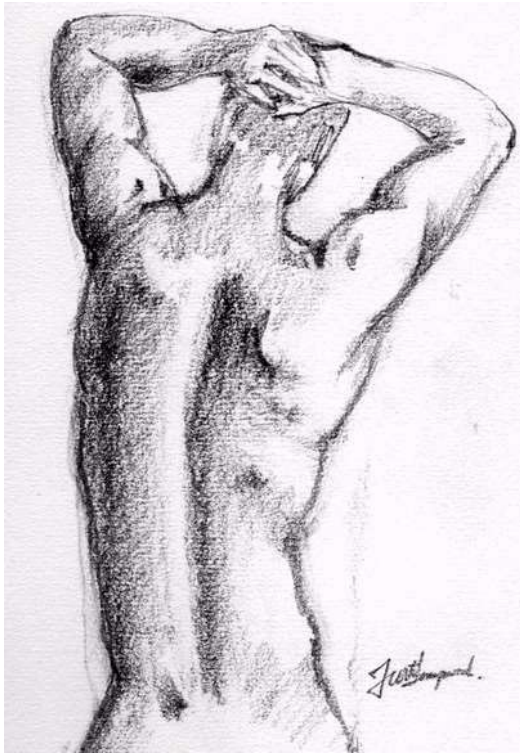


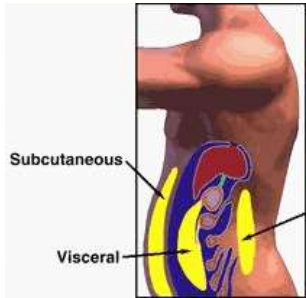


Topographic anatomy of the back

1. Retroperitoneal space – organs, blood vessels and nerves
2. Back – borders, landmarks and regions
3. Posterior neck area, *regio colli posterior*
4. Scapular area, *regio scapularis*
5. Lumbar area, *regio lumbalis*
6. Vertebral area, *regio vertebralis*
7. The vertebral canal and its content

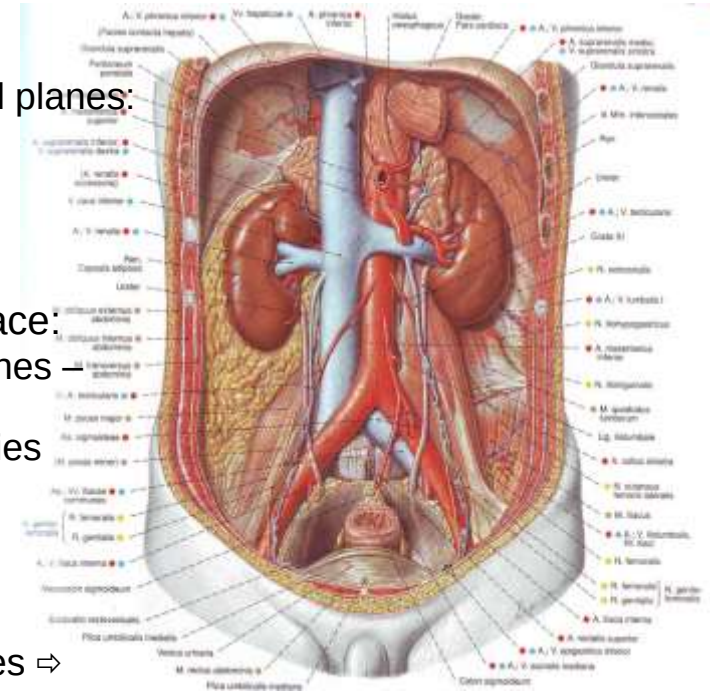


Retroperitoneum



Retroperitoneal space – compartments

- **borders:**
 - ✓ parietal peritoneum
 - ✓ posterior abdominal wall
- **three-dimensional space** – fascial planes:
 - ✓ *fascia endoabdominalis*
 - ✓ *fascia retroperitonealis*
 - ✓ *fascia perirenalis* – two laminae
- **posterior compartment** – first (posterior) connective tissue space:
 - ✓ the abdominal aorta and its branches – unpaired and paired
 - ✓ the inferior vena cava and tributaries
 - ✓ lumbar plexus – branches
 - ✓ sympathetic trunk ⇒ lumbar sympathectomy
 - ✓ *cisterna chyli* ⇒ chylous ascites
 - ✓ lymphatic vessels and lymph nodes ⇒ abscesses
- **middle compartment** – second (middle) connective tissue space (*fascia renalis* s. *perirenalis* ⇒ *paranephron*, *paraureterium*):
 - ✓ kidneys with adrenal glands ⇒ paranephritis or retroperitonitis
 - ✓ ureters
- **anterior compartment** – third (anterior) connective tissue space (*paracolon*): paracolitis



Retroperitoneal organs and structures

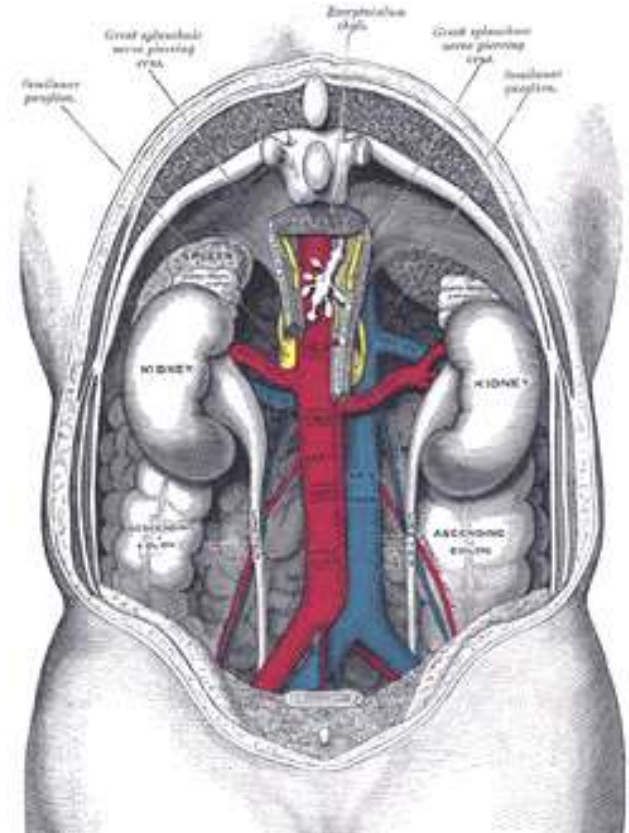
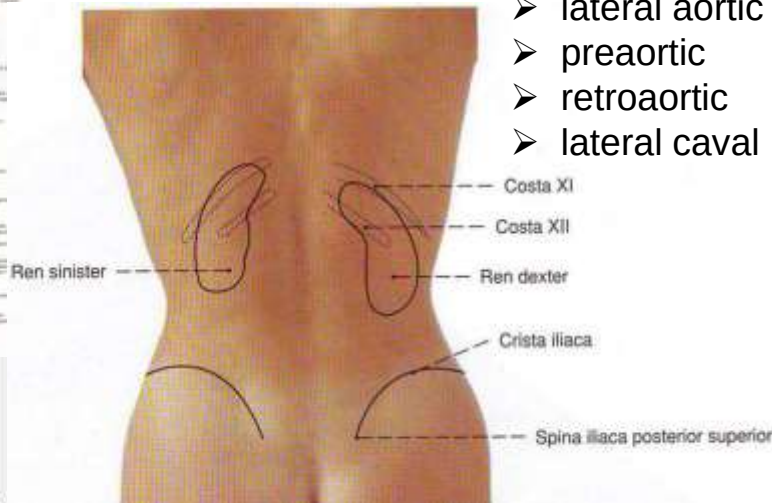
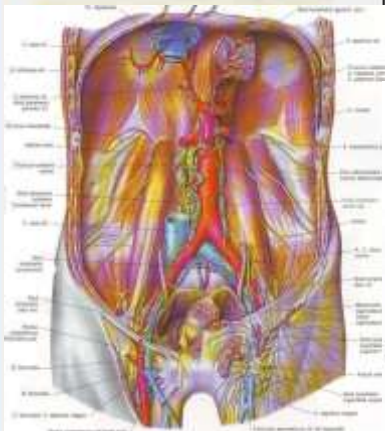
Retroperitoneal organs



- ✓ abdominal aorta, *aorta abdominalis* – Th₁₂-L₄
- ✓ inferior vena cava, *v. cava inferior* – L₅-Th₈
- ✓ nerve structures:
 - *plexus aorticus abdominalis*:
 - *ganglion mesentericum superius*
 - *ganglion aorticorenale* – paired
 - *ganglion mesentericum inferius*
 - *pars abdominalis trunci sympathici*
- ✓ kidneys – Th₁₂-L₂
- ✓ adrenal glands
- ✓ ureters

