ARTERY STRUCTURE

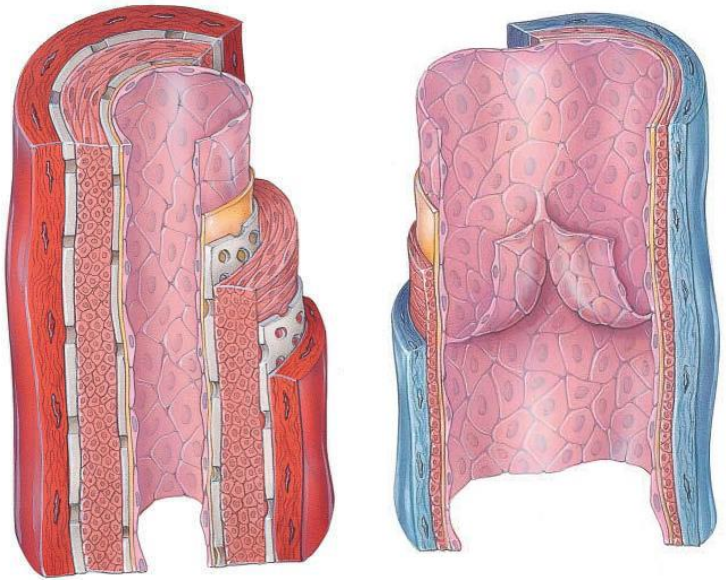
- arteriae (arteries) → arteriolae (arterioles) → vasa capillaria (capillaries) → venulae (venules) → venae (veins)
- arteriae
  - pulse waves, pulse wave velocity (5–8 m/s) is greater than blood flow velocity (40–50 cm/s)
  - blood flow and blood pressure slow down in the periphery (the cross-sectional area of the branches is greater than the cross-sectional area of the vessel before branching
  - collaterals
  - anastomoses
  - terminal arteries – arteries without anastomoses (retina, spleen, kidney; heart and brain – functionally insufficient anastomoses)
  - tunica intima – flat endothelial cells, membrana elastica interna
  - tunica media – depending on the predominance of elastic/muscular components, arteries are of the elastic (large arteries) or muscular (smaller caliber arteries) type, membrana elastica externa (only visible in large-caliber arteries)
  - tunica externa – fibrillar connective tissue (collagen and elastic fibers)
  - nutrition of the walls via vasa vasorum – in the adventitia and outer layers of the tunica media
- arterioles
  - thinnest arteries, precapillaries – smooth muscle cells only in places
  - 1–2 complete layers of smooth muscle, diameter <100 µm
- vasa capillaria
  - one layer of endothelial cells with a network of reticular fibers, in the CNS with so-called pericytes
  - 7 µm
  - wider capillaries = sinusoids

VEIN STRUCTURE

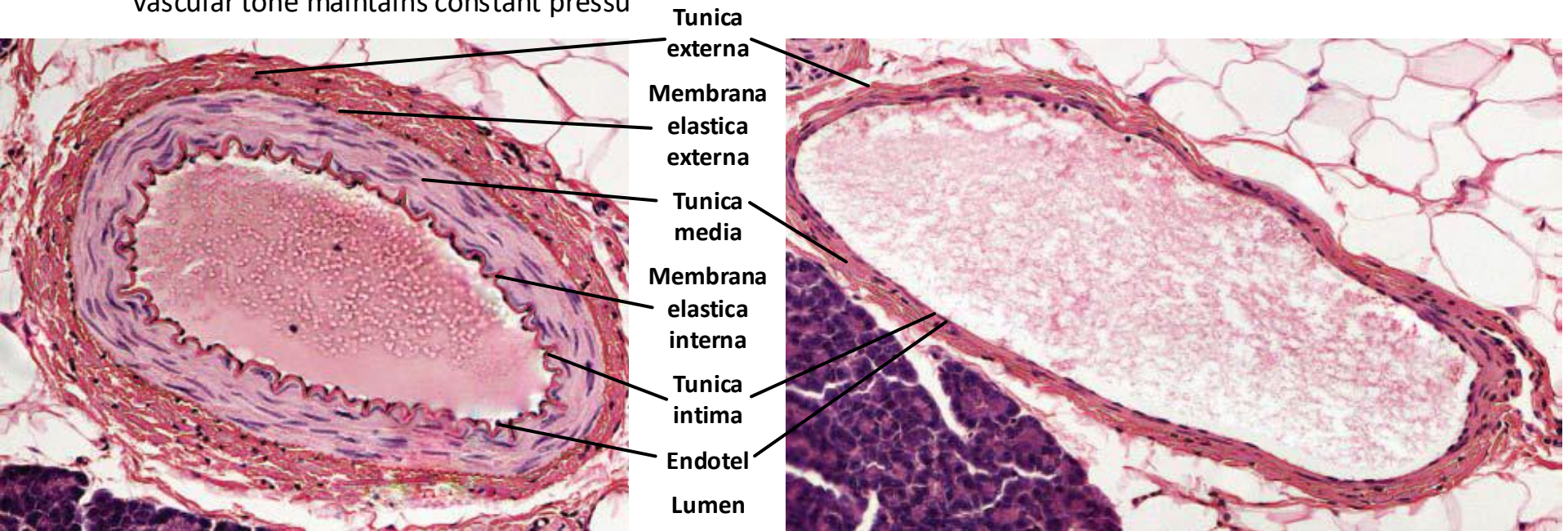
- venulae
  - postcapillary venules (wider capillaries, endothelial cells, lamina basalis, pericytes) and muscular venules (tunica media, without pericytes)
  - thinnest veins, diameter < 100 µm
  - tunica intima
  - tunica media – 1–2 complete layers of smooth muscle (from muscular venules)
  - tunica externa
- venae
  - thinner walls than arteries of the same caliber
  - lower pressure, lower than atmospheric pressure near the heart (risk of air embolism)
  - tunica intima – membrana elastica interna only in the walls of medium and larger diameter veins
  - tunica media – thinner, fewer smooth muscle cells
  - tunica externa – thick layer of connective tissue (collagen fibers with longitudinal orientation)
  - valvulae venosae – endothelium-covered projections of the intima, reinforced with connective tissue; distribution of hydrostatic pressure, prevent backflow of blood
  - richer vasa vasorum
- arteriovenous anastomoses
  - small-caliber arteries – veins (do not transition into capillaries)
- large venous trunks and superficial veins run independently of the arteries

ARTERIES VS VEINS

- tunica intima
  - endothelial cells on the basement membrane
- tunica media
  - smooth muscle
- tunica externa (adventitia)
  - innervation, vasa vasorum
- arteries
  - empty in cadavers
  - centrifugal
  - elastic – propels blood during ventricular relaxation (potential → kinetic)
  - elastic – aorta, tr. pulm., tr. bcph, ACC, aa. ilacae com.
  - muscular – vasoconstriction/dilatation, vascular tone maintains constant pressu

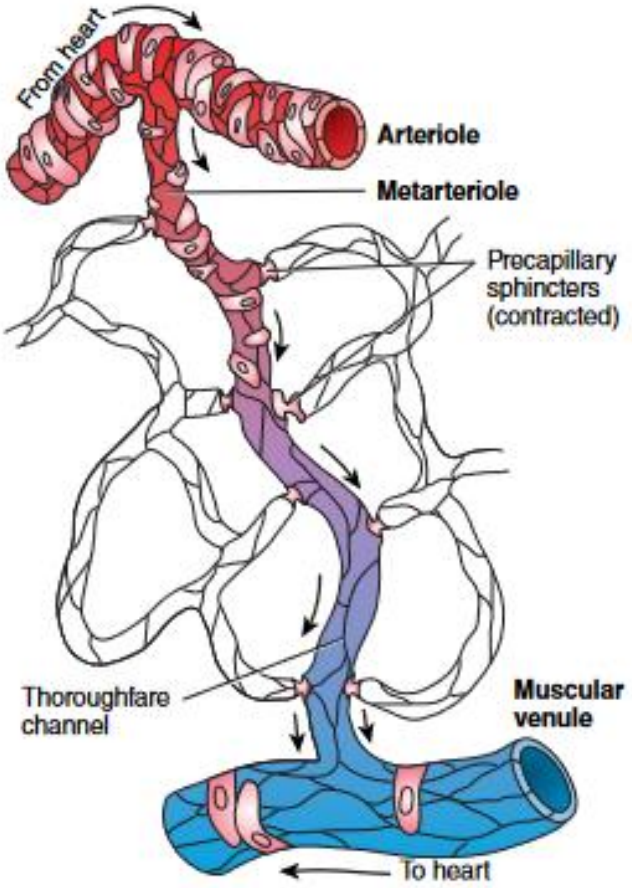


- venae
  - centripetal
  - thin wall, sometimes valves
  - postcapillary and muscular venules – blood reservoir
  - limb muscle pump, respiratory pump



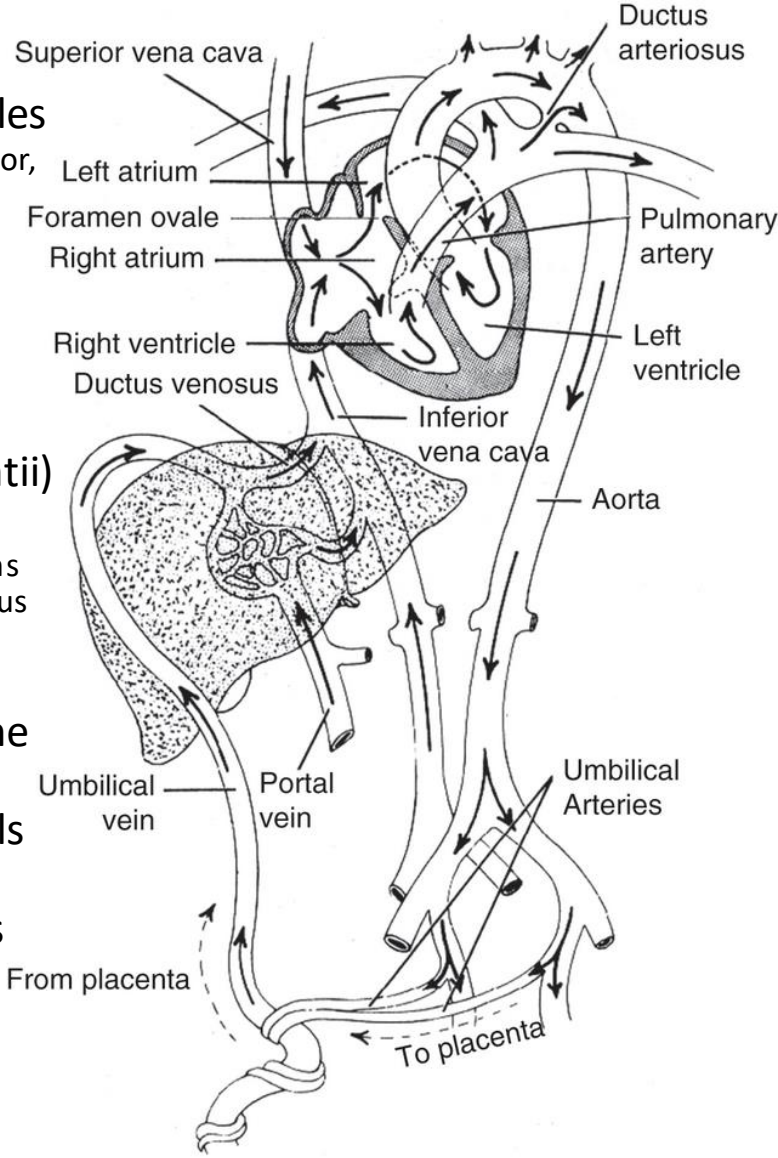
MICROCIRCULATORY BED

- arteriola
  - up to 10 µm, up to 2 circular layers of smooth muscle cells.
  - tunica externa richly innervated by sympathetic nerves
- metarteriola
  - terminal part of the arteriole
  - scattered smooth muscle cells regulate blood flow
- throughfare capillary
  - distal continuation of the metarteriole, bypasses the capillary bed
  - without tunica media
- capillary
  - mouth equipped with a precapillary sphincter – vasomotor (rhythmic contraction 5 to 10 times per minute)
  - exchange of substances
  - only tunica intima – endothelial cells and lamina basalis
- postcapillary venule
  - 10 to 50 µm
  - very porous
  - exchange of substances, migration of white blood cells
- muscular vein
  - 50 to 200 µm, up to 2 circular layers of smooth muscle cells



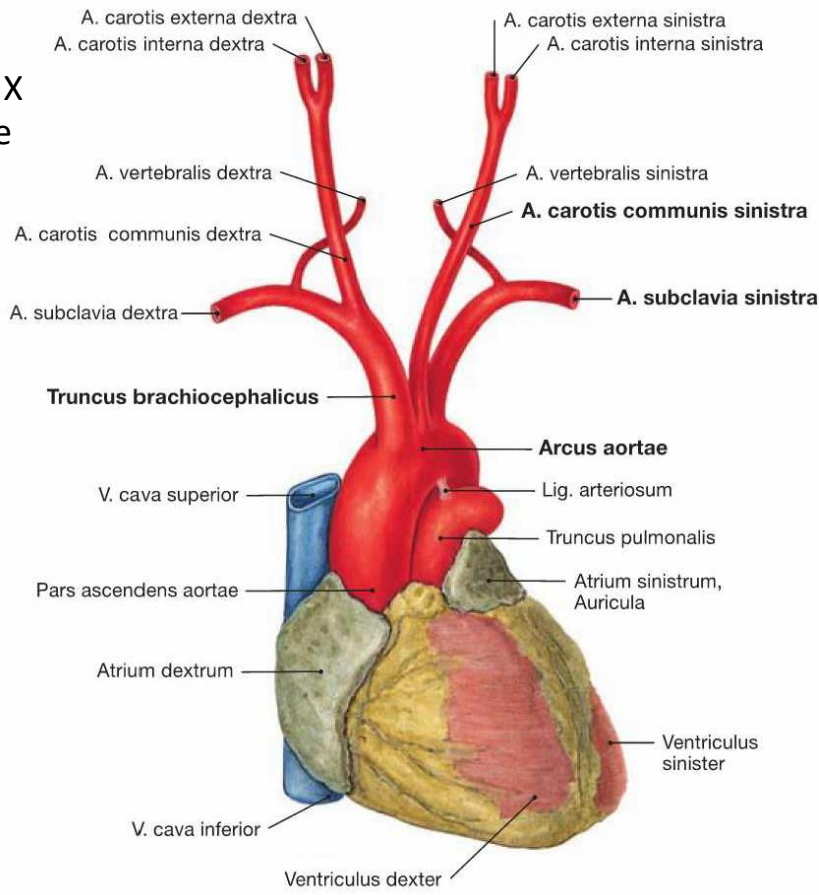
FETAL BLOOD CIRCULATION

- from the fetus's body via the umbilical cord in aa. umbilicales
  - branch of a. iliaca interna (after birth: pars patens = a. vesicalis superior, pars occluda = lig. umbilicale mediale)
- oxygenation and exchange of metabolites in the placenta
- blood to the fetus's body again via the umbilical cord in v. umbilicalis
  - after birth lig. teres hepatis
- almost half of the blood to the liver
- the rest around the liver through the ductus venosus (Arantii) to the VCI
  - sufficient supply of oxygen and nutrients to the brain and other organs
  - after birth, lig. venosum, a connection (short circuit) is formed – ductus venosus
- VCI into the right atrium
- through the foramen ovale (thanks to the VCI valve) into the left atrium
- into the aortic arch and its branches, mainly into the vessels of the head, neck, and upper limbs.
- Deoxygenated blood from the head, neck, and upper limbs to the VCS
- VCS to the right atrium, then to the right ventricle
- to the truncus pulmonalis
- ductus arteriosus Botalli
  - to the aorta behind the subclavian artery
  - around the lungs (not sufficiently developed), only 10% of the fetal cardiac output flows through the lungs
- mixture of oxygenated and deoxygenated descending aorta
  - 35% to the lower half of the torso and lower limbs
  - 65% to the umbilical arteries

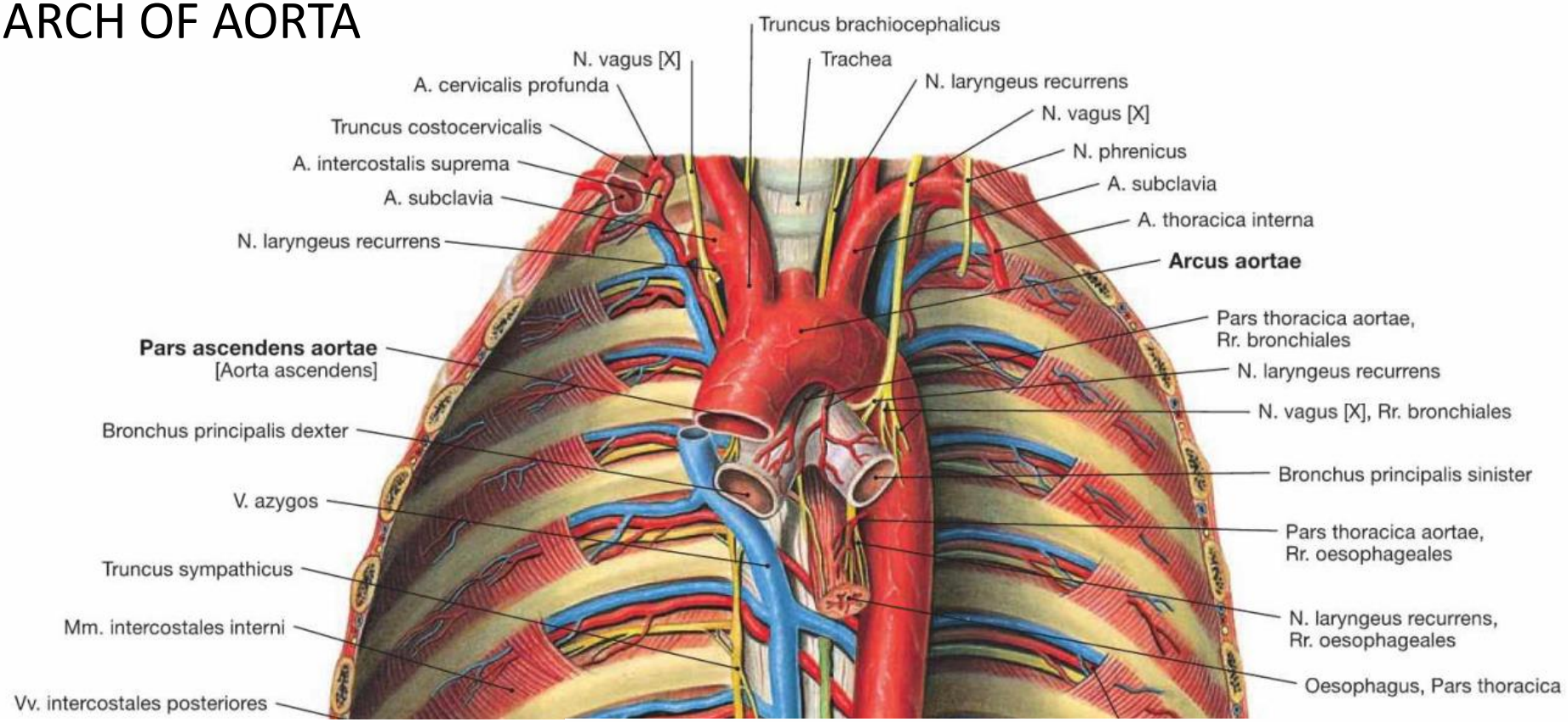


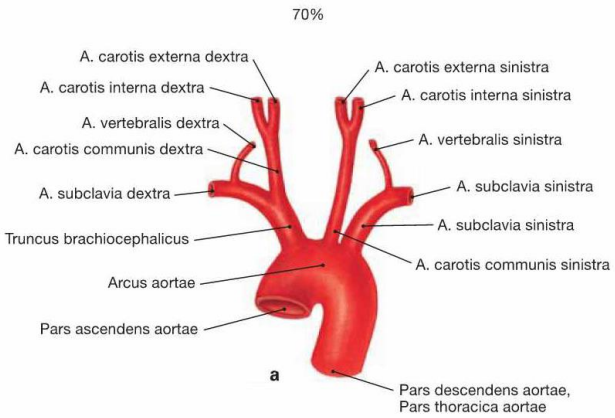
ARCH OF AORTA

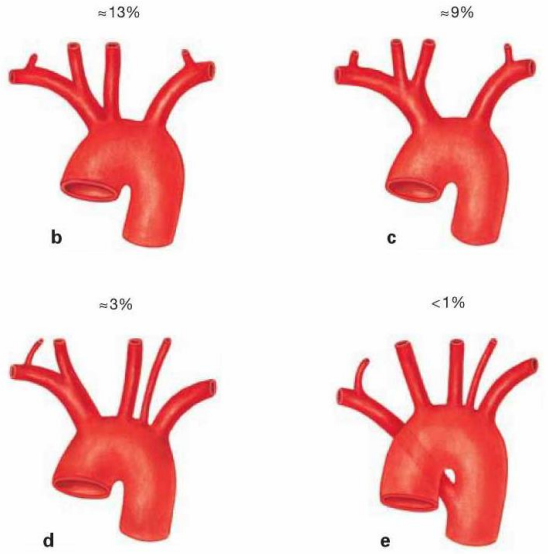
- emerges from the ventriculus sin. as the ascending aorta
- the pericardial section has a bulbus aortae
- it ascends extrapericardially into the sinus aortae maximus in the arcus aortae
- the arcus aortae directs to the left and backward through the bifurcatio tracheae into the posterior mediastinum, where it crosses the bronchus principalis sin. and attaches to Th3
- from Th4/5, the aorta descendens continues
- branches from the aortic arch
  - brachiocephalic trunk
  - left common carotid artery
  - left subclavian artery (at the point of departure, it crosses the X nerve, which gives the left recurrent laryngeal nerve under the arch)



