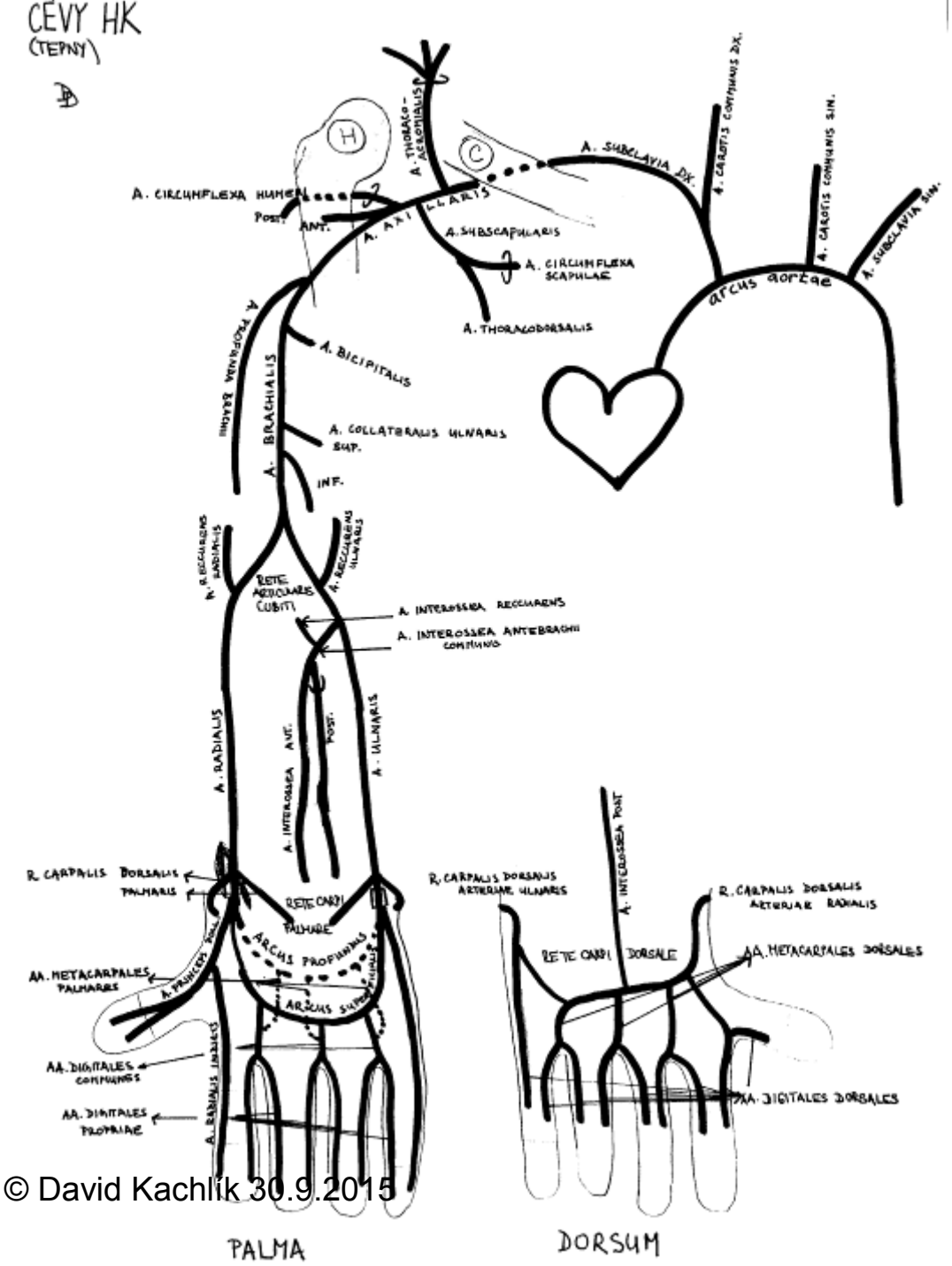
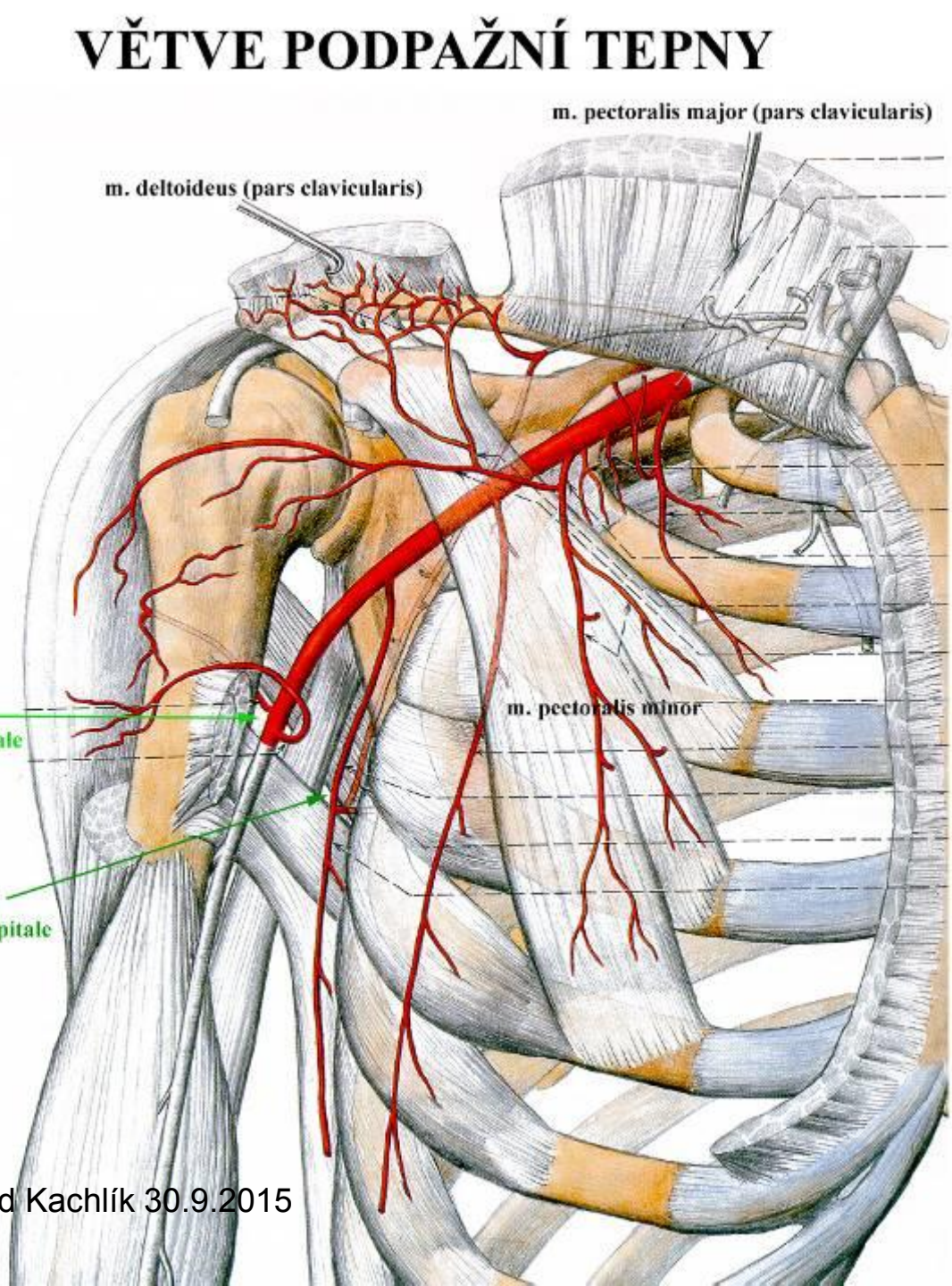
Arteries of upper limbs



Arteria axillaris

- origin: from a. subclavia to clavicula
- end: collum chirurgicum = inferior margin of m. pectoralis major
- 3 parts related to m. pectoralis minor
- division of plexus brachialis in fasciculi
- bifurcation of n. medianus



Arteria axillaris - branches

pars suprapectoralis:

- a. thoracica superior – *variable caliber*
  - *for upper intercostal spaces*
- a. thoracoacromialis
  - rr. pectorales
  - r. acromialis
  - r. deltoideus
  - r. clavicularis
- rr. subscapulares (*for m. subscapularis*)

Arteria axillaris - branches

pars retropectoralis:

- a. subscapularis – *short and thick*
  - a. circumflexa scapulae
    - *foramen omotricipitale*
  - a. thoracodorsalis
    - *runs with n. thoracodorsalis*
    - *muscular and musculo-cutaneous flap of m. latissimus dorsi*

- a. thoracica lateralis
  - *runs with n. thoracicus longus in periphery*
  - for m. serratus anterior

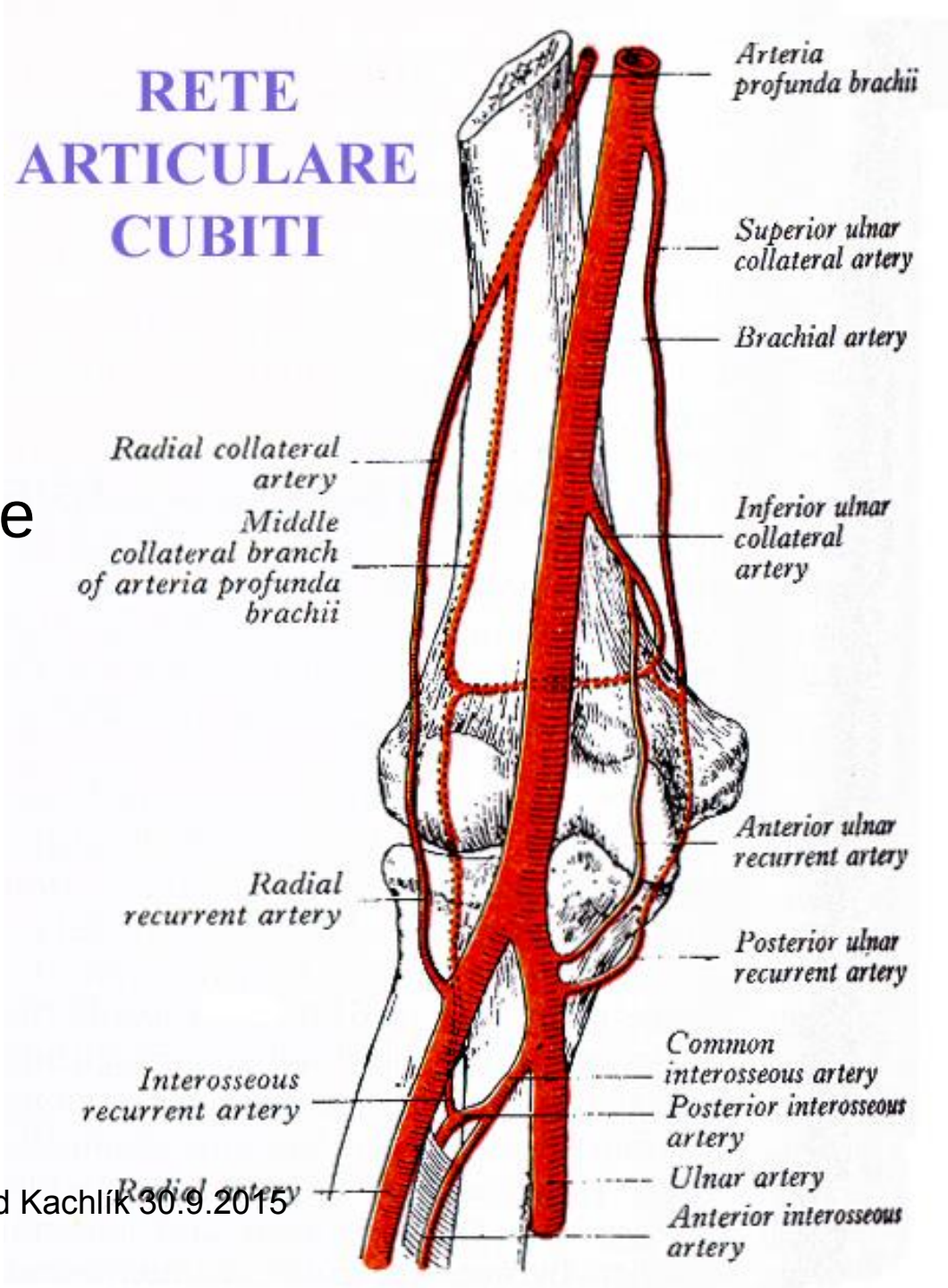
Arteria axillaris - branches

pars infrapectoralis:

- a. circumflexa humeri ant. – *thin*
- a. circumflexa humeri post.
  - *around collum chirurgicum humeri*
  - *foramen humerotricipitale*
  - *danger of injury in fractures of collum chirurgicum humeri*
  - *in 10% common trunk with a. profunda brachii*

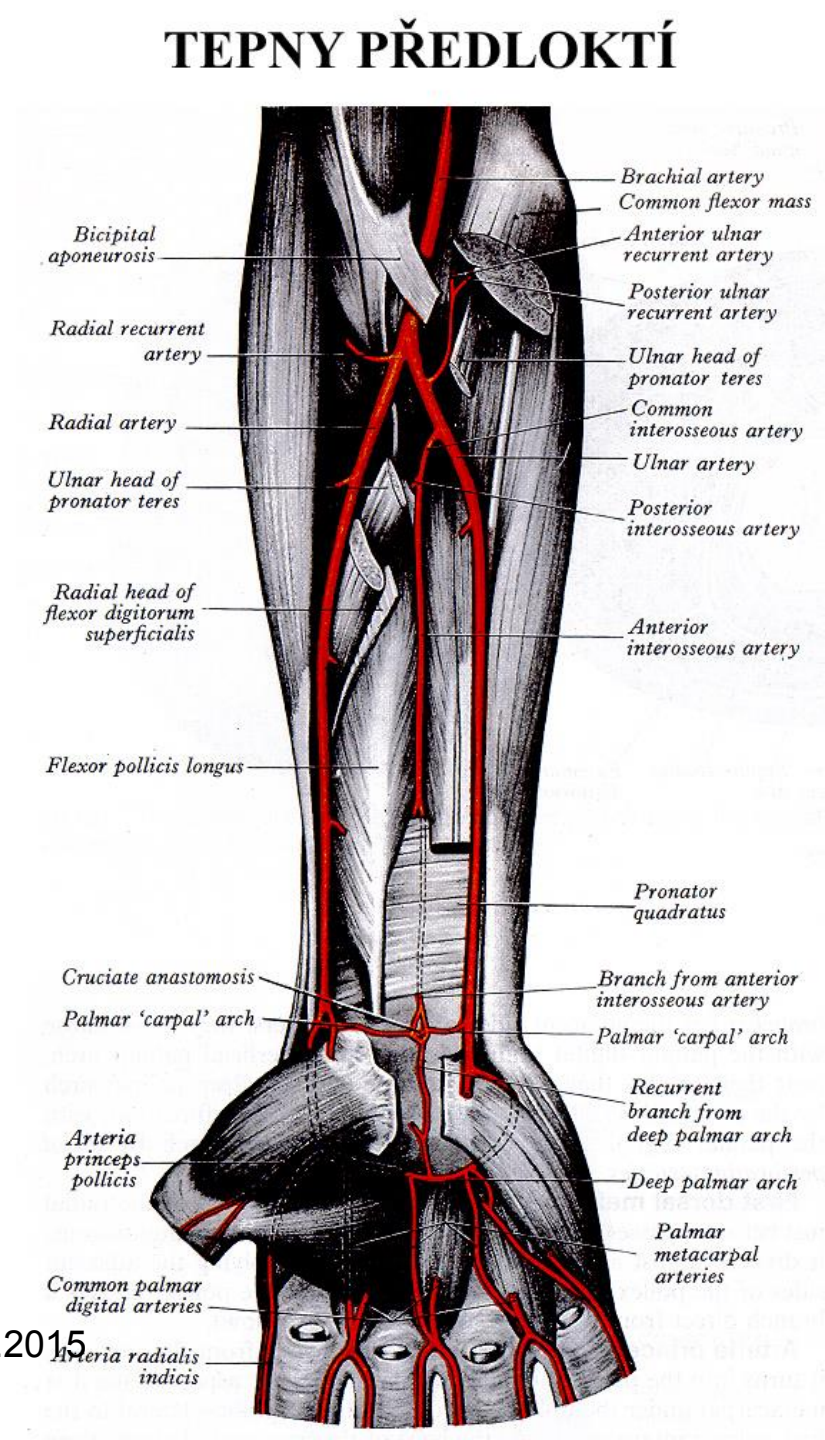
Arteria brachialis

- collateral circulation
- rete articulare cubiti
- septum intermusculare mediale brachii
- blood pressure measurement (proximal to fossa cubitalis)
- catheterization site (proximal to fossa cubitalis)
- variation: a. brachioradialis (14%)

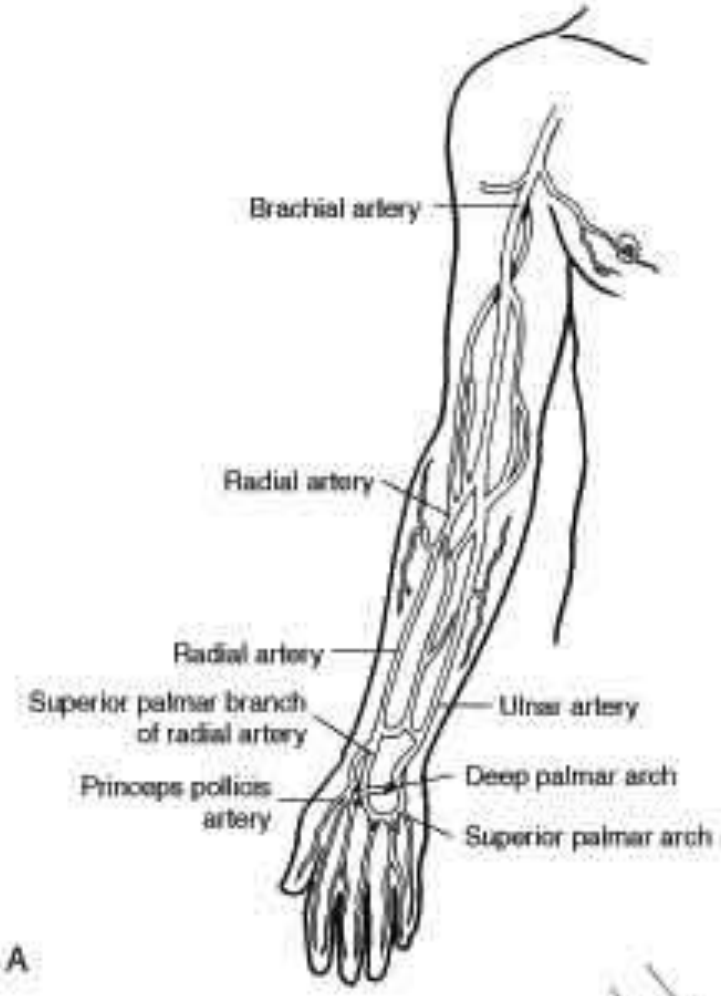


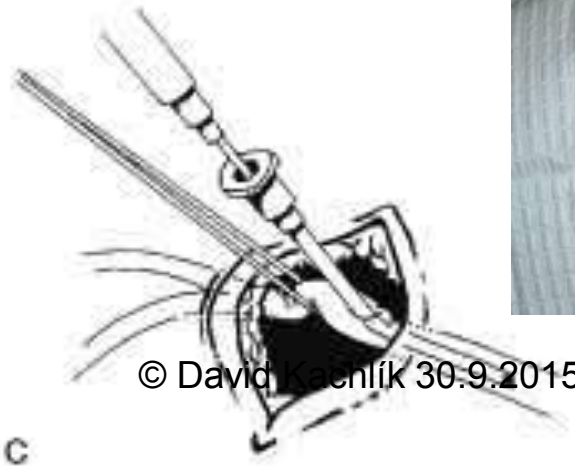
Arteria radialis

- fossa cubitalis
- foveola radialis
- Guiot‘s space
- pulse measurement (proximal to carpus)
- catheterization site (proximal to carpus)
- measurement of pH, pO_2, pCO_2 - *Astrup*
- high clinical relevance of variations (22%)
- ↓*atherosclerosis*,
- ↑*mediocalcinosis*