- ✓ lymph nodes–
30-50 *nodi lymphatici lumbales*:

- lateral aortic
- preaortic
- retroaortic
- lateral caval

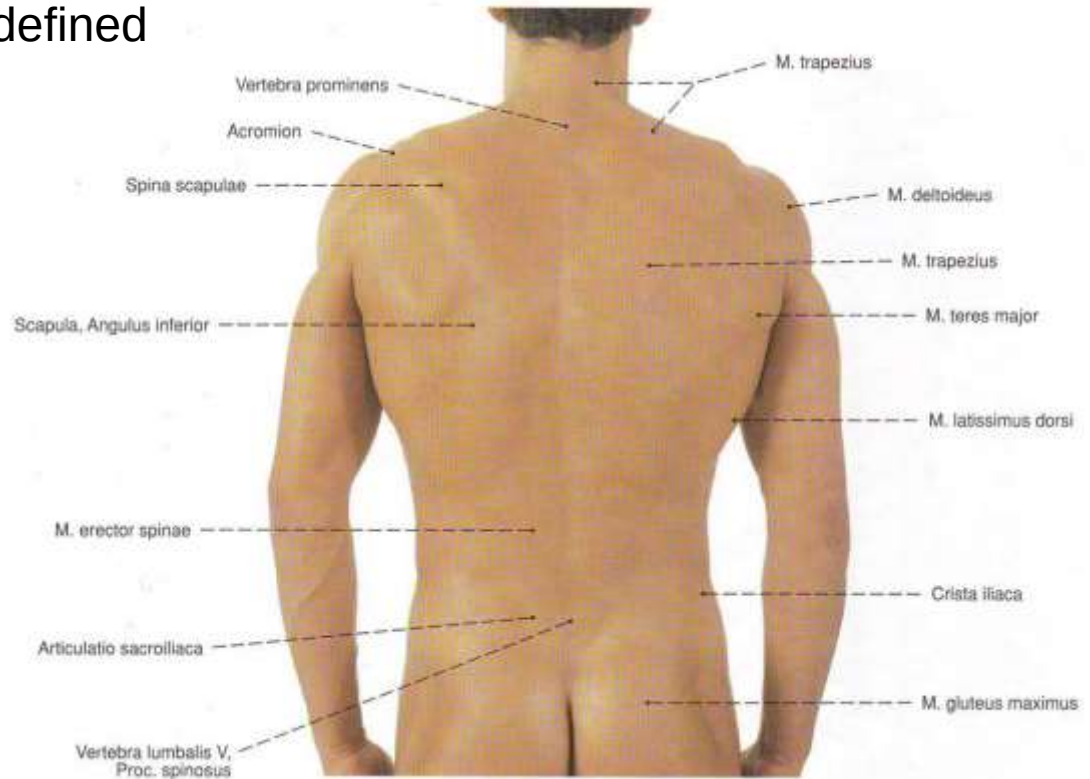


Back, *dorsum* – borders

Dorsum



- cranial:
 - ✓ *linea nuchalis superior*
 - ✓ *protuberantia occipitalis externa*
- caudal:
 - ✓ *apex ossis coccygis*
 - ✓ *spina iliaca posterior superior*
⇒ *crista iliaca*
- lateral – undefined



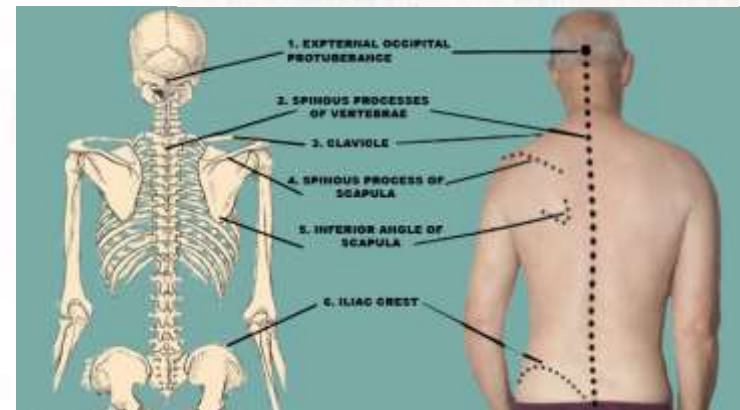
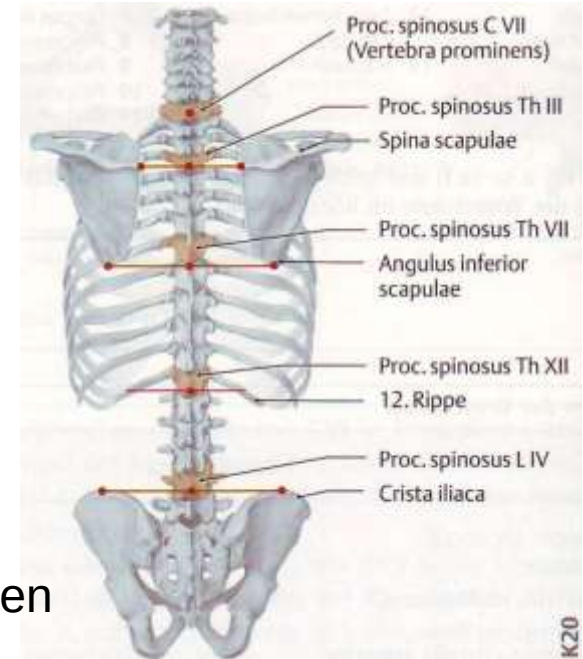
Surface anatomy



External palpation landmarks

■ Bone points and lines:

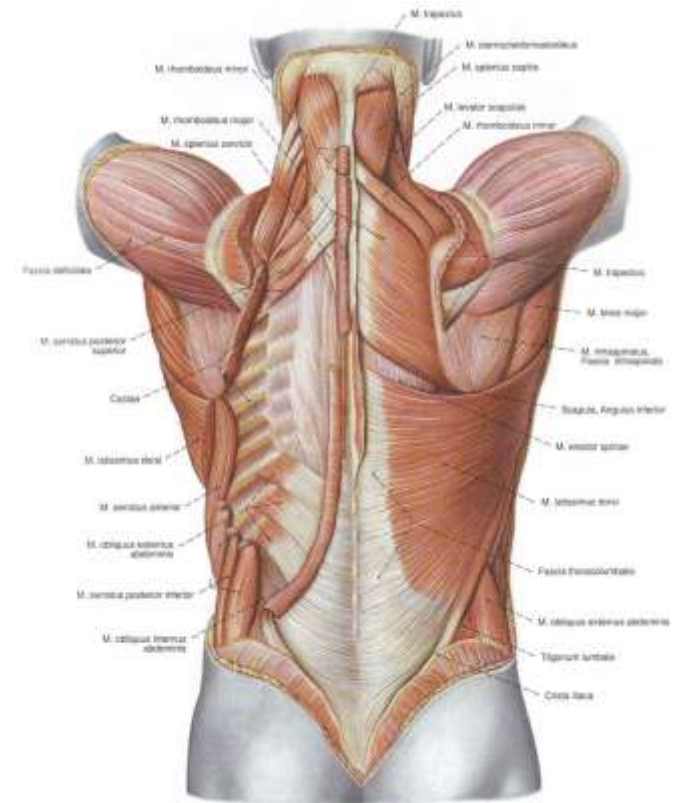
- ✓ *protuberantia occipitalis externa*
- ✓ *proc. spinosus C₇*
(*vertebra prominens*)
- ✓ *spina scapulae* – Th₃
- ✓ *angulus inferior scapulae* – Th₇
- ✓ *linea cristarum* – L₄-L₅
- ✓ the rhombus of *Michaelis* in women



