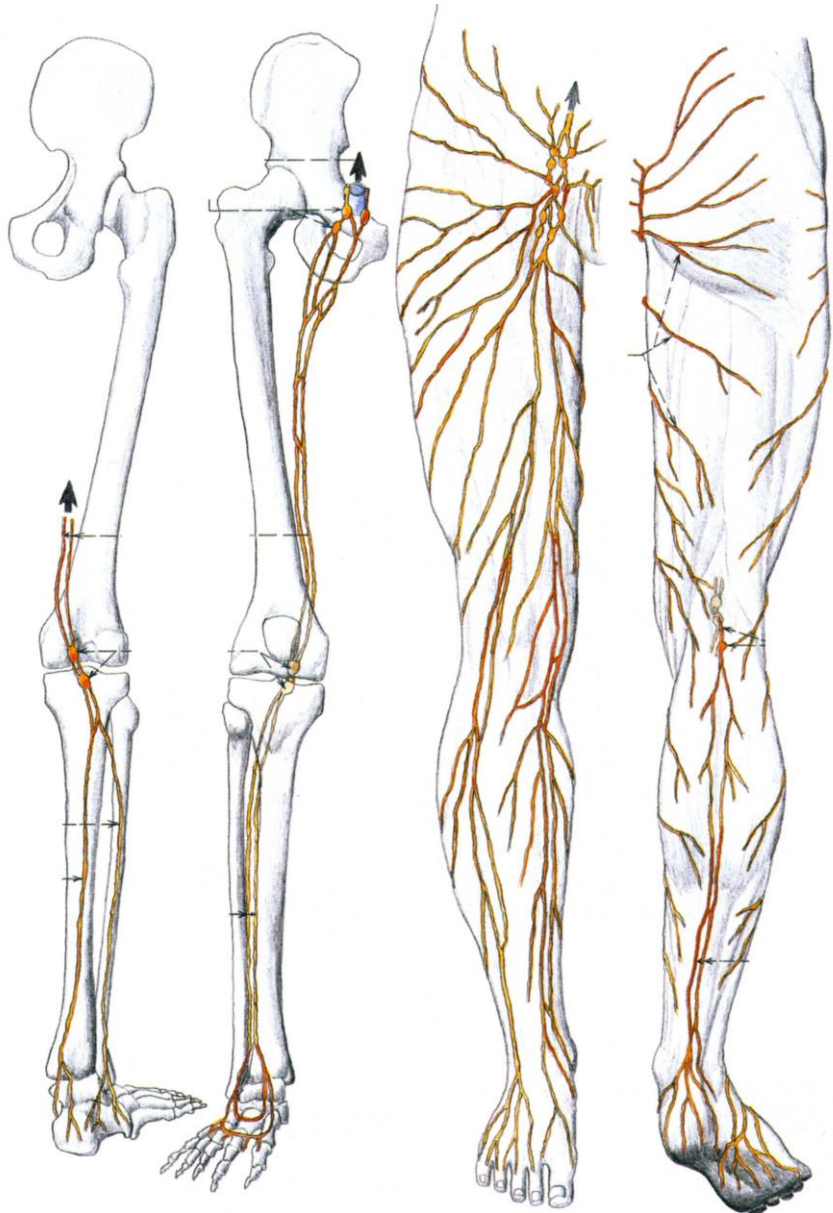


**NII. iliaci
int.**

NII. sacrales

NII. inguinales

Lower limb



**Superficial lymph vessels:
collectores:**

med. (along v. saph. magna)

lat.

post. (along v. saph. parva)

Nll. inguin. spf.

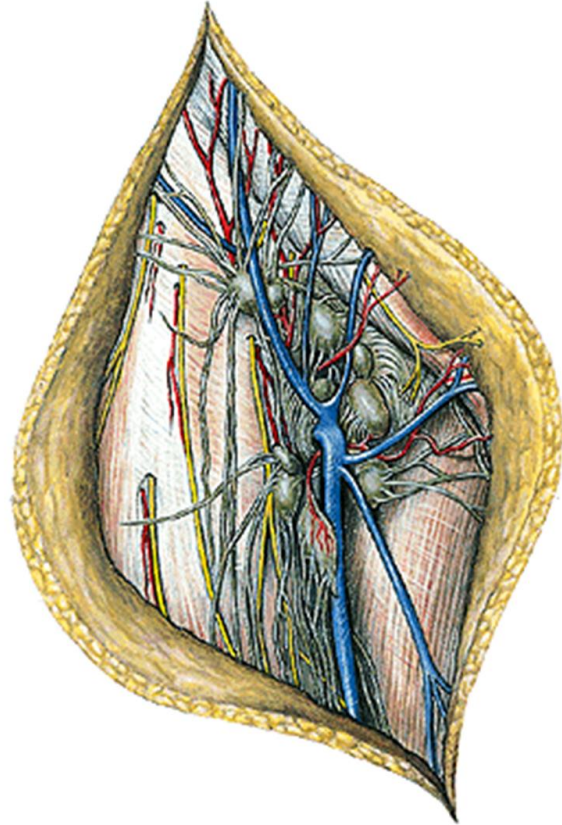
Nll. poplitei spf.