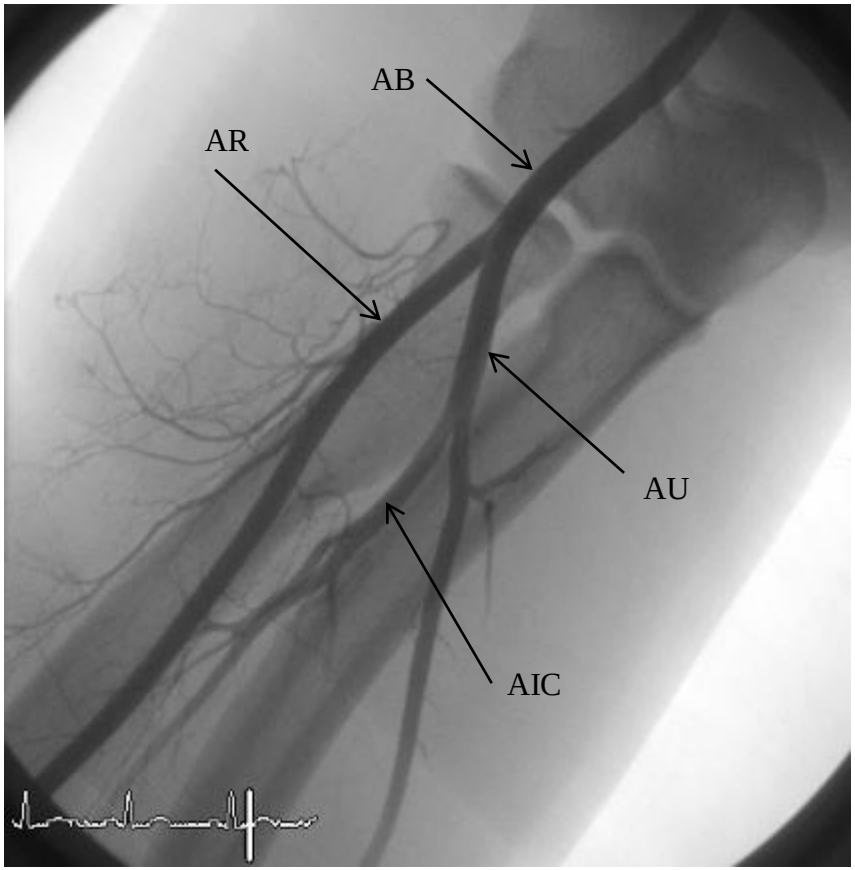


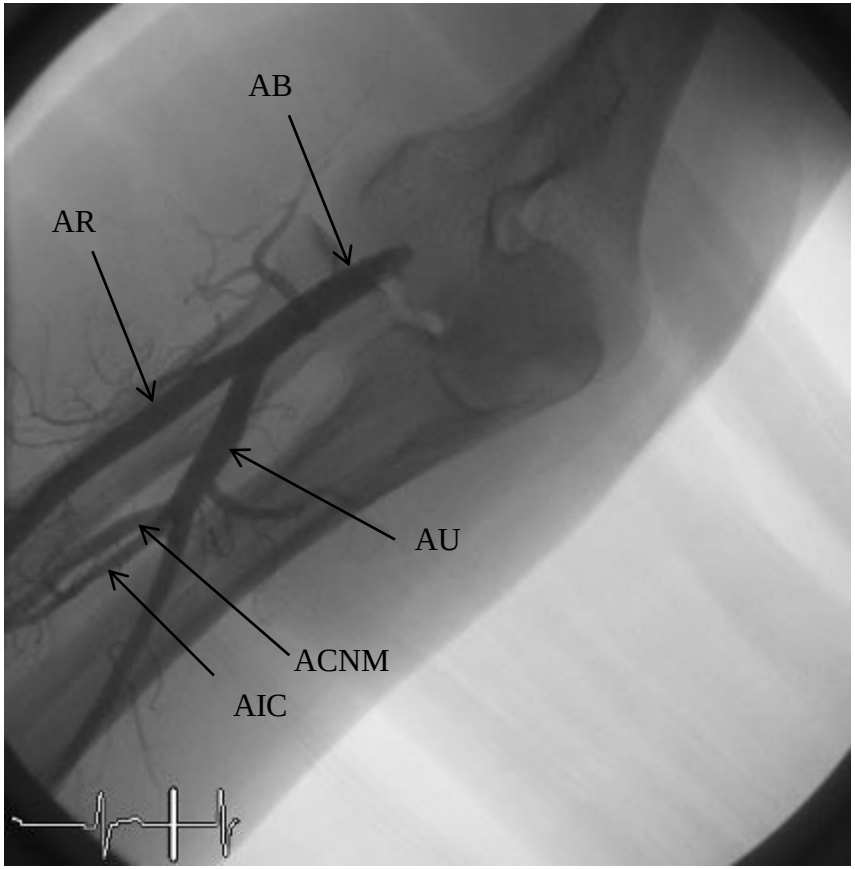
Radial catheterization





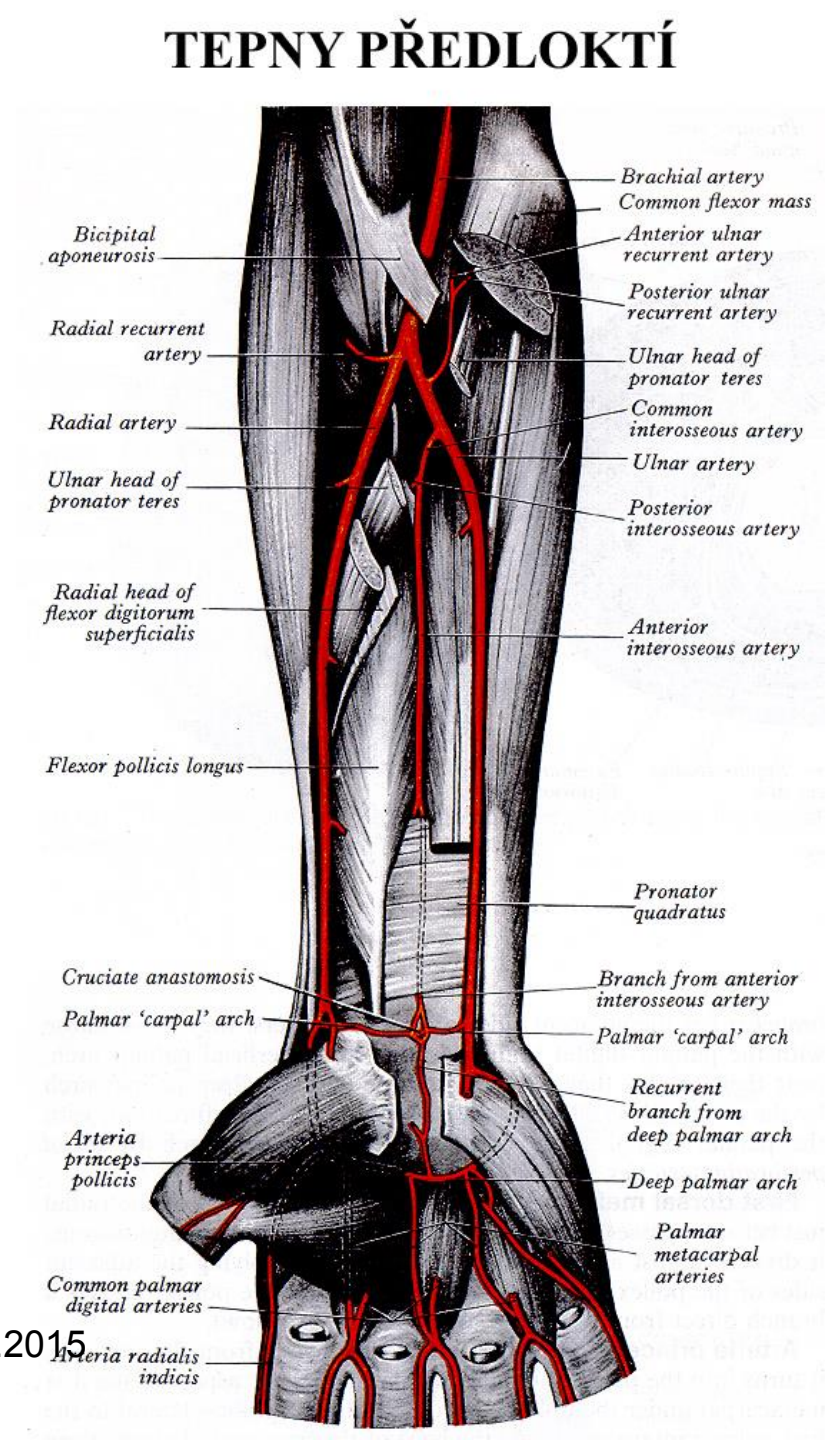
Angiography of forearm arteries - norm



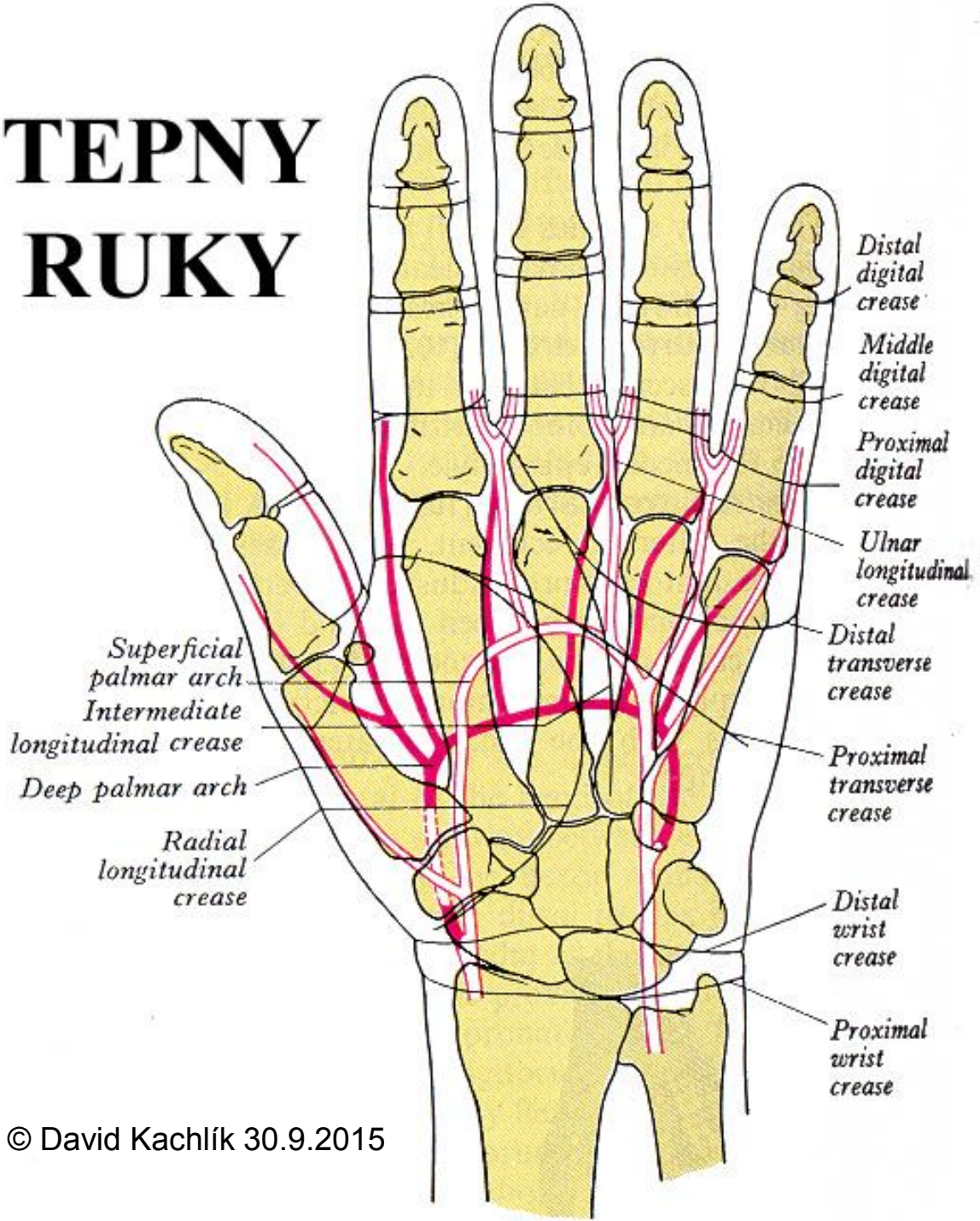


Arteria ulnaris

- fossa cubitalis
- canalis ulnaris Guyoni
- runs with n. ulnaris
- catheterization site (proximal to carpus)
- low clinical relevance of variations (3%)
- ↓*atherosclerosis*
- ↑*mediocalcinosis*



- arcus palmaris superficialis
- arcus palmaris profundus
- rete carpi dorsale



Aorta

- aorta ascendens
- arcus aortae
- <u>aorta descendens</u>
  - pars thoracica
  - pars abdominalis

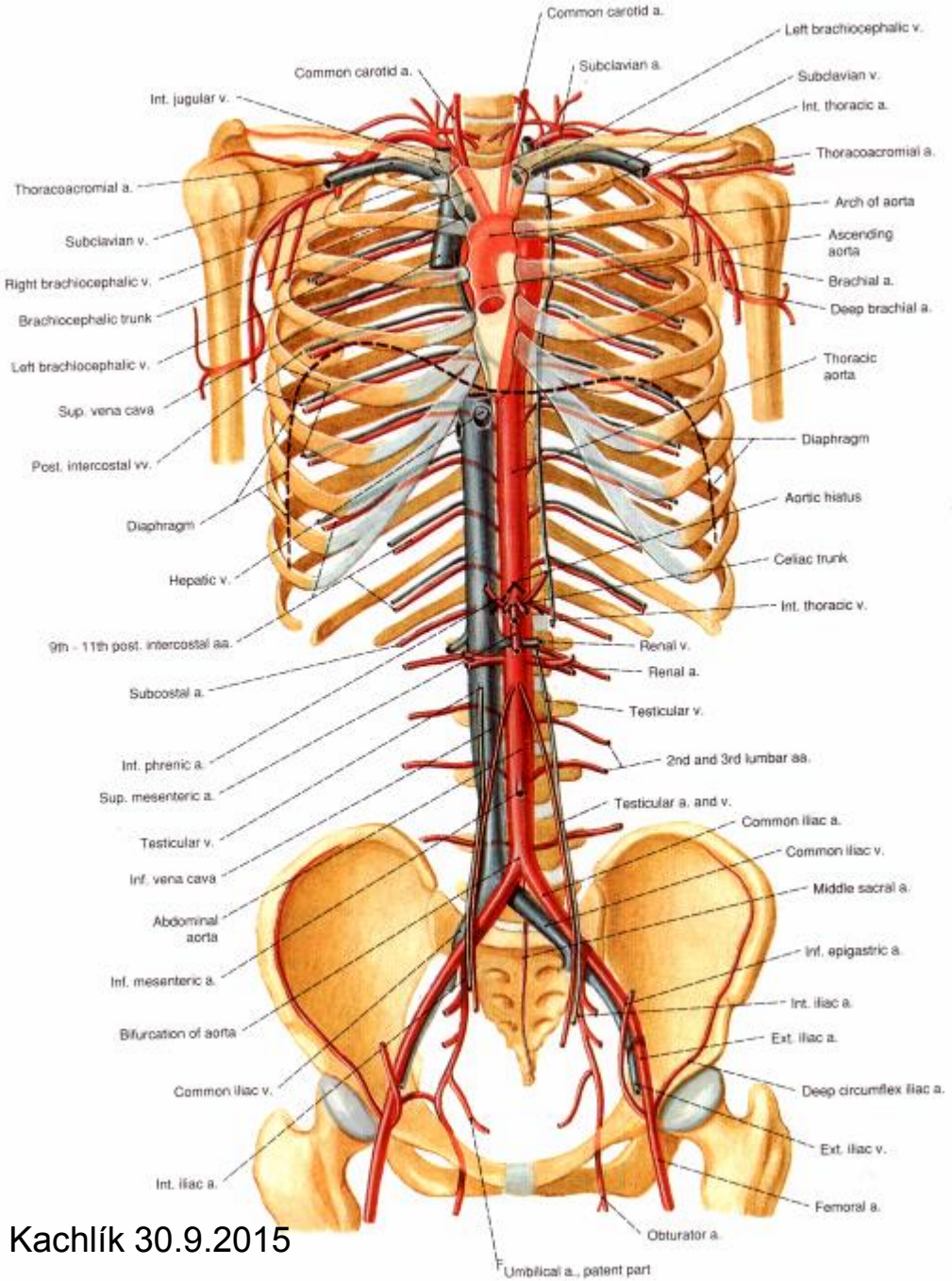
atherosclerosis

aneurysms

replacement

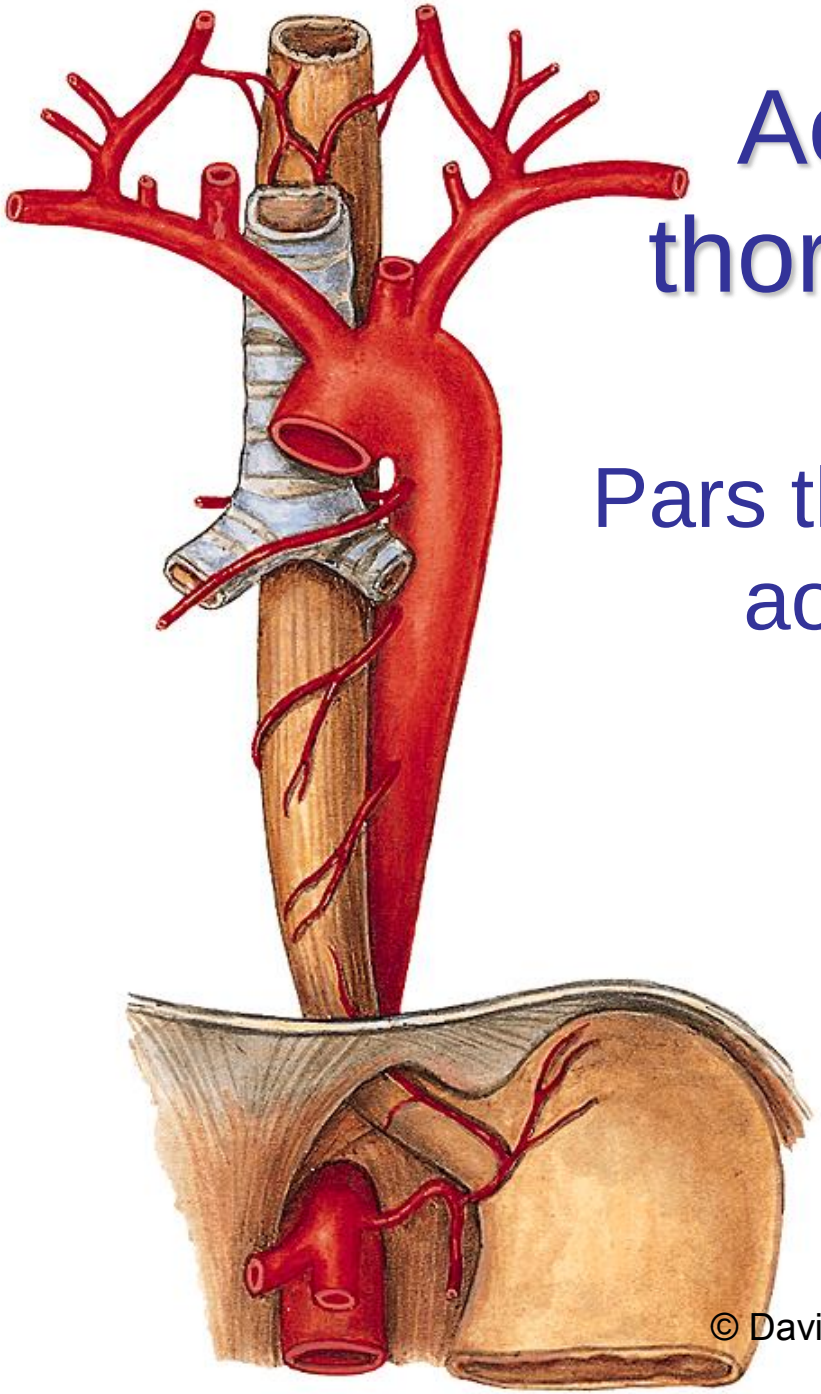
cystic medionecrosis

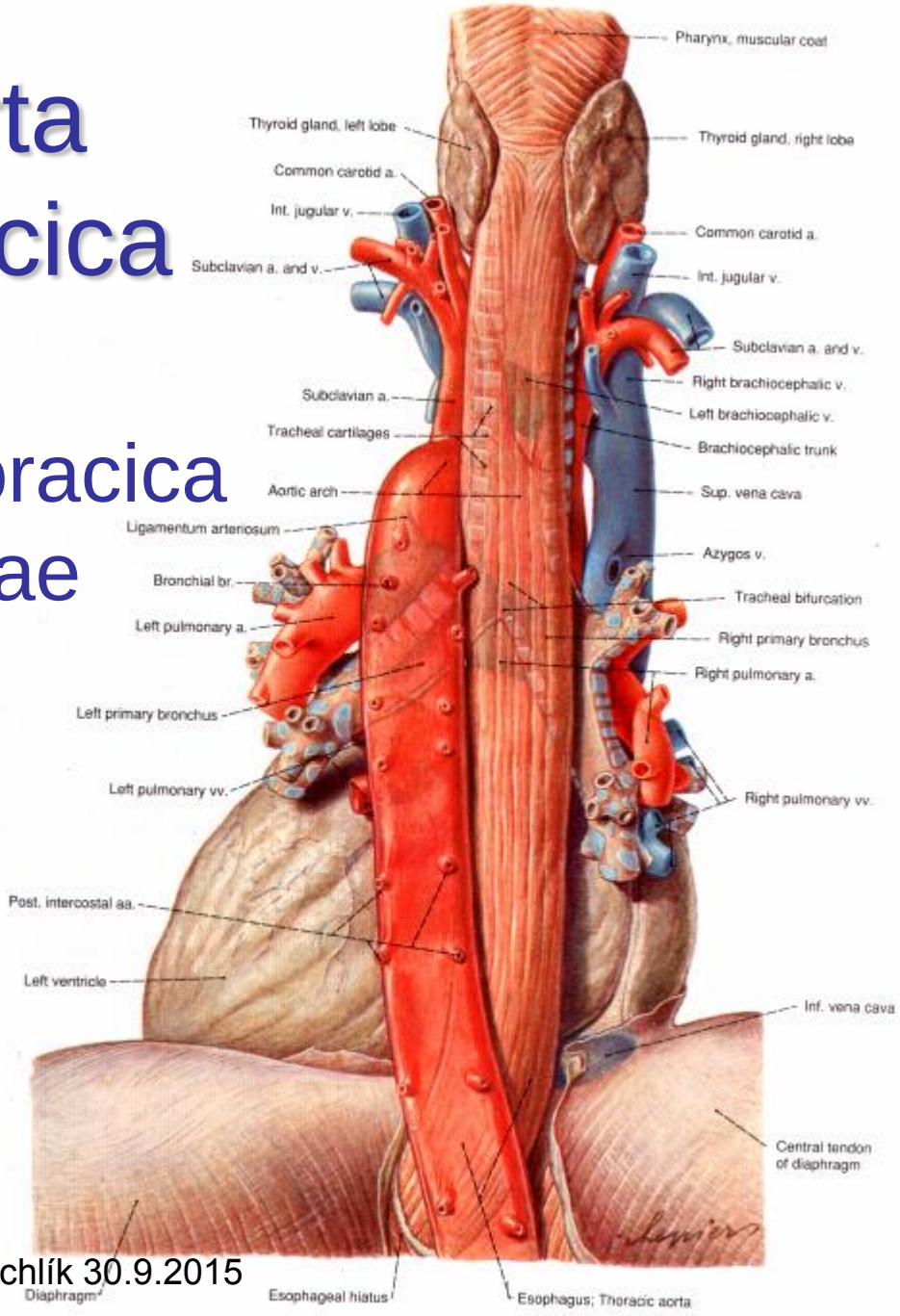
Takayashu‘s arteritis (granulomatous)



Aorta thoracica

Pars thoracica aortae





Aorta thoracica

parietal branches: *paired*

- aa. intercostales posteriores 3th-11th
- a. subcostalis
- a. phrenica superior (*rudimentary*)

visceral branches: *larger number of small branches*

- rr. bronchiales
  - 1 right – most often from a. intercostalis tertia
  - 2 left directly from aorta thoracica
- rr. oesophageales
- rr. pericardiaci
- rr. mediastinales

Aorta thoracica - topography

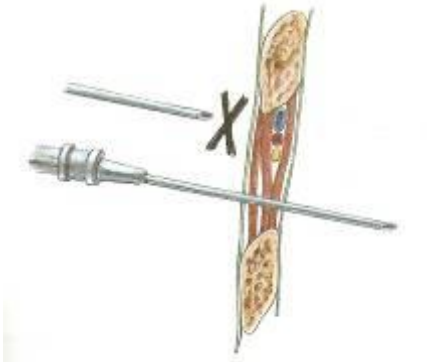
- mediastinum inferius posterius
- hiatus aorticus diaphragmatis
  - lig. arcuatum medianum (aortic arcade) - *compression*

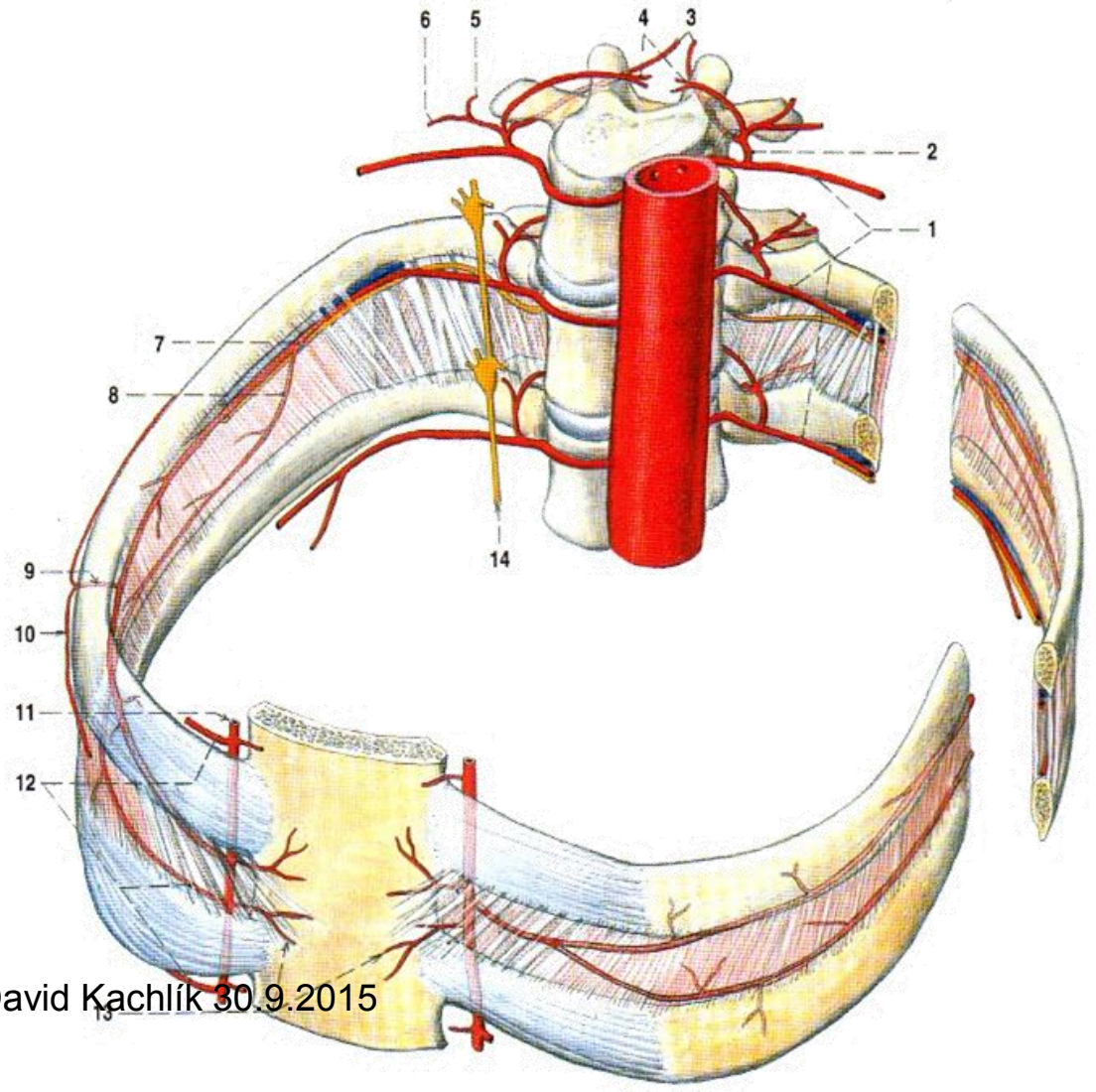
relations:

- oesophagus: right to aorta → dorsally
- ductus thoracicus: right to aorta
- v. azygos: right to aorta
- v. hemiazygos: left to aorta → dorsally

Intercostal spaces supply *aa. intercostales posteriores*

- r. dorsalis
  - r. cutaneii
  - rr. spinales
- r. collateralis
- r. cutaneus lat.
  - rr. mammarii lat.