Muscular landmarks



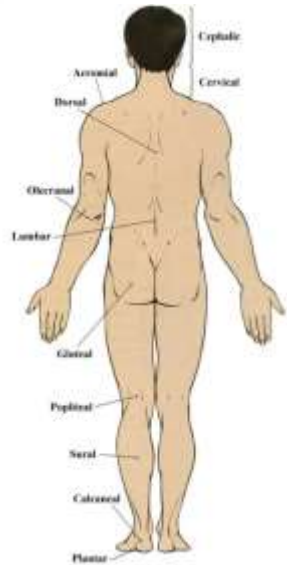
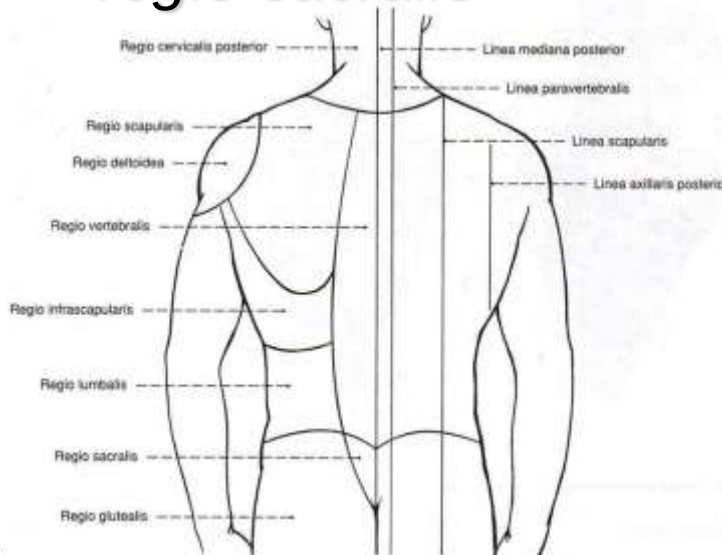
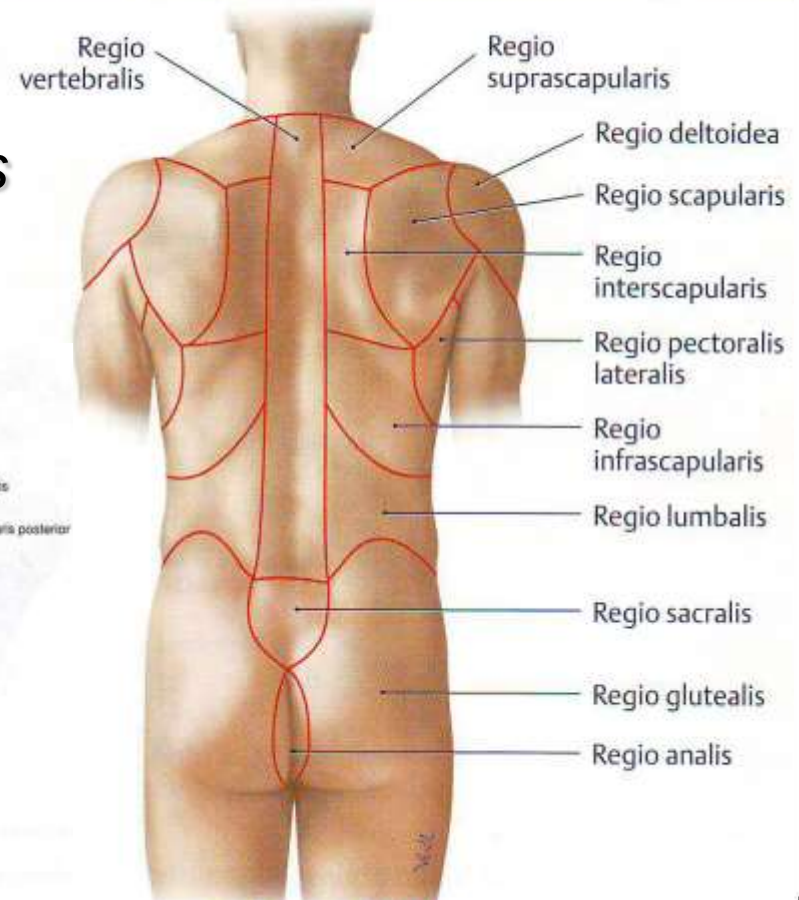
- the triangle of auscultation



Topographic anatomy areas of the back

- ✓ *regio colli posterior*
- ✓ *regio vertebralis*
- ✓ *regio scapularis*
- ✓ *regio infrascapularis*
- ✓ *regio lumbalis*
- ✓ *regio sacralis*

C-1.26 Regionen des Rückens



location

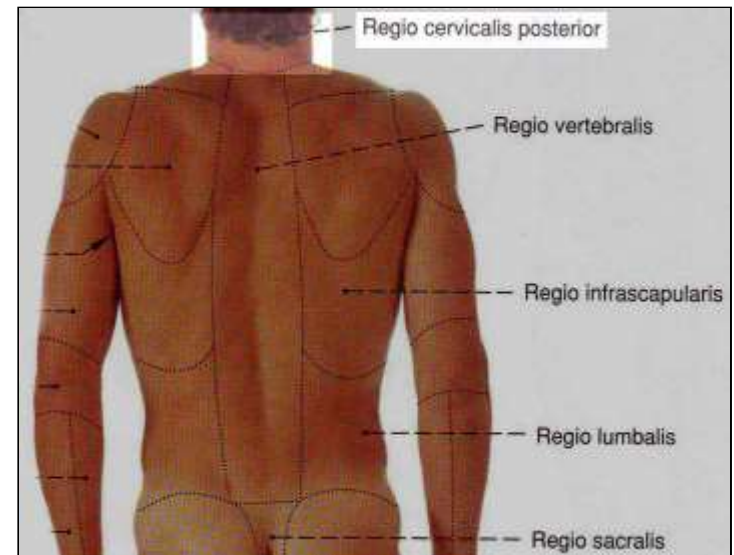
surface anatomy

Regio colli posterior



Regio cervicalis posterior

- borders:
 - ✓ superior – *linea nuchalis superior*
 - ✓ inferior – the horizontal line through the *vertebra prominens*
 - ✓ lateral – *processus mastoideus* ⇨ *acromion scapulae*
- surface anatomy:
 - ✓ skin – thick, less mobile and hairy ⇨ carbuncles
 - ✓ subcutaneous tissue – *a. occipitalis*, *n. occipitalis major, tertius, minor*, *rr. cutanei mediales (rr. dorsales nn. spinales IV-VIII)*
 - ✓ *fascia nuchae*, neck musculature



topography

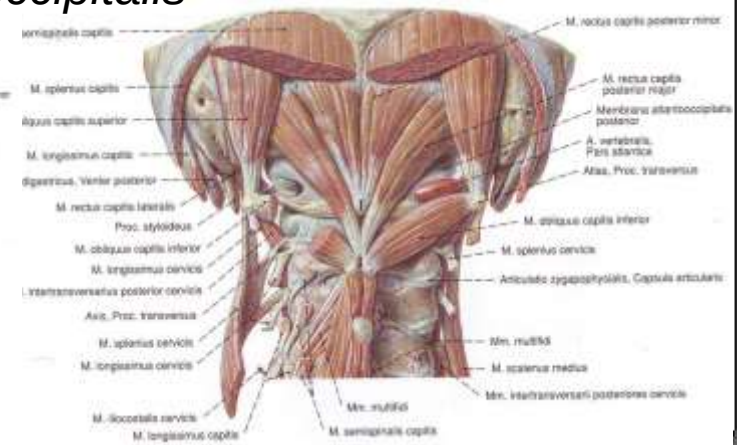
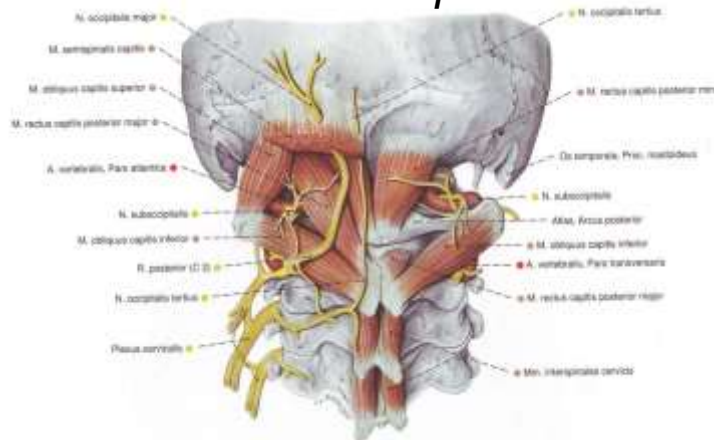
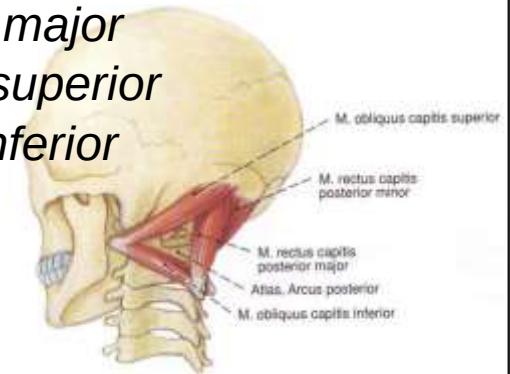
content