Deep lymph vessels

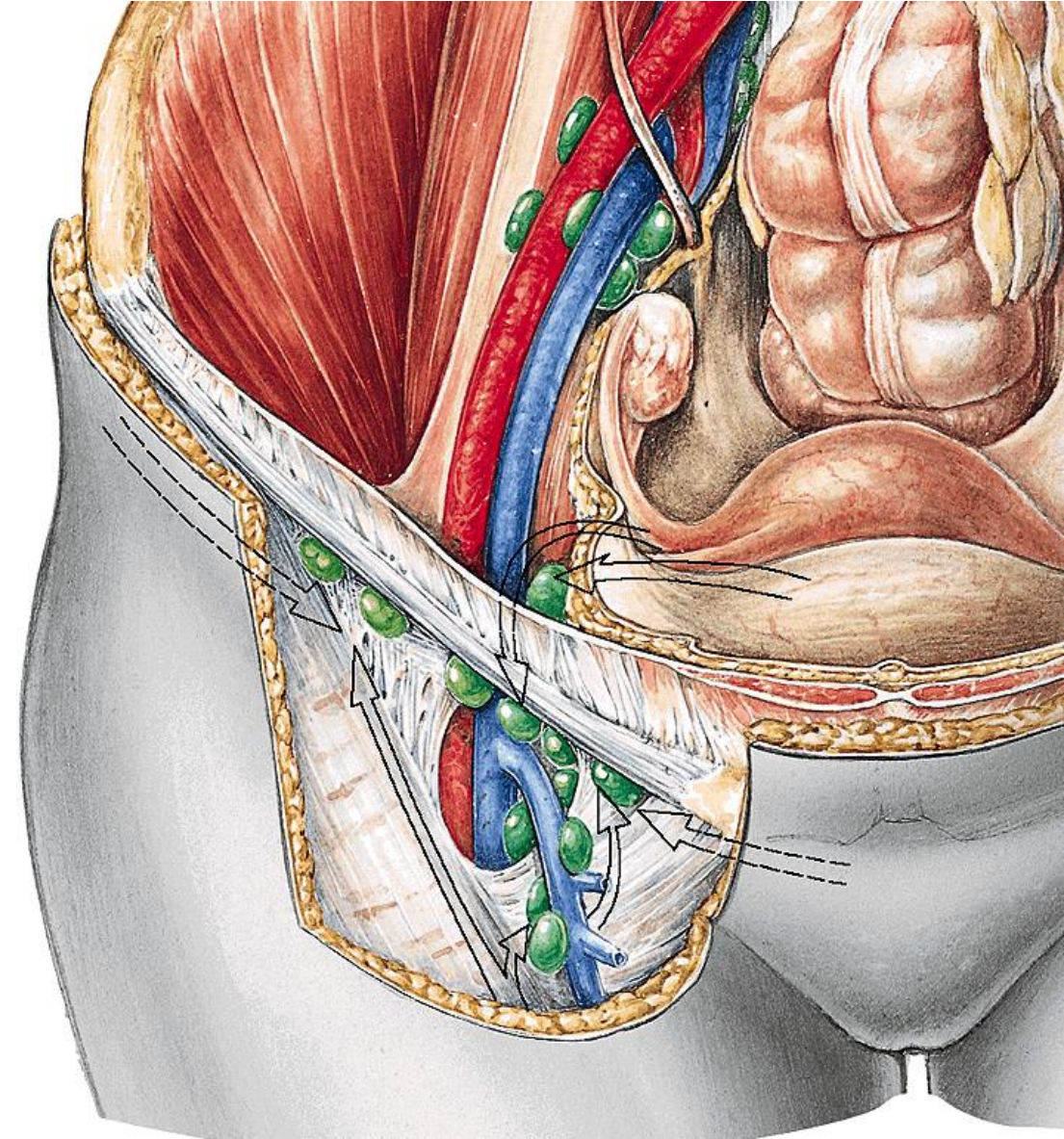
Nll. poplitei prof.