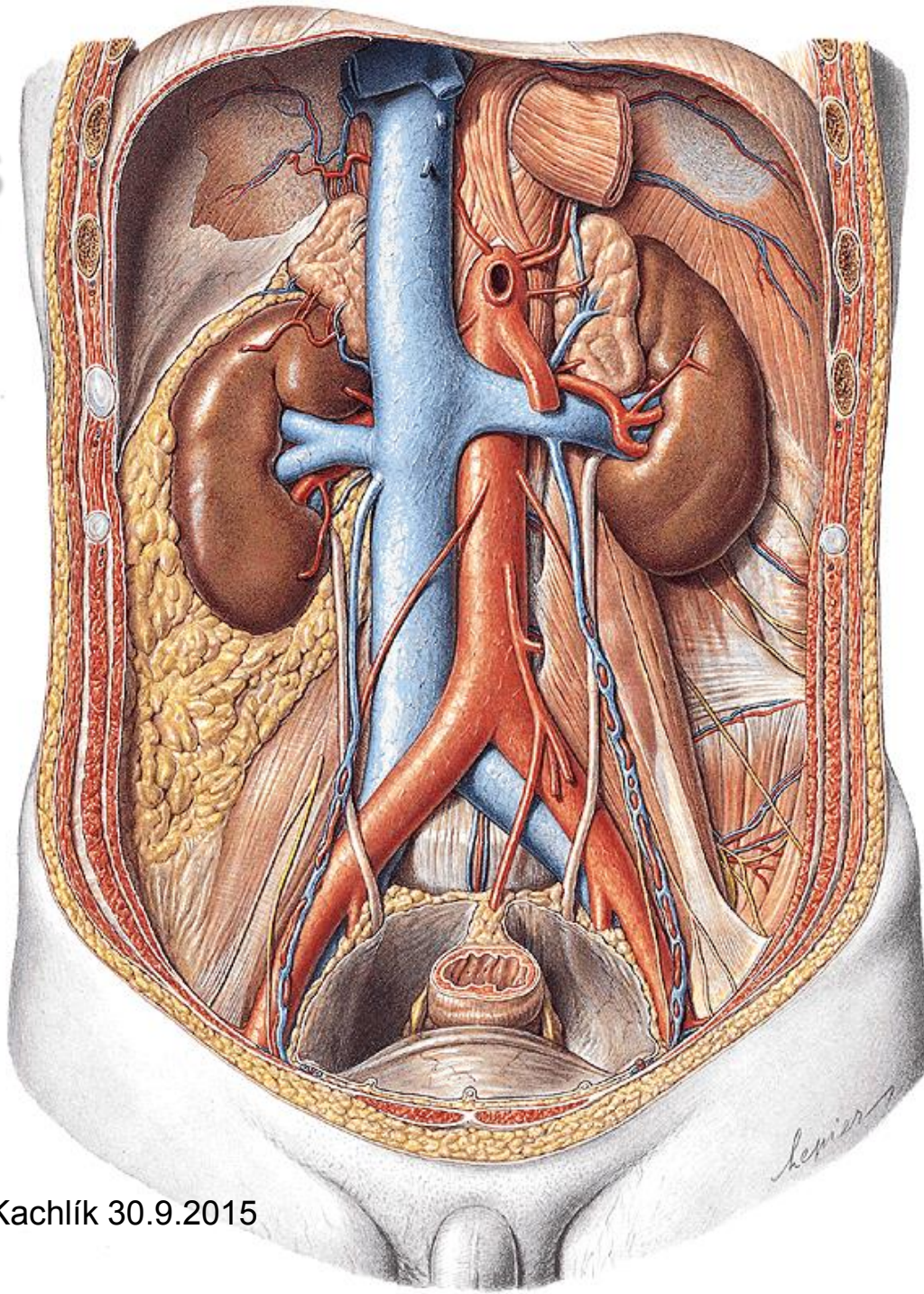


Aorta abdominalis

origin: hiatus oesophageus diaphragmatis

end: bifurcatio aortae L4

- retroperitoneum, slightly left to vertebral column
- v. cava inferior + ductus thoracicus right to aorta abdominalis



Aorta abdominalis

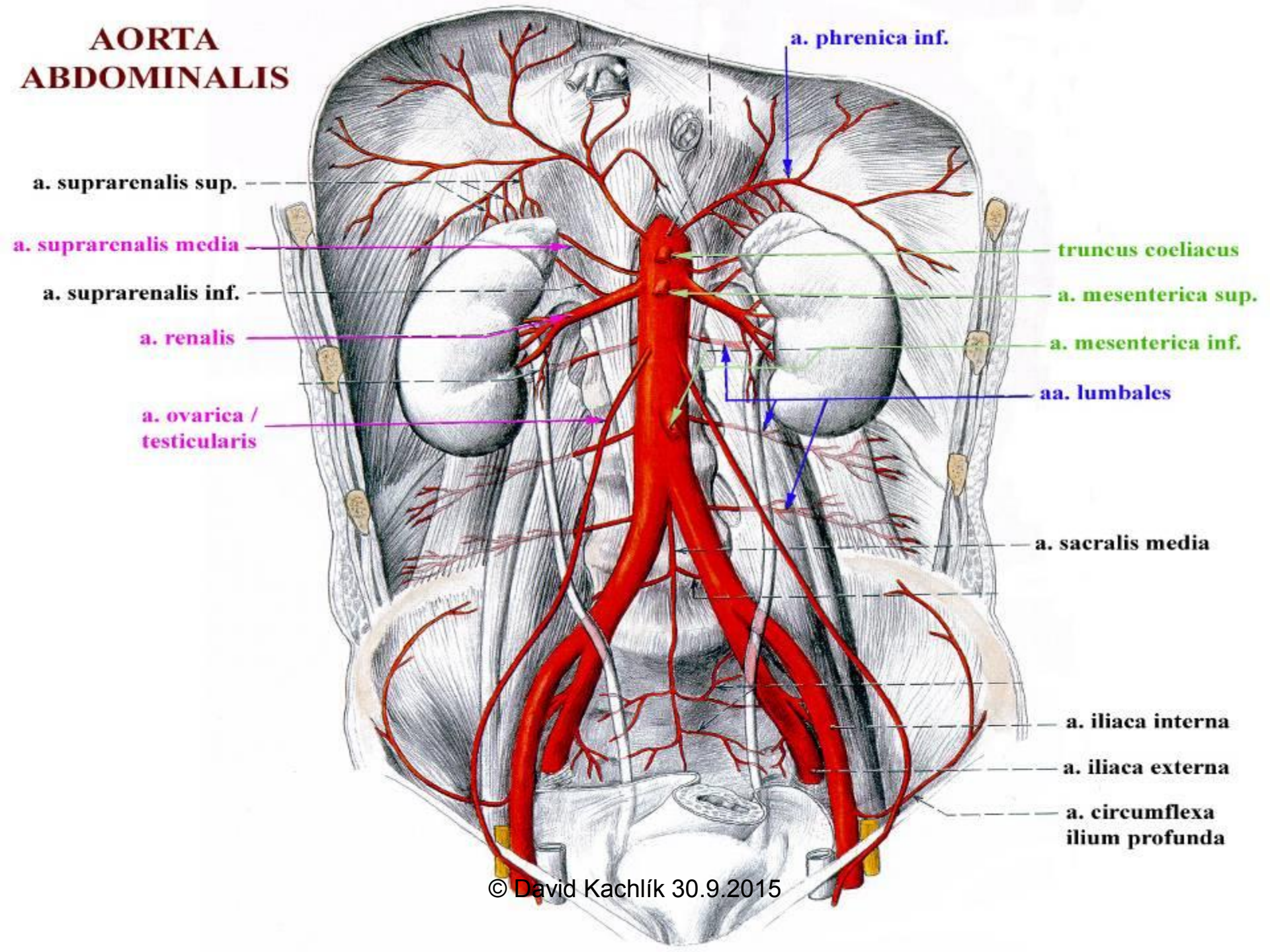
parietal branches: *paired*

- a. phrenica inf.
- aa. lumbales 1st - 4th
- rr. retroperitoneales (6-7)

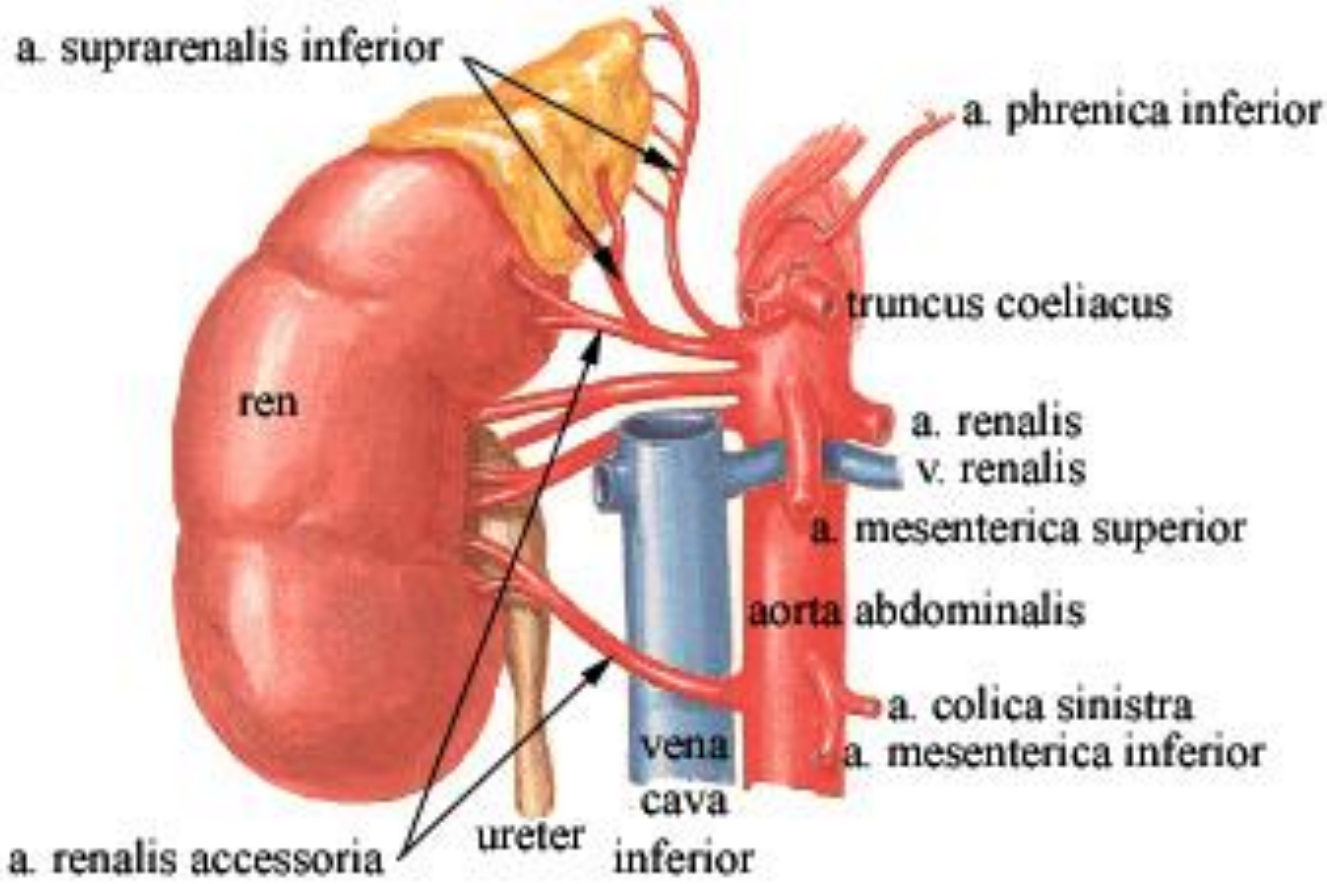
visceral branches: *paired*

- a. suprarenalis media
- a. renalis
- a. renalis accessoria (30%)
- a. testicularis♂ / ovarica♀

AORTA ABDOMINALIS



ARTERIA RENALIS ACCESSORIA



- enters upper pole (less), hilum or inferior pole (more) of kidney
- incidence 30%

Aorta abdominalis

terminal branches: *paired*

- a. iliaca communis

terminal branches : *unpaired*

- a. sacralis mediana

visceral branches : *unpaired*

- truncus coeliacus
- a. mesenterica superior
- a. mesenterica inferior

Unpaired visceral branches

- truncus coeliacus

= foregut

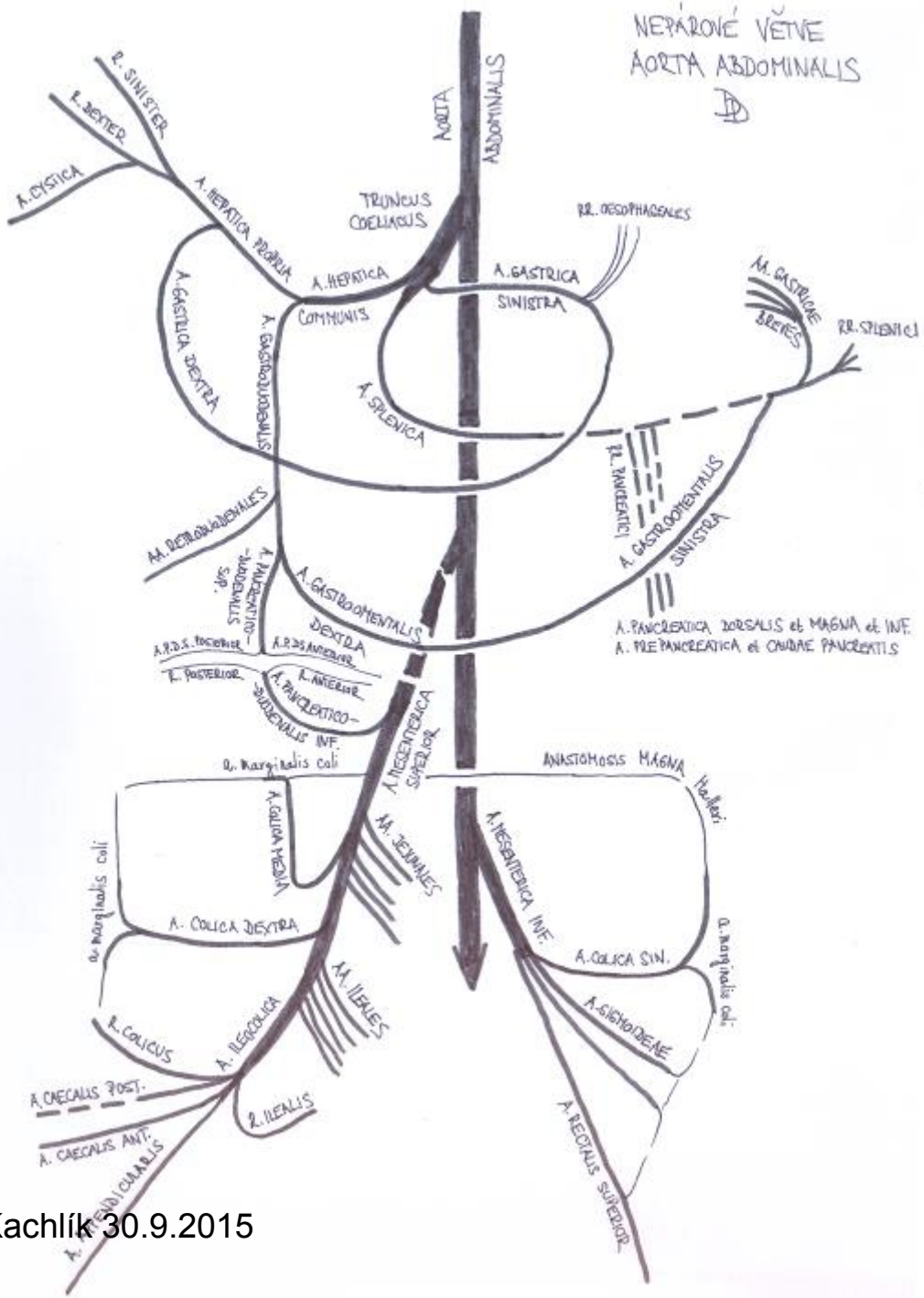
- a. mesenterica superior

= midgut

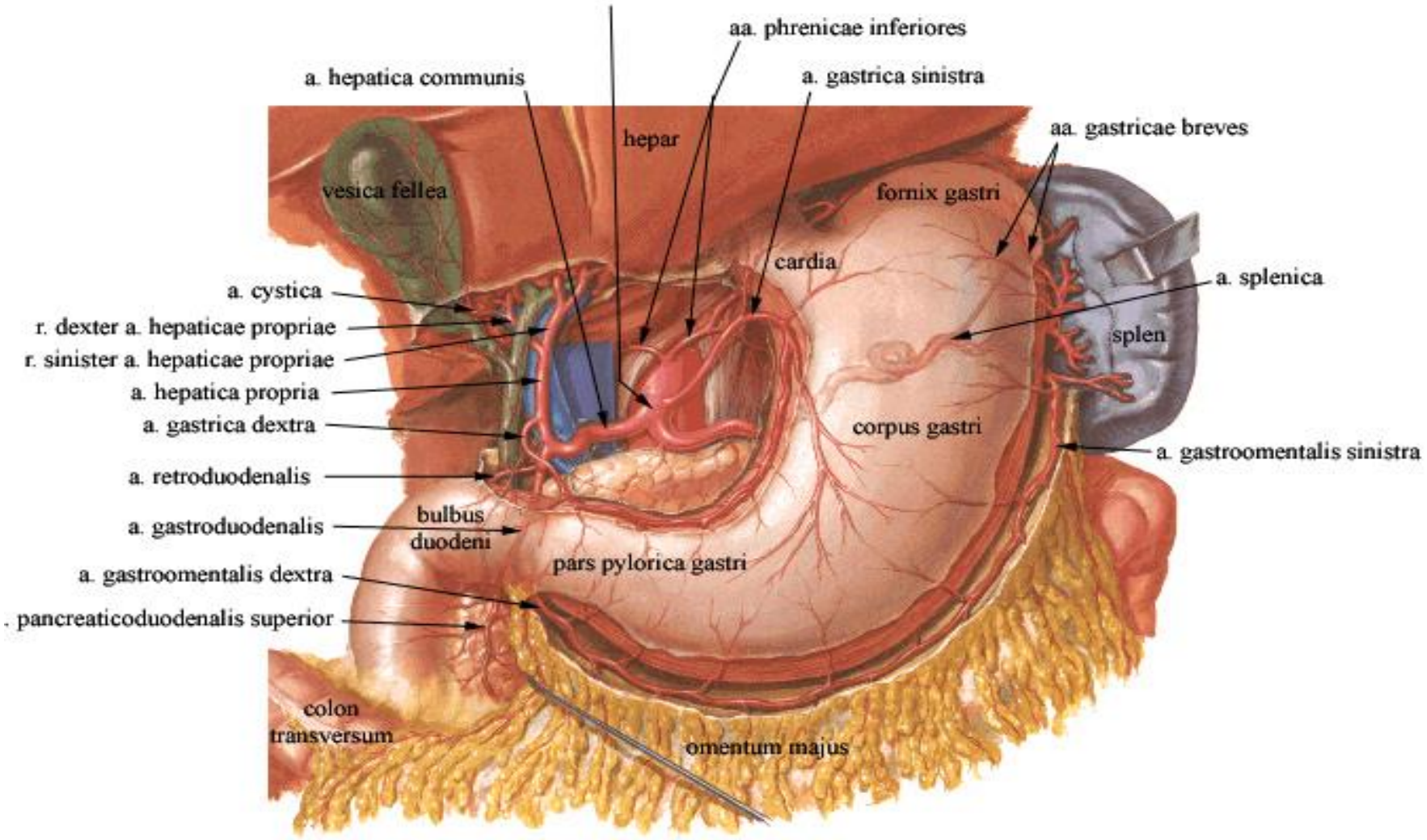
- a. mesenterica inferior

= hindgut

- venous blood into v. portae system and further into liver
- *knowledge of individual organs' blood supply due to resection and transplantation*