Trigonum suboccipitale



The suboccipital triangle, trigonum suboccipitale

- borders:
 - ✓ medially – *m. rectus capitis posterior major*
 - ✓ superolaterally – *m. obliquus capitis superior*
 - ✓ inferomedially – *m. obliquus capitis inferior*
- content:
 - ✓ *arcus posterior atlantis*
 - ✓ *n. suboccipitalis, n. occipitalis major*
 - ✓ *a. vertebralis*
 - ✓ *plexus suboccipitalis: v. vertebralis, vv. cervicalis profunda et occipitalis*



location

surface anatomy

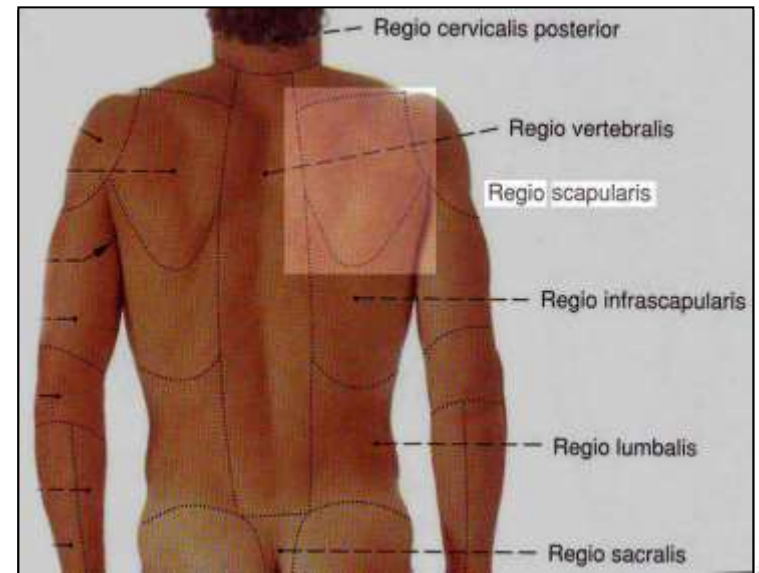
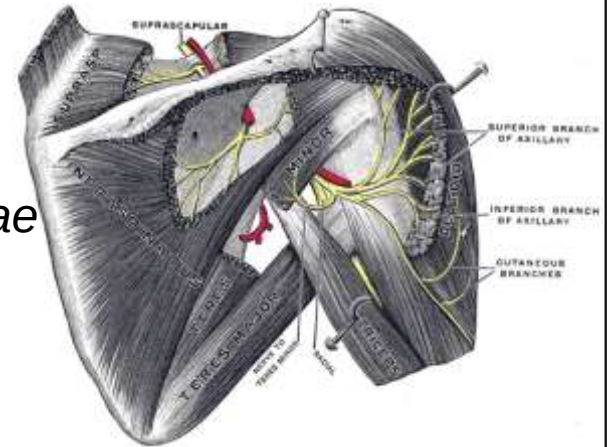
Regio scapularis



“winged scapula”
(scapula alata)

Regio scapularis

- borders:
 - ✓ medial – *anguli costarum*
 - ✓ lateral – *m. deltoideus*
 - ✓ superior – *vertebra prominens*
⇒ *acromion scapulae*
 - ✓ inferior – *angulus inferior scapulae*
- surface anatomy:
 - ✓ skin – relatively thick
 - ✓ subcutaneous adipose tissue – cutaneous innervation:
 - *nn. supraclaviculares*
 - *n. cutaneus brachii lateralis superior*
 - ✓ muscle layer:
 - *m. trapezius*
 - *m. latissimus dorsi*
 - ✓ *fascia supra- et infraspinata*
- neurovascular bundles:
 - ✓ *n., a. et v. suprascapularis*
 - ✓ deep: *a. transversa colli* et *n. dorsalis scapulae*
 - ✓ superficial: *n. accessorius* et *a. transversa colli*



location

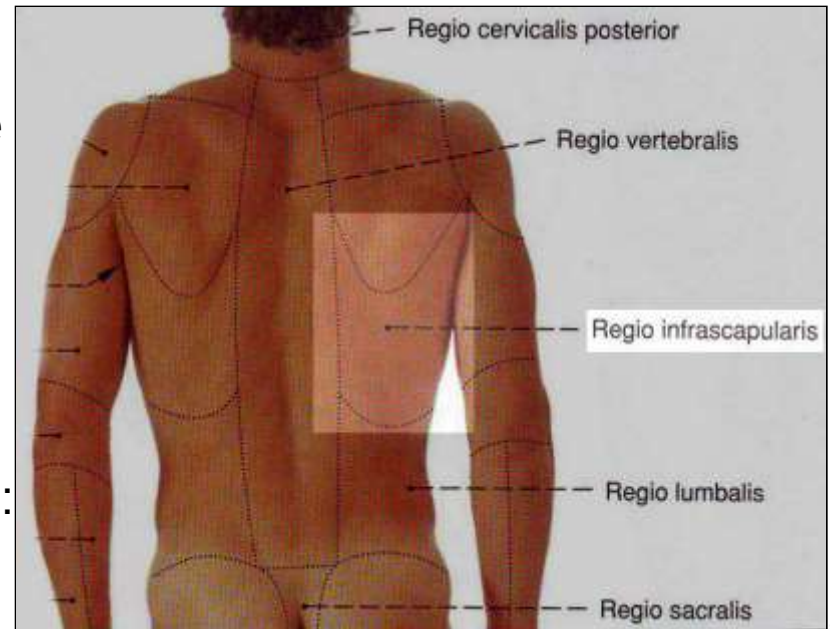
surface anatomy

Regio infrascapularis



Regio infrascapularis

- borders:
 - ✓ medial – the line through *anguli costarum*
 - ✓ lateral – posterior axillar line, the deltoid muscle
 - ✓ superior – horizontal line through the inferior scapular angle
 - ✓ inferior – inferior chest borders, i.e. the 12th rib
- surface anatomy:
 - ✓ skin – thin
 - ✓ superficial fascia – scarce adipose tissue
 - ✓ muscle layer:
 - *m. latissimus dorsi*
 - *m. serratus posterior inferior*
 - *m. obliquus externus abdominis*
 - ✓ neurovascular bundle:
 - *a., v. et n. thoracodorsalis*



location

surface anatomy

Succusio renalis

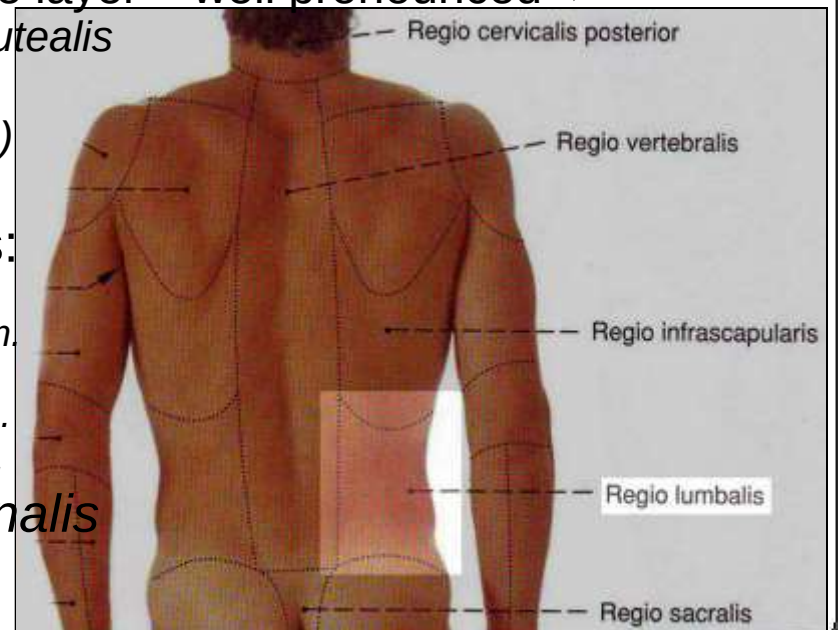


Regio lumbalis

- borders:
 - ✓ superior – the 12th rib
 - ✓ inferior – the iliac crest, *crista iliaca*
 - ✓ medial – lateral border of *m. erector spinae*
 - ✓ lateral – the posterior axillary line
- surface anatomy:
 - ✓ skin – relatively thin and movable
 - ✓ subcutaneous adipose layer – well pronounced ⇒
massa adiposa lumboglutealis
rr. cutanei laterales
(*rr. dorsales nn. spinales*)
nn. clunium superiores
 - ✓ three muscle layers:
 - trigonum lumbale* } ➤ *m. latissimus dorsi*,
 m. obliquus ext. abdom.
 - spatium lumbale* } ➤ *m. serratus post. inf.*,
 m. obliquus int. abdom.
 ➤ *m. transversus abdom.*
 - ✓ *fascia endoabdominalis*
 - *fascia transversalis* ⇒
 - *fascia quadrata*

trigonum lumbale
(Petit triangle)

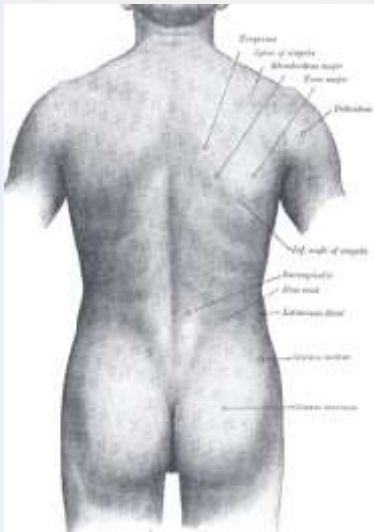
Lumbar triangle



location

surface anatomy

Regio vertebralis



Regio vertebralis

■ borders:

- ✓ lateral: line along *angulus costarum* and *m. erector spinae*
- ✓ superior: a line connecting the acromion scapulae to the spinous process of the C7, *vertebra prominens*
- ✓ inferior: the horizontal line one finger-width below *linea cristarum* and connecting *apex ossis coccygis* with *spina iliaca posterior superior*

■ surface anatomy:

- ✓ skin – relative thick with limited mobility
- ✓ subcutaneous fat layer – well-pronounced:

rr. cutanei med. (Th₆-Th₇)

rr. cutanei lat. (pod Th₇)

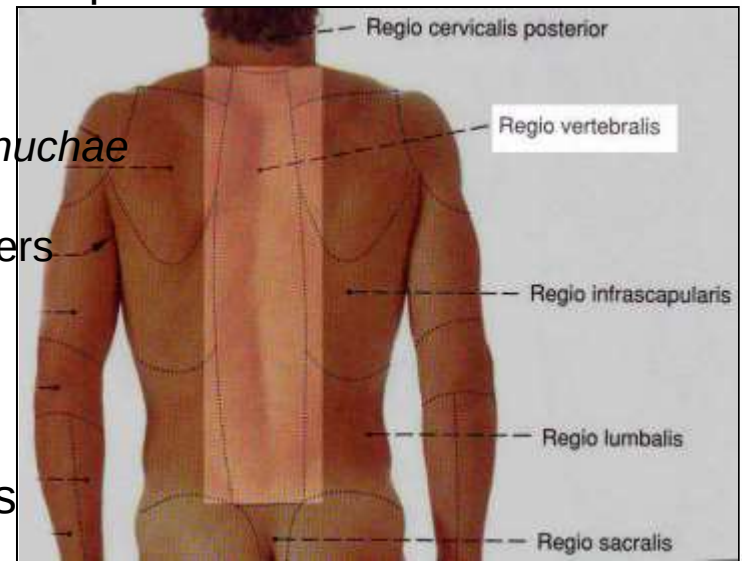
- ✓ superficial fascia ⇨ *fascia nuchae*

- ✓ muscle layer:
superficial muscles – two layers

- ✓ *fascia thoracolumbalis*
– superficial layer

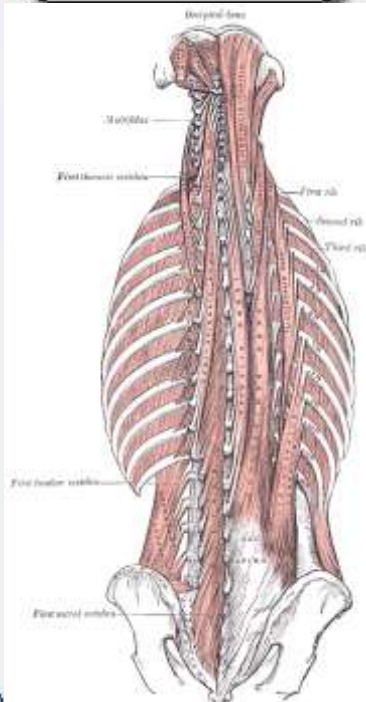
- ✓ autochthonous muscles –
m. erector spinae
– arranged in two columns

- ✓ *plexus venosus vertebralis*
externus posterior

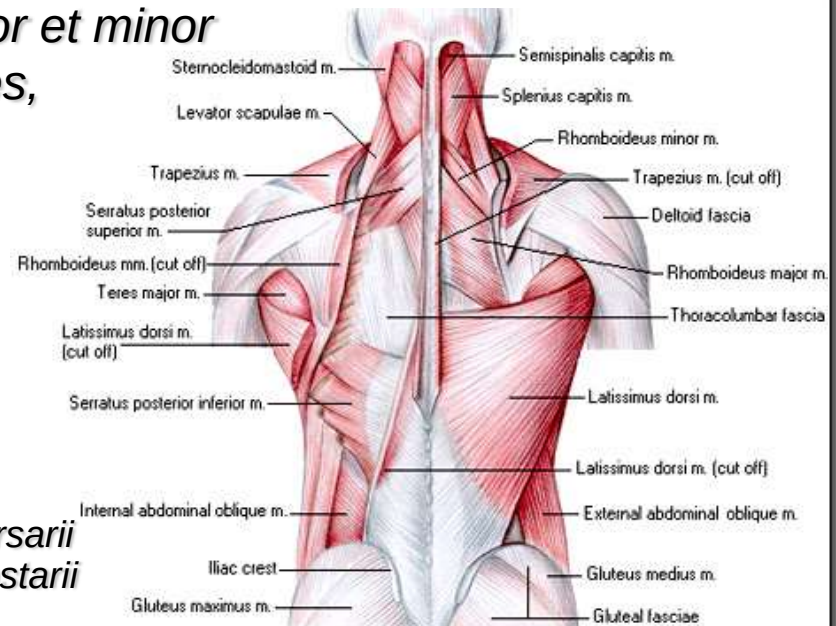


Muscles of the back

Back muscles



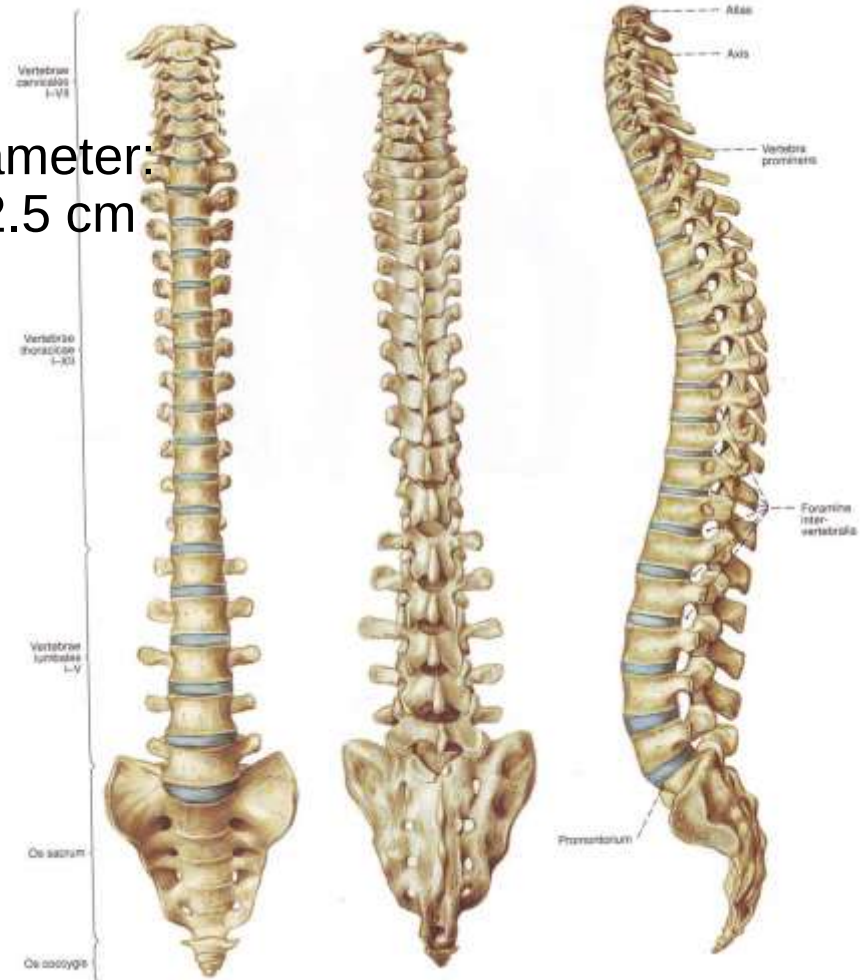
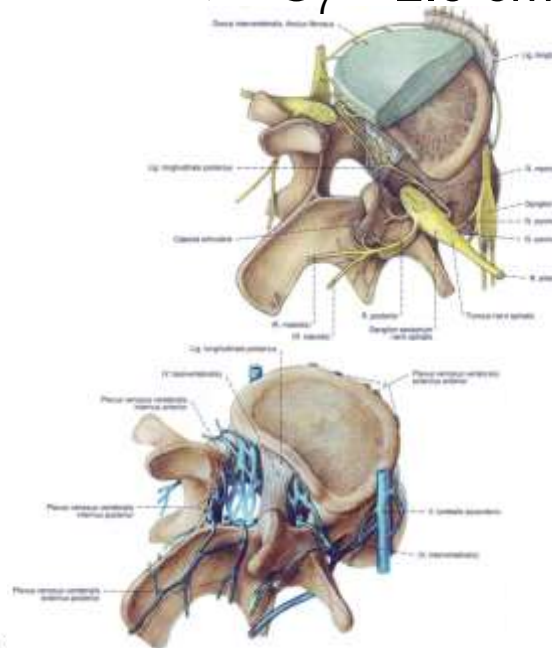
- superficial muscles – first layer:
 - ✓ *m. trapezius*
 - ✓ *m. latissimus dorsi*
- superficial muscles – second layer:
 - ✓ *mm. splenii capitis et cervicis*
 - ✓ *mm. rhomboidei, major et minor*
 - ✓ *mm. serrati posteriores, superior et inferior*
- *fascia thoracolumbalis*
- autochthonous muscles:
 - ✓ *m. erector spinae*:
 - lateral column –
 - *mm. iliocostalis*
 - *m. longissimus*
 - *m. spinalis*
 - *mm. intertransversarii*
 - *mm. levatores costarii*
 - medial column –
 - *m. transversospinalis*
 - *mm. interspinales*
 - ✓ *mm. levatores costarum longi et breves*