ARCH OF AORTA

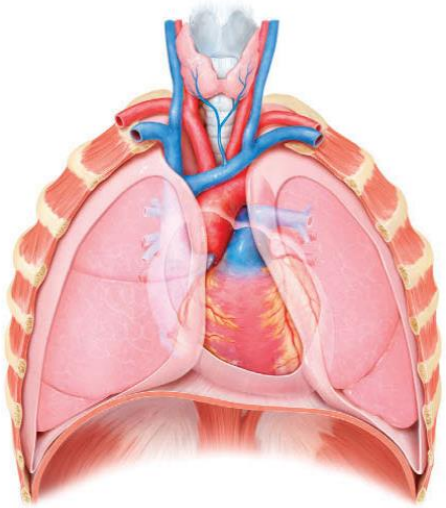


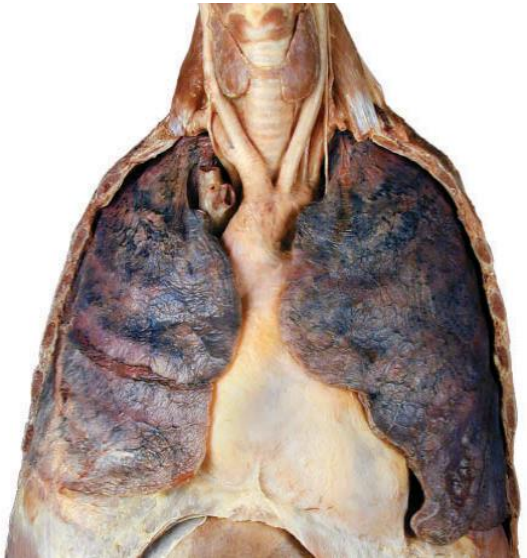


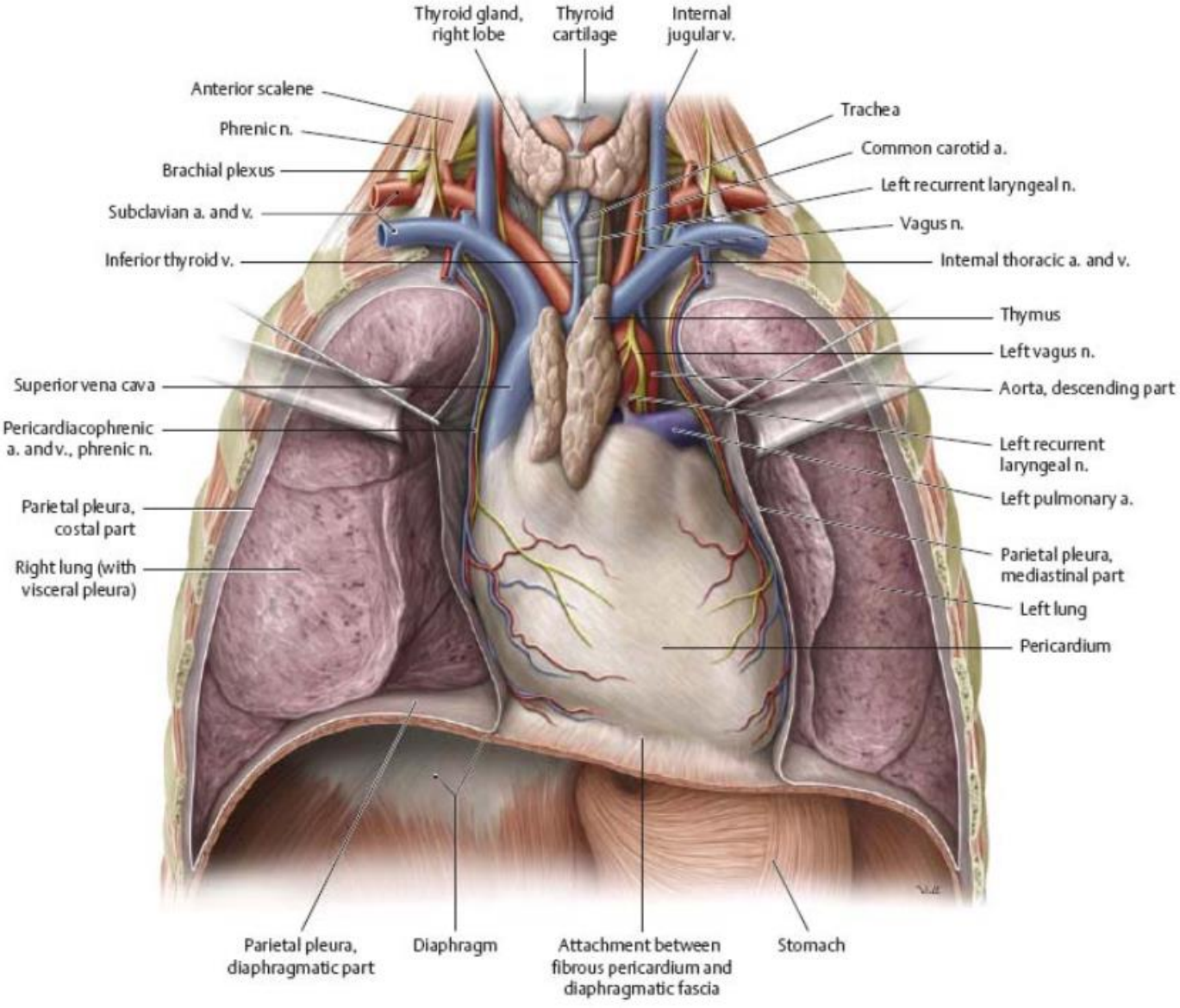


BRACHIOCEPHALIC TRUNK

- behind the manubrium sterni, dorsally to the trachea, on the right side of the v. brachiocephalica dx., ventrally to the v. brachiocephalica sin.
- at the level of the art. sternoclavicularis, it divides into
  - a. carotis communis dx.
  - a. subclavia dx.







COMMON CAROTID ARTERY

- asymmetrical origin (truncus vs. arcus)
- on the neck, it protrudes alongside the trachea and esophagus, ventrally m. sternocleidomastoideus and m. omohyoideus
- nerve-vascular bundle of the neck
  - laterally v. jugularis interna, anteriorly r. descendens nervi hypoglossi, posteriorly n. vagus
  - medially a. carotis communis (resp. interna, externa only briefly)
  - enveloped by the carotid sheath
- does not give branches, divides into the carotid triangle at the level of the upper edge of the thyroid cartilage
  - external carotid artery
  - internal carotid artery
  - at the point of division is the chemoreceptor organ, the carotid body (blood oxygen saturation, nerves IX and X)

EXTERNAL CAROTID ARTERY

- runs behind the angle and neck of the mandible (leaves the cervical neurovascular bundle), externally venter posterior musculi digastrici, m. stylohyoideus, arcus n. hypoglossi, veins of the neck and face draining into the internal jugular vein
- ventral branches (branch off close to each other)
  - a. thyroidea superior
  - a. lingualis
  - a. facialis
- medial branch
  - a. pharyngea ascendens
- dorsal branches
  - a. occipitalis
  - a. auricularis posterior
- terminal branches
  - a. temporalis superficialis
  - a. maxillaris

The external carotid artery supplies, through its branches, most of the organs of the neck, the muscles on the front of the neck, part of the nuchal (nape) musculature, and the head excluding the brain (it does supply the meninges), the orbit, and the inner ear

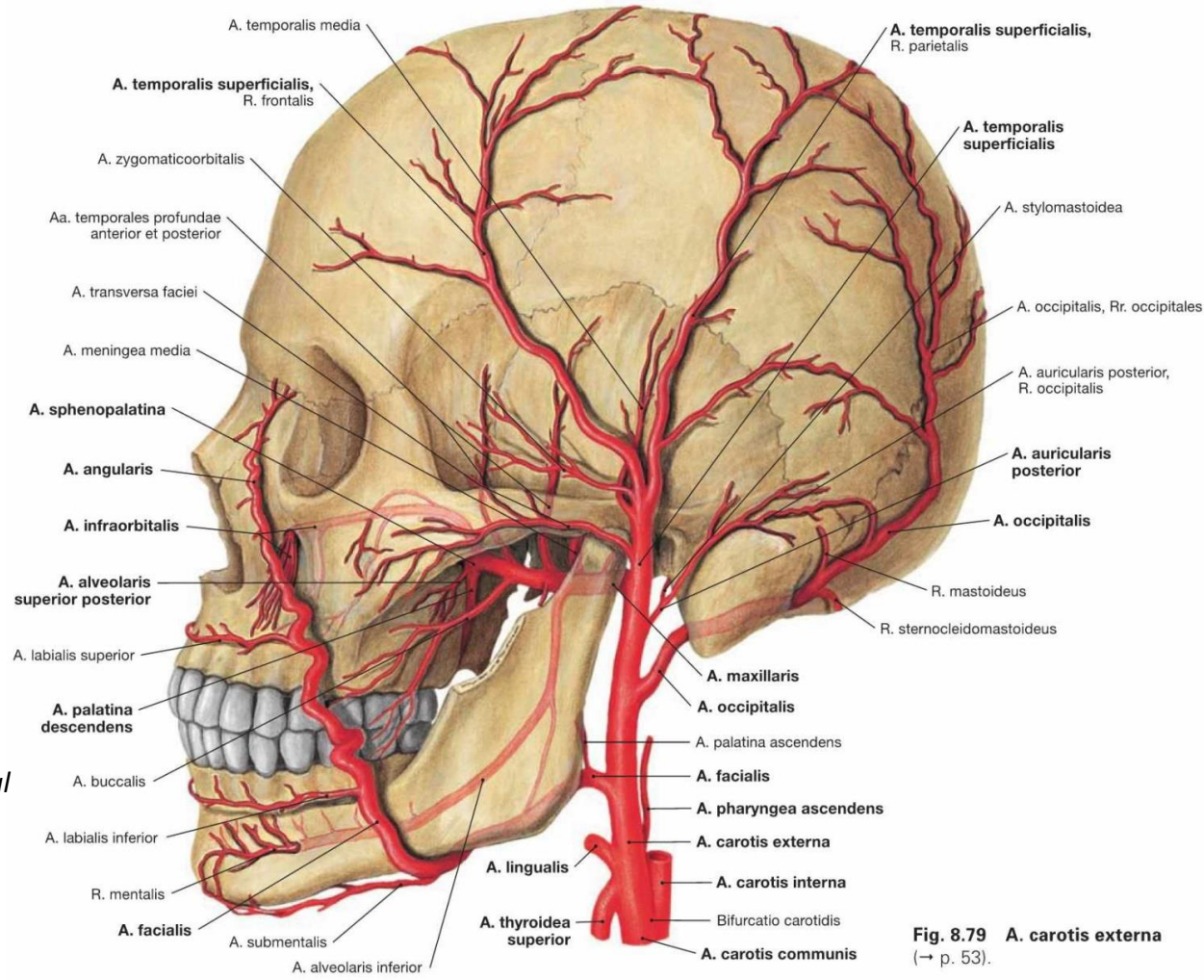
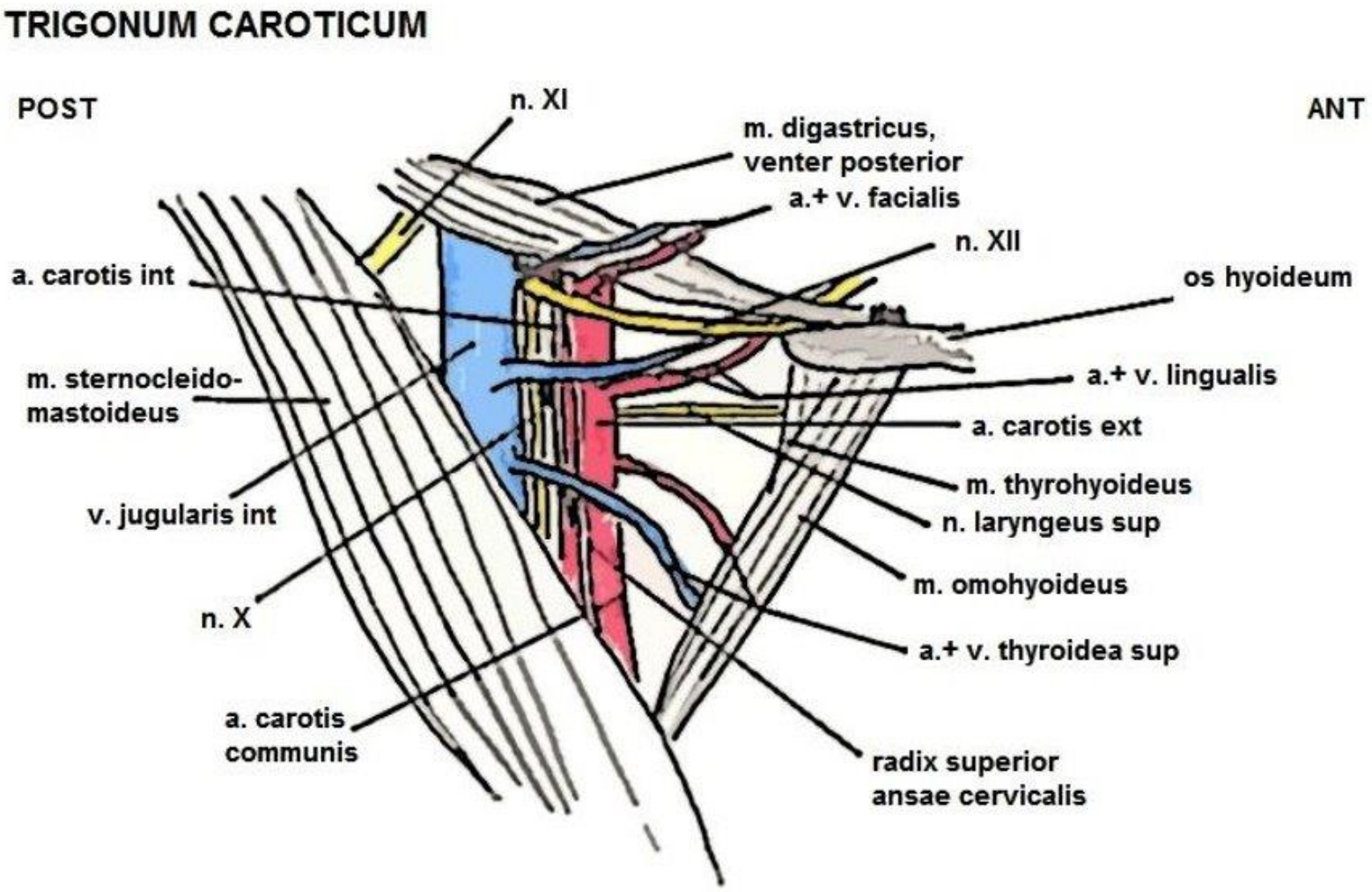
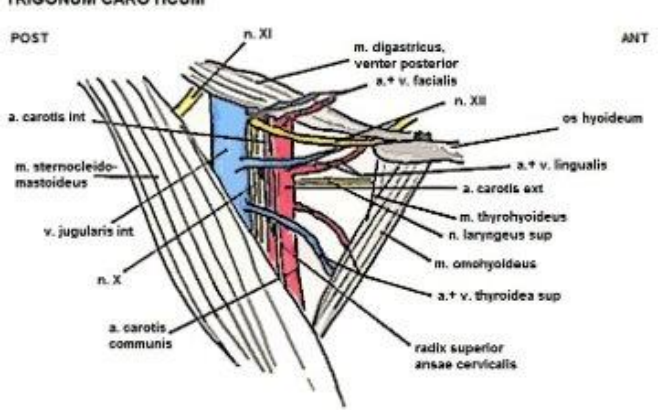


Fig. 8.79 A. carotis externa (→ p. 53).

CAROTID TRIANGLE



CAROTID TRIANGLE



BRANCHES OF THE EXTERNAL CAROTID ARTERY I.

- a. thyroidea superior
  - branches off at the bifurcation
  - supplies the thyroid gland, infrahyoid muscles, and larynx
  - anastomoses with the contralateral artery and the a. thyroidea inferior (from the truncus thyrocervicalis)
  - gives the superior laryngeal artery
- lingual artery
  - branches off at the level of the greater horns of the hyoid bone and passes under the hyoglossus muscle
  - supplies the tongue, floor of the mouth, and sublingual gland
  - Béclard's angle – greater horn of the hyoid bone and posterior belly of the digastric muscle
  - Pirogov's triangle – posterior border of the mylohyoid muscle, posterior belly of the digastric muscle, and hypoglossal nerve arch
- a. facialis
  - runs under the stylohyoid muscle and the posterior belly of the digastric muscle, goes under/in the submandibular gland to the lower jaw and crosses over to the face in front of the edge of the masseter muscle (covered by the platysma muscle)
  - supplies the submandibular gland, suprahyoid muscles, pharynx, soft palate with palatine tonsil, facial muscles, and skin of the face up to the orbit and wings of the nose
  - gives off in the neck a. palatina ascendens
  - on the face, the superior and inferior labial arteries (anastomosis with the contralateral side)
  - on the face, the angular artery (anastomosis with the arteries of the eye socket – ophthalmic artery)
- ascending pharyngeal artery
  - branches off near the bifurcation and ascends along the pharynx to the base of the skull
  - supplies the pharynx, dura mater in the posterior cranial fossa, and middle ear
  - posterior meningeal artery (through the jugular foramen)
  - inferior tympanic artery (through the tympanic canaliculus)

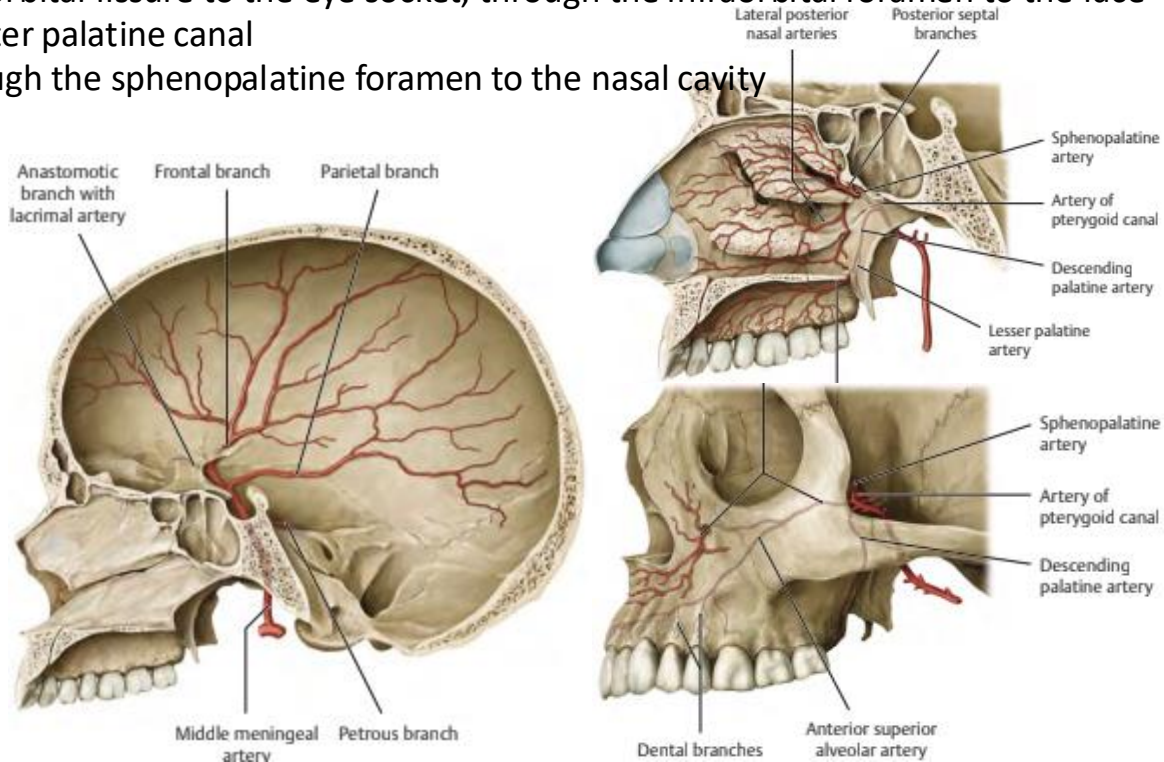
BRANCHES OF THE EXTERNAL CAROTID ARTERY II.