TRUNCUS COELIACUS



Gaster (stomach)

truncus coeliacus

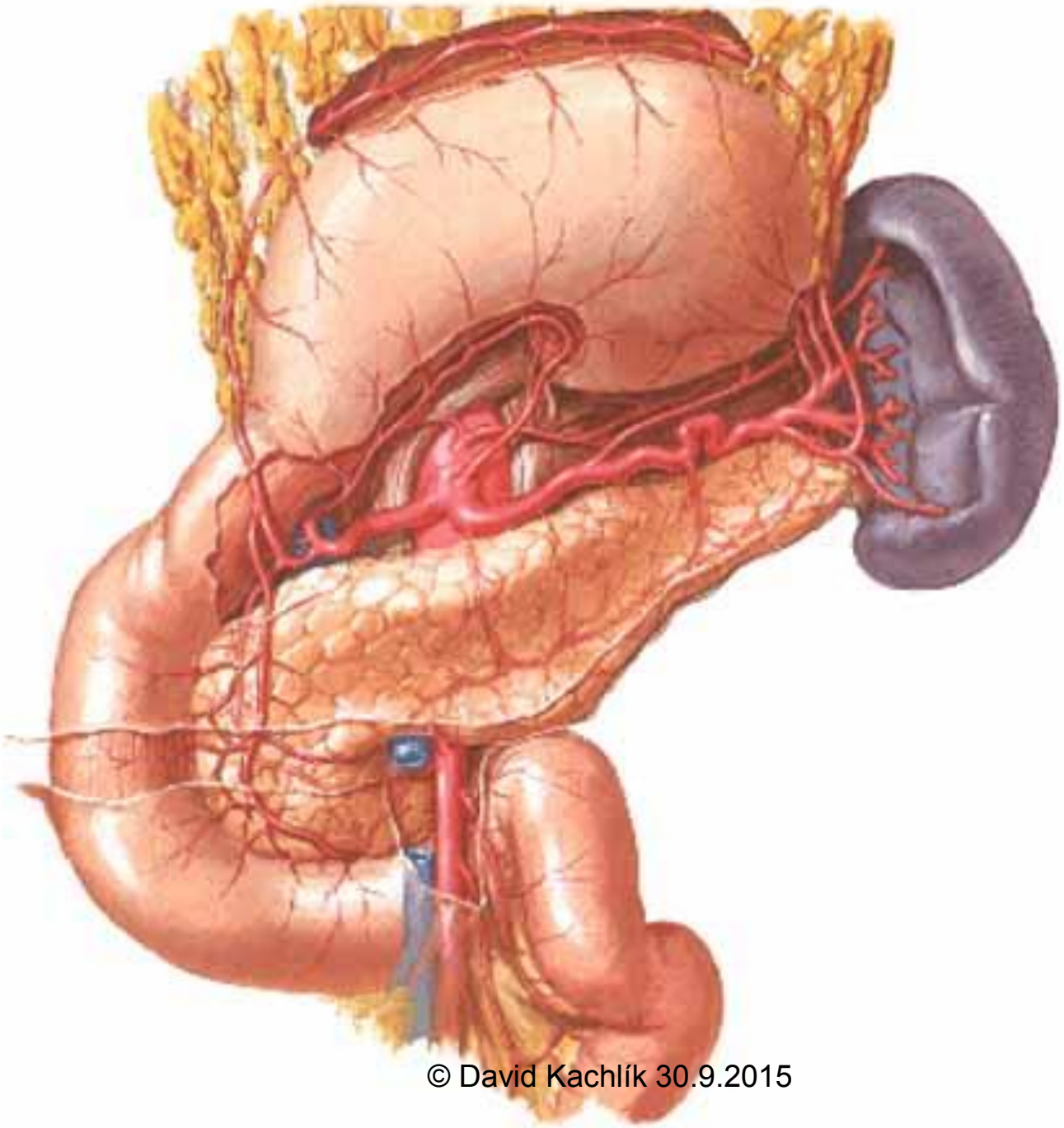
- ➔ a. gastrica sin.
- ➔ a. hepatica communis
  - ➔ a. hepatica propria ➔ a. gastrica dx.
  - ➔ a. gastroduodenalis ➔ a. gastroomentalis dx.
- ➔ a. splenica
  - ➔ a. gastroomentalis sin.
  - ➔ aa. gastricae breves (*fundus*)
  - ➔ a. gastrica posterior (80 %)

arcus gastricus (curvatura minor)

arcus gastroomentalis (curvatura major)

- ımunis
- - sup.
- ıs ant.

aı r



Jejunum + ileum

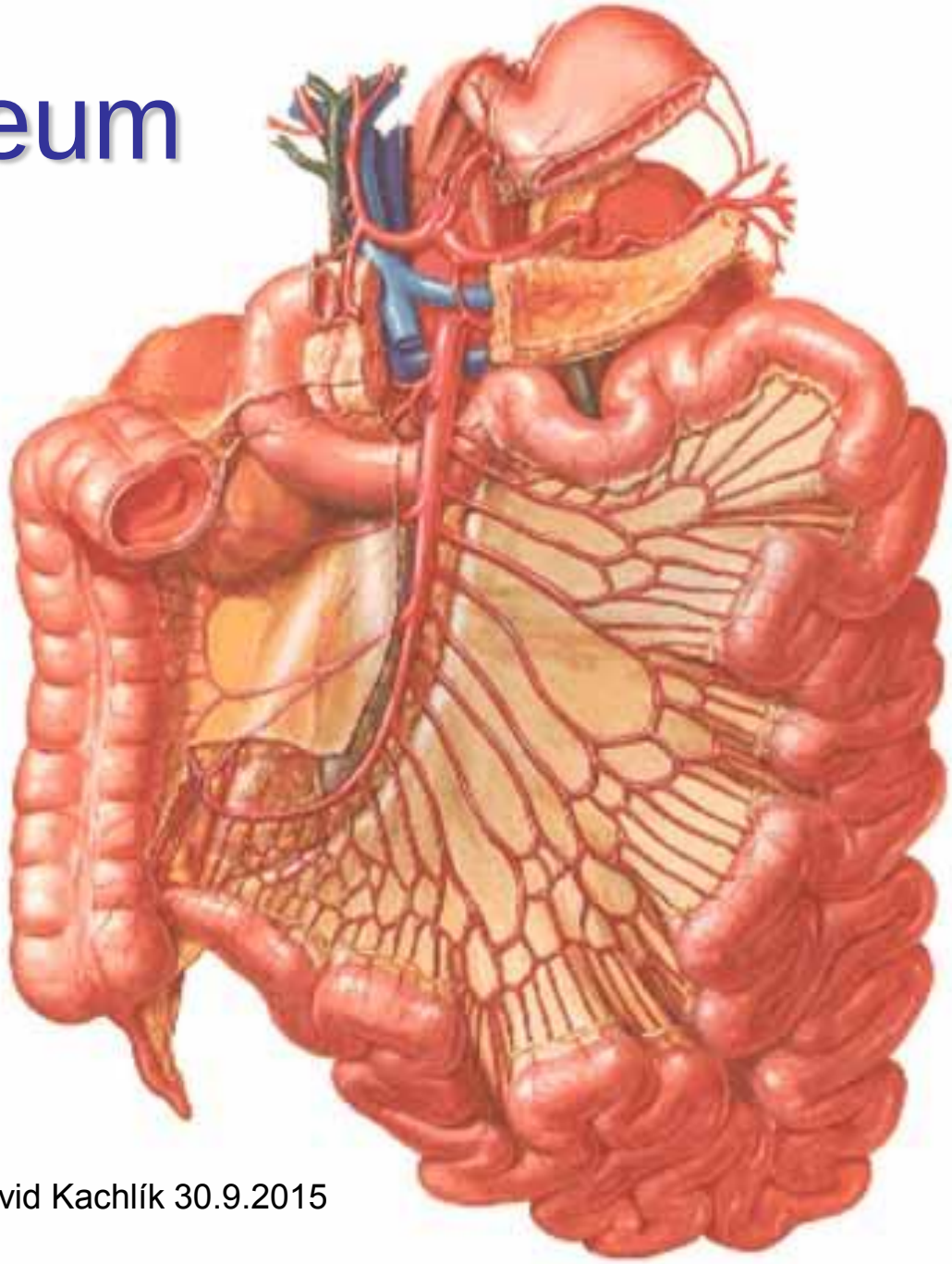
a. mesenterica sup.

- aa. jejunales
- aa. ileales
- a. ileocolica

arcades

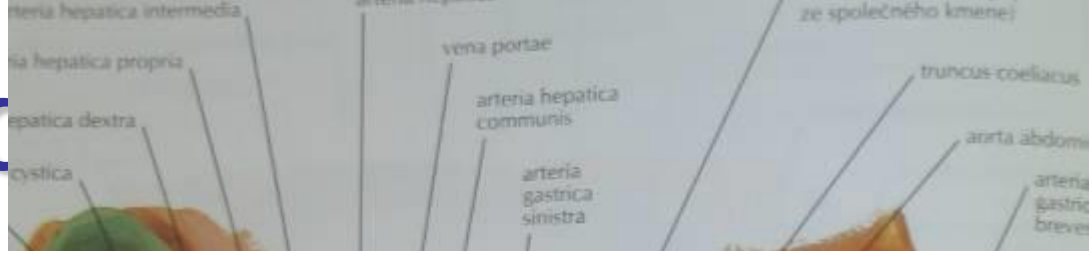
parallel Dwigth‘ s artery

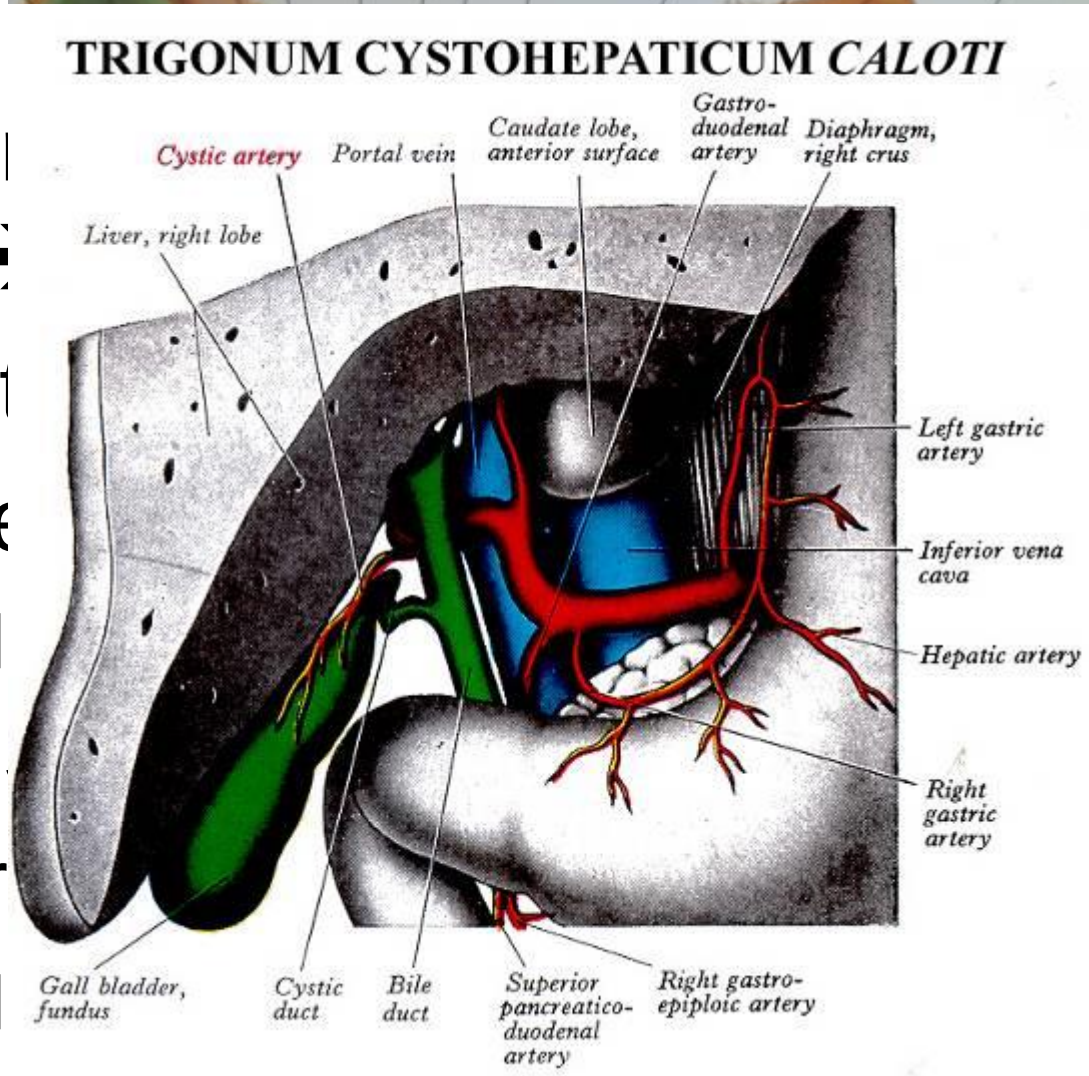
→ arteriolae rectae

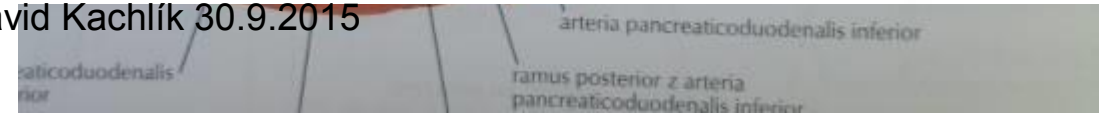


Liver anc

truncus coeliacus
➔ a. hepatica pr
(*porta hepatis*) ➔
r. dexter ➔ a. cyst
- r. hepaticus acce
  - branch from AM
  - branch from AG
- a. hepatica aber
  - branch from AM







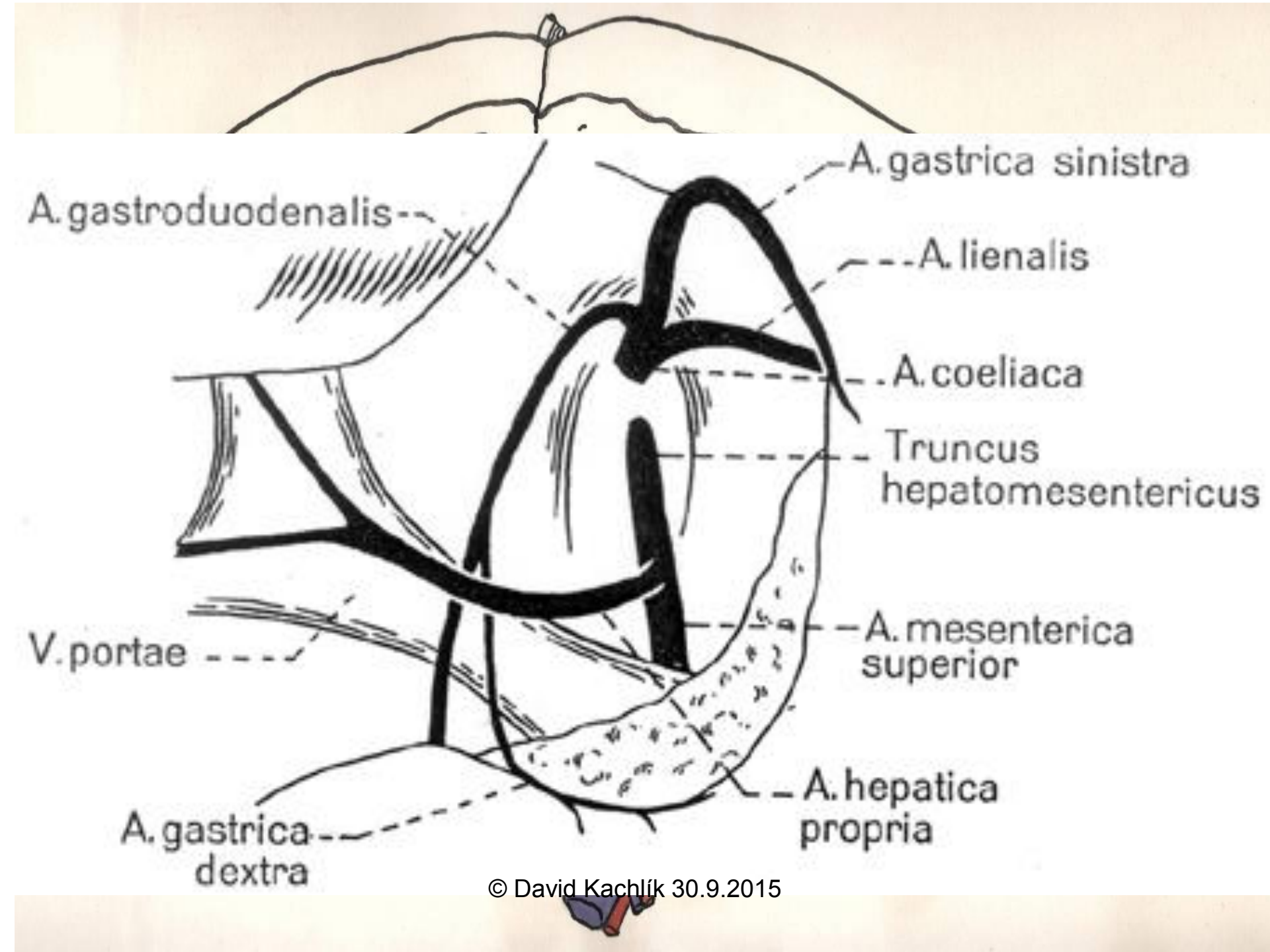
Arteria hepatica - variations

- normal anatomy – 75%

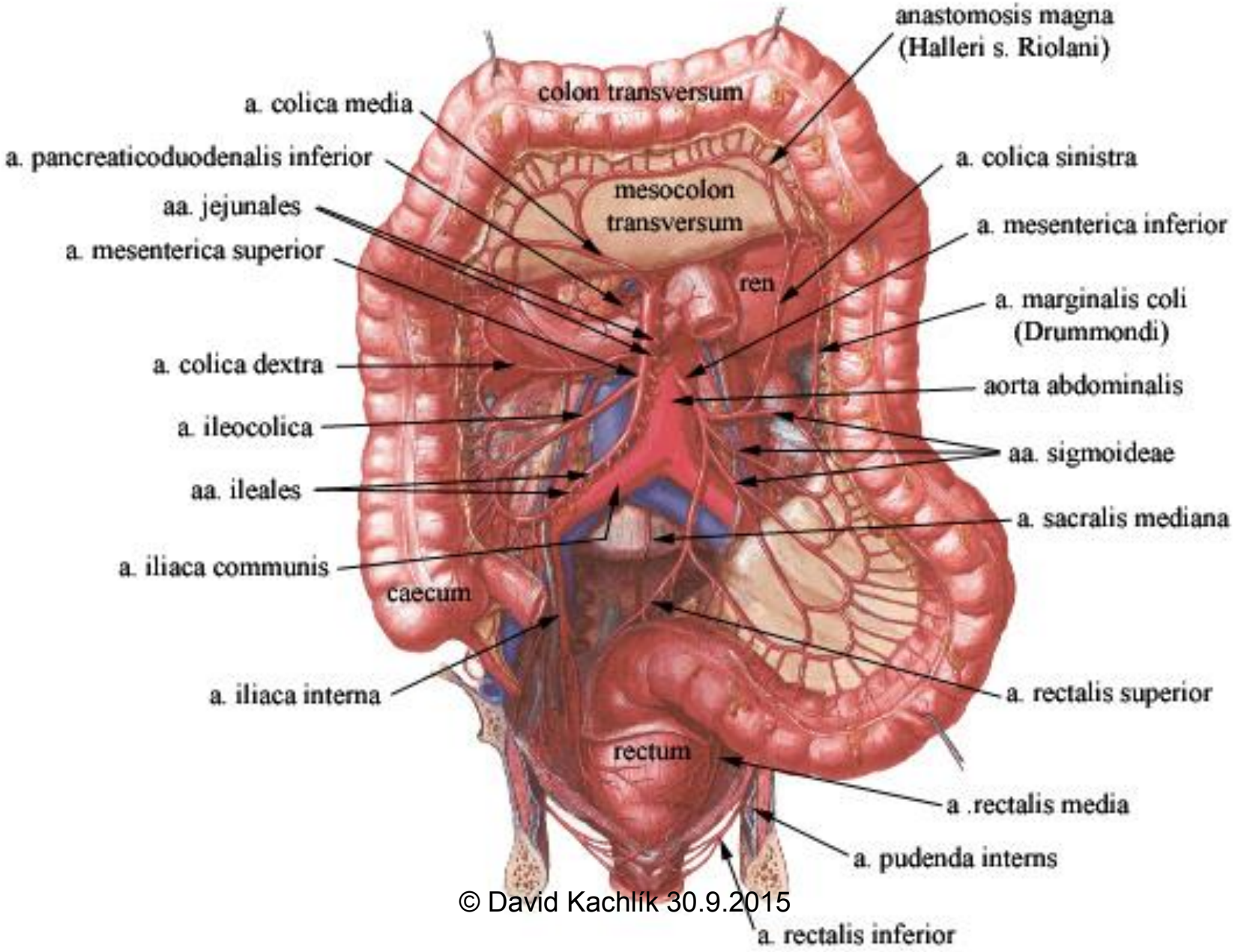
accessory x aberrant (replaced artery)

- r. dx. accessorius / aberrans from AMS – 10%
- r. sin. accessorius / aberrans from AGS – 10%
- separate r. dx+sin. aberrans from AGS – 2%
- whole AHC aberrans from AMS – 2%
- whole AHC directly from TC – 1%

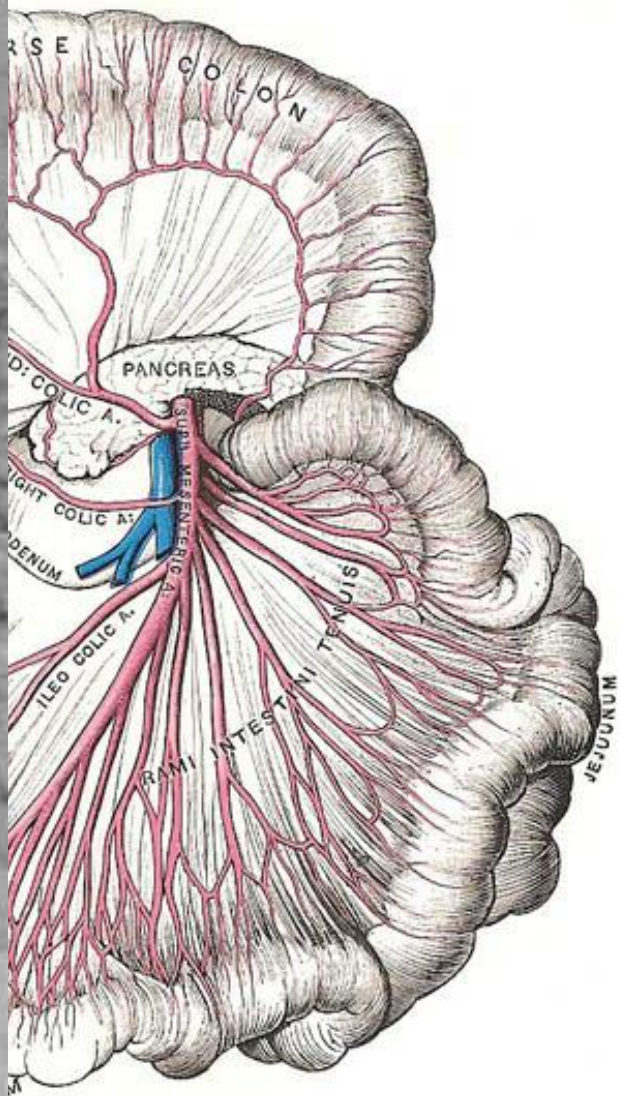
Hiatt JR et al. Surgical anatomy of the hepatic arteries in 1000 cases. Ann Surg. 1994 July; 220(1): 50–52.