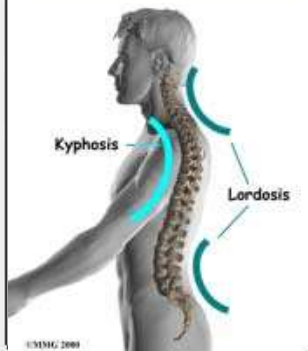
The vertebral canal, *canalis vertebralis*

■ borders:

- ✓ length: 66-69 cm
- ✓ the transverse diameter:
 - ✓ average 2.3-2.5 cm
 - L₅ = 3.2 cm
 - C₇ = 2.9 cm

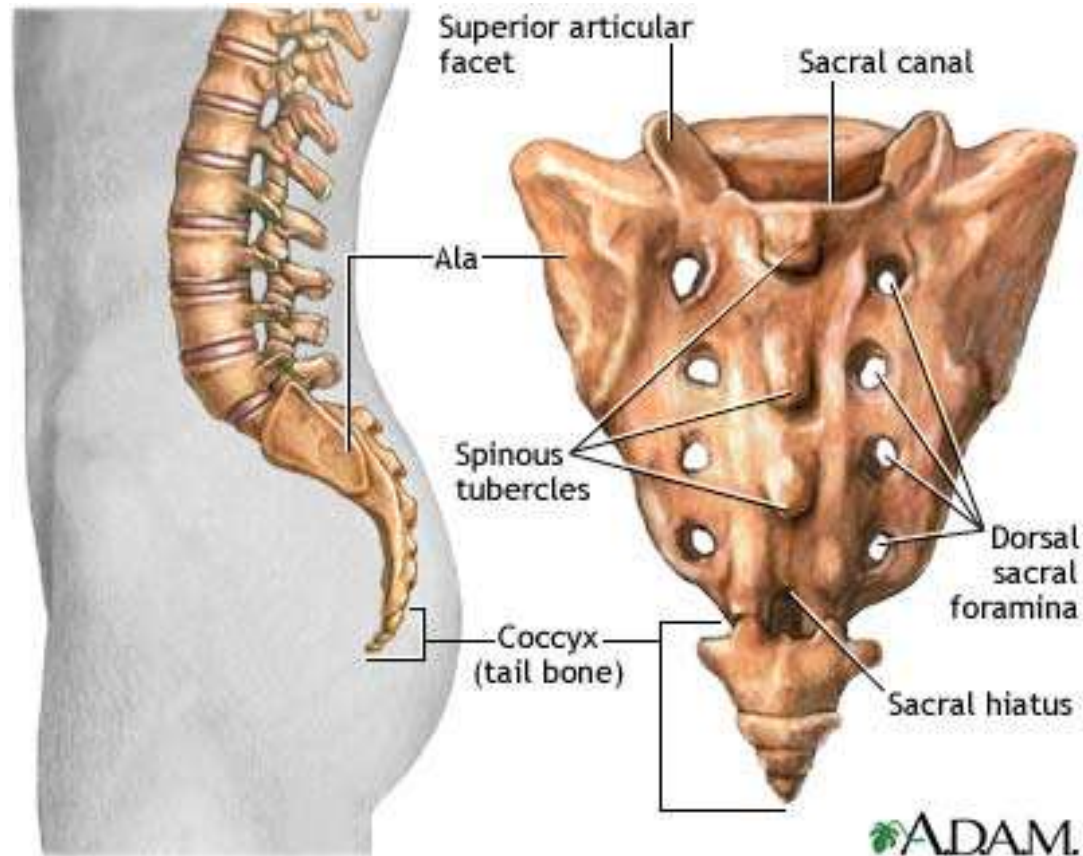


The spine curves



The sacral canal, *canalis sacralis*

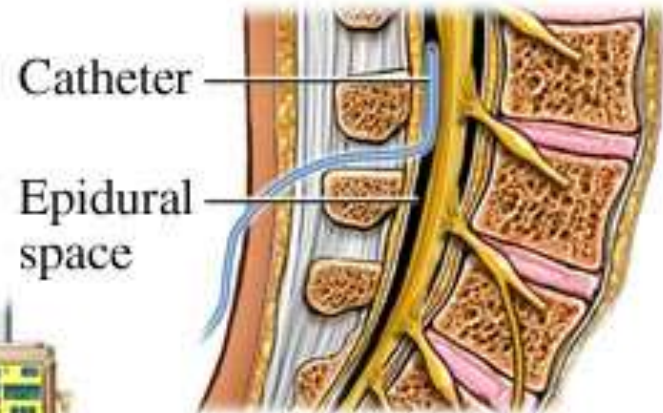
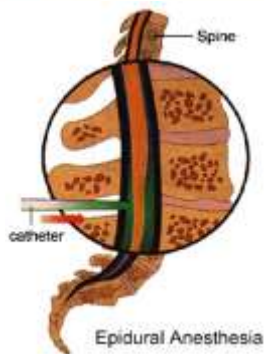
- ✓ *hiatus sacralis* $\Rightarrow$ *lig. sacrococcygeum dorsale*
- ✓ *cornua sacralia* $\Rightarrow$ *cornua coccygea*



“Sacral fontanelle” – clinical significance

- Sacral hiatus $\Rightarrow$ covered by the skin, subcutaneous fat, and the sacrococcygeal ligament: sacral (epidural) anesthesia

Epidural anesthesia

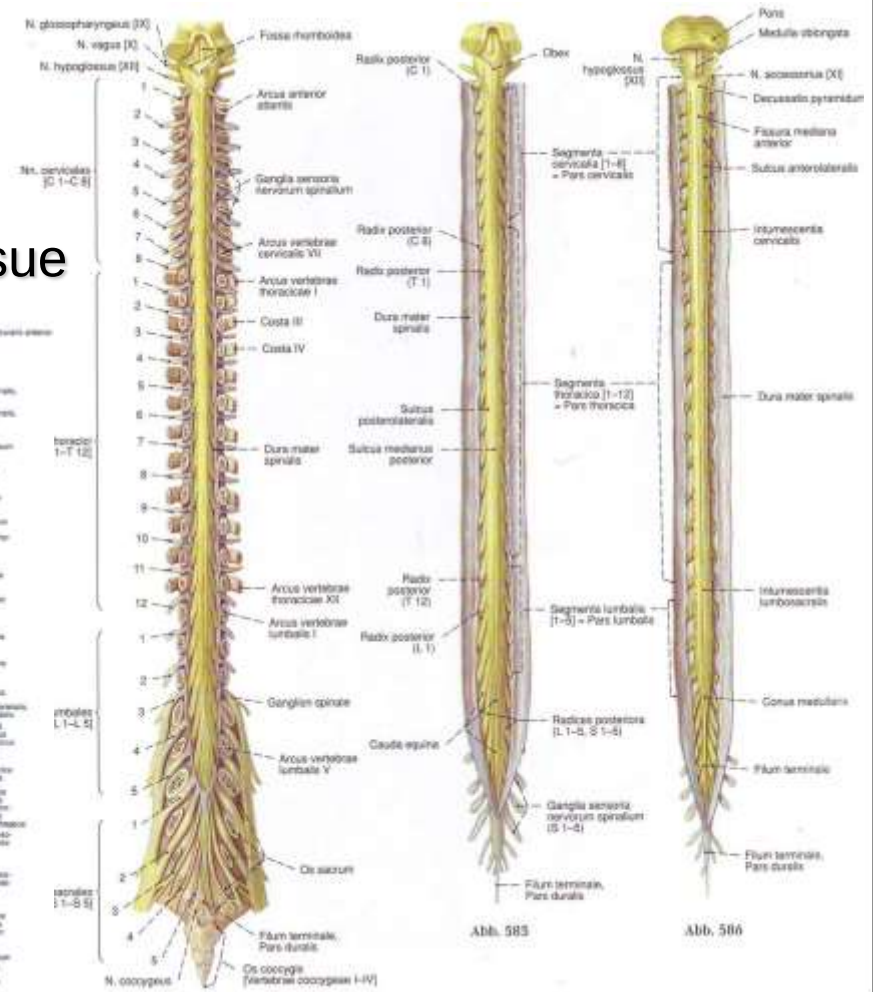
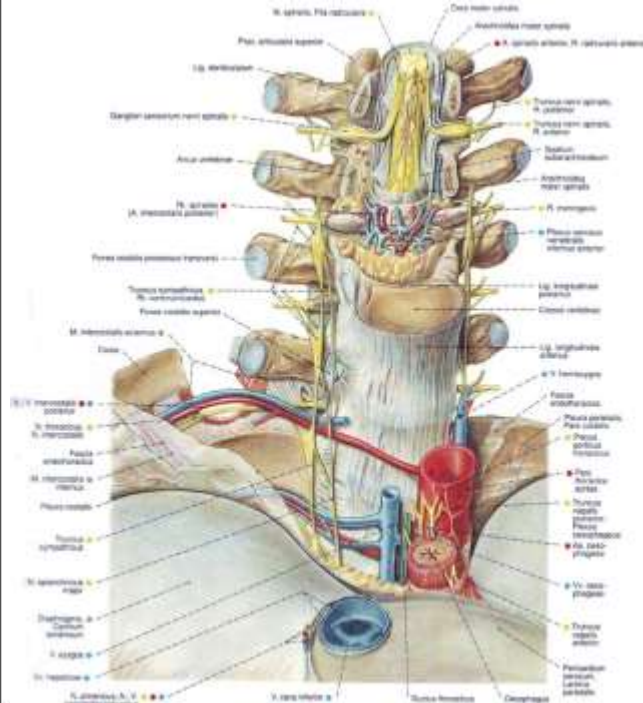