- a. occipitalis
  - under the posterior belly of the digastric muscle to the occipital artery sulcus
  - supplies the sternocleidomastoid muscle, neck muscles, soft coverings of the skull at the back of the head, posterior side of the auricle, posterior cranial fossa
- a. auricularis posterior
  - covered by the parotid gland, then runs along the posterior belly of the digastric muscle to the posterior side of the auricle
  - supplies the auricle, adjacent part of the occiput, middle ear with mastoid cells, and parotid gland
- a. temporalis superficialis
  - rises behind the neck of the mandible covered by the parotid gland, then runs in front of the auricle (palpable pulse) across the zygomatic arch to the temporal region
  - supplies the parotid gland, cheek and facial muscles, eyelids, auricle and external auditory canal, temporal muscle, skin of the lateral surface of the skull

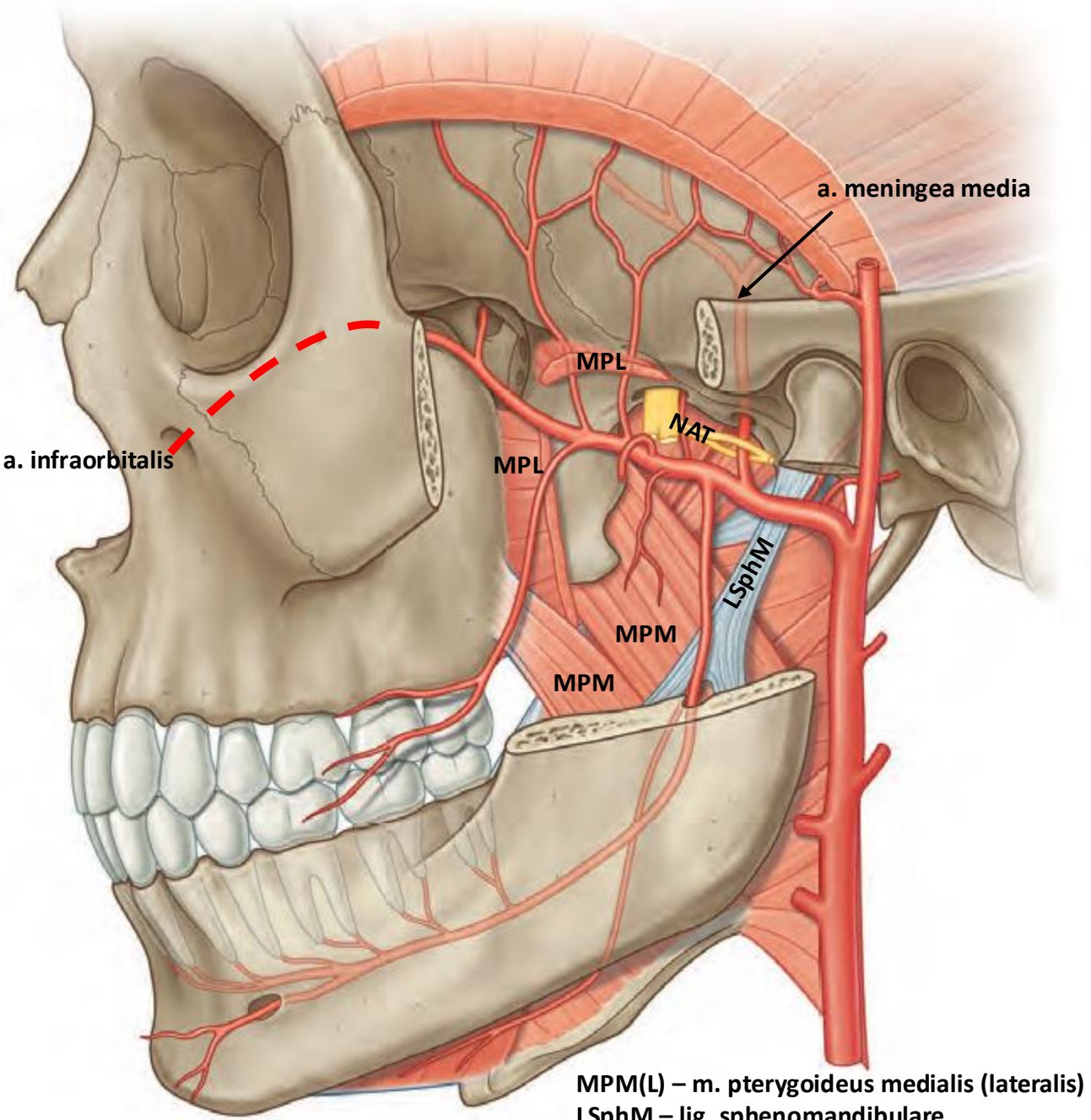
BRANCHES OF THE EXTERNAL CAROTID ARTERY III.

- a. maxillaris
  - behind the parotid gland medially from the temporomandibular joint, runs between the mandibular neck and the sphenomandibular ligament (mandibular part) into the infratemporal fossa, where it runs between the pterygoid muscles (pterygoid part) and ends in the pterygopalatine fossa (pterygopalatine part)
  - in **pars mandibularis** gives a. tympanica anterior (into the middle ear cavity through fissura petrotympanica)
  - a. meningea media – passes through the n. auriculotemporalis and through the foramen spinosum into the middle cranial fossa and supplies the dura mater
  - a. alveolaris inferior – into the canalis mandibulae, ends after passing through the foramen mentale as the r. mentalis
  - in the **pars pterygoidea**, it gives off branches for all the masticatory muscles and for the m. buccinator
  - in the **pars pterygopalatina**, it gives off a. alveolaris superior posterior – through the openings in the tuber maxillae to the upper molars and premolars
  - a. infraorbitalis – through the inferior orbital fissure to the eye socket, through the infraorbital foramen to the face
  - a. palatina descendens – into the greater palatine canal
  - a. sphenopalatina – final section, through the sphenopalatine foramen to the nasal cavity

It supplies a part of the external auditory canal and the mucous membrane of the middle ear cavity, the dura mater of the middle cranial fossa and adjacent sections of the calvaria, the mandible and its teeth, the muscles of mastication and the buccinator muscle, part of the maxilla and its teeth, the cheek near the infraorbital foramen, part of the wall of the nasopharynx and the Eustachian tube, the hard and soft palate, and the posterior part of the nasal cavity mucosa.



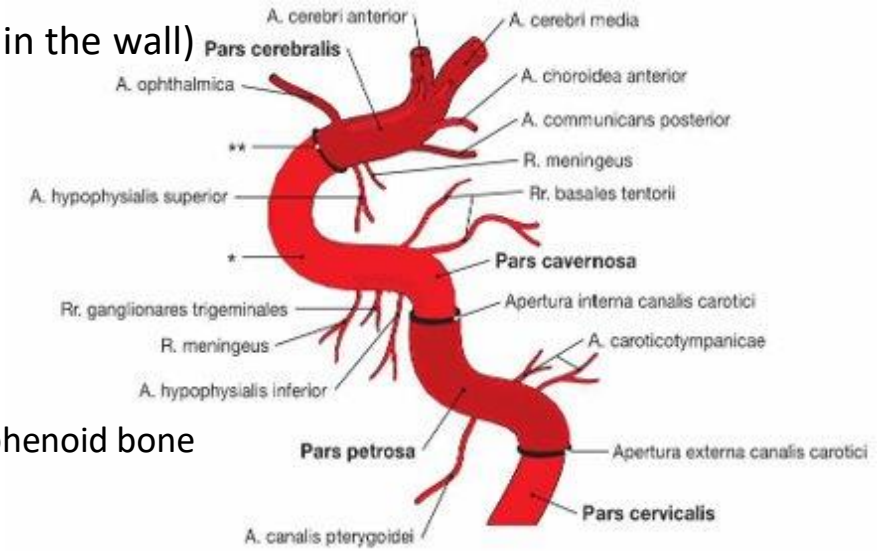
Maxillary artery

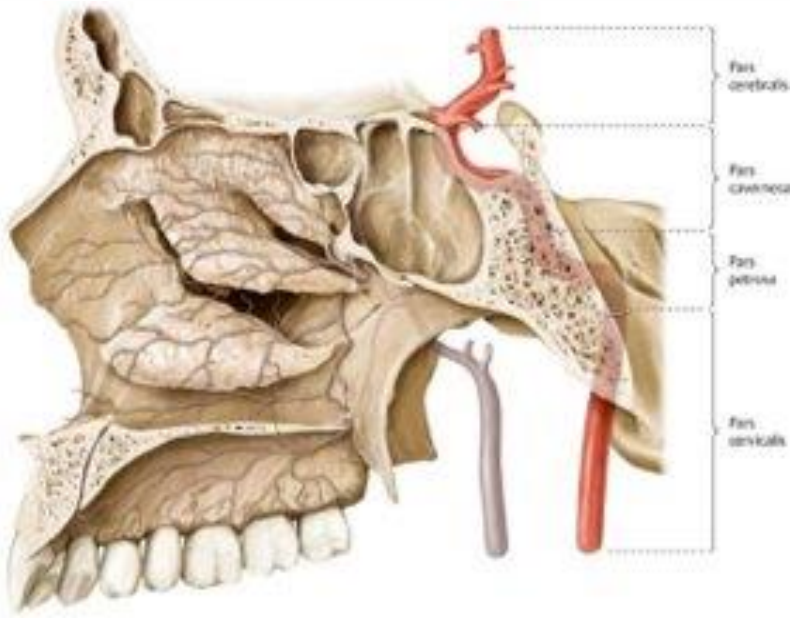


MPM(L) – m. pterygoideus medialis (lateralis)
LSphM – lig. sphenomandibulare
NAT – n. auriculotemporalis

INTERNAL CAROTID ARTERY

- After branching, it runs first laterally and then dorsomedially from the external carotid artery near the lateral wall of the pharynx into the retrostyloid space and into the carotid canal, remaining within the cervical neurovascular bundle throughout, separated from the external carotid artery by the stylopharyngeus and styloglossus muscles, laterally by the internal jugular vein.
- beginning widened into the carotid sinus (baroreceptors in the wall)
- pars cervicalis
  - does not branch in the neck
  - curved like an S before entering the carotid canal
- pars petrosa
  - another S-shaped curve
  - caroticotympanic arteries
- pars cavernosa
  - through the venous sinus cavernosus on the side of the sphenoid bone
  - r. ganglii trigeminalis
  - a. hypophysalis inferior
- pars cerebralis
  - pierces the dura mater and sends
  - a. ophthalmica
  - then branches for the brain – for the blood supply of the CNS

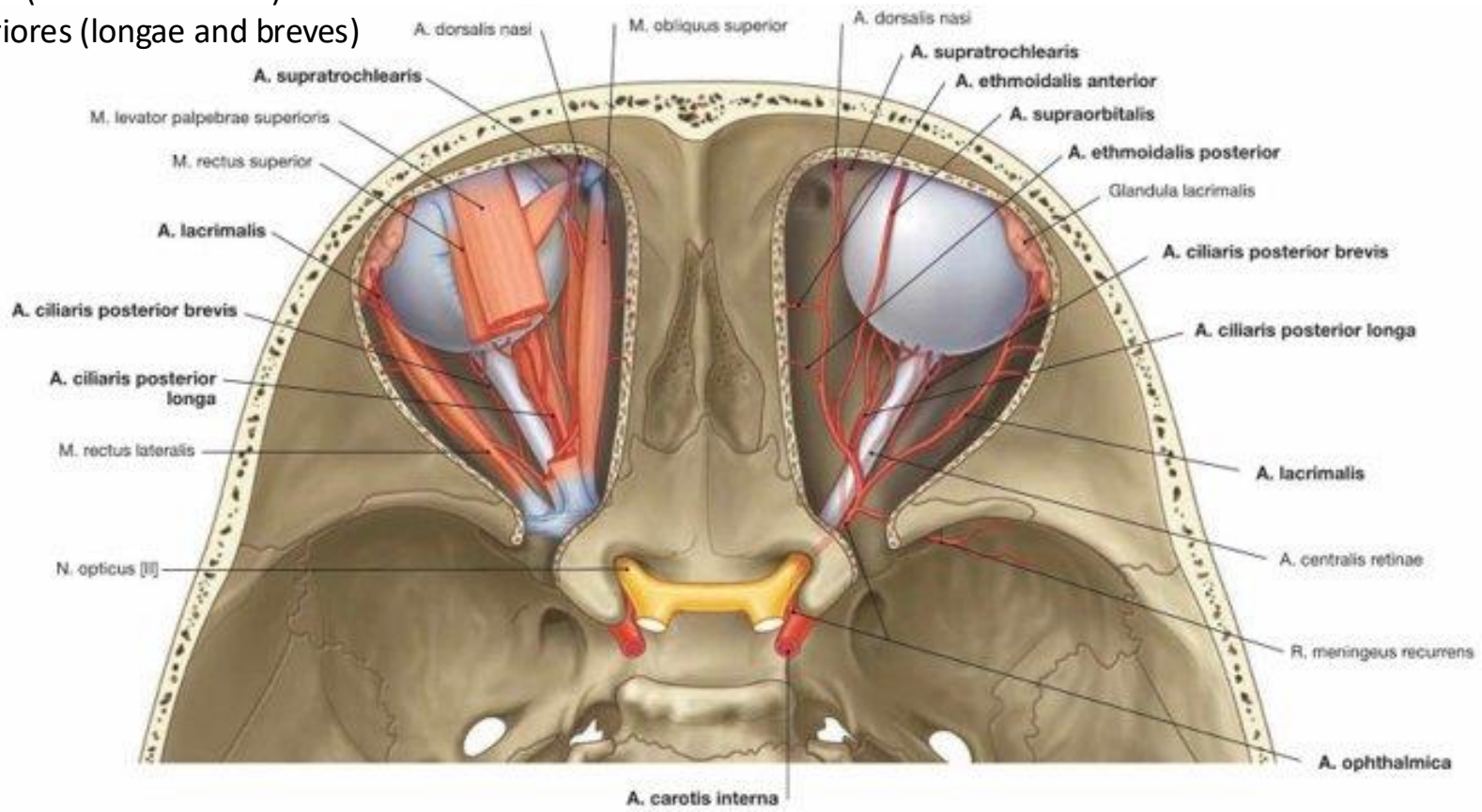




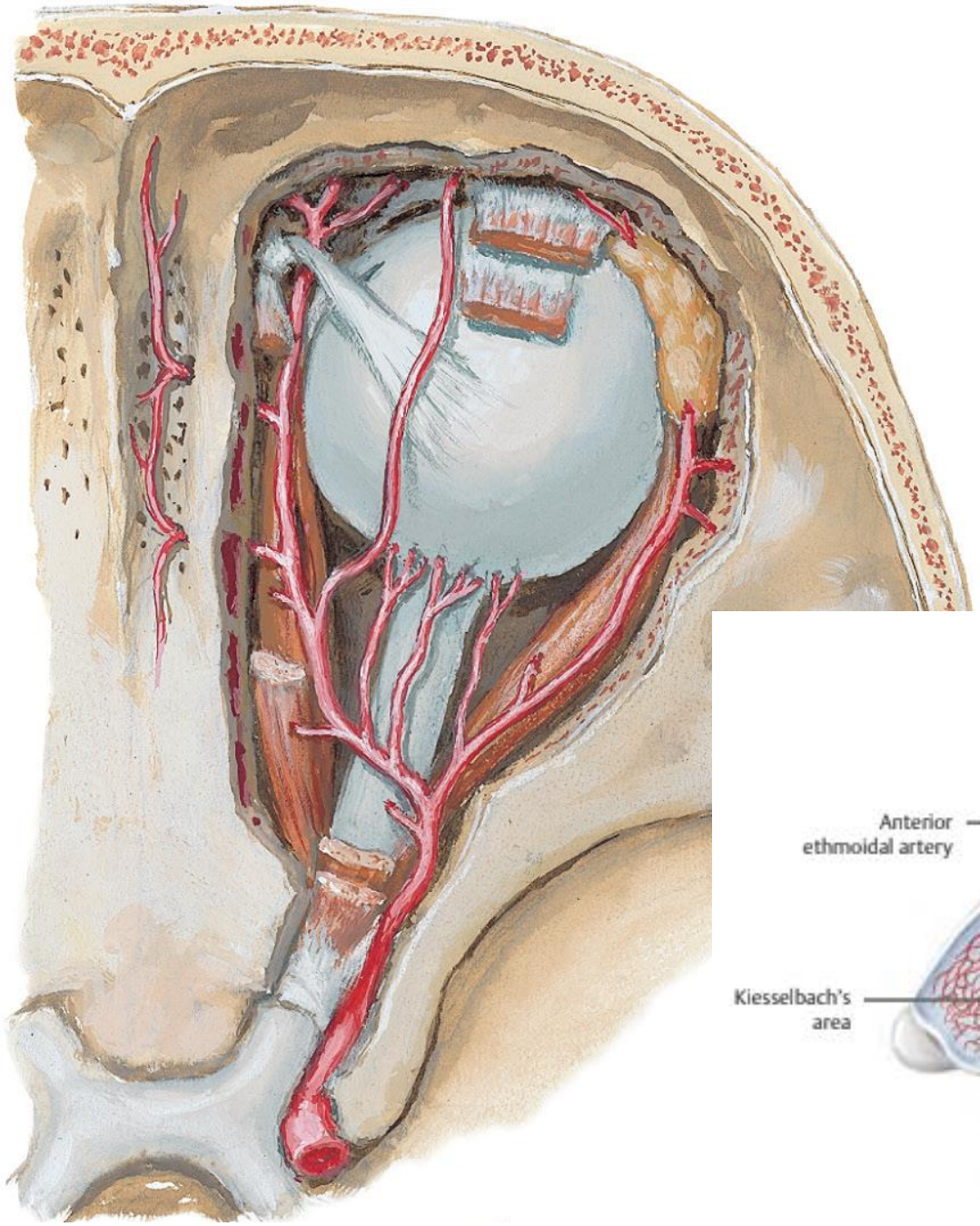
It supplies the contents of the orbit including the eyeball, the eyelids, the skin of the forehead and the bridge of the nose, the mucous membrane of the middle ear cavity, two areas of the dura mater, the pituitary gland, and the brain.