ARTERIAE MESENTERICAE

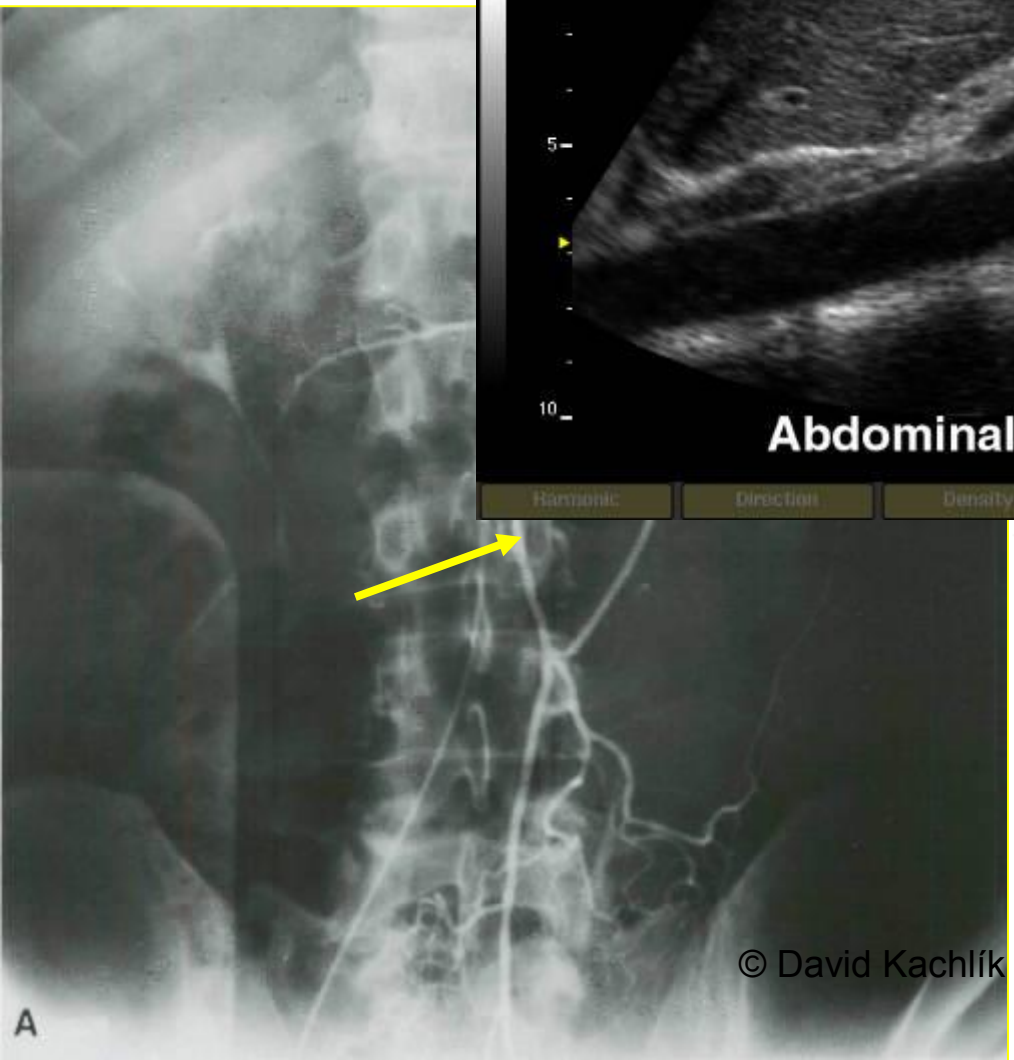


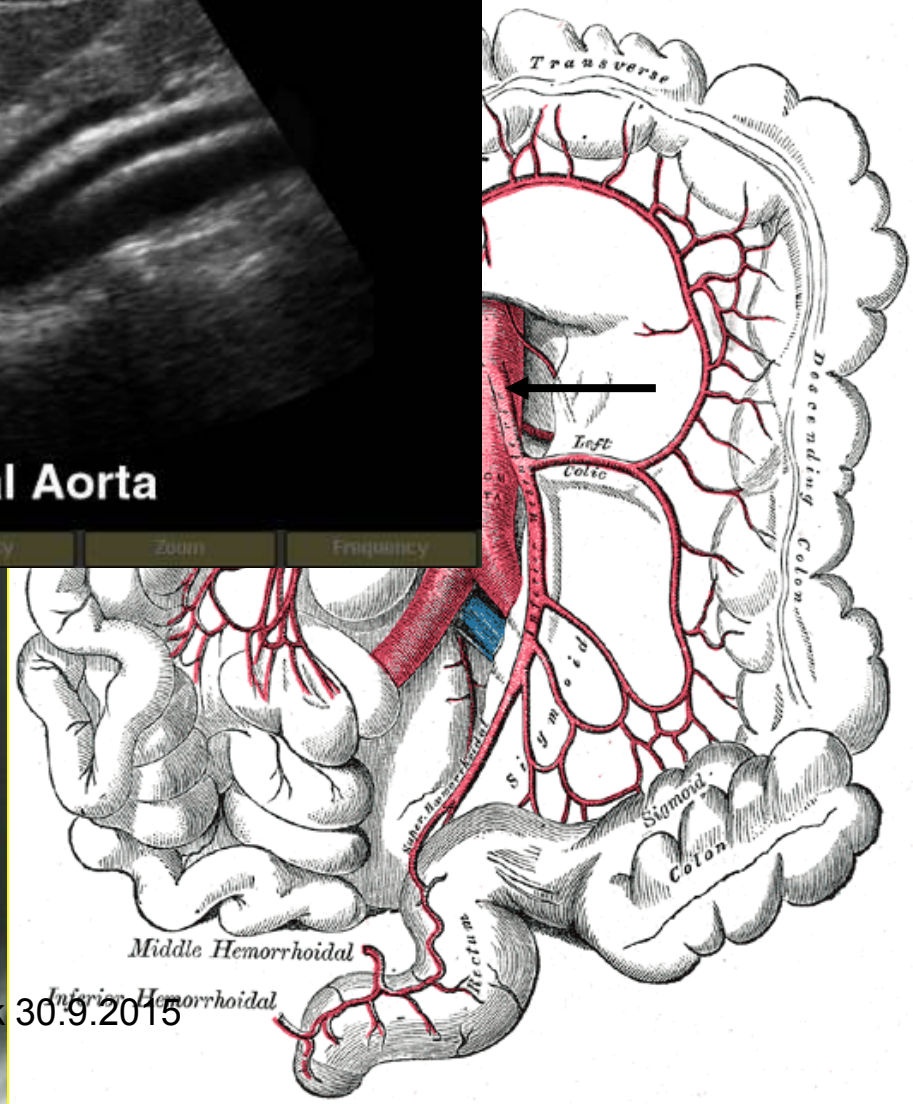
superior



Arteria mesenterica inferior

- L3



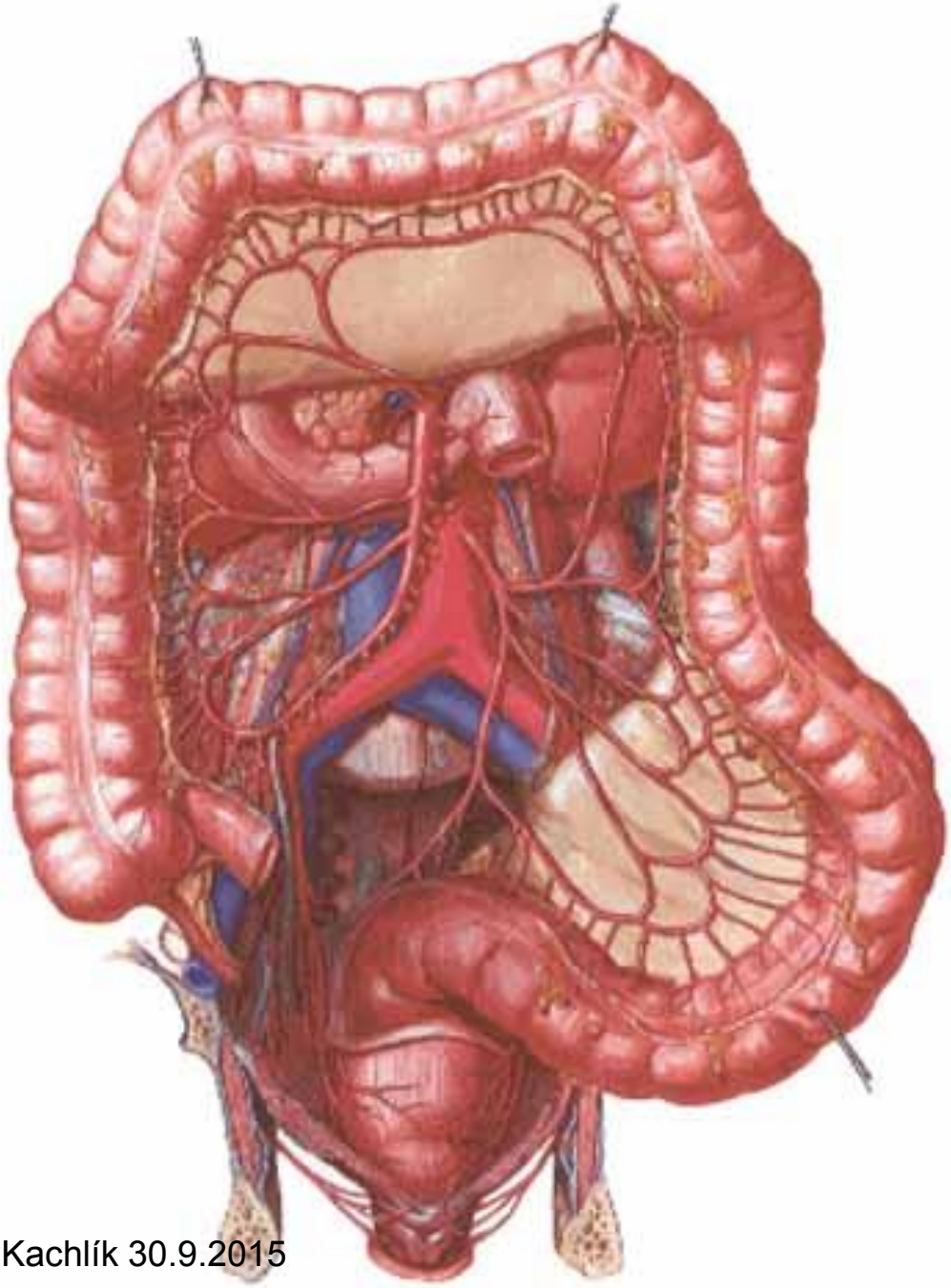


Larg

- a. mesenterica
  - ➔ a. ileocolica
    appendicularis
  - ➔ a. colica dx.
  - ➔ a. colica me
- a. mesenterica
  - ➔ a. colica sin
  - ➔ aa. sigmoide

arteria marginalis (

anastomosis magn



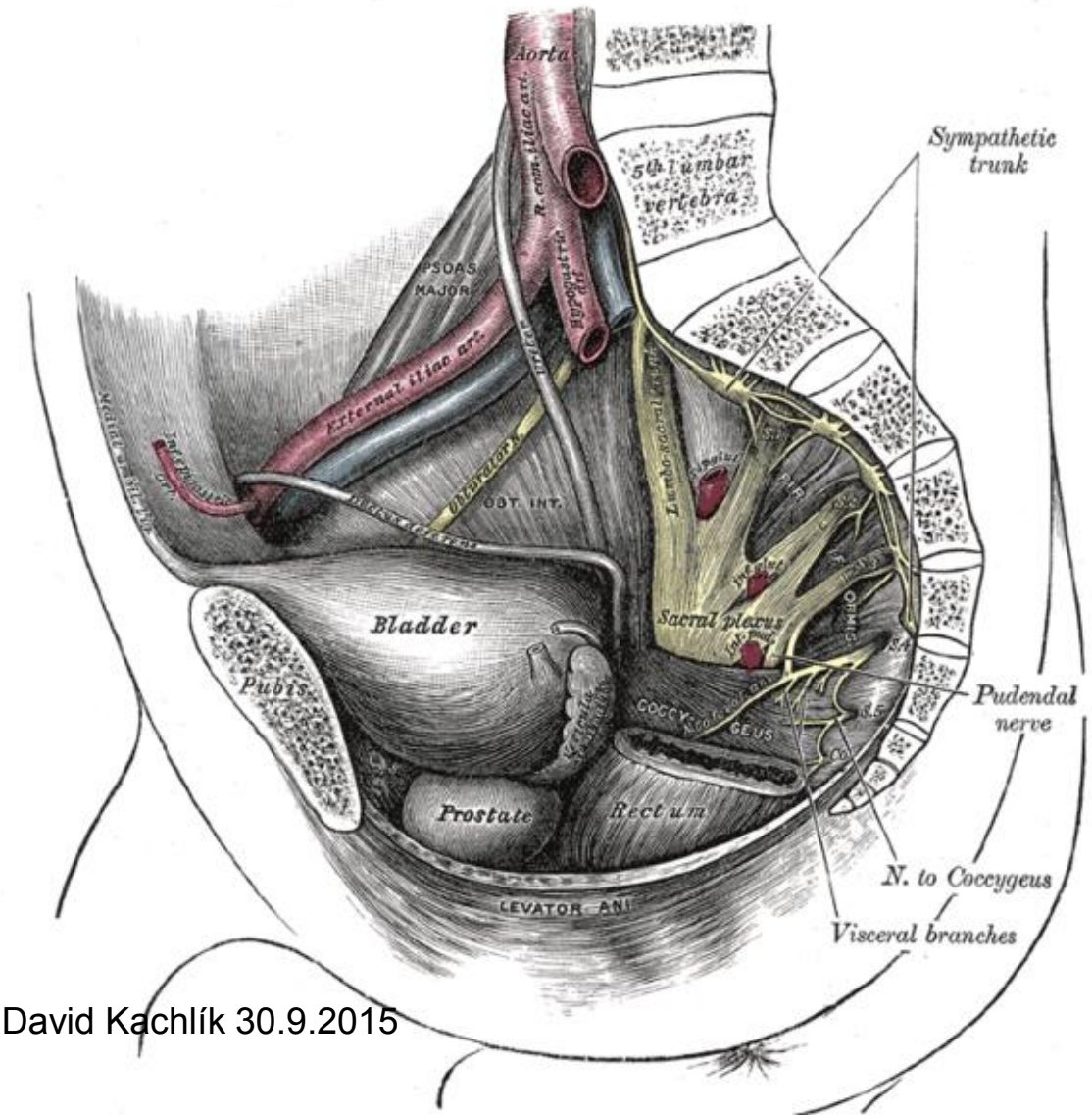
Arteria iliaca communis

- 4 cm long
- 1 cm wide

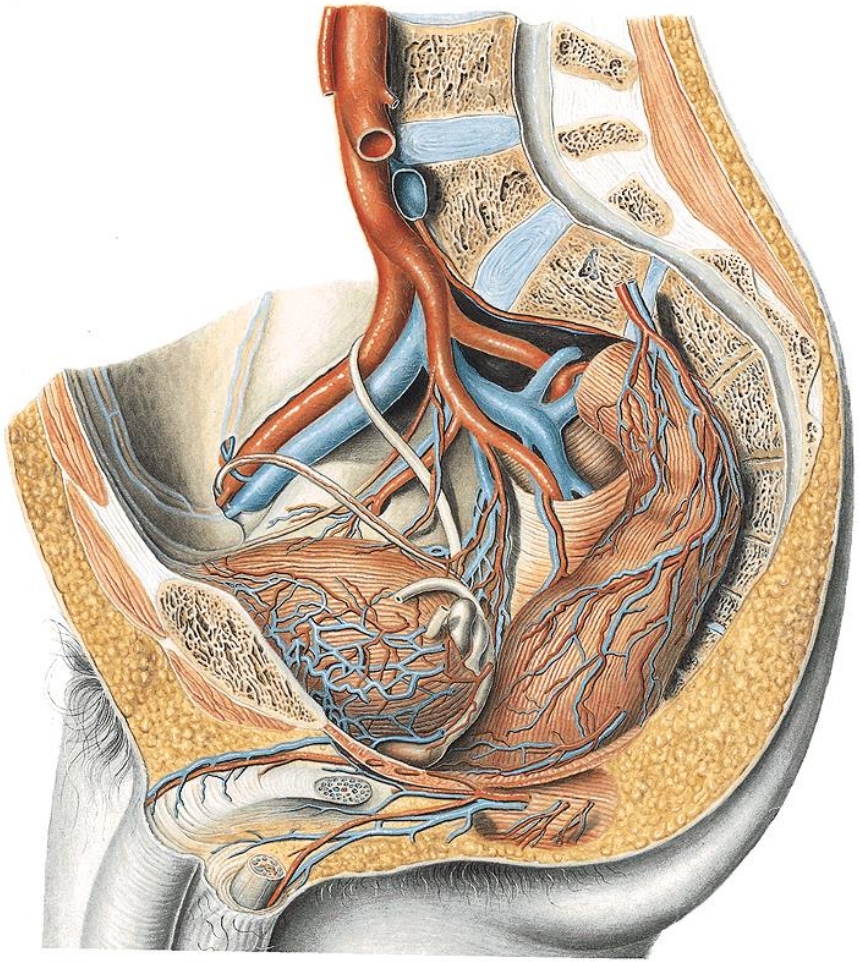
origin: L4

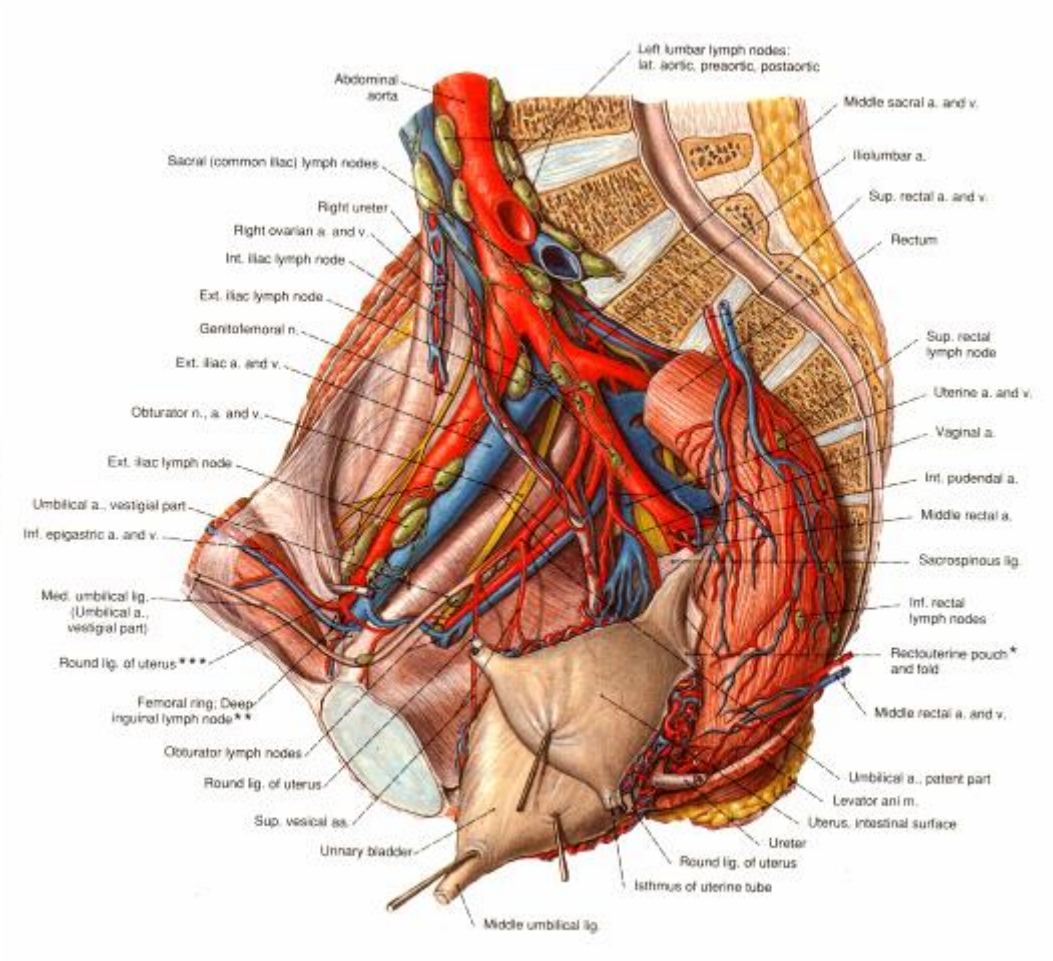
- medial to m. psoas major
- dorsal to ureter

end: bifurcation ventral to articulatio sacroiliaca
  - a. iliaca externa
  - a. iliaca interna



Arteriae iliacae





Transplanted kidney to AIC

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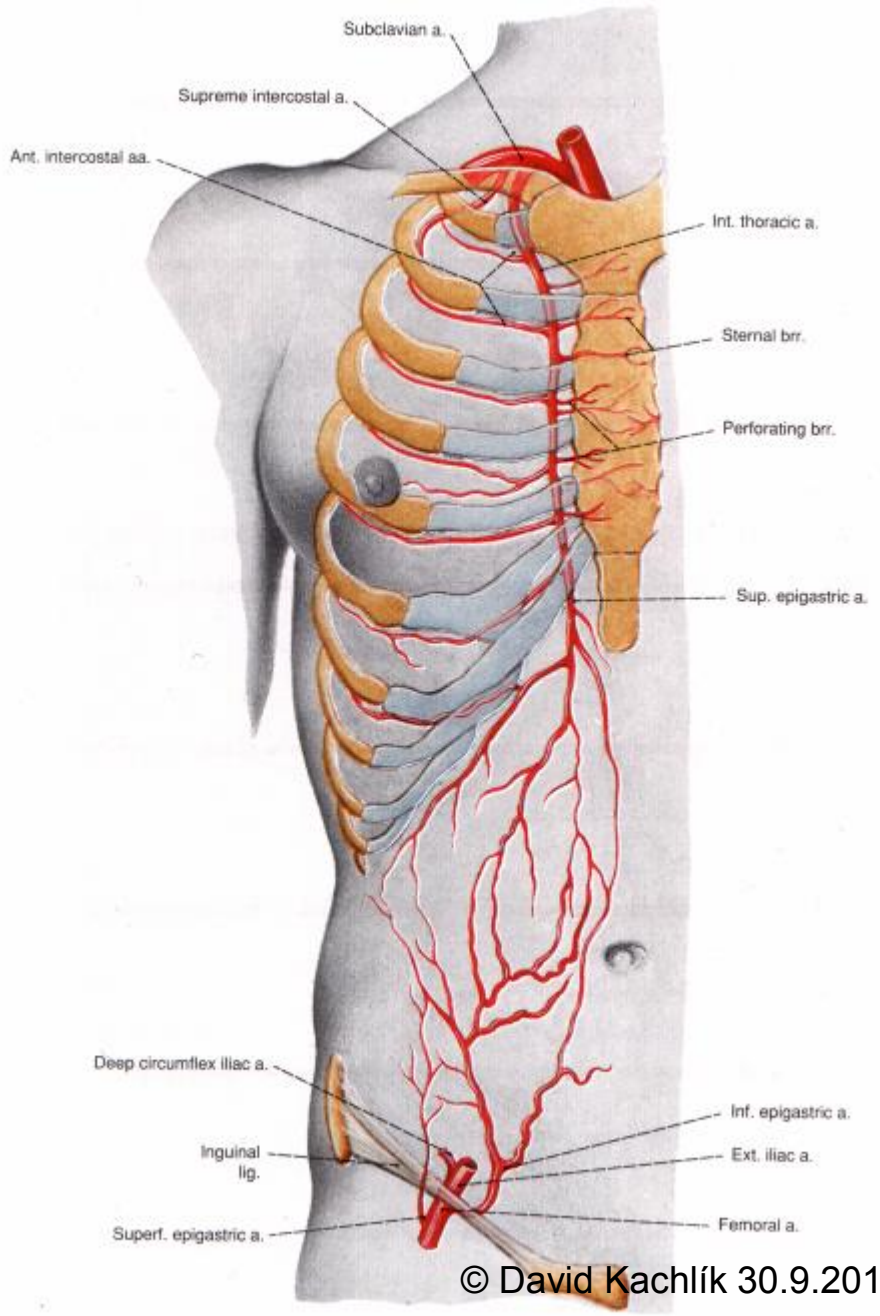
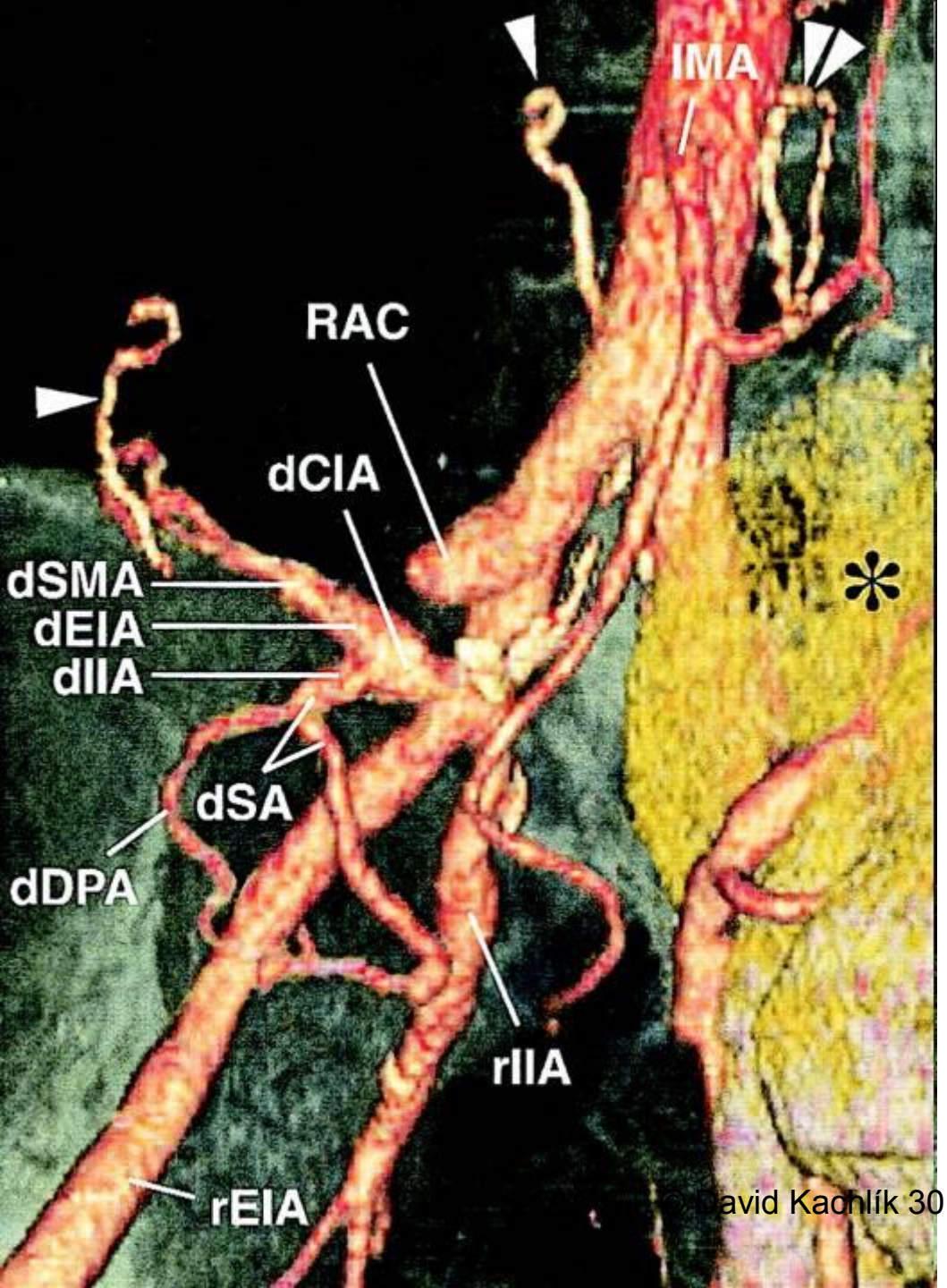