The vertebral canal – content

Vertebral canal



- ✓ spinal cord
- ✓ spinal nerve roots
- ✓ spinal meninges
- ✓ venous plexuses
- ✓ loose connective tissue



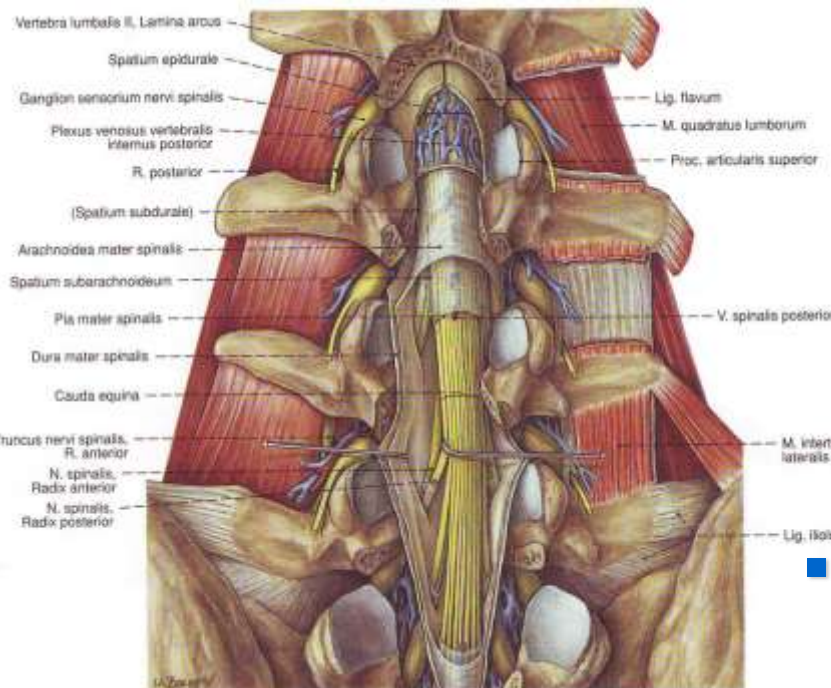
Venous plexuses

Veins of the vertebral column



■ *plexus venosus vertebralis internus:*

- ✓ *anterior* (in *cavum epidurale*)
- ✓ *posterior*
- ✓ *cavo-caval anastomosis*



CMMG 2001

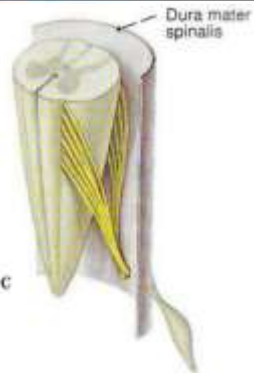
■ 6 longitudinal venous trunks

- **laminectomy** ⇒ massive bleeding and air embolism



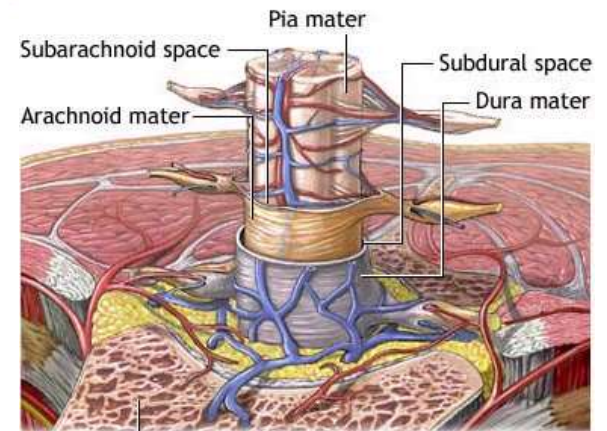
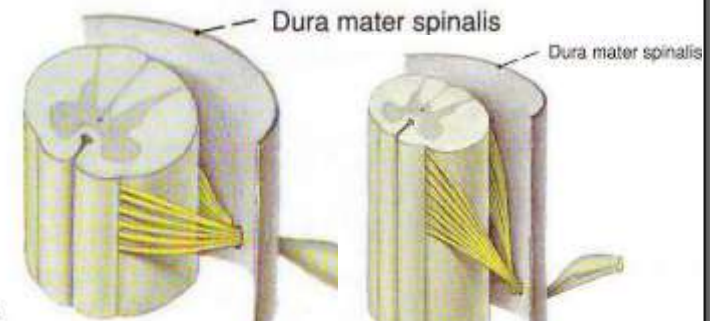
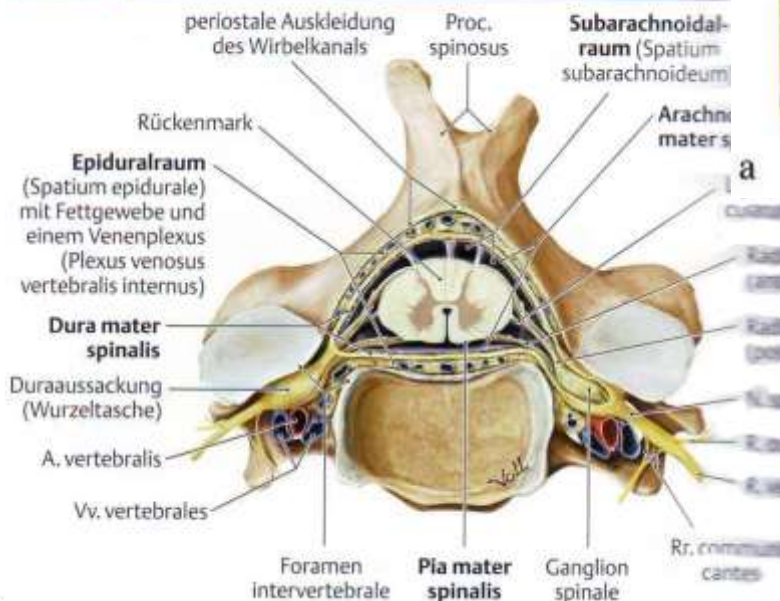
The spinal meninges

Spinal meninges



- *dura mater spinalis* – from foramen magnum to S₂
 ⇒ *cavum subdurale*: lymph-like fluid
- *arachnoidea spinalis*
 ⇒ *cavum subarachnoidale* (*leptomeningicum*)
 ⇒ *cisterna terminalis*: *liquor cerebrospinalis*
- *pia mater spinalis*