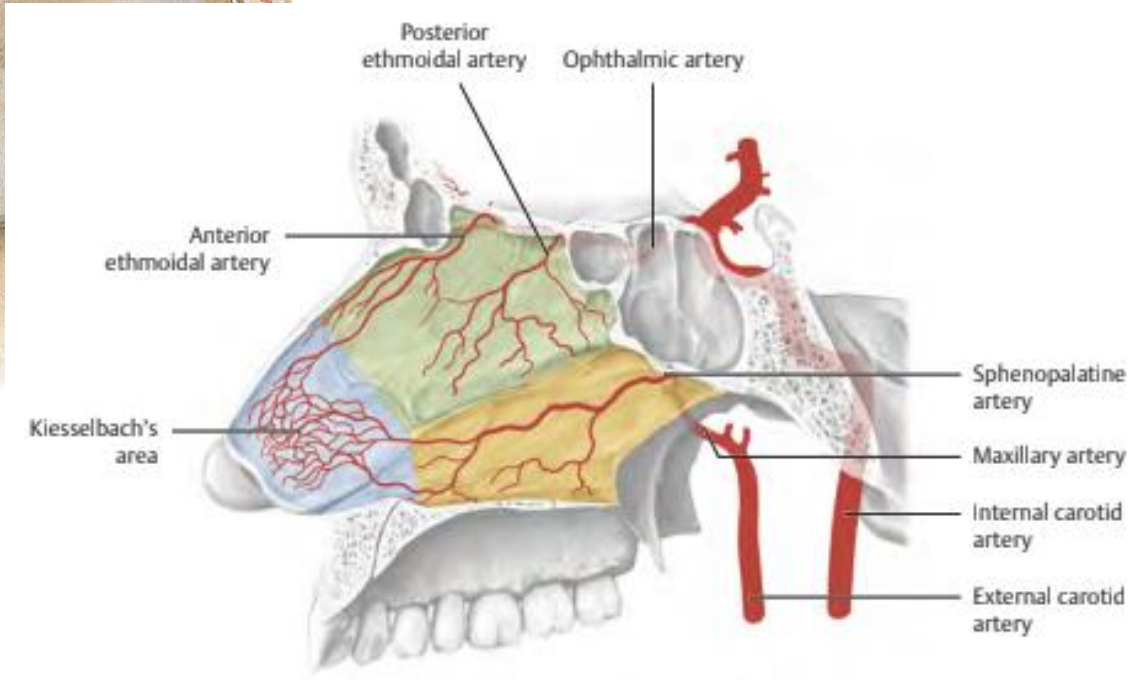
OPHTHALMIC ARTERY

- It branches off from the convexity of the internal carotid artery into the carotid canal, where it lies beneath the optic nerve, then laterally, crossing the optic nerve from above in the orbit and heading toward the inner corner of the eye (anastomosing with the angular artery from the facial artery). The terminal branches are the supratrochlear artery and the dorsal nasal artery.
- supplies the entire contents of the orbit (including the eyeball), eyelids, skin on the forehead and bridge of the nose
- a. centralis retinae
- a. lacrimalis
- a. supraorbitalis (incisura supraorbitalis)
- a. ethmoidalis posterior
- a. ethmoidalis anterior – r. meningeus anterior
- a. supratrochlearis (incisura frontalis)
- aa. ciliares posteriores (longae and breves)



OPHTHALMIC ARTERY

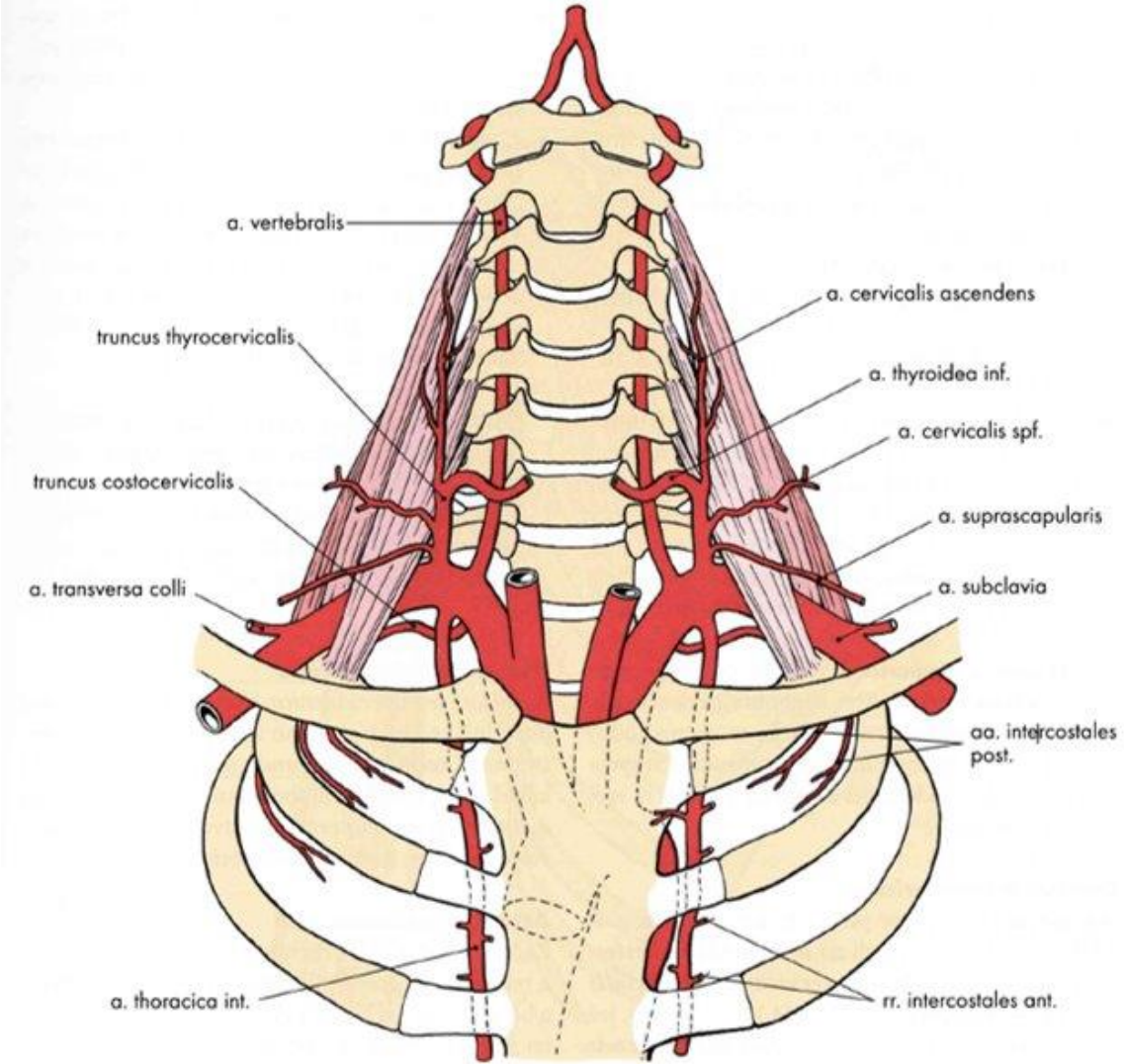




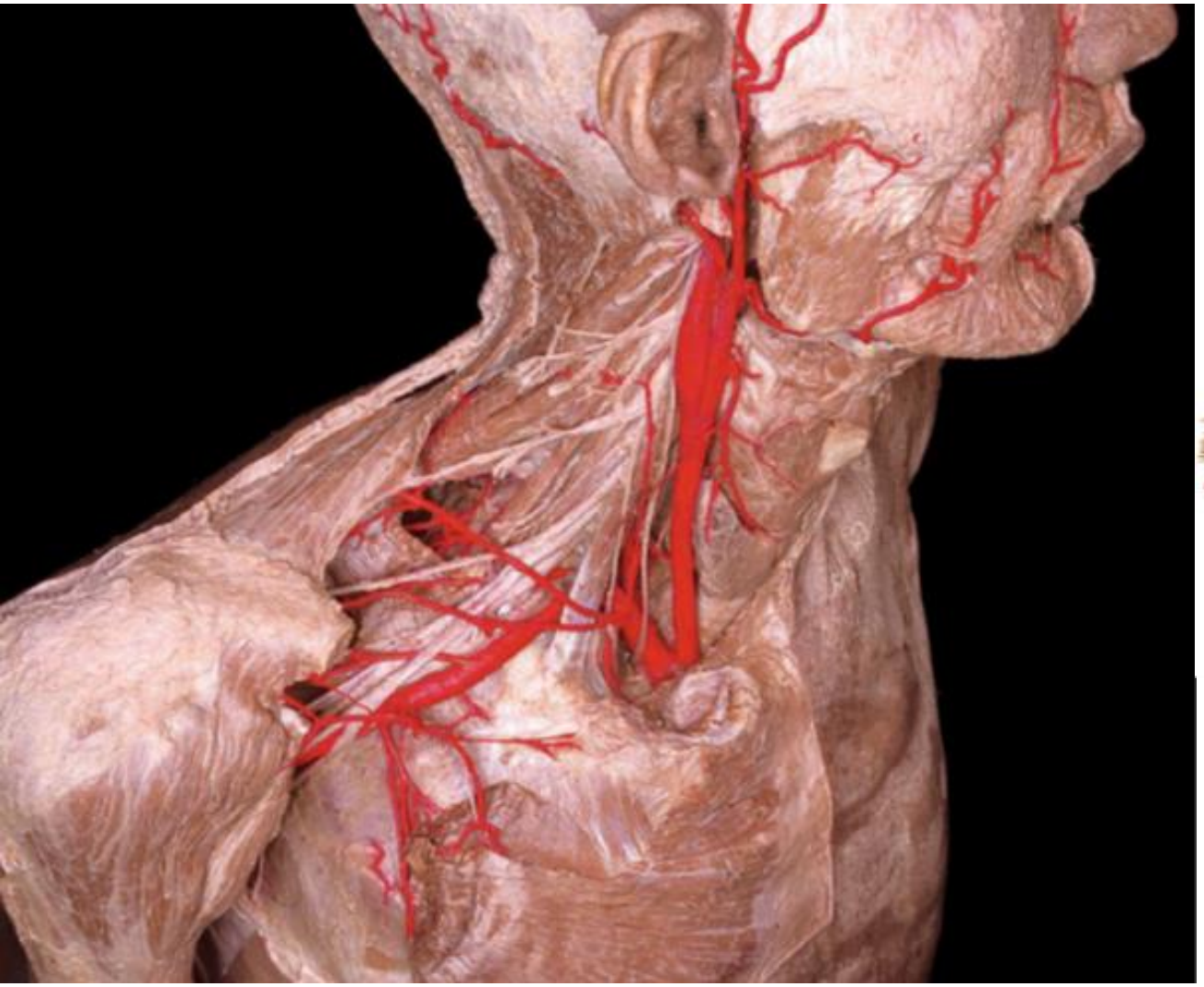
SUBCLAVIAN ARTERY

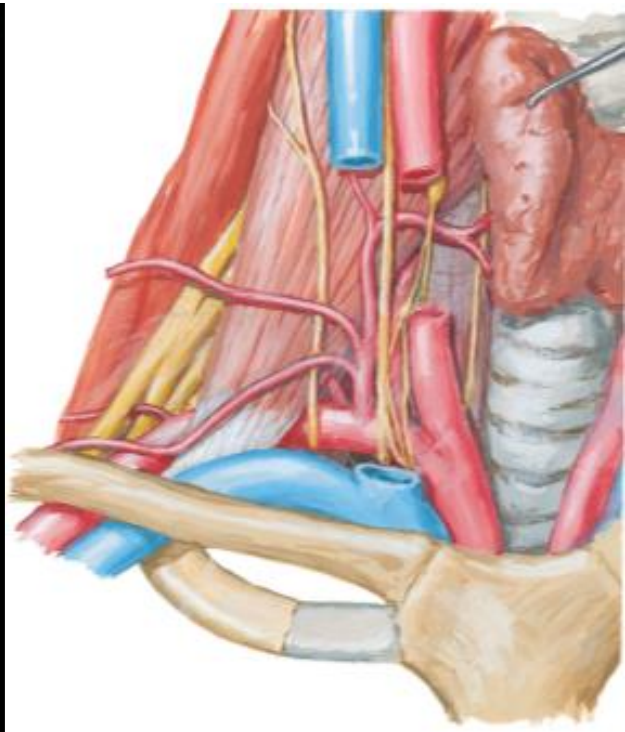
- in the right from the brachiocephalic trunk, on the left from the aortic arch
- It runs in an arc across the cupula pleurae, leaving an imprint on the lungs, and runs through the fissura scalenorum (between the m. scalenus anterior and medius) across the first rib of the lungs (sulcus arteriae subclaviae), above which is the brachial plexus, ending at the outer edge of the first rib with a transition into the axillary artery
- the subclavian vein is located before the fissura scalenorum, between the vein and the artery, with the n. phrenicus running laterally and the n. vagus medially, wrapping around the artery on the right side of the n. laryngeus recurrens dx.
- pars intrascalenica
  - a. vertebralis
  - a. thoracica interna
  - truncus thyrocervicalis
- pars interscalenica
  - truncus costocervicalis
- pars extrascalenica
  - a. transversa colli

It supplies the brain, the cervical segment of the spinal cord, the cervical spine and surrounding muscles, the entire first two intercostal spaces and the anterior sections of the 3rd–11th intercostal spaces, the anterior mediastinum, the pericardium and the diaphragm, the thyroid gland and larynx, parts of the muscles and skin of the neck, chest, and back, and the upper half of the rectus abdominis muscle.



SUBCLAVIAN ARTERY





BRANCHES OF THE SUBCLAVIAN ARTERY I.

- a. vertebralis
  - goes cranially and enters the foramen processus transversi C6 and through these openings into the foramen magnum and onto the clivus, where the left and right arteries join to form the unpaired a. basilaris
  - in the neck, it gives off the spinal branches and muscular branches for the deep cervical muscles, cervical spinal cord, and spinal cord coverings.
  - more in the blood supply of the CNS

The vertebral artery supplies the deep muscles adjacent to the cervical spine, the walls of the spinal canal, spinal ganglia, spinal meninges and the spinal cord, the dura mater in part of the posterior cranial fossa, and the brain.

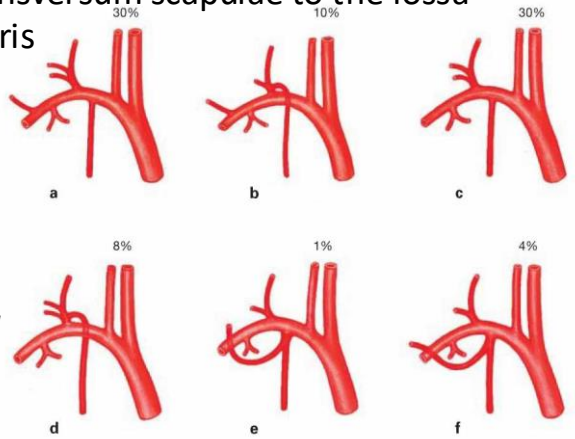
- internal thoracic artery
  - it branches off from the vertebral artery and descends through the anterior mediastinum behind the costal cartilages between the bundles of the transverse thoracic muscle about 1 cm from the edge of the sternum. at the level of the 6th rib, it divides into its terminal branches, the musculophrenic artery and the superior epigastric artery (passing through the sternocostal trigone of the diaphragm to the posterior surface of the rectus abdominis muscle, the internal thoracic artery is renamed the epigastric artery)
  - a. pericardiacophrenica – pericardium and mediastinal pleura
  - rr. mediastinales – thymus, bronchi
  - rr. intercostales anteriores – two in each intercostal space to the upper and lower edges of the adjacent ribs; in the second to fifth intercostal spaces in women, they give rise to the rr. mammarii for the mammary gland and anastomose with the aa. intercostales posteriores
  - a. epigastrica superior – in m. rectus abdominis anastomoses with a. epigastrica inferior from a. iliaca externa!

It supplies the anterior sections of all intercostal spaces and the sternum; in the mediastinum, it supplies the thymus, bronchi, and pericardium; of the muscles, it supplies the diaphragm and part of the rectus abdominis muscle, adjacent skin areas, and in women, part of the mammary gland.

BRANCHES OF THE SUBCLAVIAN ARTERY II.

- truncus thyrocervicalis
  - short vessel at the medial edge of m. scalenus anterior
  - variable branching of diverging vessels
  - a. thyroidea inferior – runs medially to the lower pole of gl. thyroidea and lies dorsally from the cervical neurovascular bundle; at the posterior edge of gl. thyroidea, it crosses n. laryngeus recurrens (sometimes dorsally, sometimes ventrally), primarily giving a. laryngea inferior for the larynx, anastomosing with a. thyroidea superior (a. carotis externa)
  - a. cervicalis ascendens – runs cranially along the m. scalenus anterior with the n. phrenicus, often a branch of the a. thyroidea inferior
  - a. cervicalis superficialis – runs across the m. scalenus anterior to the anterior edge of the m. trapezius, gives off the rr. spinales (supplying the spinal canal)
  - a. suprascapularis – runs with the lower belly of m. omohyoideus and n. suprascapularis to incisura scapulae, crossing m. scalenus anterior and plexus brachialis, continues through lig. transversum scapulae to the fossa infraspinata, anastomosing with the a. circumflexa scapulae from the a. axillaris

It supplies the thyroid gland and larynx, parts of the mediastinal organs (pharynx, esophagus, thymus, trachea), deep cervical muscles (and contributes to the supply of the spinal canal), muscles and skin in the lateral cervical region, and muscles on the dorsal side of the scapula and its surroundings.



- truncus costocervicalis

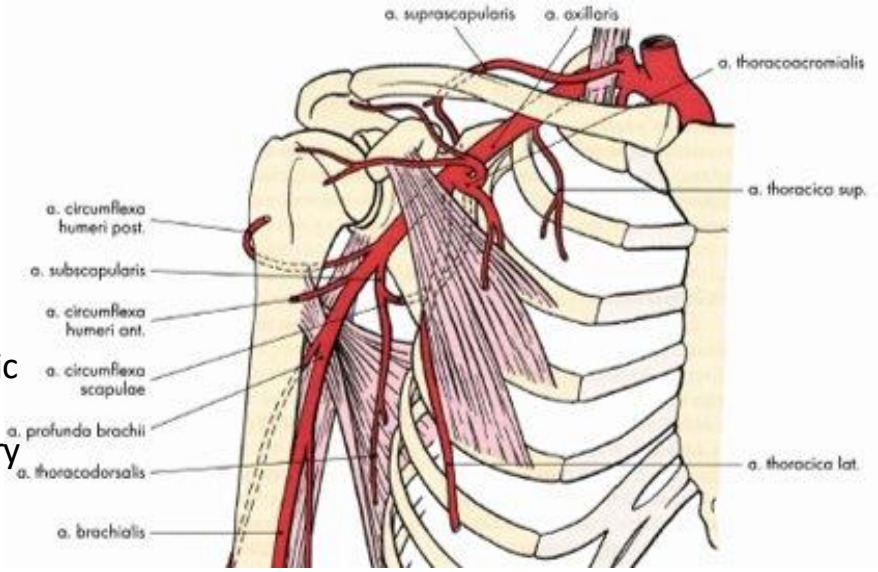
It supplies the first two intercostal spaces from the posterior (their anterior sections are supplied by branches of the internal thoracic artery), the deep neck muscles, and contributes to the supply of the spinal canal and spinal meninges.

  - departs from the pars interscalenica dorsally to the neck of the first rib and divides into the ascending a. cervicalis profunda and the descending a. intercostalis suprema

- transversus colli artery
  - departs either from the pars extrascalenica or from the thyrocervical trunk, pierces the brachial plexus and runs to the upper edge of the scapula

It supplies the neck (nuchal) muscles, the muscles of the upper limb girdle, and the trapezius muscle.