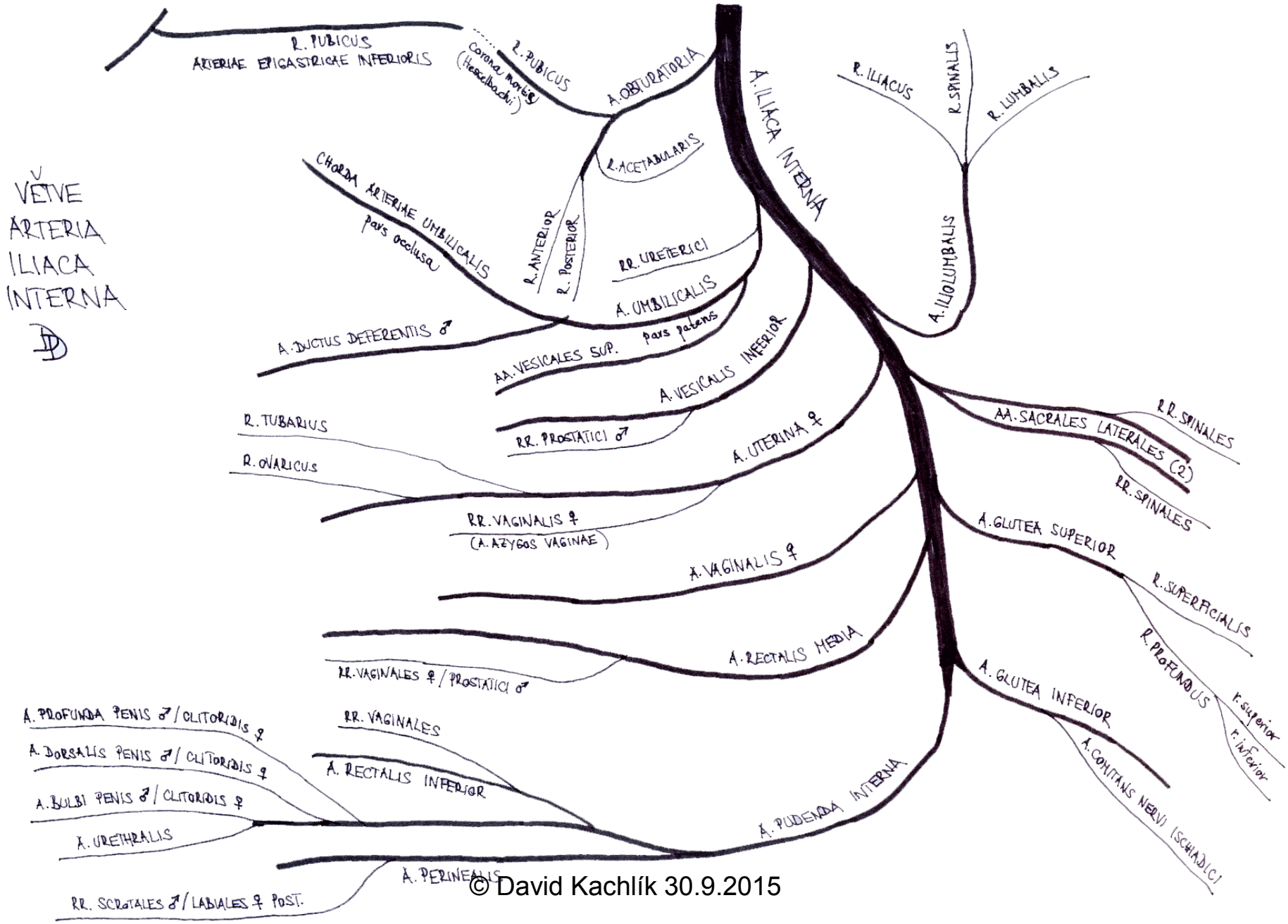


Two separate pancreas transplantations at different times

d = donor's, r = right, l = left

CIA = common iliac artery, CIVB = common iliac vein bifurcation, DPA = dorsal pancreatic artery, EIA external iliac artery, IIA = internal iliac artery, IMA = inferior mesenteric artery, SA = splenic artery, SMA = superior mesenteric artery, asterisk = renal graft.

Three-dimensional volume-rendering image of contrast-enhanced MDCT during dominant arterial phase, obtained 5 days after sequential pancreas-after-kidney retransplantation after vascular failure and pancreatectomy of initial pancreatic graft, shows normal posttransplantation arterial anatomy, residual arterial conduit (RAC) after pancreatectomy of initial pancreatic graft, hyperdense staple line (*single arrowheads*) of donor's duodenum, and hyperdense circular staple line (*double arrowheads)* of duodenojejunostomy (intestinal wall structures and grafted pancreatic parenchyma are not seen because of applied electronic thresholds).



Arteria iliaca interna

- lesser pelvis + buttocks
- obsolete term „a. hypogastrica“
- short (3-4 cm)

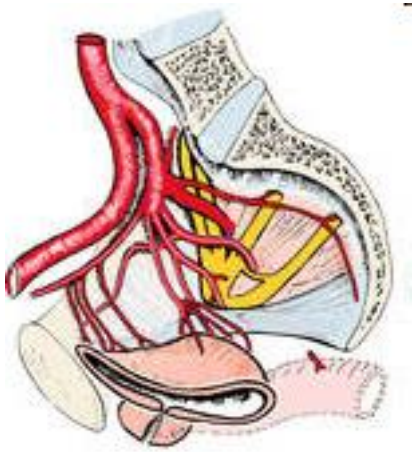
→ anterior division

→ 3 branches

→ posterior division

→ all organs of lesser pelvis

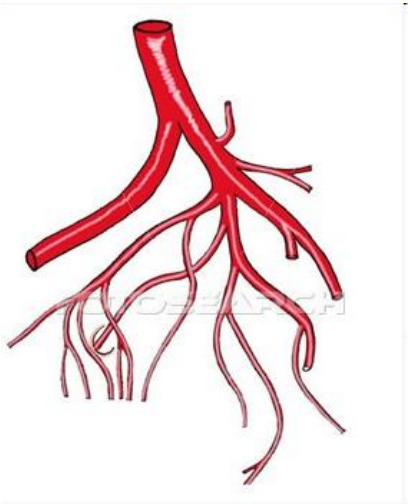
– *ligation in postpartal haemorrhage*

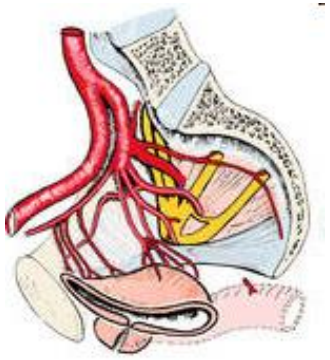


Arteria iliaca interna - branches

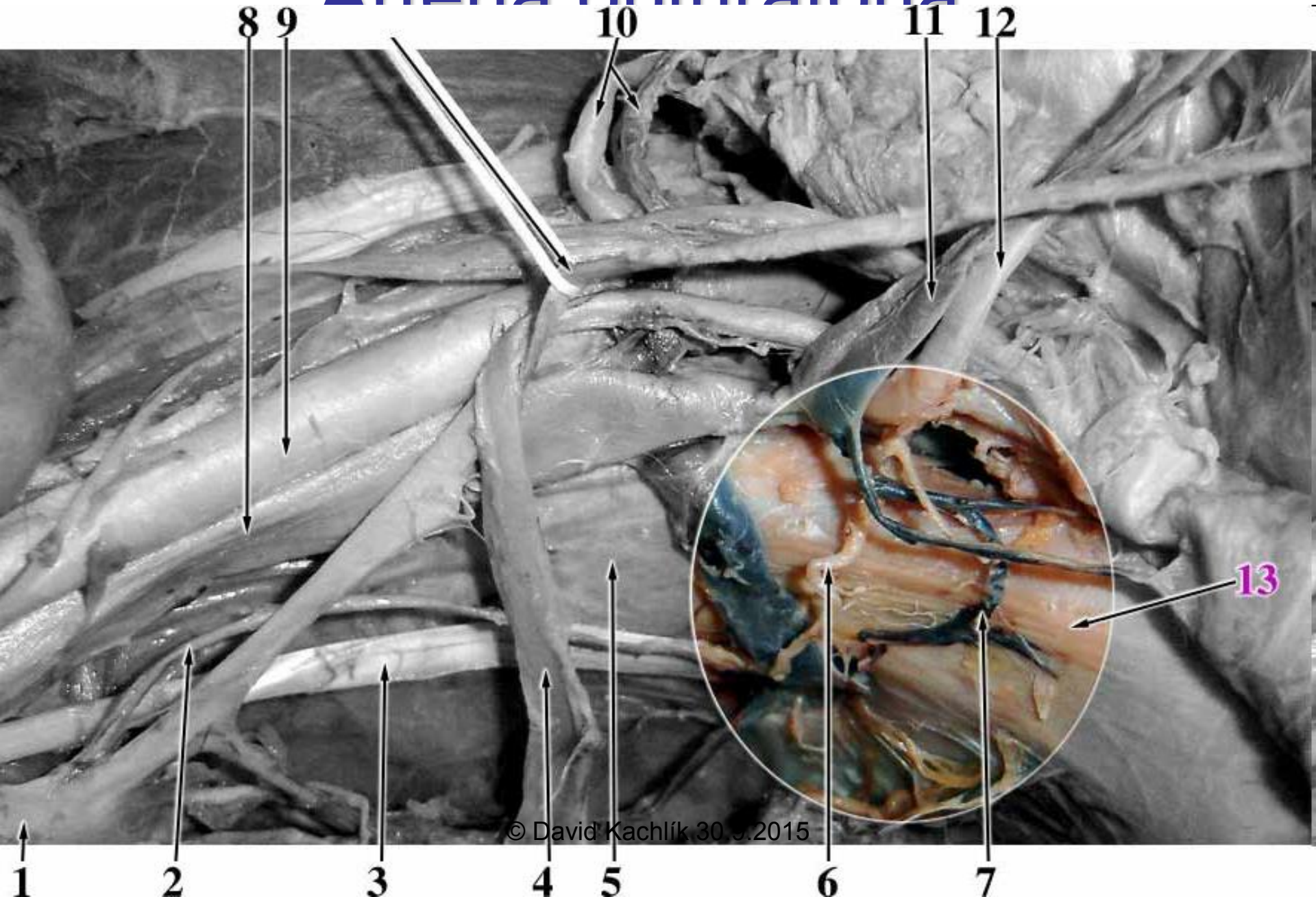
<u>parietal branches</u>: 5

- a. iliolumbalis
  - r. iliacus, lumbalis, spinalis
- a. obturatoria
  - *canalis obturatorius*
- aa. sacrales laterales sup. + inf. (→2)
  - *foramina sacralia anteriora*
  - rr. spinales
- a. glutea superior
  - *foramen suprapiriforme*
  - r. superficialis + profundus
- a. glutea inferior
  - *foramen infrapiriforme*
  - a. comitans nervi ischiadici





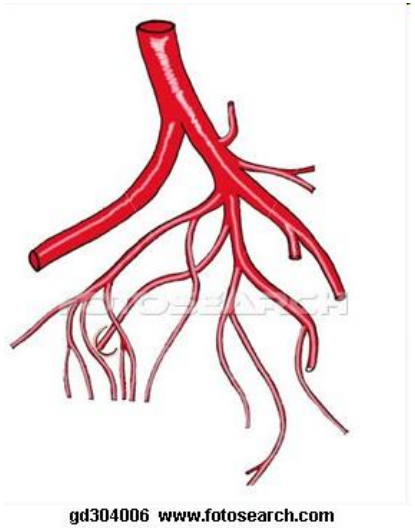
Arteria obturatoria

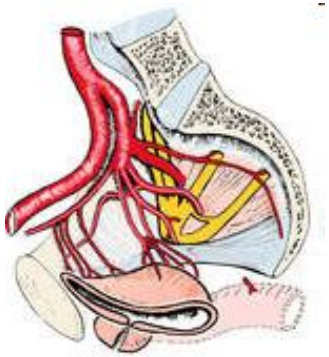


Arteria iliaca interna - branches

visceral branches: 6

- a. umbilicalis
  - aa. vesicales superiores
  - a. ductus deferentis ♂
- a. vesicalis inferior
  - rr. prostatici ♂
- a. uterina ♀
  - r. ovaricus
  - r. tubarius
  - ventral to ureter
- a. rectalis media
  - rr. prostatici ♂ / rr. vaginales ♀
- a. vaginalis ♀
- a. pudenda interna

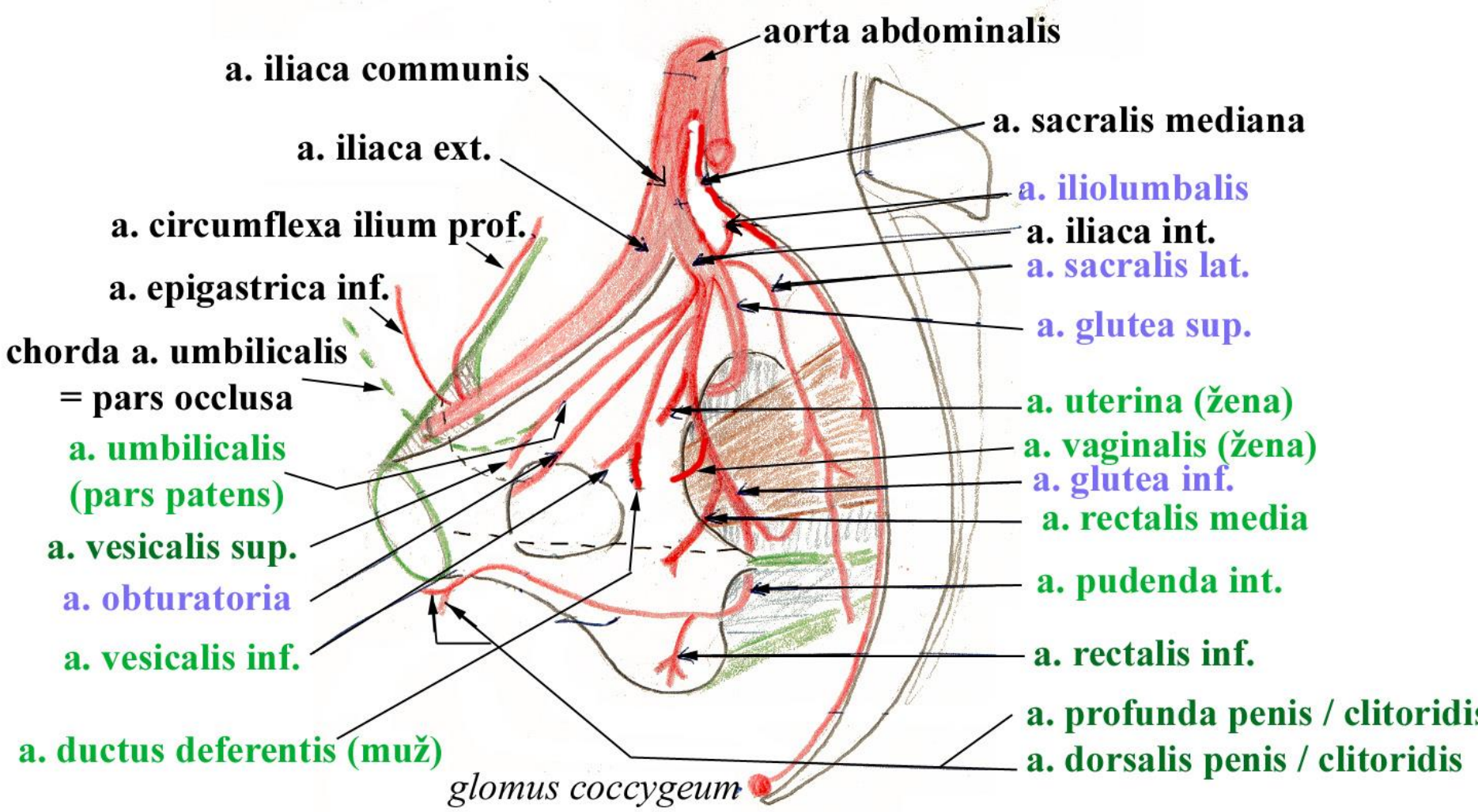




parietální větve

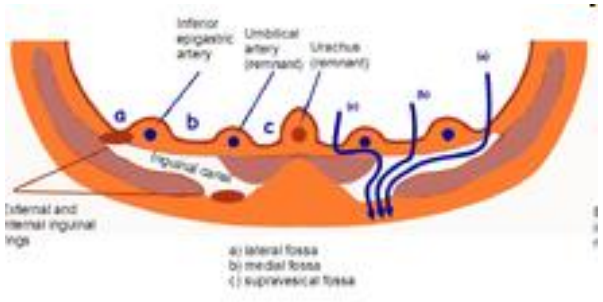
TEPNY PÁNVE

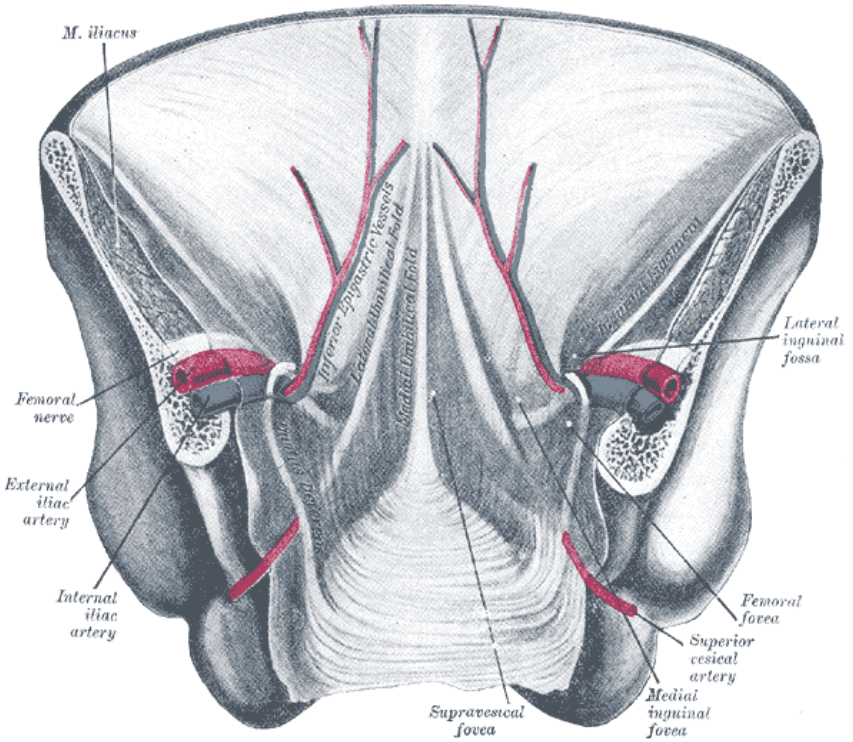
viscerální větve



Arteria umbilicalis

- pars patens
  - aa. vesicales superiores
  - a. ductus deferentis ♂
- pars occlusa
  - fetal vessel with unoxygenated blood leading to placenta
  - lig. umbilicale mediale (chorda a. umbilicalis)
  - fascia vesicoumbilicalis





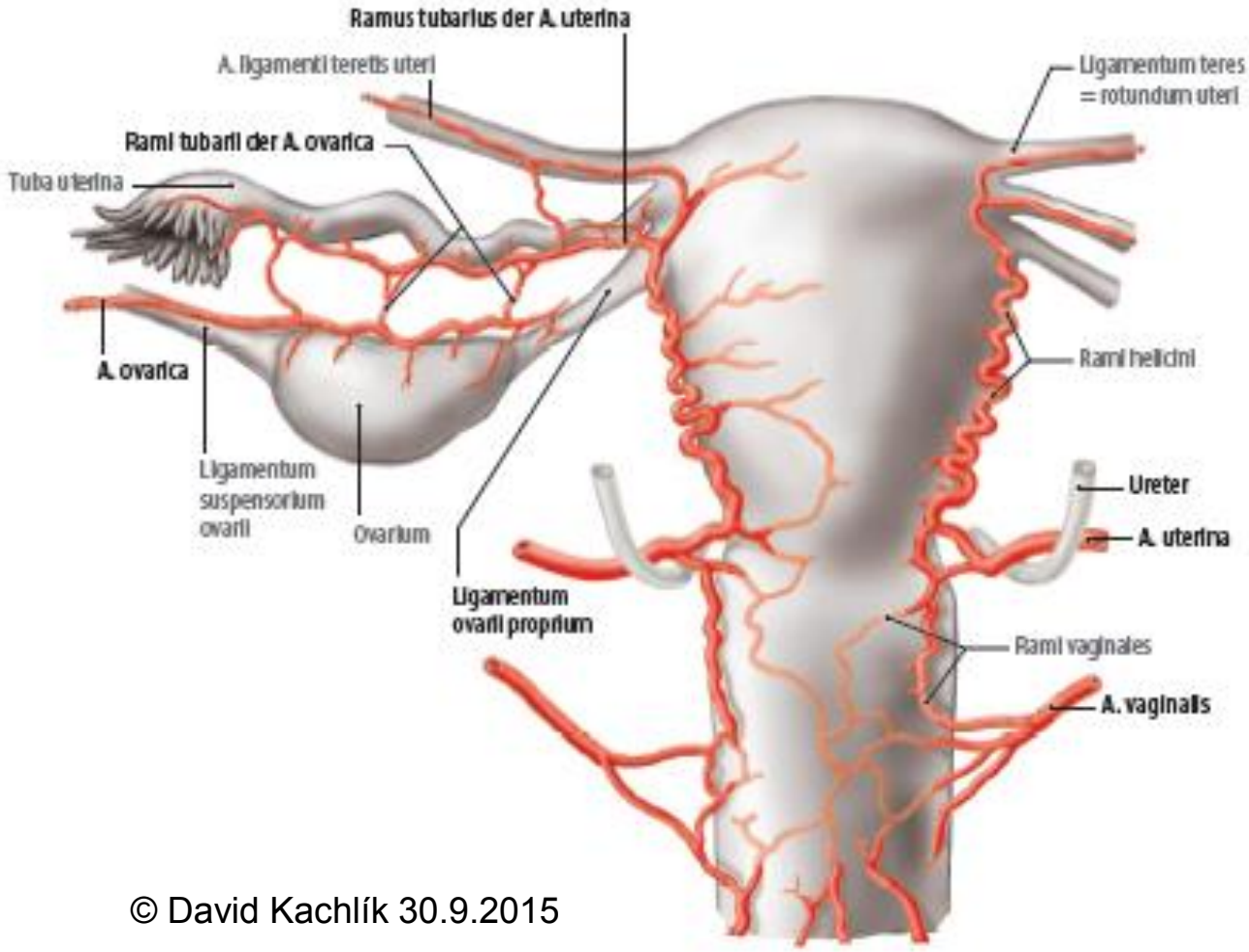
Arteries of female internal genital organs

Ao. abdominalis:

- a. ovarica

A. iliaca interna:

- a. uterina
- a. vaginalis
- (a. pudenda int.)