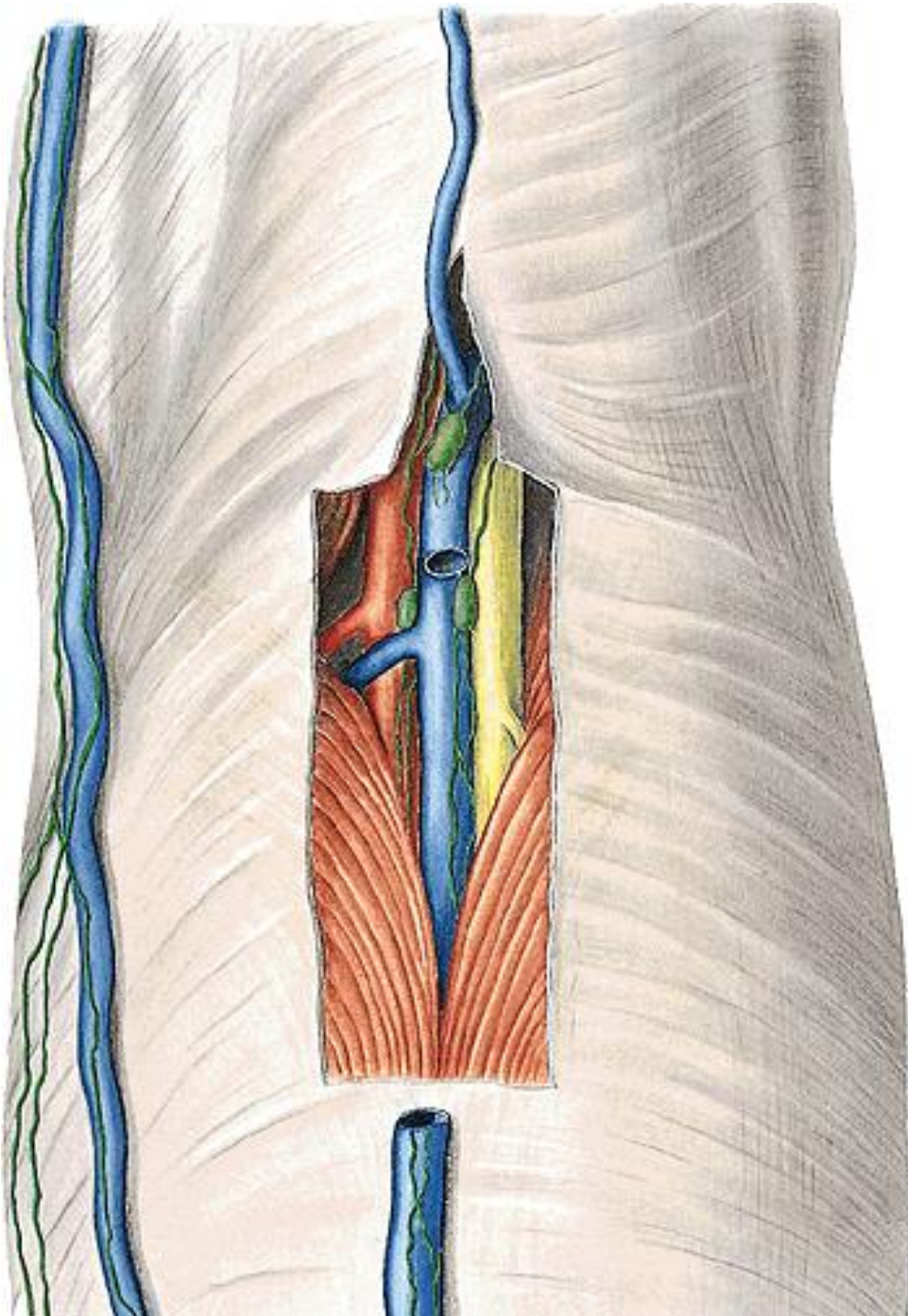
Nll. inguin. prof.