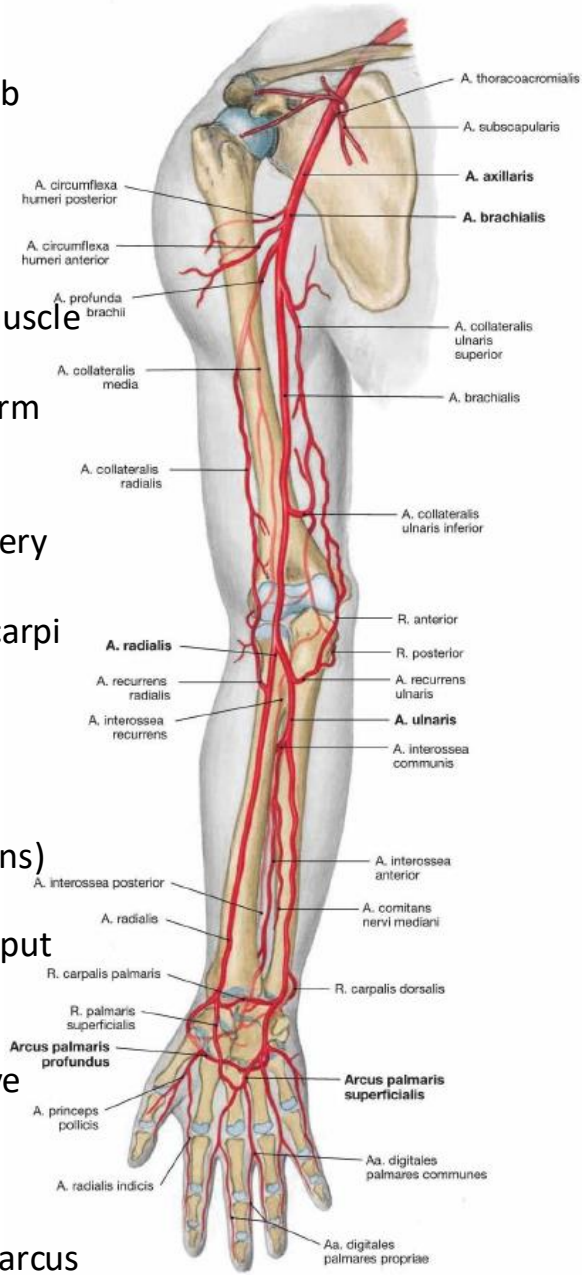
AXILLARY ARTERY



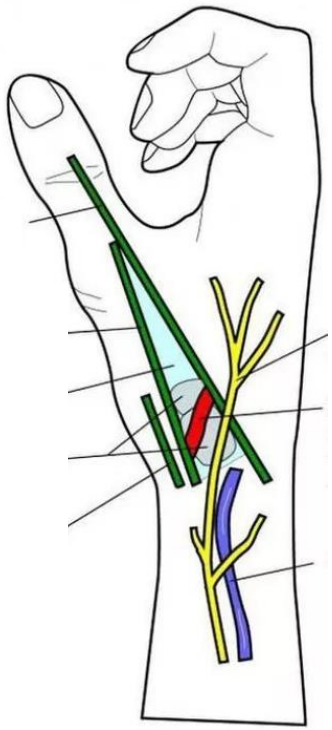
- continuation of the subclavian artery from the first rib to the surgical neck of the humerus, where it transitions into the brachial artery
- lies in the axilla, surrounded by the brachial plexus, the axillary vein runs ventrally
- the pectoralis minor muscle defines its three sections
    - proximal to the pectoralis minor muscle – superior thoracic artery and thoracoacromial artery
    - behind the pectoralis minor muscle – lateral thoracic artery
    - distal to the pectoralis minor muscle – subscapular artery, anterior and posterior circumflex humeral arteries
- a. thoracica superior
    - weak branch, supplies the dorsal part of the first two intercostal spaces
- a. thoracoacromialis
    - short trunk
    - divides into branches supplying the shoulder joint, m. deltoideus, and m. pectoralis major et minor
- a. thoracica lateralis
    - descends along m. serratus anterior with n. thoracicus longus
    - supplies m. serratus anterior, in women rr. mammarii laterales to the mammary gland
- a. subscapularis
    - runs through the axilla to the foramen omotricipitale, where it divides
    - a. thoracodorsalis – m. latissimus dorsi, m. teres major
    - a. circumflexa scapule – through the foramen omotricipitale to the m. infraspinatus (anastomosis with a. suprascapularis – collateral supply to the upper limb)
- a. circumflexa humeri anterior
    - in front of collum chirurgicum humeri
    - supplies m. coracobrachialis and caput breve m. bicipitatis
- a. circumflexa humeri posterior
    - through foramen humerotricipitale from behind around collum chirurgicum humeri
    - supplies shoulder joint, m. deltoideus, m. triceps brachii

OVERVIEW OF THE ARTERIES OF UPPER LIMB

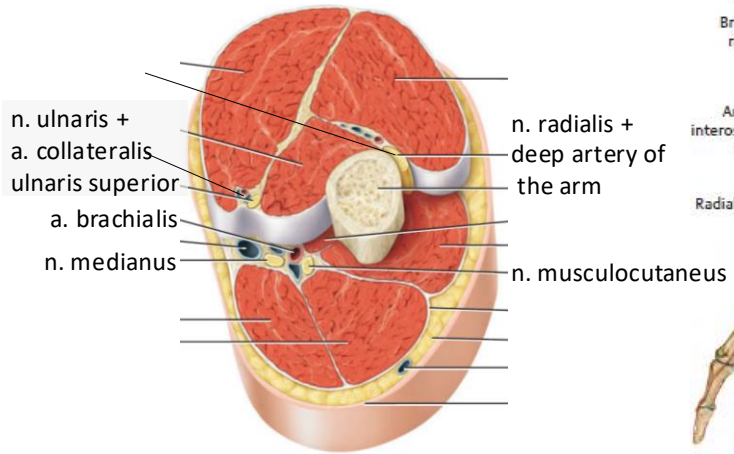
- a. subclavia
  - between m. scalenus anterior and medius, leaves an impression on the first rib
  - along the lateral edge of the first rib
- a. axillaris
  - under the clavicle behind m. pectoralis minor
  - plexus brachialis
  - along the surgical neck of the humerus/caudal edge of the pectoralis major muscle
- a. brachialis
  - below the medial bicipital sulcus in the medial intermuscular septum of the arm into the cubital fossa
  - under the lacertus fibrosus, it divides into the radial artery and ulnar artery
  - deep brachial artery – with the radial nerve, ending as the radial collateral artery
- radial artery
  - along the brachioradialis muscle under the pronator teres muscle and flexor carpi radialis muscle
  - under m. abductor pollicis longus into foveola radialis
  - under m. extensor pollicis longus on the back of the hand
  - through foveola radialis first metacarpal space into the palm under the flexor tendons, arcus palmaris profundus (between mm. interossei and flexor tendons)
- a. ulnaris
  - under the aponeurosis of m. bicipitis brachii, along m. brachialis and under caput commune ulnare
  - with n. ulnaris under m. flexor carpi ulnaris
  - into the palm through retinaculum mm. flexorum through Guyon's canal above the flexor tendons
  - radially from the pisiform bone, it divides into a weaker deep branch and a stronger superficial branch
  - r. palmaris superficialis → connection with a weak branch of the a. radialis → arcus palmaris superficialis (between the flexor tendons and the palmar aponeurosis)

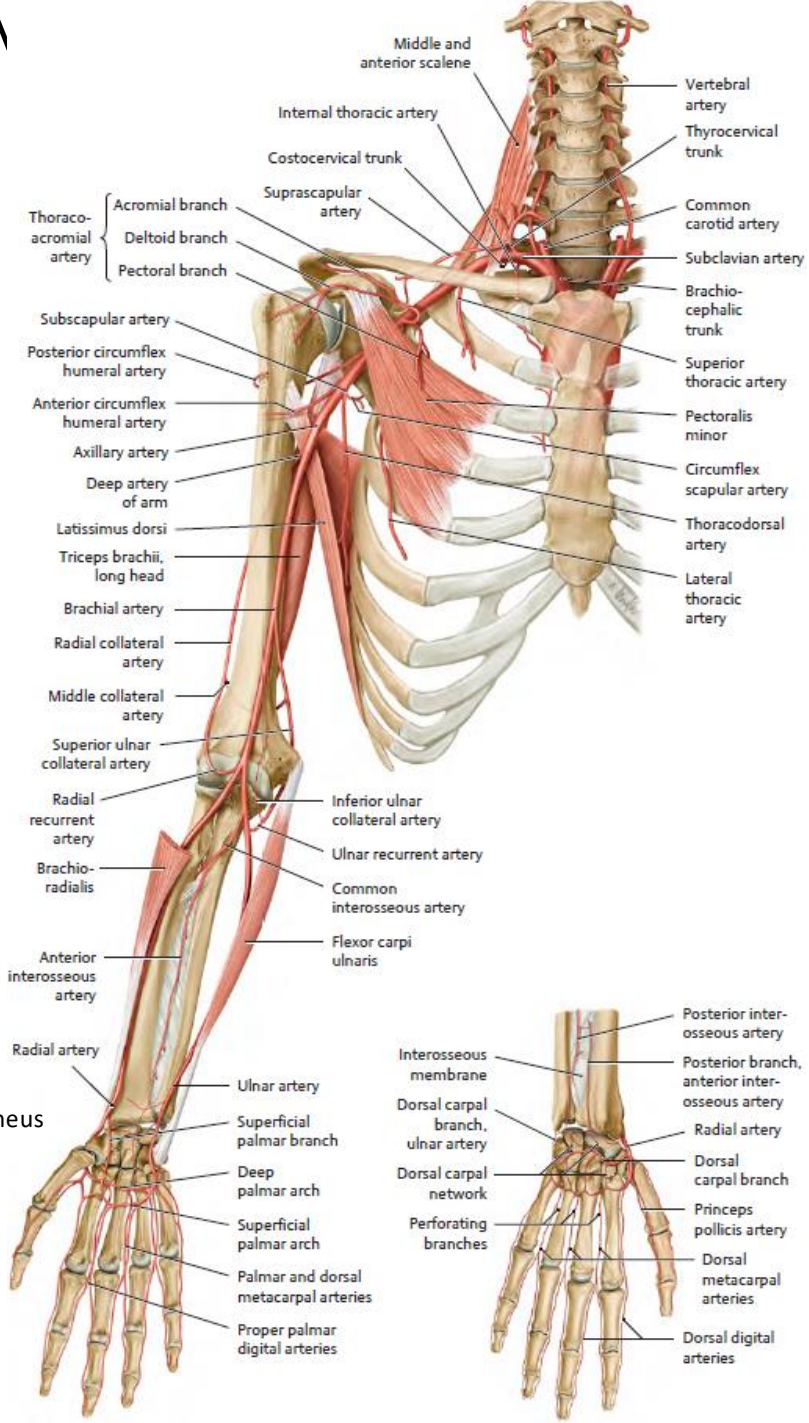


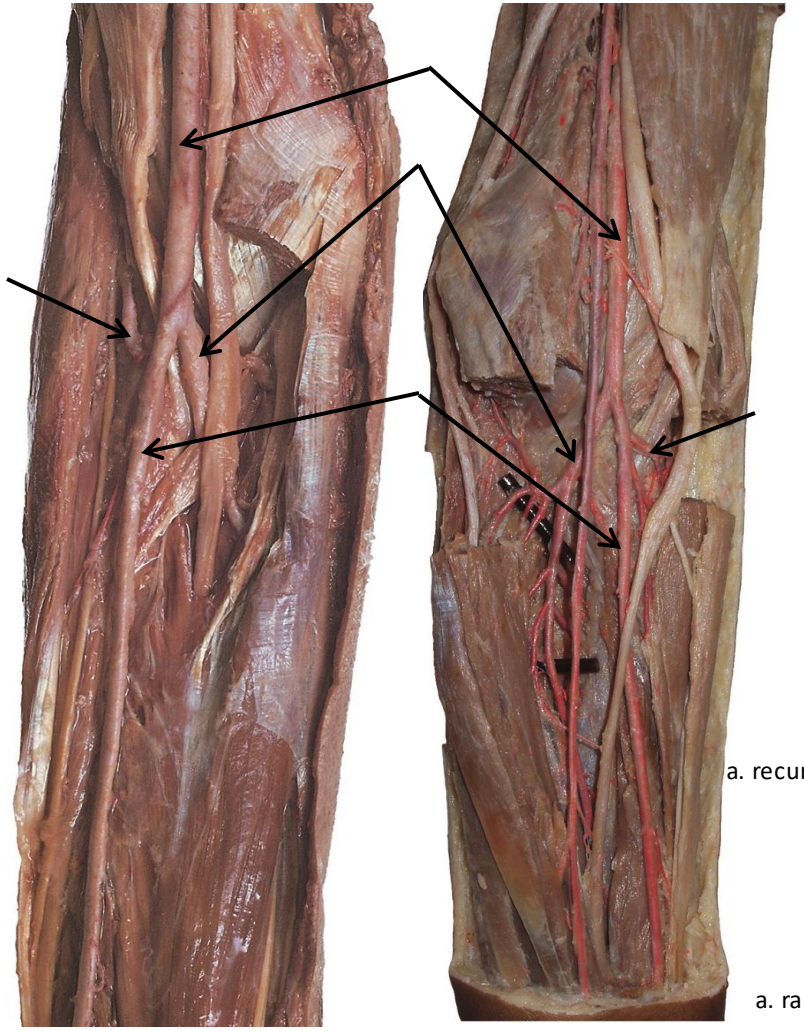
OVERVIEW OF THE ARTERIES OF UPPER LIM

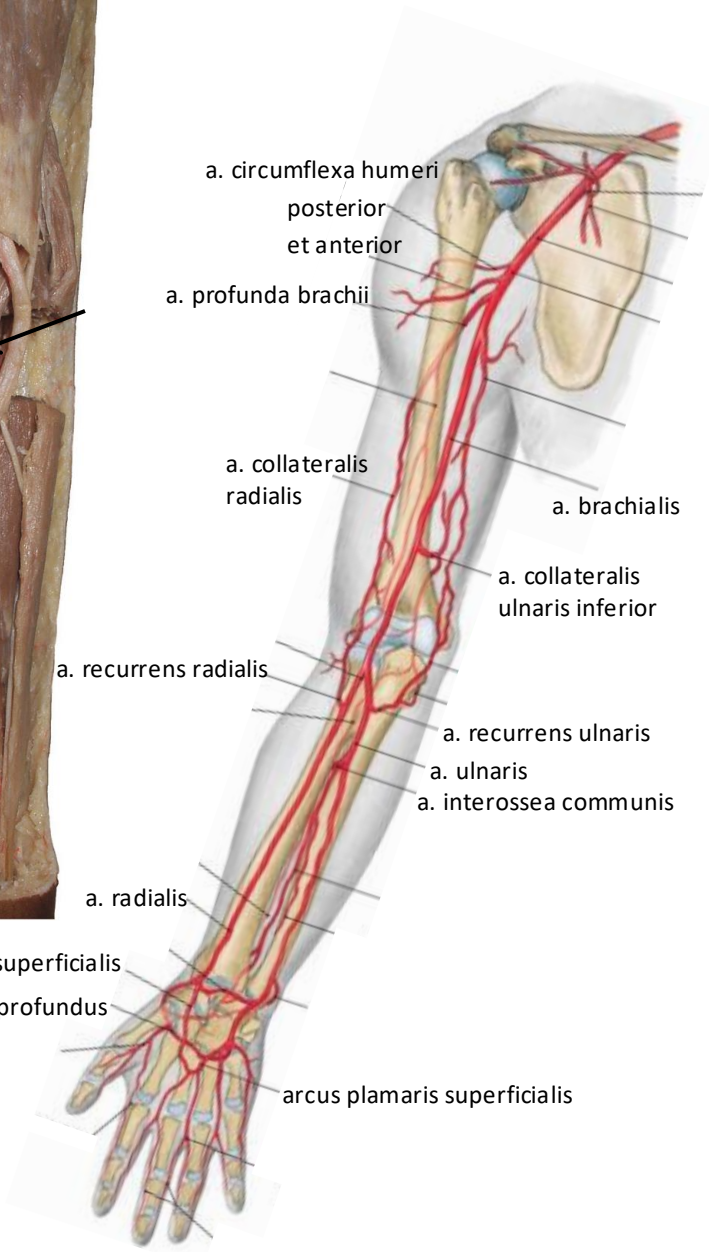


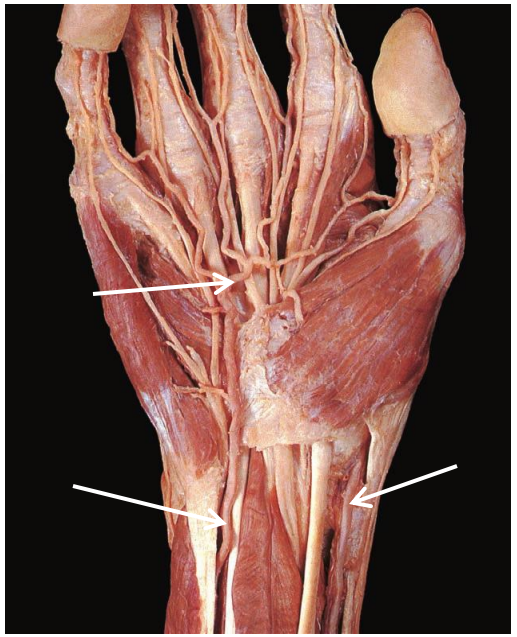
foveola radialis

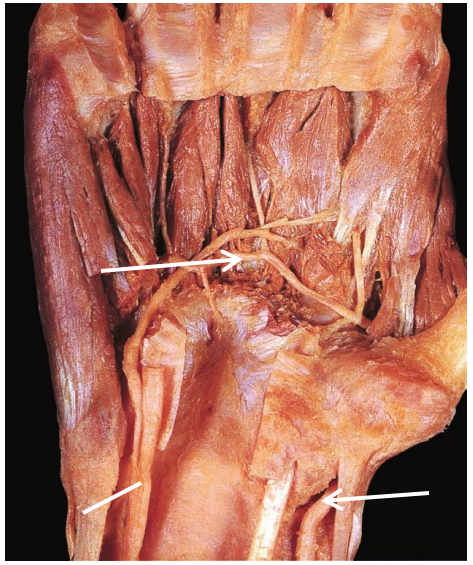






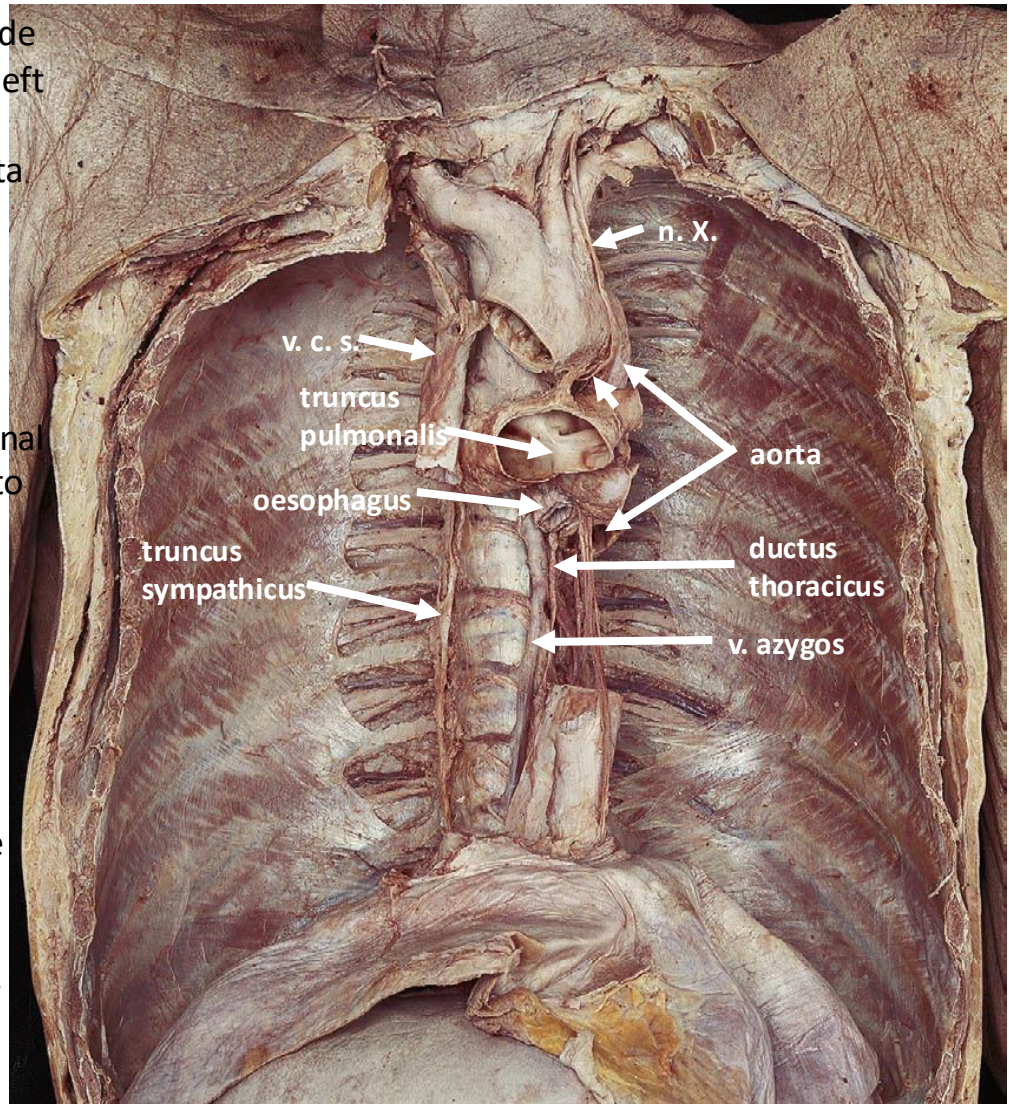

a. circumflexa humeri
posterior
et anterior
a. profunda brachii
a. collateralis
radialis
a. brachialis
a. collateralis
ulnaris inferior
a. recurrens radialis
a. recurrens ulnaris
a. ulnaris
a. interossea communis
a. radialis
arcus plamaris superficialis
arcus palmaris profundus
arcus plamaris superficialis