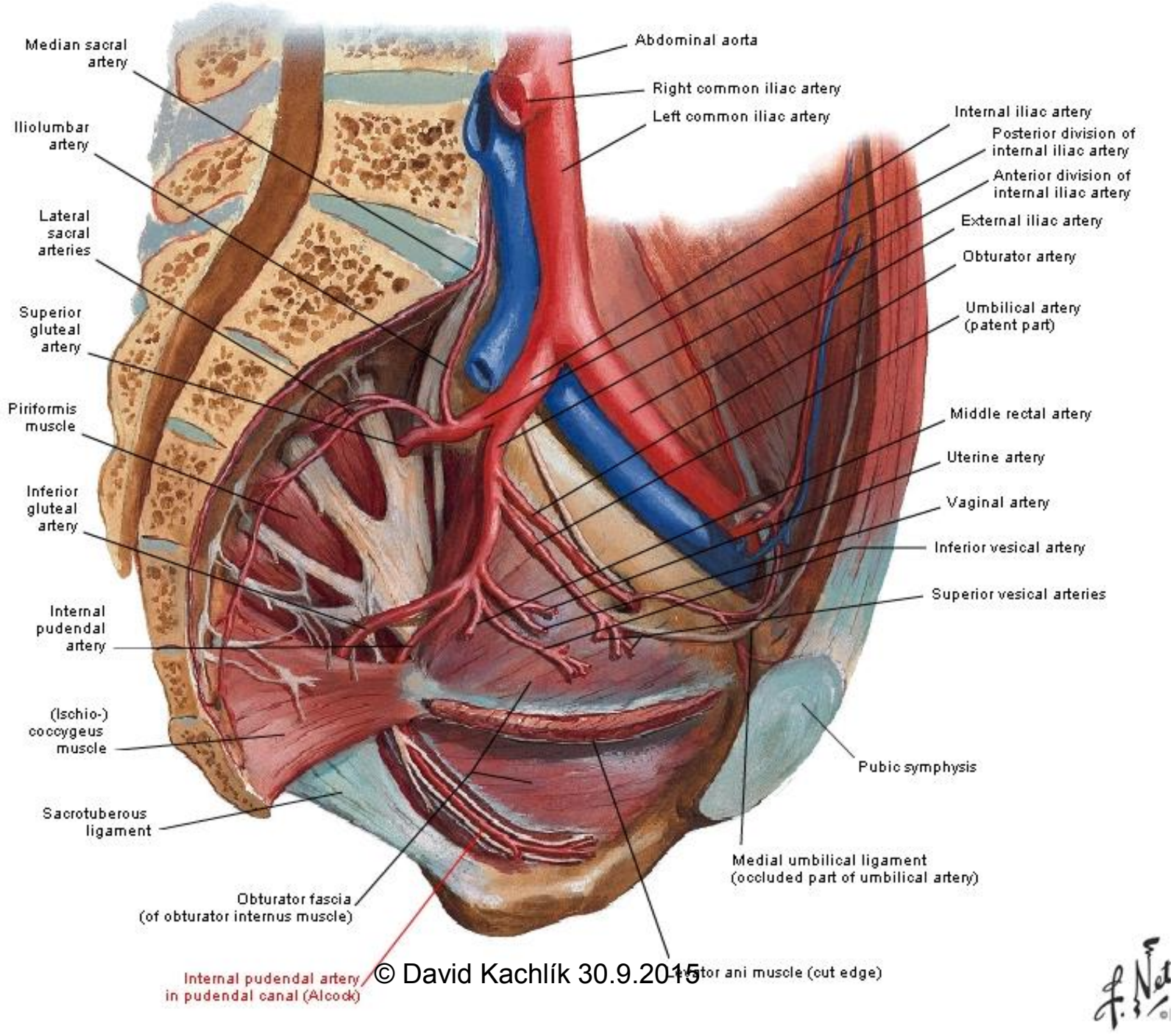


Arteria pudenda interna

topography: foramen infrapiriforme → foramen ischiadicum minus → fossa ischioanalis (canalis pudendalis *Alcocki*)

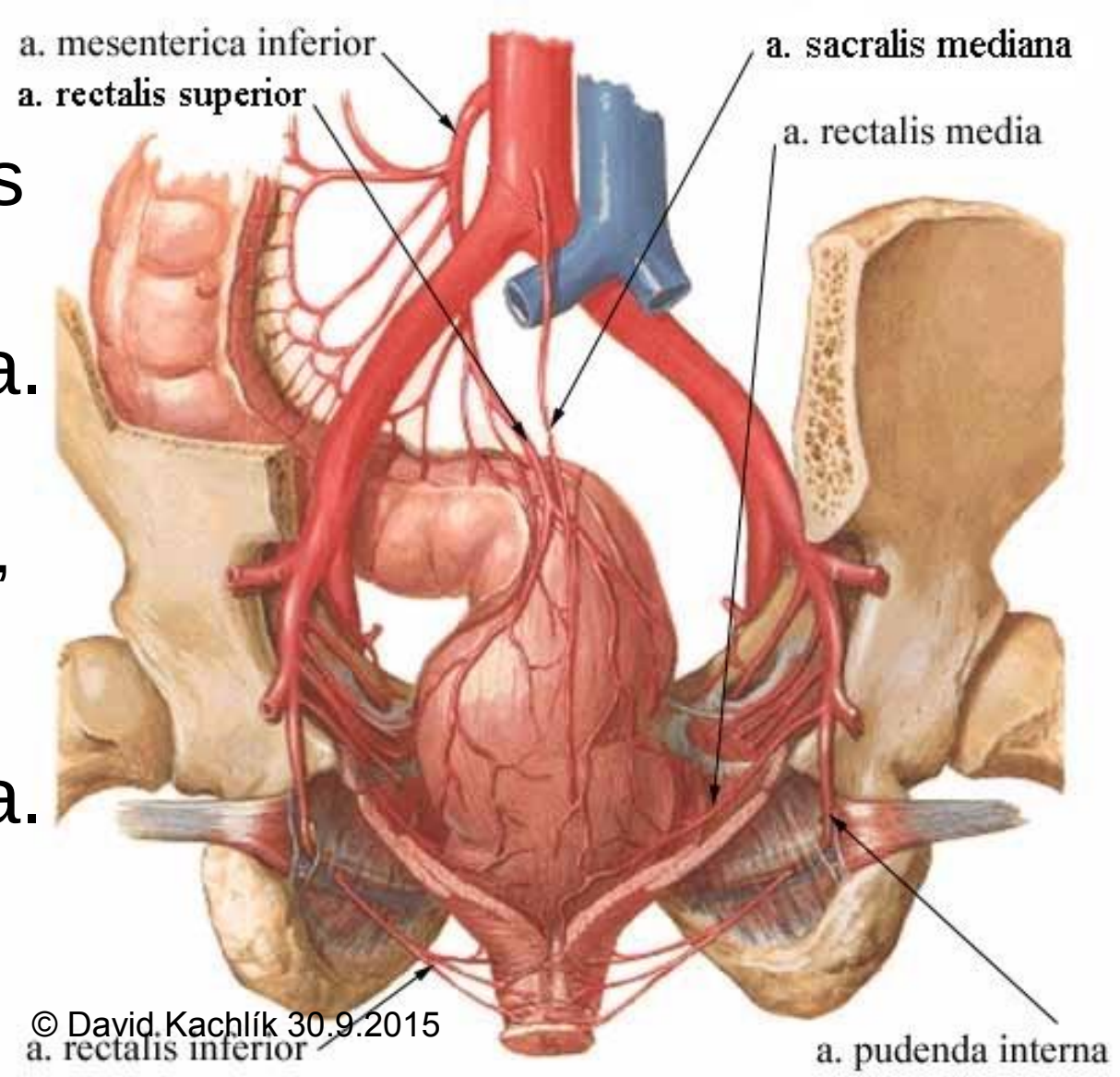
branches:

- a. rectalis inferior
  - rr. vaginales ♀
- a. perinealis
- rr. scrotales ♂ / labiales ♀ anteriores
- a. urethralis
- a. bulbi penis ♂ / vestibuli ♀
- a. dorsalis penis ♂ / clitoridis ♀
- a. profunda penis ♂ / vestibuli ♀

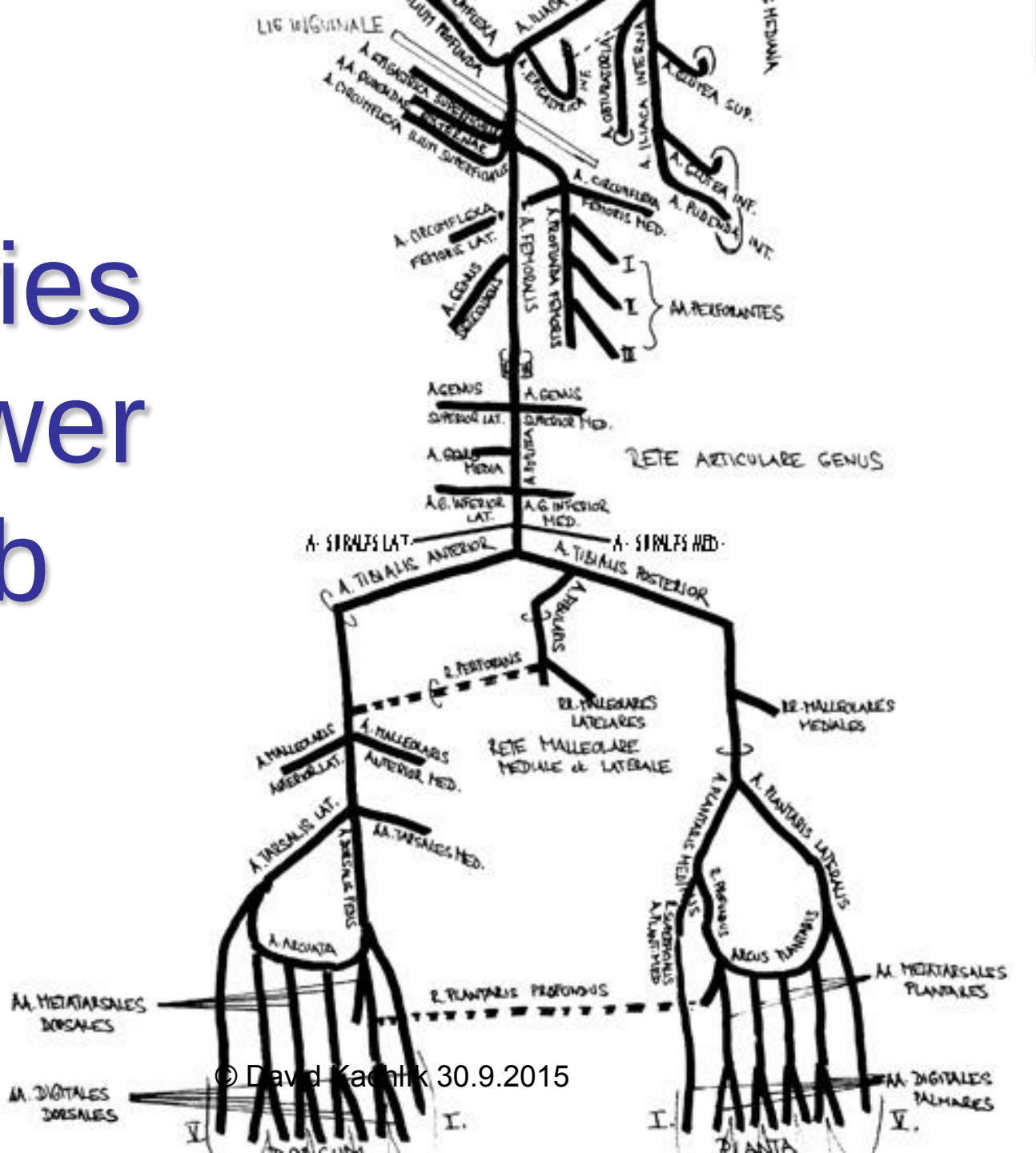


Rectum

- a. mesenterica inf. ➔ a. rectalis sup.
- a. iliaca int. ➔ a. rectalis media
  - present in 50%, insignificant for rectum
- a. iliaca int. ➔ a. pudenda int. ➔ a. rectalis inf



Arteries of lower limb

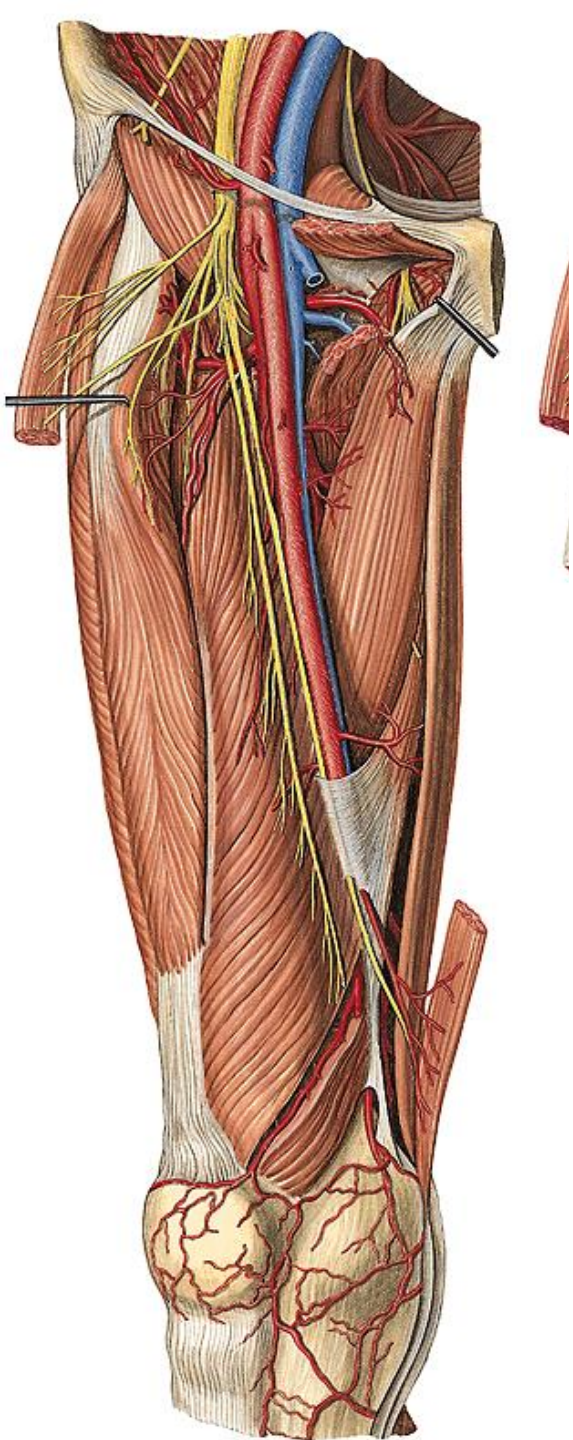


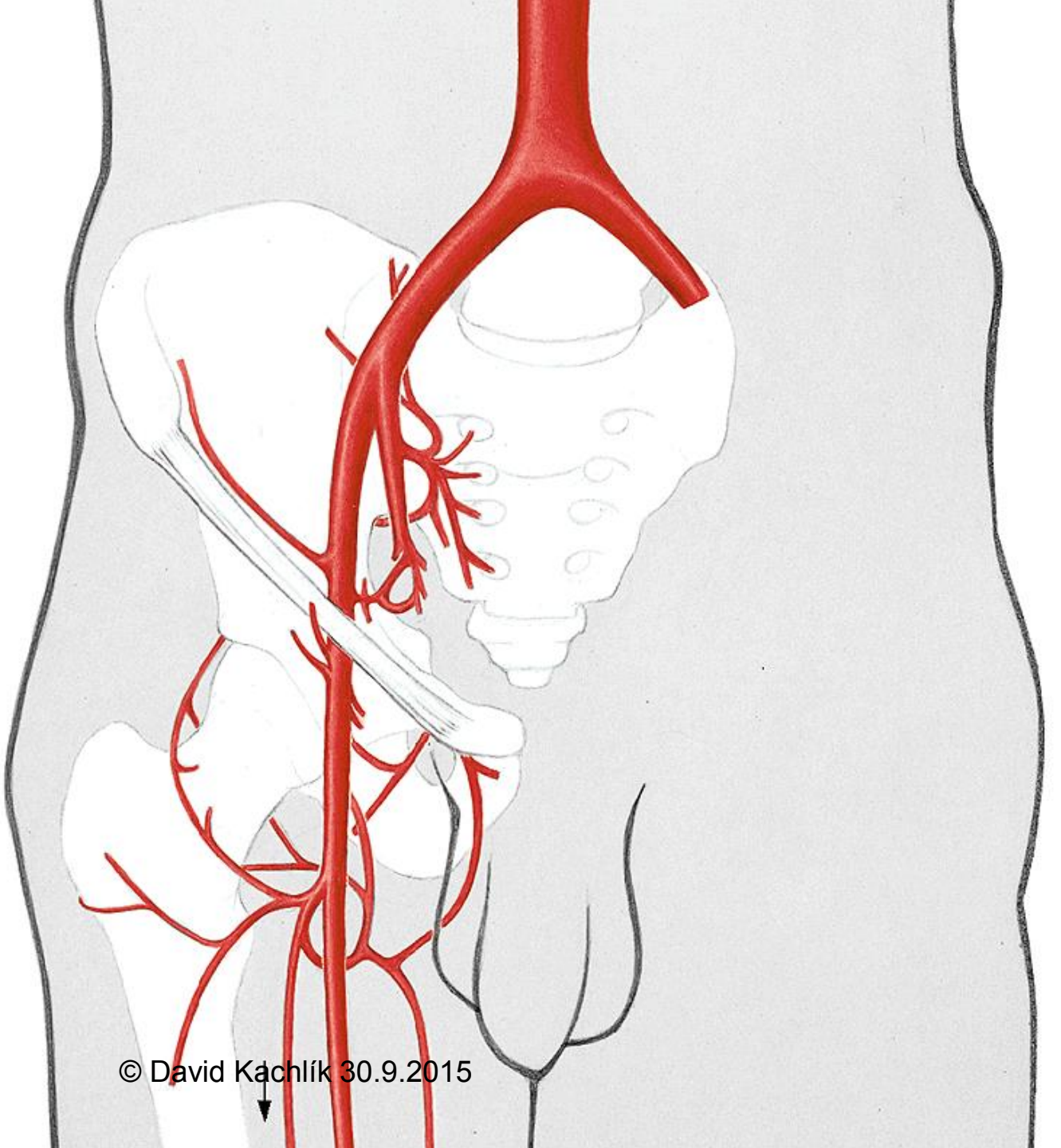
Arteria femoralis

- compression point
- pulse measurement
- ultrasound examination
- catheterization site
- *atherosclerosis – by-passes*
- topography within lacuna vasorum: „CLOVAN“

lacuna vasorum → trigonum femorale (fossa iliopectinea) → canalis adductorius *Hunteri* → hiatus adductorius

- 3 parts: trigonum femorale, subsartorial, inside canalis adductorius





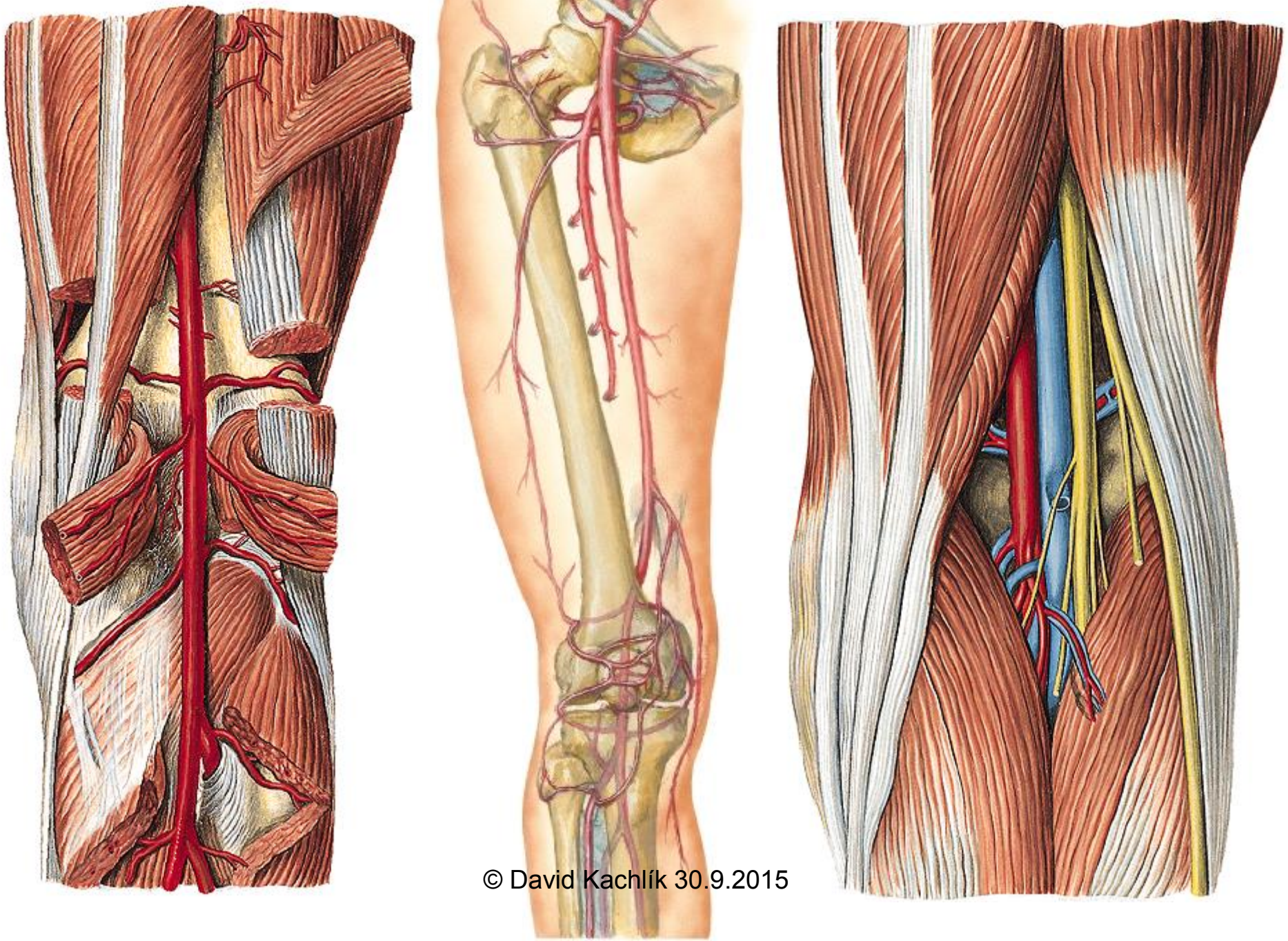
Arteria femoralis - branches

- a. epigastrica superficialis
  - *pedicle artery for cutaneous flap*
- aa. pudendae externae
- a. circumflexa ilium profunda
- a. profunda femoris
  - a. circumflexa femoris med.
    - art. coxae (r. acetabularis), posterior side of thigh
    - a. circumflexa femoris lat.
      - r. ascendens, transversus, descendens
      - anterior and lateral side of thigh
  - aa. perforantes (3-4)
    - zadní strana stehna
    - *collaterals in stenosis/occlusion of a. femoralis*
- a. genus descendens
  - origini within canalis adductorius
  - r. saphenus, rr. articulares

Arteria poplitea

- hiatus adductorius → fossa poplitea
- elastic artery (thin tunica media) - *aneurysms*
- rete articulare genus
- rete patellare
- *compression point*
- *pulse measurement*
- *ultrasound examination*
- topography within fossa poplitea: „AVEN“

bifurcation into a. tibialis ant. + post.