**Nll. inguinales spf.
(hiatus saphenus)**

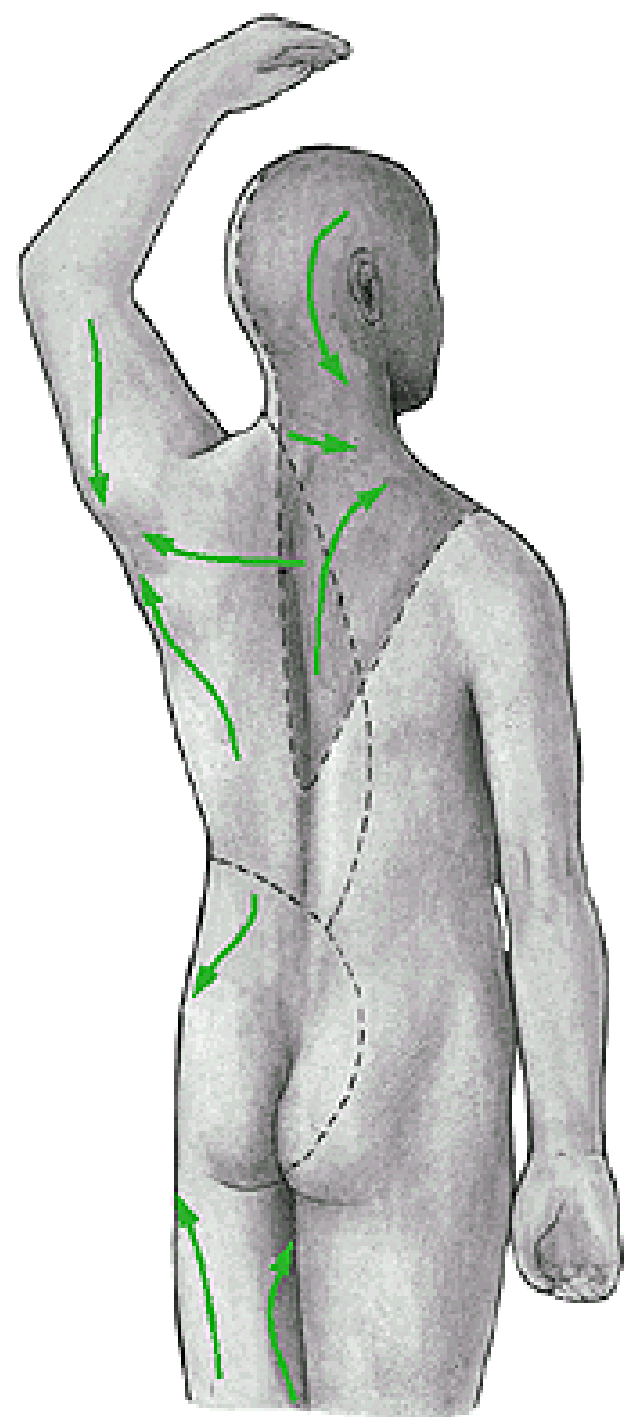
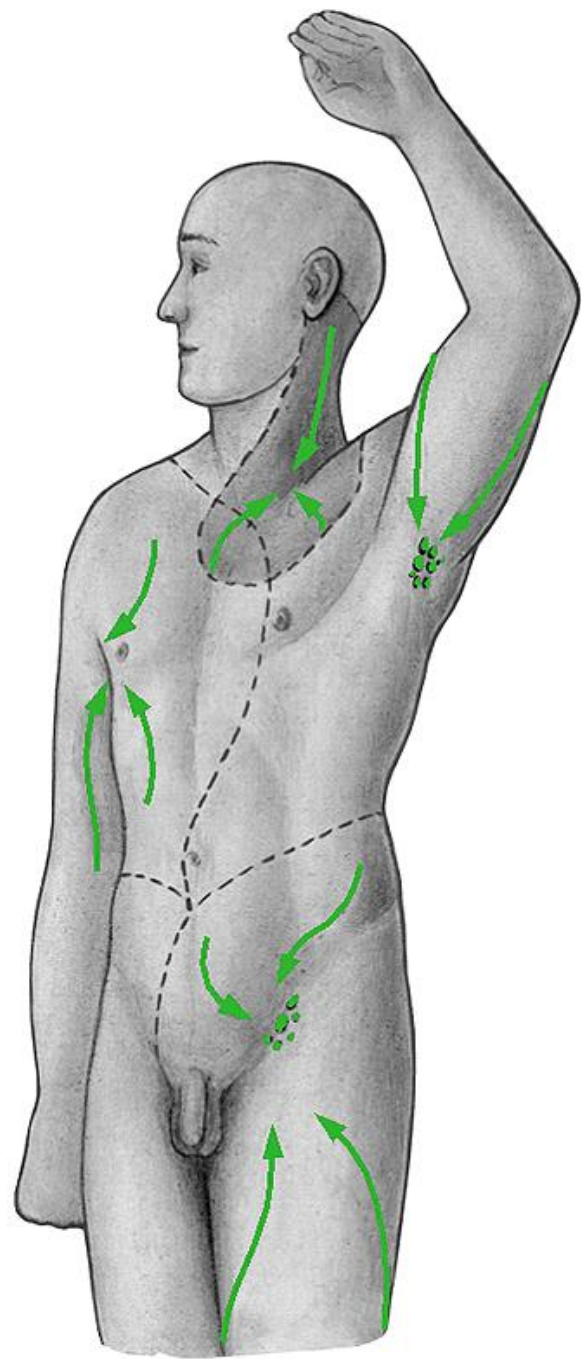


**Nll. inguinales prof.
(Cloquet-Rosenmüller)**





NII. poplitei





Lymfography



Blue dye is injected
between the toes
into the webbing

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.**