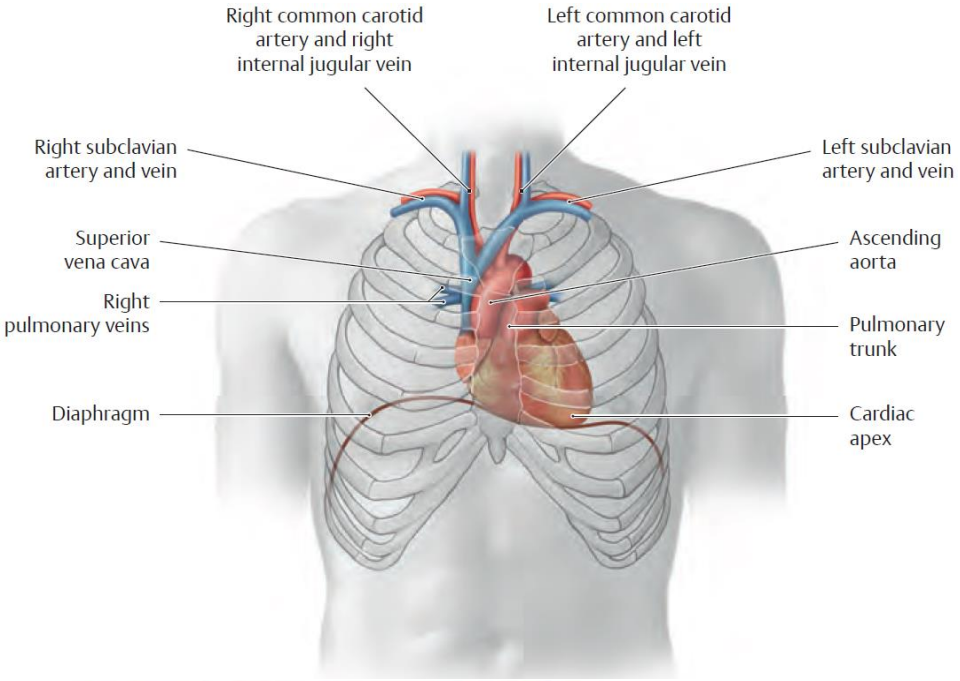


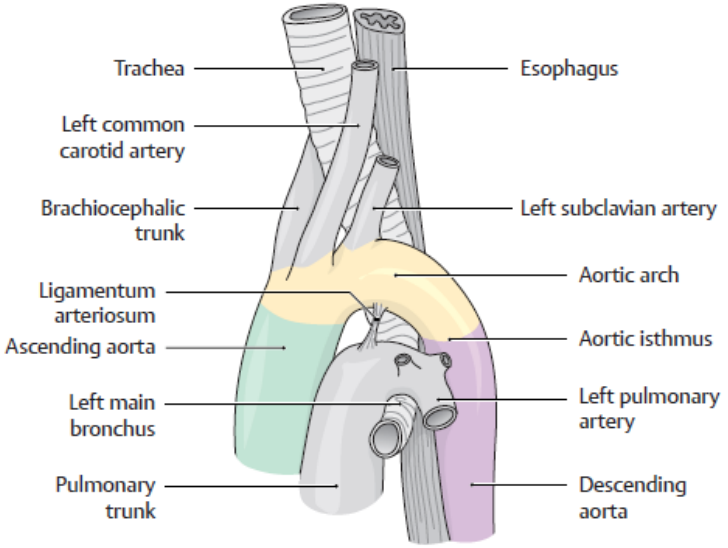
THORACIC AORTA

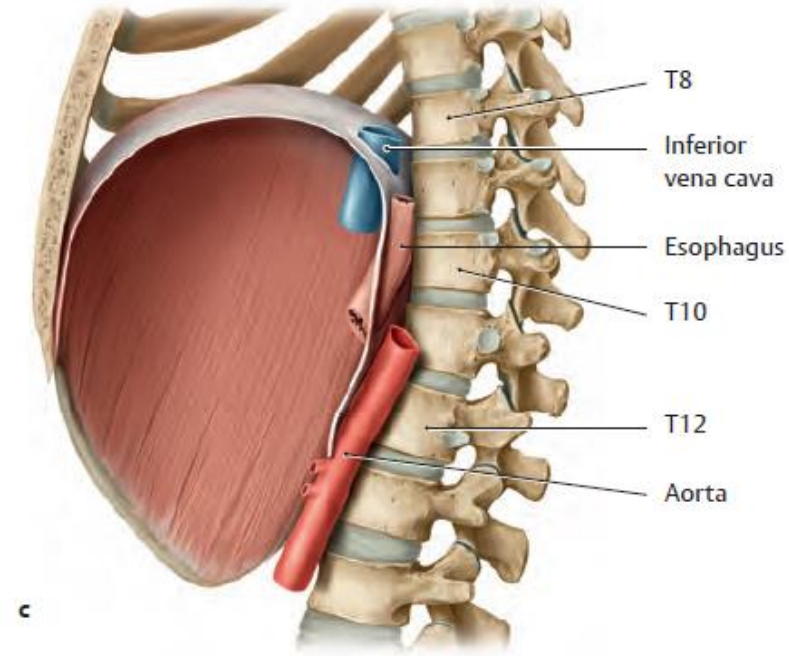
- runs through the posterior mediastinum from the left side of Th3 to the aortic hiatus (Th11–12), passing from the left in front of the vertebral bodies
- esophagus first on the right, caudally in front of the aorta and to the left
- on the right: thoracic duct and v. azygos (more laterally)
- cranially in front of the aorta radix pulmonis sinistri, caudally heart in the pericardium
- left: v. hemiazygos
- from the sides, it presses on the thoracic aorta mediastinal pleura of both pleural cavities, the aorta is imprinted into the left lung through the mediastinal pleura
- visceral branches
  - rr. bronchiales
  - rr. oesophagei
  - rr. mediastinales
- parietal branches
  - a. phrenica superior
  - aa. intercostales posteriores – rr. dorsales (for the back muscles and skin), rr. spinales (for the spinal canal, spinal cord, and spinal membranes), rr. collaterales (to the upper edge of the next rib), rr. cutanei laterales (to the subcutaneous tissue, in women branches rr. mammarii laterales for the mammary gland)
  - a. subcostalis (a. intercostalis posterior below the 12th rib in the muscles of the abdominal wall)

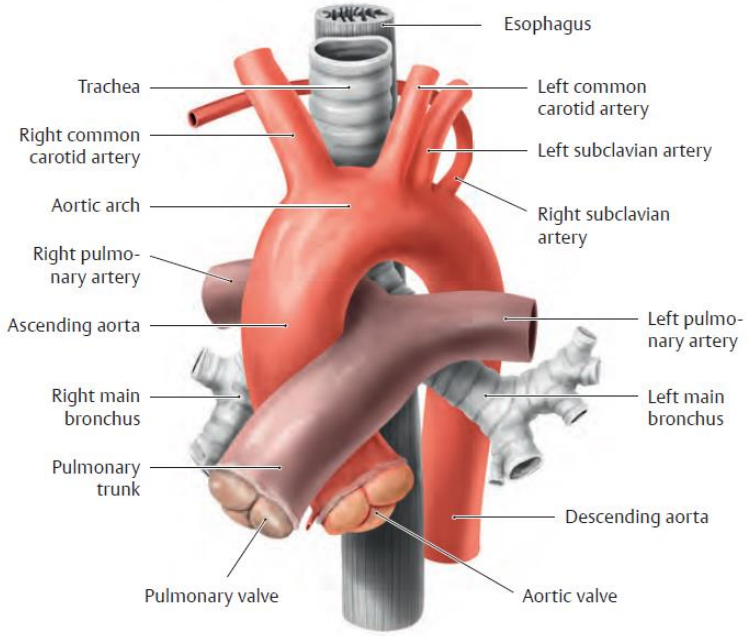


TOPOGRAPHICAL RELATIONS IN THE THORACIC CAVITY





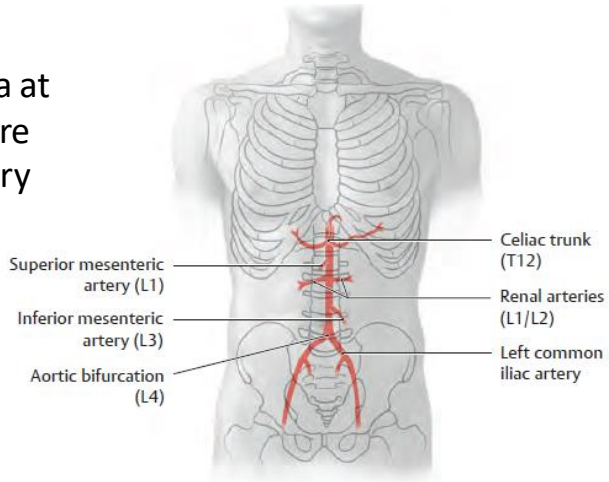


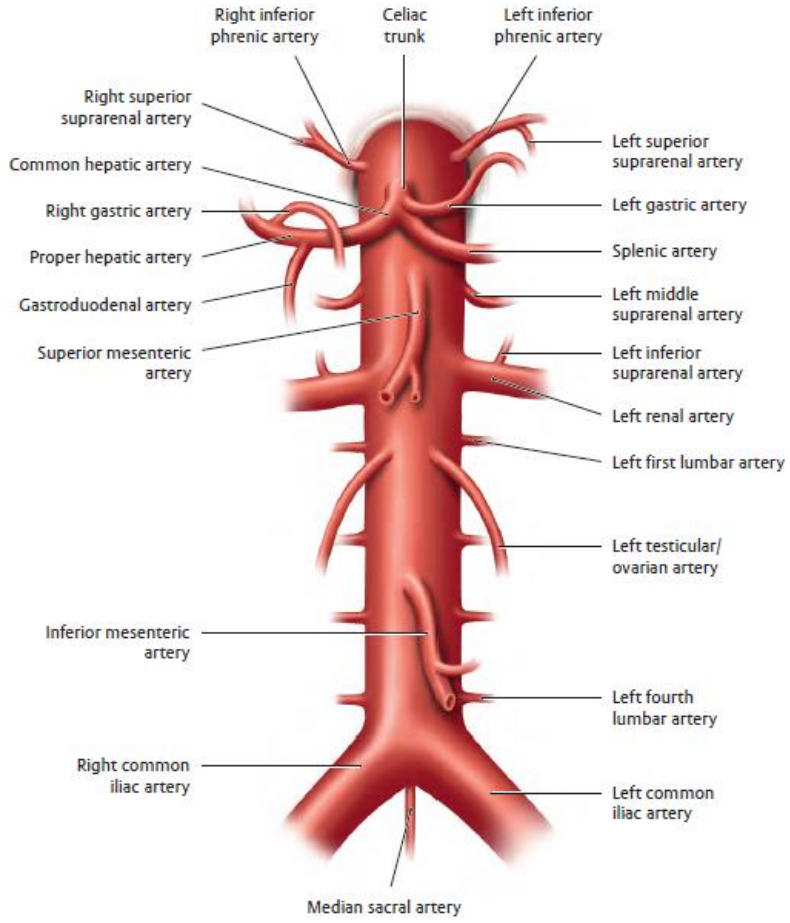


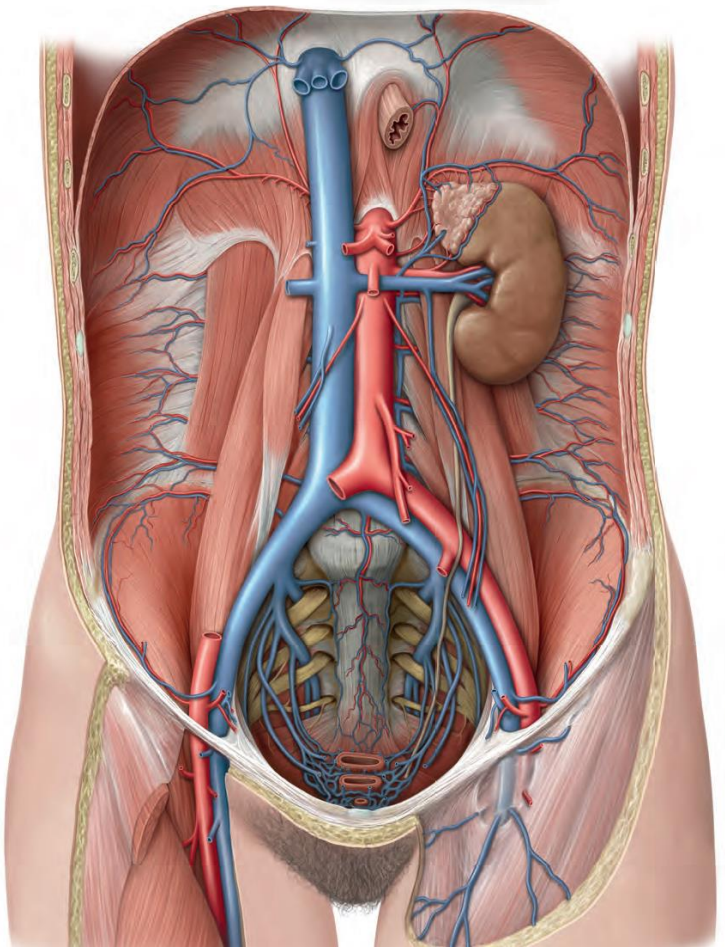
ABDOMINAL AORTA

- three unpaired visceral branches
  - celiac trunk (supramesocolic space)
  - superior mesenteric artery (right inframesocolic space)
  - inferior mesenteric artery (left inframesocolic space)
- three paired visceral branches
  - middle suprarenal artery, renal artery, gonadal artery
- "three" parietal branches
  - inferior phrenic artery, lumbar arteries, median sacral artery

anastomosis magna at
the left colic flexure
middle rectal artery
+
left renal artery







OVERVIEW OF THE ABDOMINAL ARTERIES I.

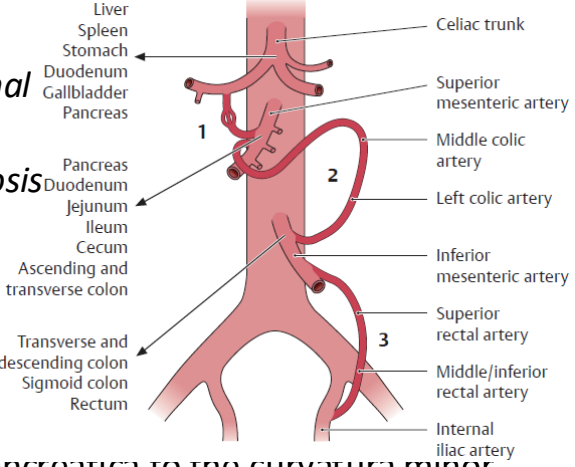
parietal branches of the a. abdominis

- a. phrenica inferior
  - aa. suprarenales superiores
- aa. lumbales
  - in four pairs from the dorsolateral circumference, below the m. psoas major and m. quadratus lumborum
  - rr. dorsales et spinales (supplies the back muscles, skin of the back, vertebrae, spinal cord with its coverings)
- a. sacralis mediana
  - from the bifurcation of the aorta
  - at the tip of the coccyx, it ends in the glomus coccygeum (arteriovenous anastomosis)

visceral branches a. abdomins – paired

- a. suprarenalis media
- a. renalis
  - intervertebral disc L1–L2
  - on the right behind the inferior vena cava, on the left behind the renal vein sin.
  - inferior suprarenal artery
- testicular artery (ovarian artery)
  - obliquely along m. psoas major
  - at the transition to the pelvis, it crosses the ureter and a. iliaca externa
  - a. testicularis goes into the inguinal canal and into the spermatic cord to the testicle and epididymis
  - a. ovarica into the lig. suspensorium ovarii and into the hilum of the ovary

OVERVIEW OF THE ABDOMINAL ARTERIES II.



1. pancreaticoduodenal arteries

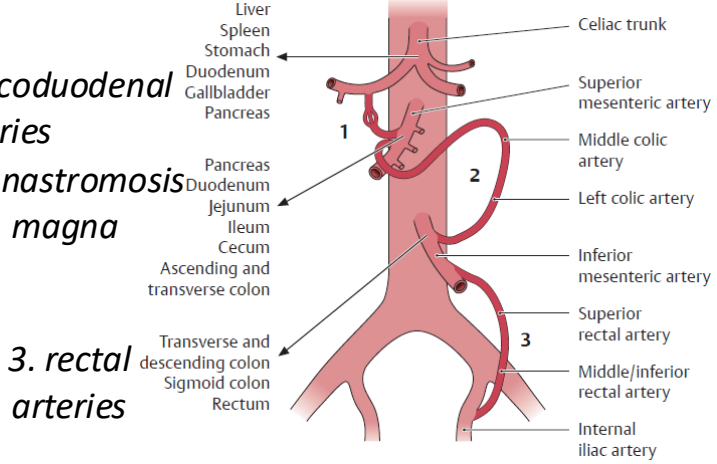
2. anastomosis magna

3. rectal arteries

visceral branches of the a. abdominis – unpaired

- coeliac trunk
  - originates at the level of Th12–L1
  - supplies all organs in the supramesocolic part of the peritoneal cavity
  - branches: a. gastrica sinistra, a. hepatica communis, a. lienalis
- left gastric artery
  - to the left along the posterior wall of the bursa omentalis in the plica gastropancreatica to the curvatura minor ventriculi
  - rr. oesophagei
- common hepatic artery
  - along the upper edge of the pancreas to the right to the pylorus, where it branches
  - proper hepatic artery – in lig. hepatoduodenale to the liver (on the right ductus choledochus, behind v. portae), gives off a. gastrica dx. (anastomosis with a. gastrica sin.), in porta hepatis it divides into ramus dx. et sin., most often from r. dx. a. cystica
  - gastroduodenal artery – caudally behind the pylorus, branches:
    - a. gastroepiploica dextra – along the curvatura major ventriculi, anastomosis with a. gastroepiploica sin. (branch of a. lienalis)
    - a. pancreaticoduodenalis superior – between the duodenum and caput pancreatis, r. posterior et anterior – connections with a. pancreaticoduodenalis inferior (branch of a. mesenterica superior)
- a. lienalis (splenica)
  - strongest branch of the coeliac trunk
  - waves along the upper edge of the pancreas on the posterior wall of the omental bursa to the hilum of the spleen (plica pancreaticolienalis)
  - a. gastroepiploica sinistra (plica gastrolienalis)
  - rr. pancreatici
  - aa. gastricae breves

OVERVIEW OF THE ABDOMINAL ARTERIES III.