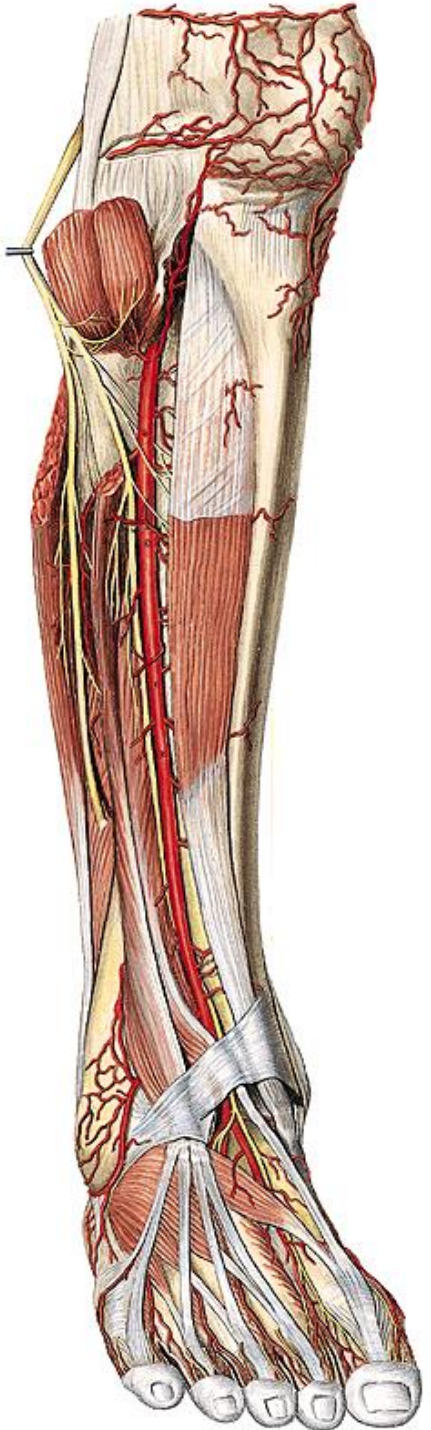


Arteria poplitea - branches

- a. superior lat./med. genus
  - around epicondyles
- aa. surales
  - for heads of m. gastrocnemius
- a. media genus
  - into art. genus towards ligg. cruciata and membrana synovialis
- a. inferior lat./med. genus
  - under heads of m. gastrocnemius and ligg. collateralia
- *contribute to both rete*

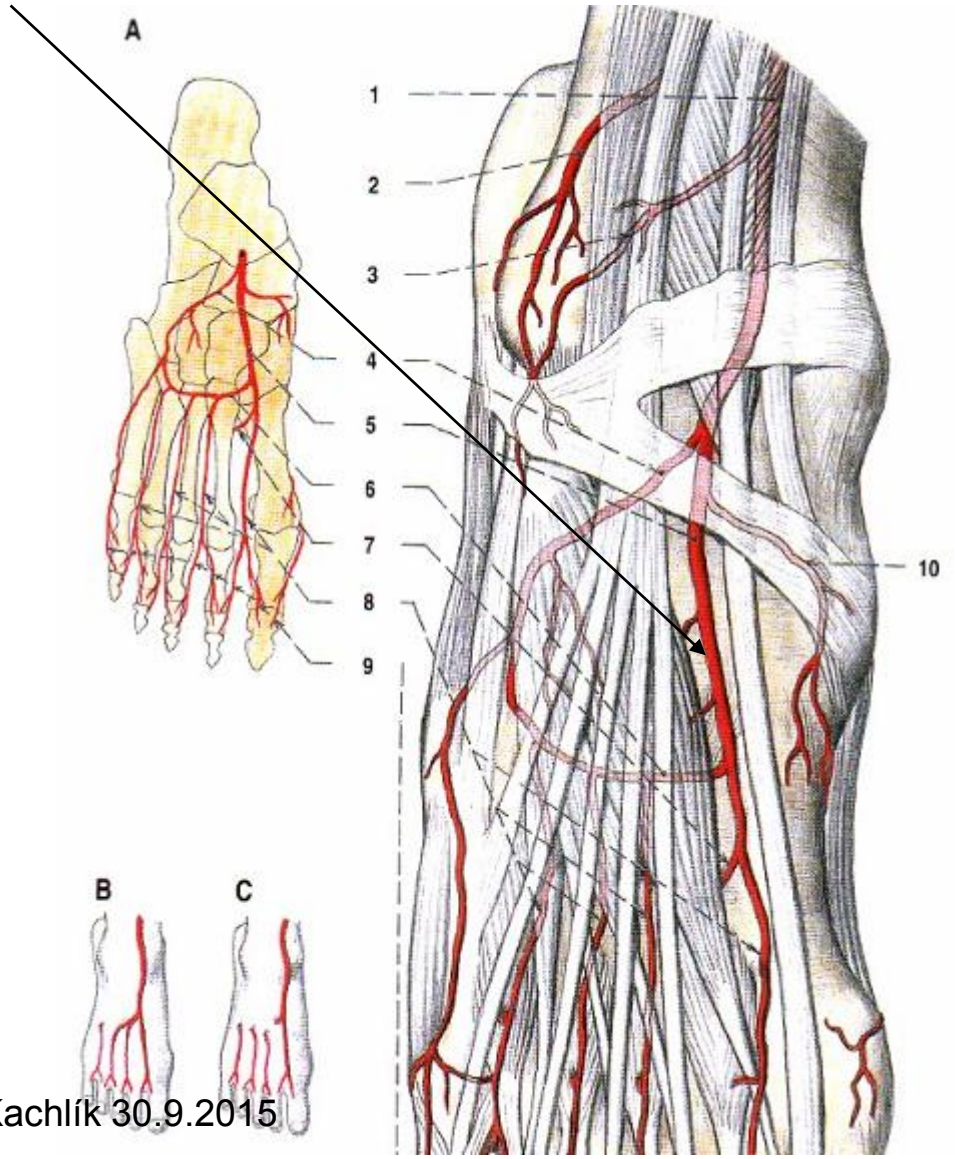
Arteria tibialis anterior

- proximally through membrana interossea cruris
- runs with n. fibularis profundus
- fixed to membrane with *vincula*
  - almost unmoveable → bleeding in fracture
- (a. recurrens tibialis post.)
  - before passage through membrane, into rete art. genus
- a. recurrens tibialis ant.
  - behind passage through membrane, into rete art. genus
- a. malleolaris anterior lat./med.
  → rete malleolare lat./med.
- under retinaculum mm. extensorum sup.+ inf. → a. dorsalis pedis



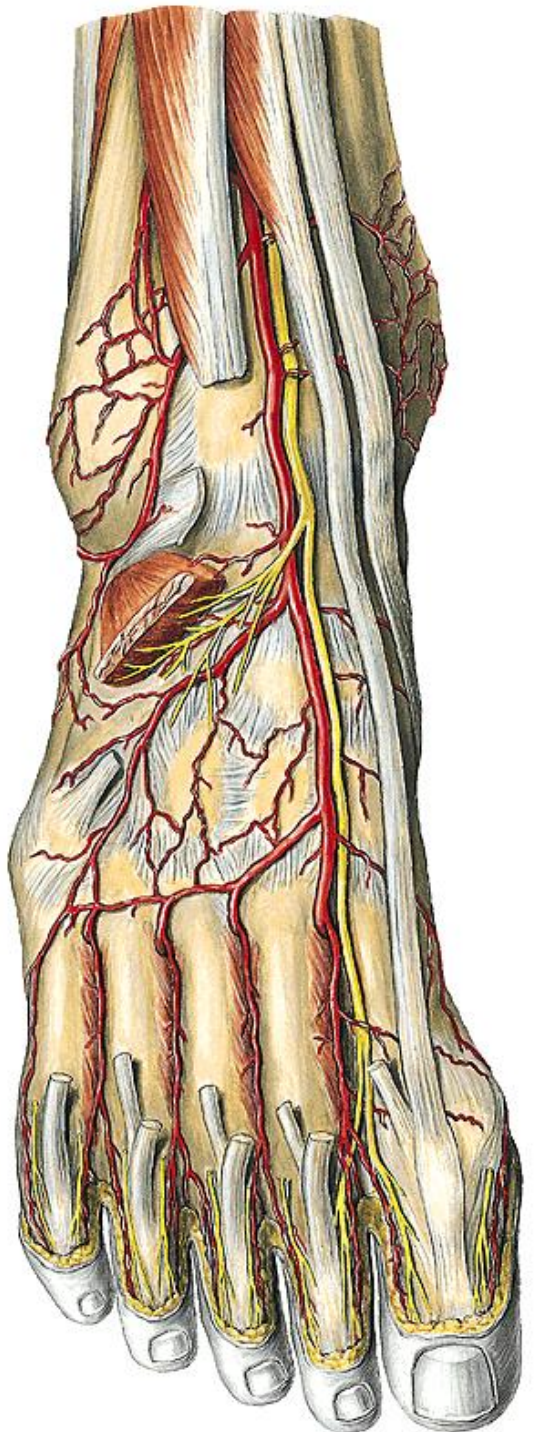
Arteria dorsalis pedis

- *compression point*
- *pulse measurement*
- *ultrasound examination*
- continues as a. arcuata in 10% only



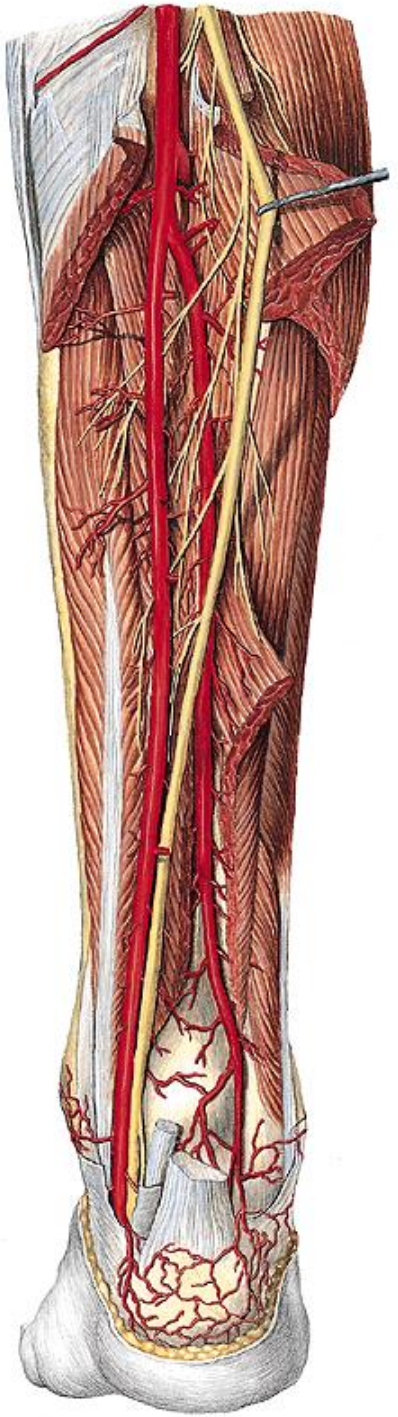
Arteria dorsalis pedis

- a. tarsalis lat.
  - – origin at level of caput tali
- aa. tarsales med.
- (a. arcuata – 10 %)
  - – aa. metatarsales dorsales
  - → aa. digitales dorsales
  - → r. plantaris profundus
    - thick anastomosis with arcus plantaris prof.
    - 1st intermetatarsal space



Arteria tibialis posterior

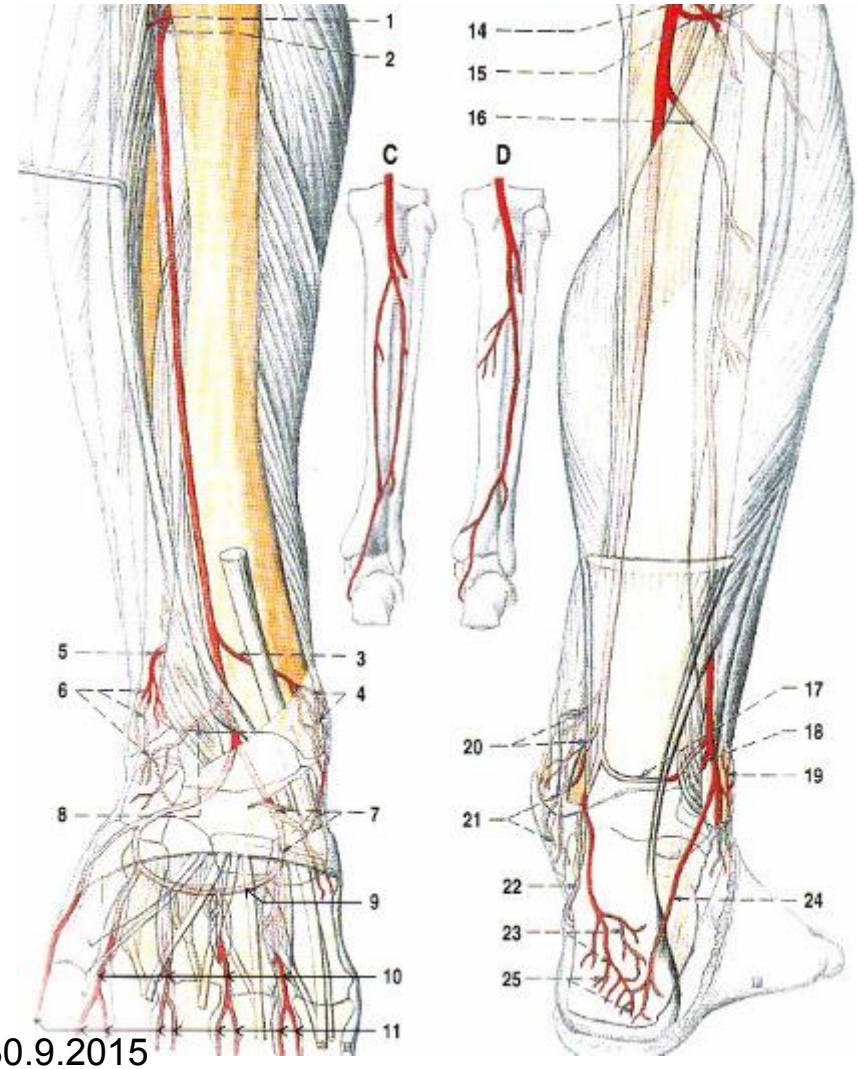
- arcus tendineus m. solei
- runs with s n. tibialis
- canalis malleolaris
  - topography: „TIDIVANEH“
  - bifurcation into a. plantaris med. + lat.
- *compression point*
- *pulse measurement*
- *ultrasound examination*



Arteria tibialis posterior

origin – clinical term „truncus tibiofibularis“

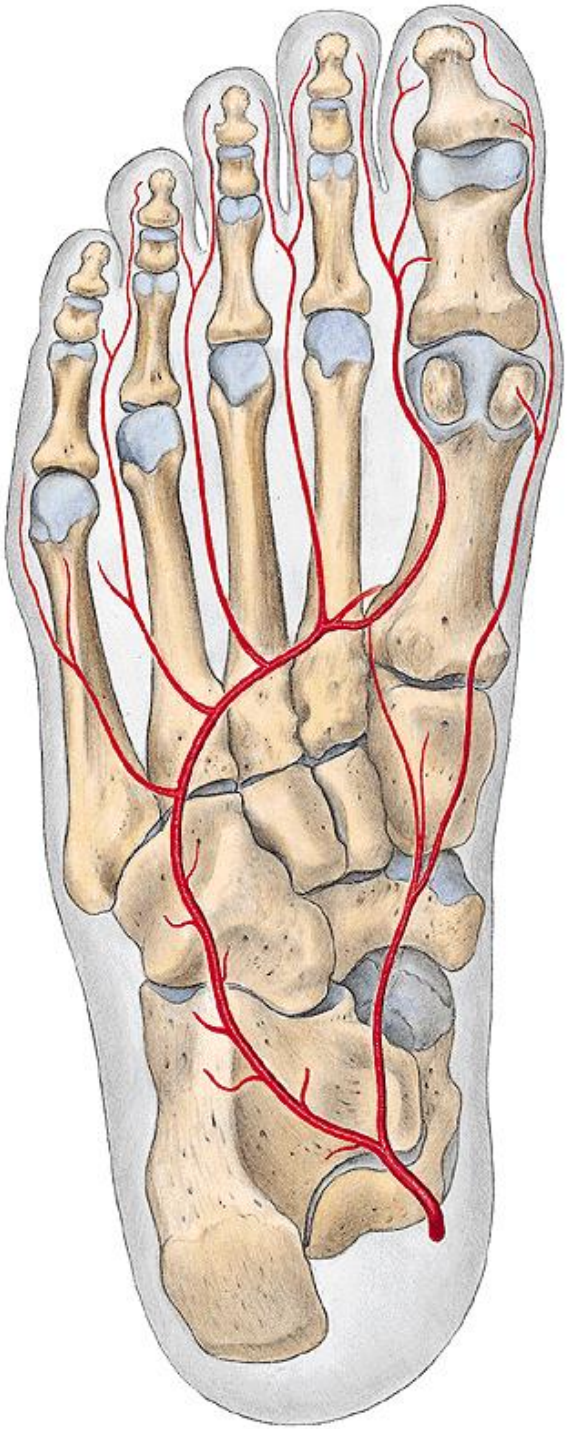
- r. circumflexus fibulae
- a. fibularis
  - canalis musculofibularis *Hyrtli*
  - r. communicans (with ATP)
  - r. perforans
    - through membrana interossea cruris ventrally
  - rr. malleolares lat.
  - rr. calcanei → rete calcaneum
  - *collateral in strenosis/occlusion of ATP*
- rr. malleolares med. → rete malleolare med.
- rr. calcanei → rete calcaneum

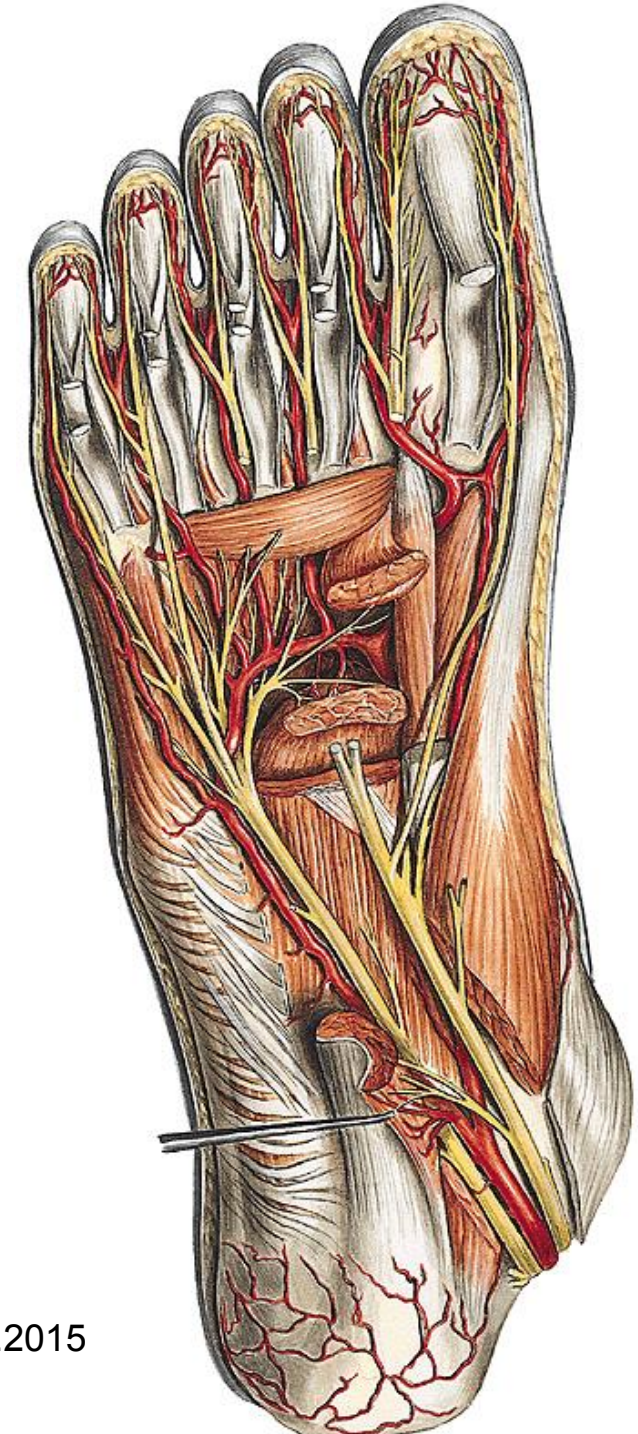


Tepny chodidla

- a. plantaris medialis
  - r. superficialis
  - r. profundus → arcus plantaris profundus
- a. plantaris lat. → arcus plantaris profundus
  - aa. metatarsales plantares
    - rr. perforantes (2 from each) – into aa. metatarsales dorsales

  → aa. digitales plantares communes → aa. digitales plantares propriae
- (arcus plantaris superficialis)





Arteries of LL – clinical relevance

- atherosclerosis – ischaemic disease of lower limbs (peripheral vascular disease)
  - by-passes
  - stents
- diabetes mellitus (microangiopathy)
- trombangiitis obliterans (endangiitis von-Winiwarter-Buerger)
- *claudications*