1. pancreaticoduodenal arteries

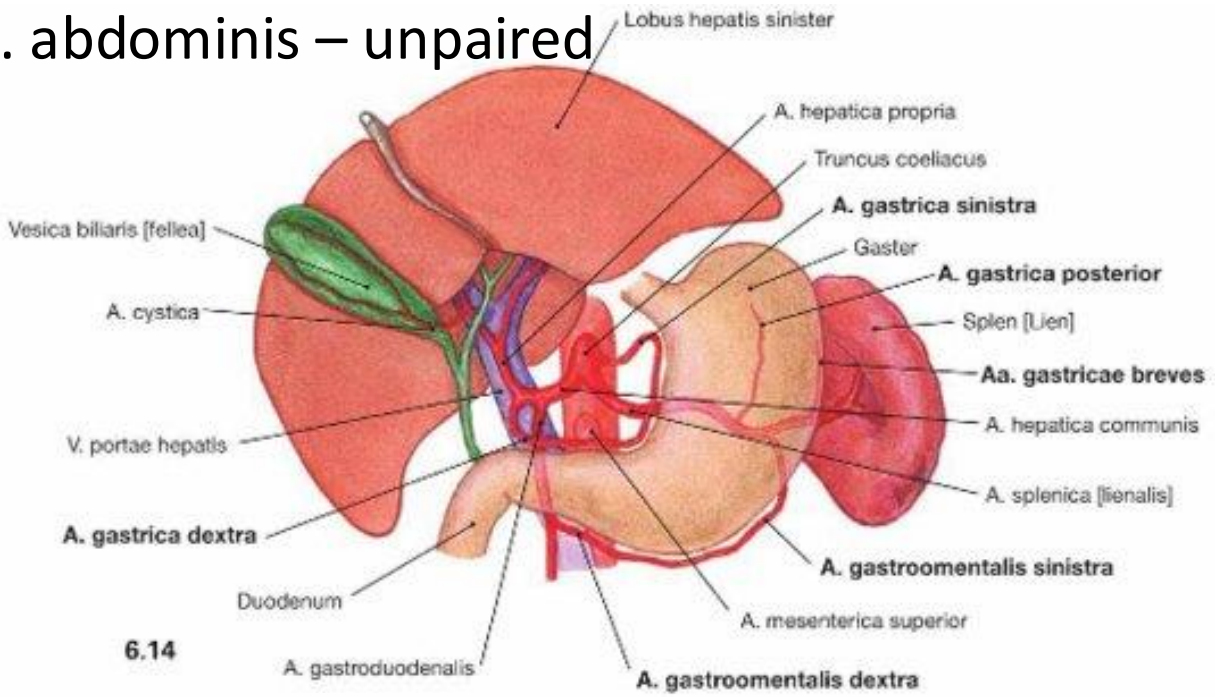
2. anastromosis magna

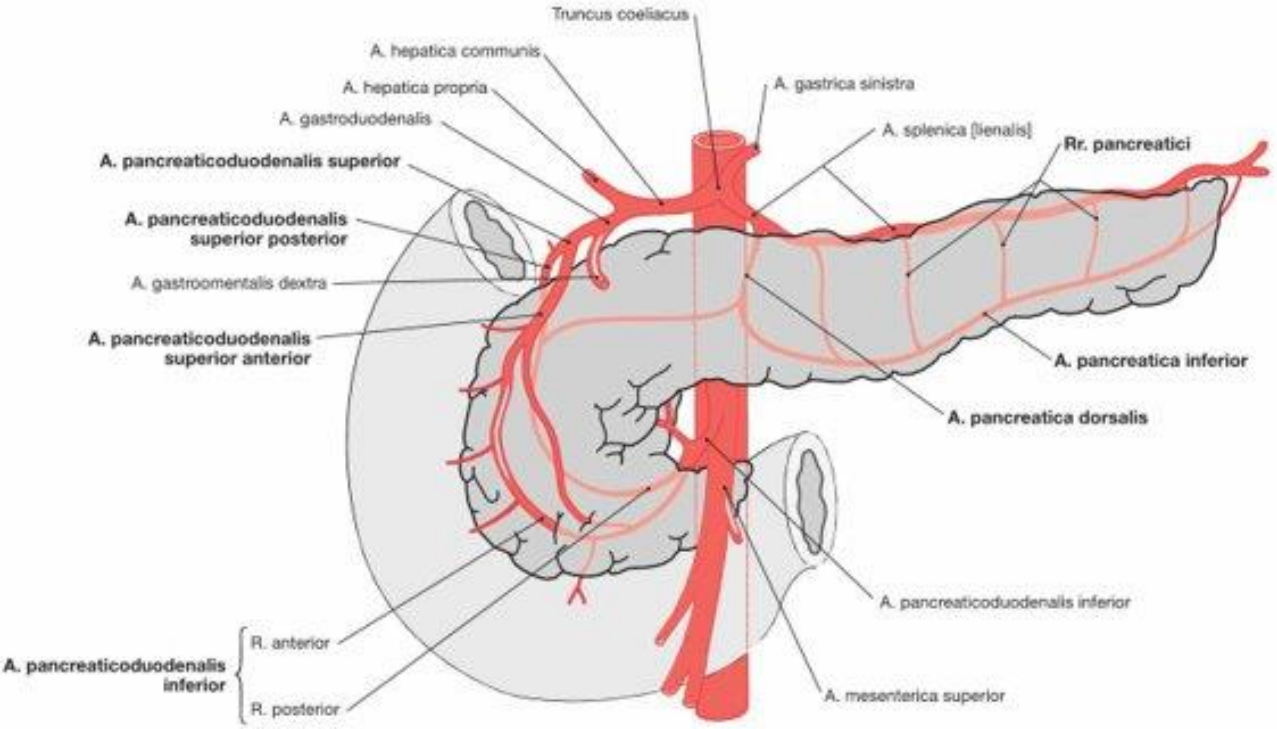
3. rectal arteries

visceral branches of the a. abdominis – unpaired

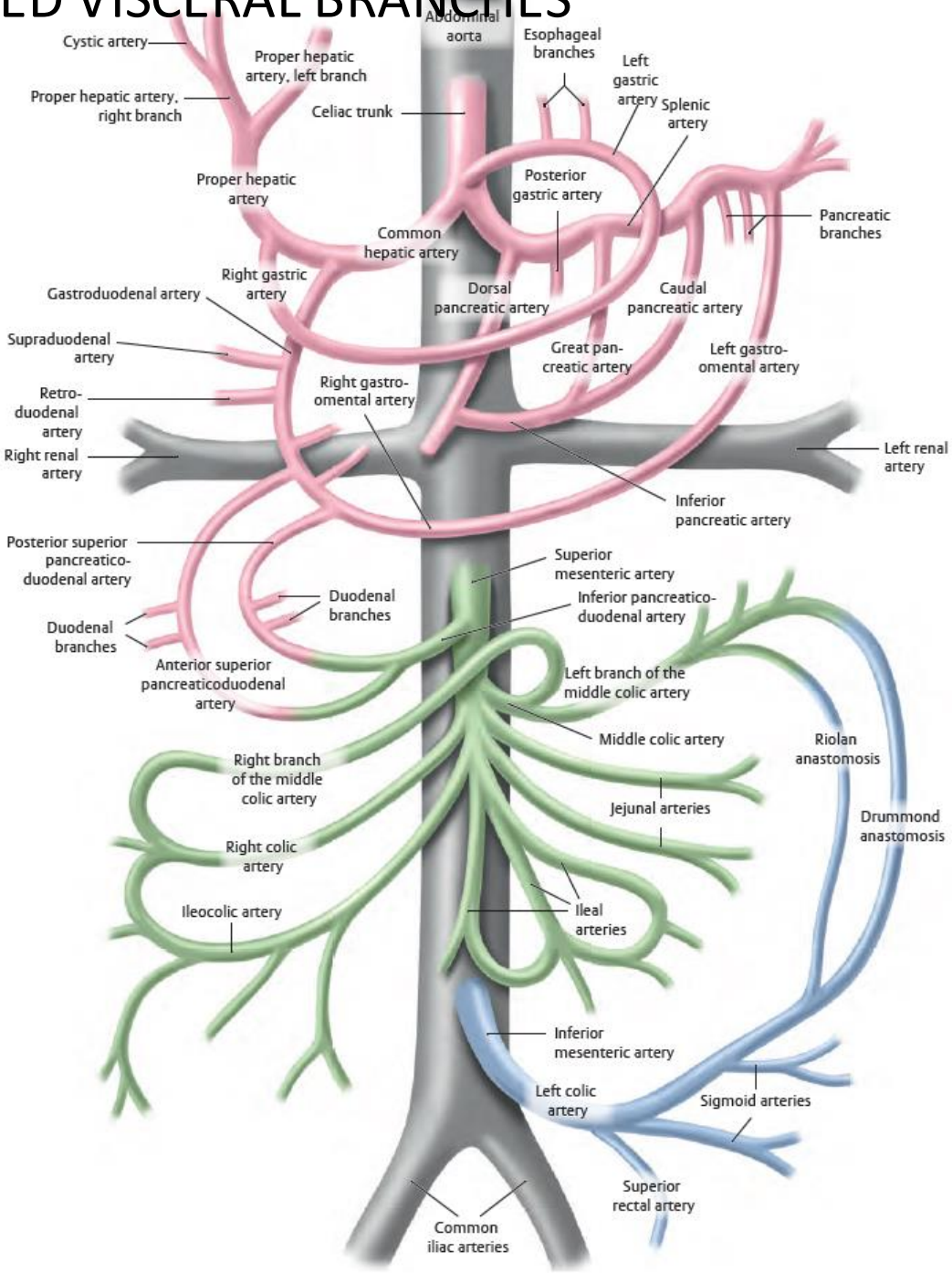
- superior mesenteric artery
  - supplies the small intestine and organs in the right infrasplenic field in the right infrasplenic part of the peritoneal cavity and the infrasplenic part of the pancreas and duodenum
  - emerges behind the body of the pancreas and continues caudally in front of the processus uncinatus and in front of the pars horizontalis (inferior) duodeni
  - enters the radix mesenterii
  - a. pancreaticoduodenalis inferior – r. posterior et anterior, anast. with a. pancreaticoduodenalis superior (branch of a. gastroduodenalis)
  - aa. jejunales et ilei – 12–16 arteries, anastomotic arches, arteriolae rectae
  - a. ileocolica – a. appendicularis
  - a. colica dextra – via the right ureter and m. psoas major to the colon ascendes and flexura coli dextra, anastomotic with a. ileocolica and a. colica media
  - a. colica media – to mesocolon transversum, at flexura coli sinistra anastomoses with a. colica sinistra (branch of a. mesenterica inferior) = anasomosis magna (Halleri, Riolani)
- inferior mesenteric anrtery
  - branches at the level of L3
  - supplies the left third of the transverse colon, descending colon, sigmoid colon, and upper part of the rectum
  - a. colica sinistra – ascending branch (anastomosis magna), descending branch (anastomosis with aa. sigmoideae)
  - aa. sigmoideae – several branches, upper artery anastomoses with a. colica sin., lower artery anastomoses with a. rectalis superior (Sudeck's anastomosis)
  - a. rectalis superior – several branches on the sides of the rectum, anast. with paired a. rectalis media et inferior (branches of a. iliaca interna, resp. a. pudenda interna)

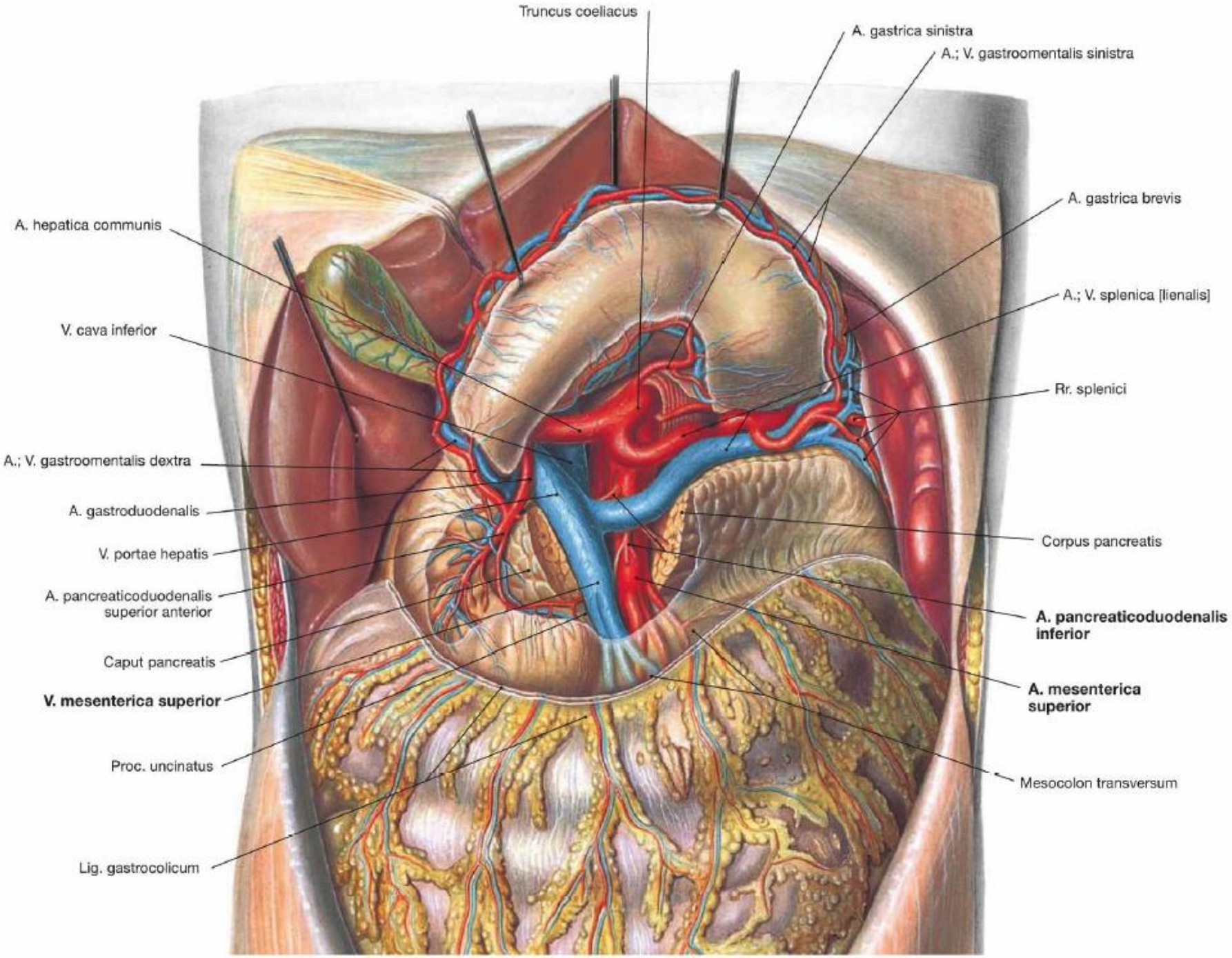
Visceral branches of the a. abdominis – unpaired

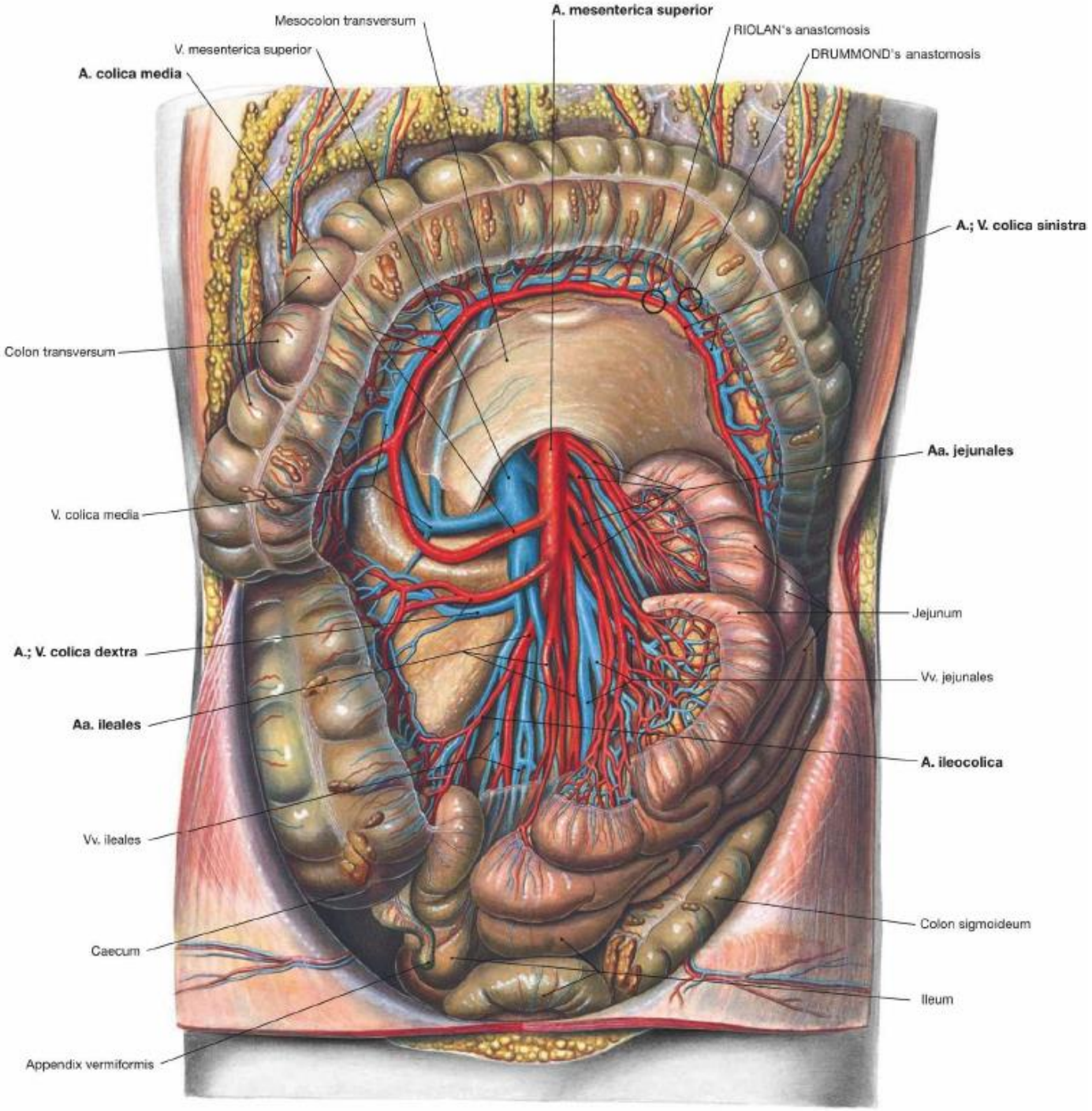


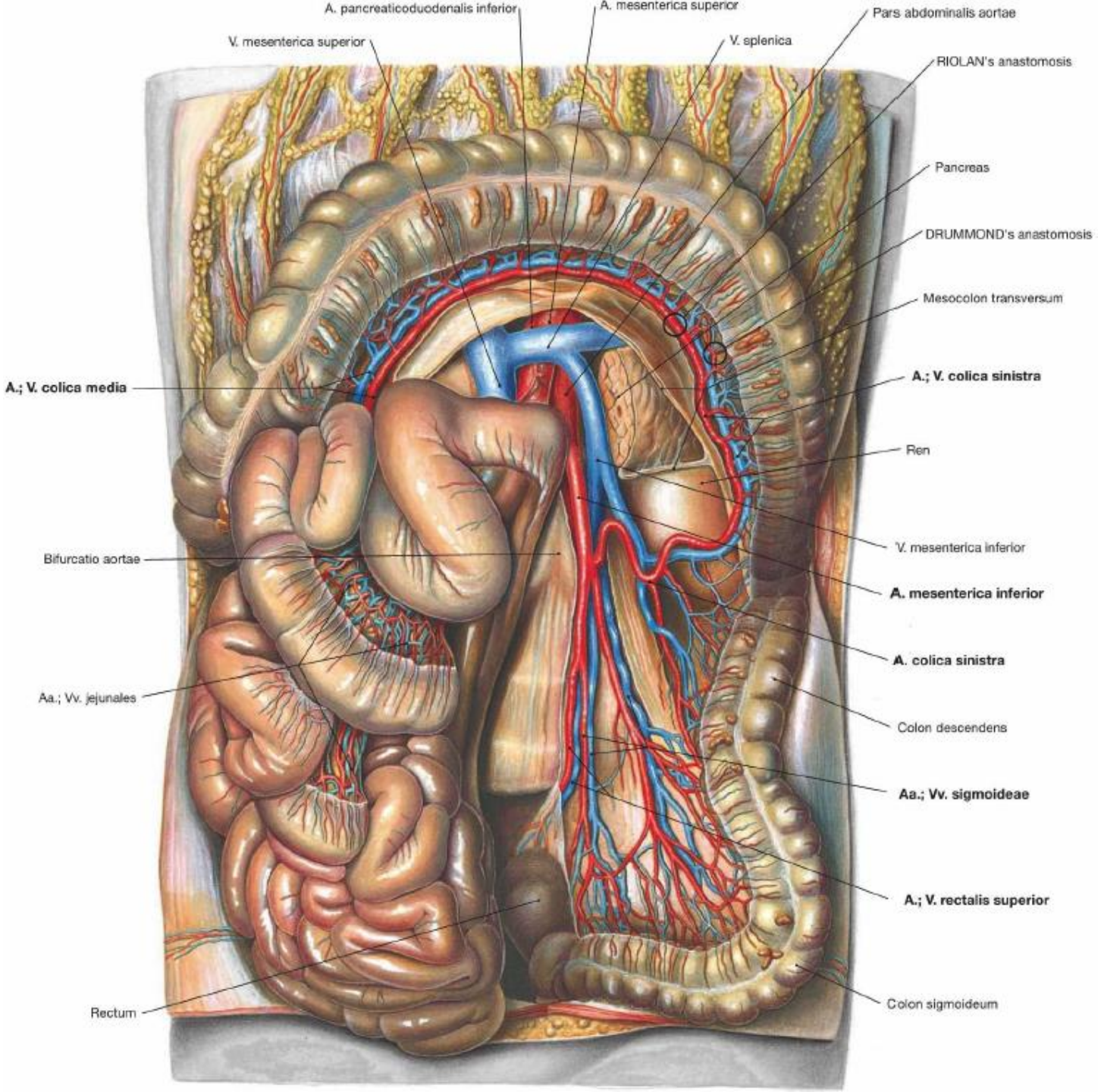


ANASTOMOSING OF THE UNPAIRED VISCERAL BRANCHES



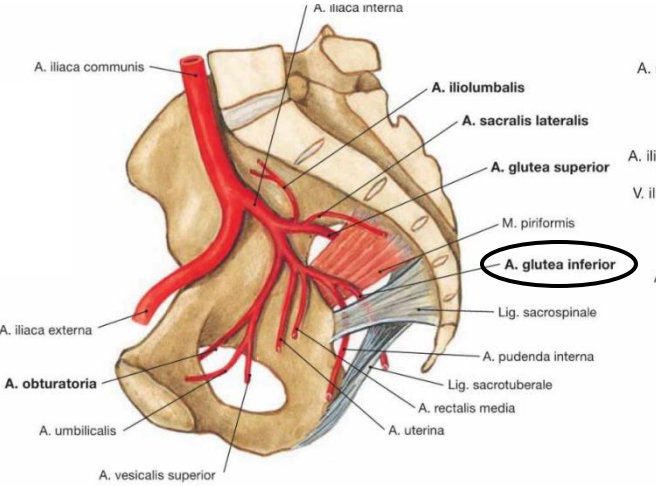

Truncus coeliacus
A. gastrica sinistra
A.; V. gastroomentalis sinistra
A. gastrica brevis
A. hepatica communis
A.; V. splenica [lienalis]
V. cava inferior
Rr. splenici
A.; V. gastroomentalis dextra
A. gastroduodenalis
Corpus pancreatis
V. portae hepatis
A. pancreaticoduodenalis superior anterior
A. pancreaticoduodenalis inferior
Caput pancreatis
A. mesenterica superior
V. mesenterica superior
Proc. uncinatus
Mesocolon transversum
Lig. gastrocolicum

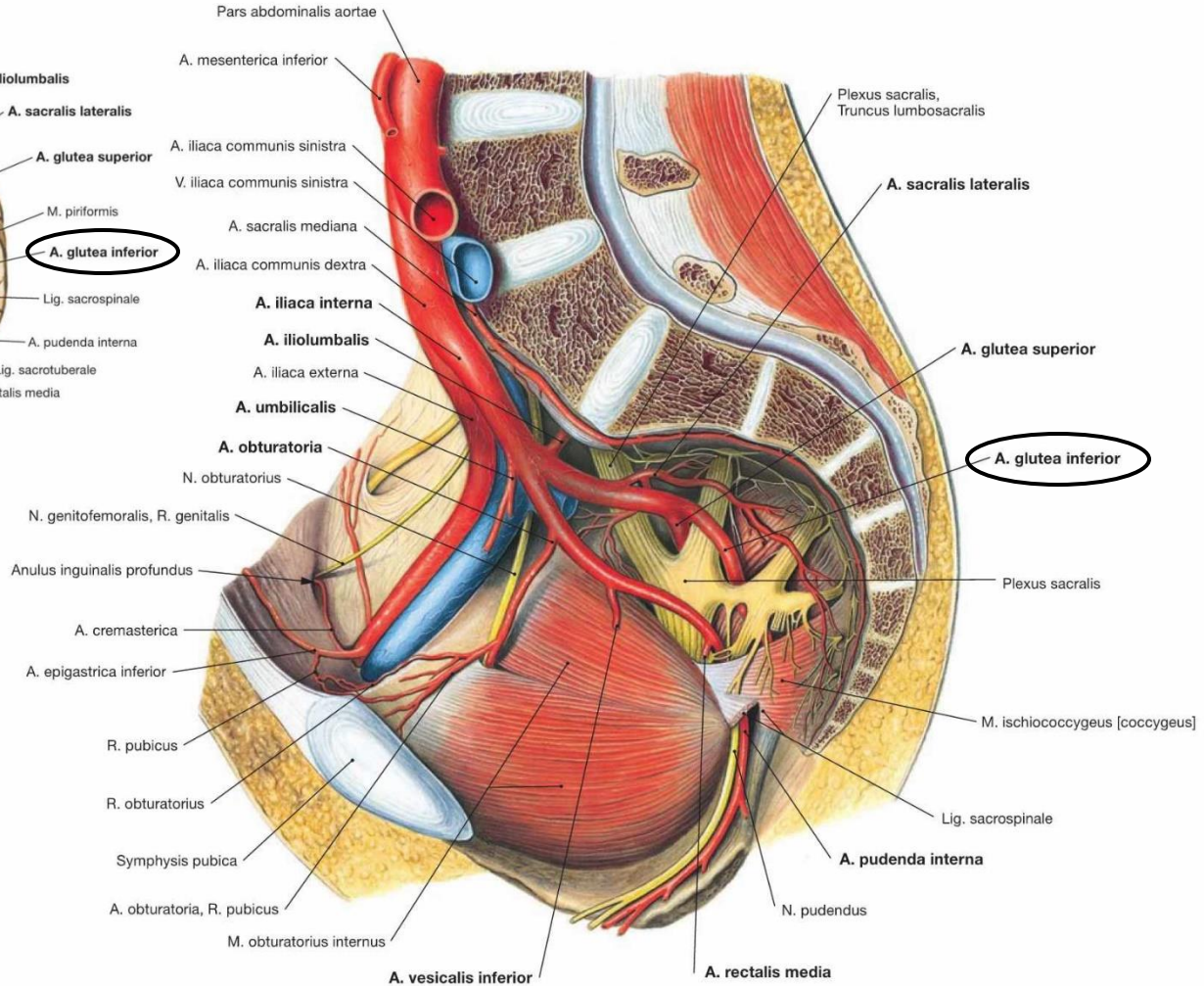

Mesocolon transversum
A. mesenterica superior
RIOLAN's anastomosis
V. mesenterica superior
DRUMMOND's anastomosis
A. colica media
A.; V. colica sinistra
Colon transversum
Aa. jejunales
V. colica media
Jejunum
A.; V. colica dextra
Vv. jejunales
Aa. ileales
A. ileocolica
Vv. ileales
Colon sigmoideum
Caecum
Ileum
Appendix vermiformis


A. pancreaticoduodenalis inferior
A. mesenterica superior
Pars abdominalis aortae
V. mesenterica superior
V. splenica
RIOLAN's anastomosis
Pancreas
DRUMMOND's anastomosis
Mesocolon transversum
A.; V. colica media
A.; V. colica sinistra
Ren
V. mesenterica inferior
Bifurcatio aortae
A. mesenterica inferior
A. colica sinistra
Aa.; Vv. jejunales
Colon descendens
Aa.; Vv. sigmoideae
A.; V. rectalis superior
Rectum
Colon sigmoideum

PELVIC ARTERIES

- common iliac artery
  - originates from the bifurcation of the aorta at the level of L4, angle between the right and left arteries 70°
  - run laterocaudally along the medial edge of the psoas major muscle, at the level of the sacroiliac joint they divide into
  - a. iliaca interna – into the small pelvis, dividing into ventral and dorsal trunks
  - a. iliaca externa – along the m. psoas major to the lower limb
  - in front of the aa. iliacae, the ureters (left vs. right)
  - in front of the a. iliaca communis, the mesosigmoid attachment





BRANCHES OF THE EXTERNAL ILIAC ARTERY

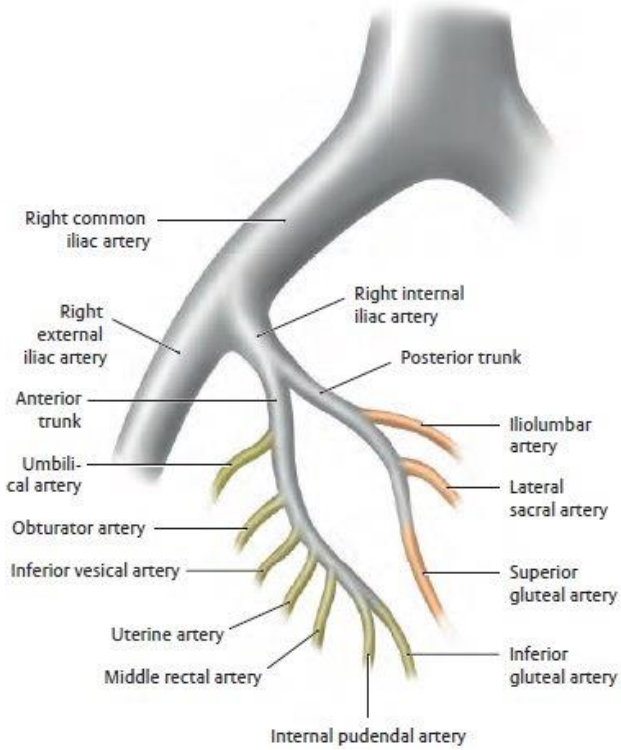
- under the parietal peritoneum at the medial edge of the psoas major muscle
- medially to the external iliac vein, crossed on the right by the ureter and appendix (in pelvic position), on the left by the mesocolon sigmoideum, bilaterally across the ovarian artery
- into the lacuna vasorum – femoral artery
- supplies the lower part of the anterior abdominal wall and the wall of the greater pelvis

- inferior epigastric artery
  - along the posterior wall of the inguinal canal, cranially and medially under the peritoneum into the vagina of the rectus abdominis muscle
  - at the level of the navel, anastomosing with branches of the superior epigastric artery.
  - pubic artery – then the obturator artery, anastomosing with the obturator artery (corona mortis)
- deep circumflex iliac artery
  - at the inguinal ligament
  - iliacus muscle, abdominal wall muscles

BRANCHES OF THE INTERNAL ILIAC ARTERY I.

dorsal trunk

- iliolumbal artery
  - posteriorly and cranially (under m. psoas major)
  - m. iliacus (r. iliacus), m. psoas and m. quadratus lumborum (r. lumbalis)
- lateral sacral artery
  - on the ventral surface of the sacrum
  - spinal canal, dorsal muscles
- superior gluteal artery
  - continuation of the dorsal trunk, into the suprapiriform foramen
  - mm. glutei



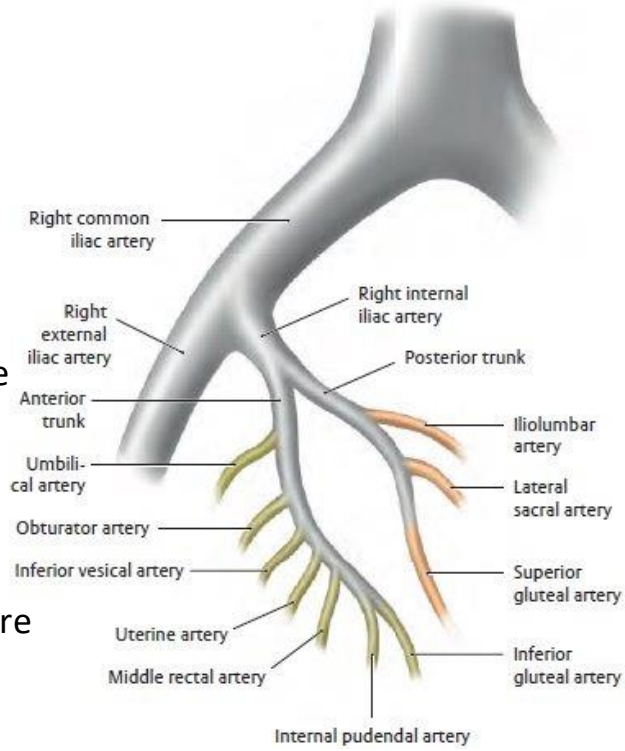
ventral trunk – parietal branches

- obturator artery
  - after m. obturatorius internus, before entering canalis obturatorius gives branch r. pubicus (anast. with r. pubicus from a. epigastrica inf., corona mortis), after exit r. anterior (adductors of thigh), r. posterior (pelvitrochanteric muscles, hip joint)
- inferior gluteal artery
  - between the roots of the sacral plexus into the infrapiriform foramen
  - mm. glutei

BRANCHES OF THE INTERNAL ILIAC ARTERY II.

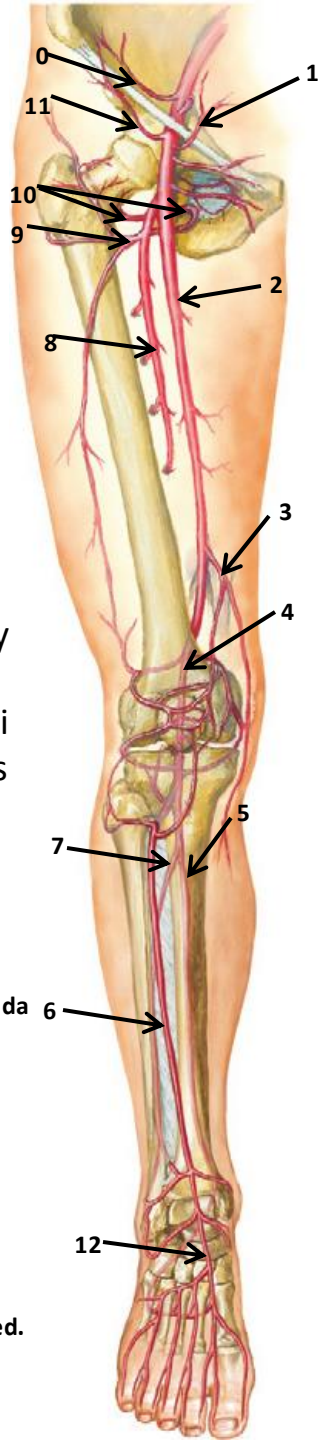
ventral trunk – visceral branches

- a. vesicalis superior
  - remnant of a. umbilicalis (proximal patent pars patens)
  - upper part of the urinary bladder
- a. vesicalis inferior
  - bottom of the urinary bladder, prostate and seminal vesicles/fornix vaginae
- a. rectalis media
  - distal part of the rectum, prostate, seminal vesicles, anastomosis with a. rectalis inferior
- a. uterina
  - in women to the edge of the uterus at the base of the lig. latum uteri (where it crosses under the ureter), then divides
  - ascending branch – tubal branch, ovarian branch; anastomoses with the ovarian artery
  - descending branch – ends as the vaginal artery
- ductus deferens artery
  - in men, ascending branch and descending branch (in the spermatic cord to the scrotum)
- internal pudendal artery
  - through the infrapiriform foramen, wraps around the ischial spine from behind, returns through the lesser sciatic foramen to the small pelvis
  - in Alcock's canal to the perineum
  - pars analis recti, pelvic floor, perineum, penis/clitoris (continuation of the trunk of the a. penis/a. clitoridis)
  - a. rectalis inferior – anastomosis with a. rectalis media
  - a. perinealis



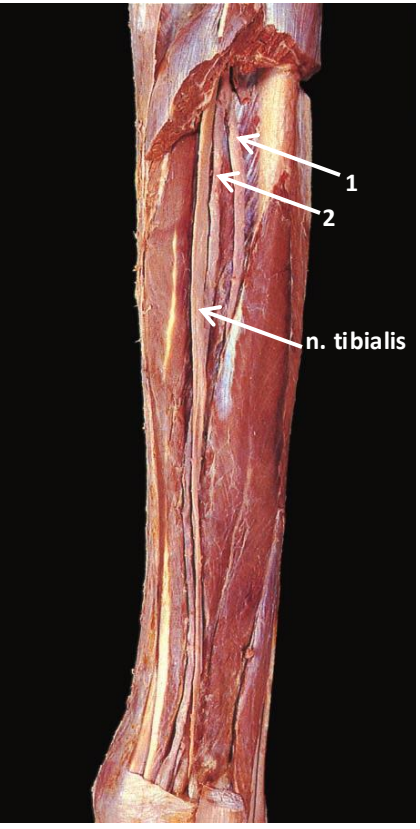
OVERVIEW OF THE ARTERIES OF LOWER EXTREMITY

- femoral artery
  - continuation of a. iliaca externa in lacuna vasorum, from trigonum femorale through canalis adductorius to fossa poplitea
  - with v. femoralis and n. femoralis
  - projection of the course on the line connecting the center of lig. inguinale and medial condyle of femur
- popliteal artery
  - continuation of the femoral artery from the adductor hiatus to the distal edge of the popliteus muscle
  - with the popliteal vein and tibial nerve
  - **anterior tibial artery** – through the interosseous membrane of the leg between the extensors, runs with two veins and the deep peroneal nerve, continues as the dorsal artery of the foot
  - **posterior tibial artery** – from the distal edge of m. popliteus under arcus tendineus musculi solei, runs along the deep layer of flexors behind malleolus medialis into canalis malleolaris with two vv. and n. tibialis where it divides into medial and lateral plantar **arteries**; into canalis Hyrtli it gives **fibular artery**



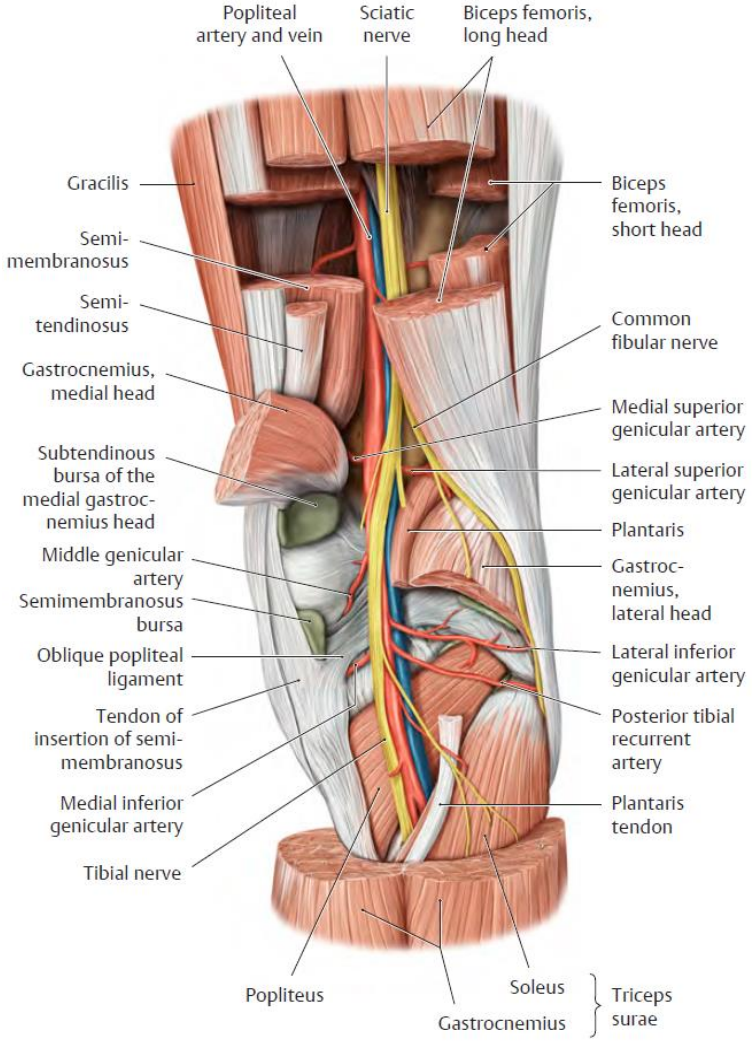
0 a. circumflexa ilium profunda
1 a. epigastrica superficialis
2 a. femoralis
3 a. genus descendens
4 a. poplitea
5 a. tibialis posterior
6 a. tibialis anterior
7 a. fibularis
8 a. profunda femoris
9 a. cirumflexa femoris lat.
10 a. circumflexa femoris med.
11 a. circumflexa ilium spf.
12 a. dorsalis pedis

OVERVIEW OF THE ARTERIES OF LOWER EXTREMITY

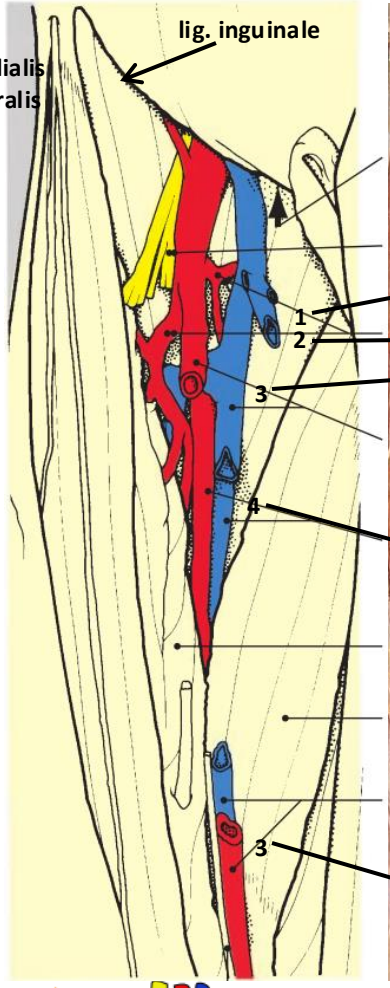


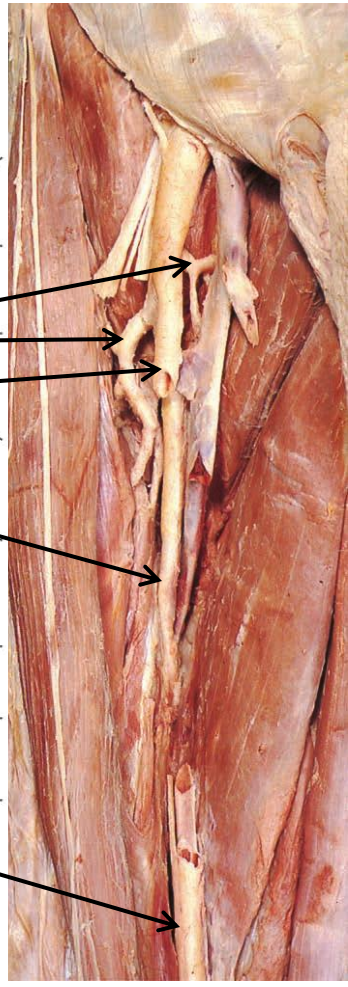
right leg
1. a. fibularis
2. a. tibialis posterior

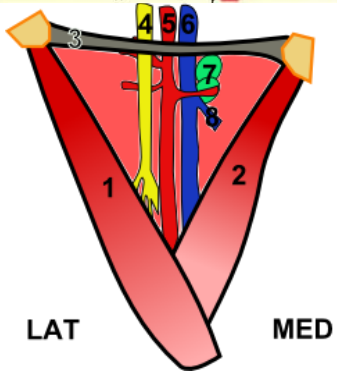
1 a. circumflexa femoris medialis
2 a. circumflexa femoris lateralis
3 a. femoralis
4 a. profunda femoris



trigonum femorale dextrum and fossa iliopectinea







1 – m. sartorius
2 – m. adductor longus
3 – lig. inguinale
4 – n. femoralis
5 – a. femoralis
6 – v. femoralis
7 – nodi lymphatici inguinales profundi
8 – v. saphena magna