☉ N-1.42 Darstellung der Rückenmarkshäute



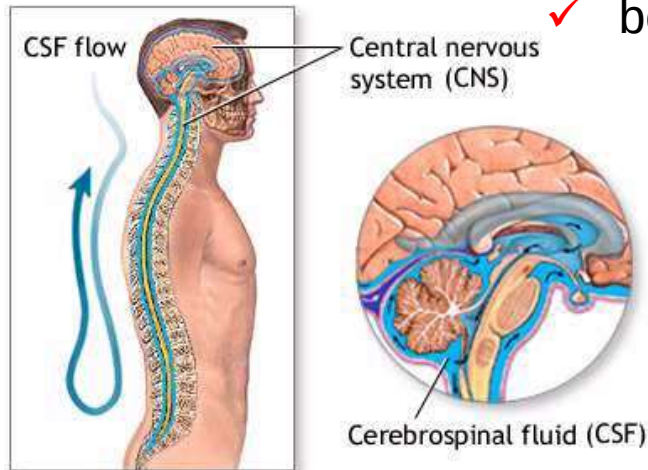
The spinal meninges – clinical significance

Lumbar puncture

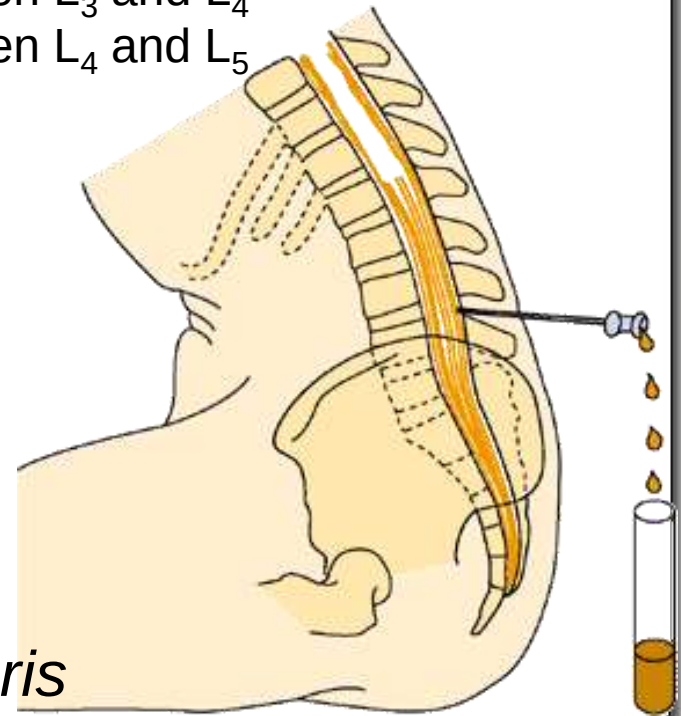


- intradural spinal anesthesia
- lumbar puncture (spinal tap): intercristal line (Jacoby's line) = L₄

- ✓ between L₃ and L₄
- ✓ between L₄ and L₅



- suboccipital puncture ⇒ *cisterna cerebellomedullaris*

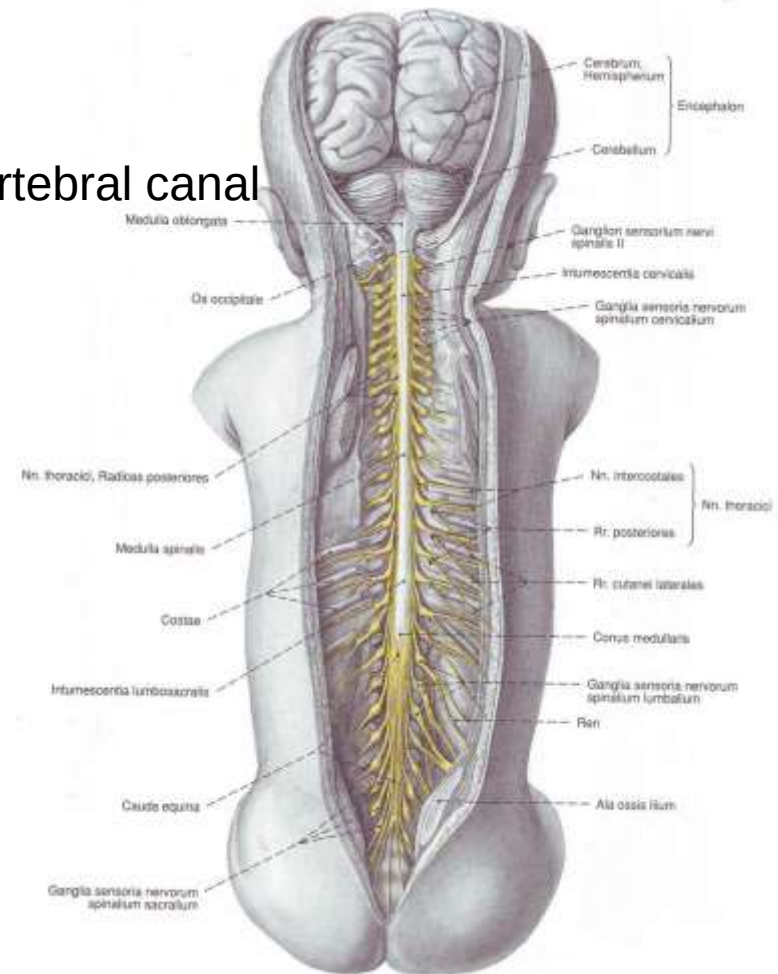




The spinal cord, *medulla spinalis*

■ location:

- ✓ in the upper $\frac{2}{3}$ of the vertebral canal
- ✓ from *foramen magnum*
- ✓ lower margin of L₁,
or upper margin of L₂
- ✓ in men – until Th₁₂ level
- ✓ in women and children
– slightly lower



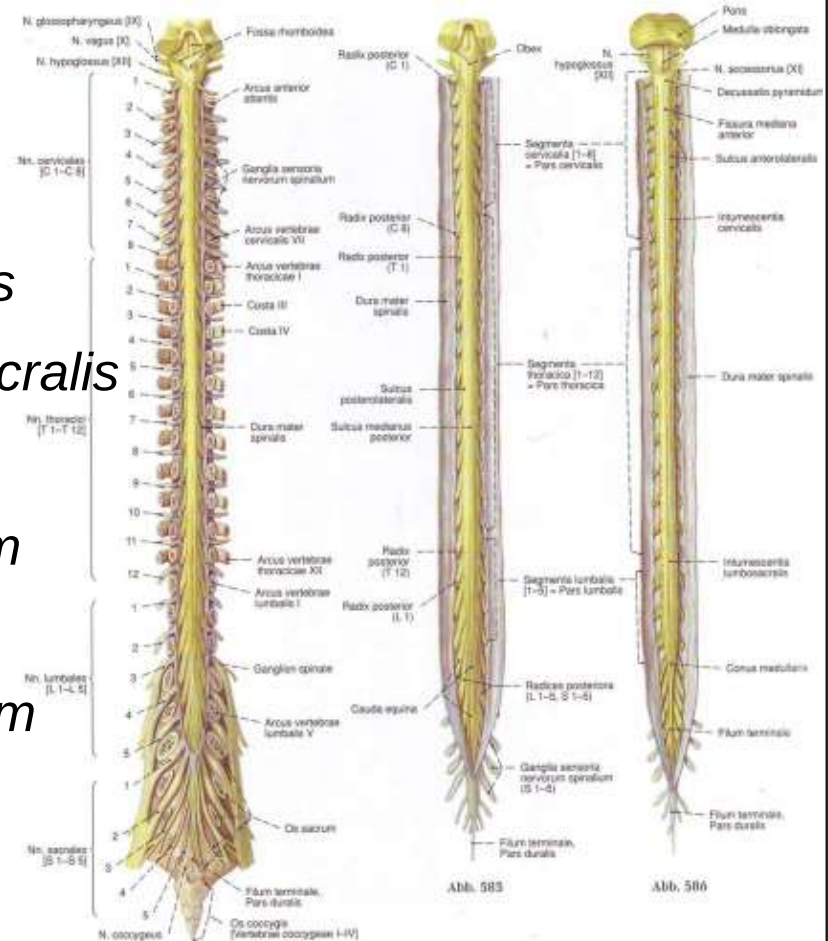
Shape and topography

Spinal cord segment

anatomy



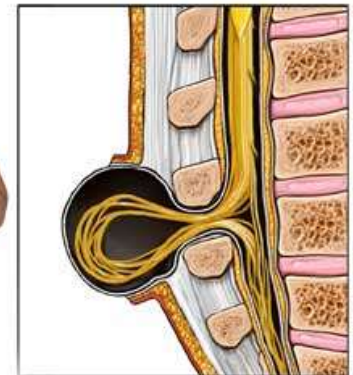
- ✓ length: 40-45 cm
- ✓ diameter: 1.0-1.5 cm
- ✓ 31 segments
- ✓ *intumescentia cervicalis*
- ✓ *intumescentia lumbosacralis*
- ✓ *conus medullaris* – L₂
- ✓ *filum terminale internum*
 - L₂-S₂
- ✓ *filum terminale externum*
 - Co₂
- ✓ *cauda equina*



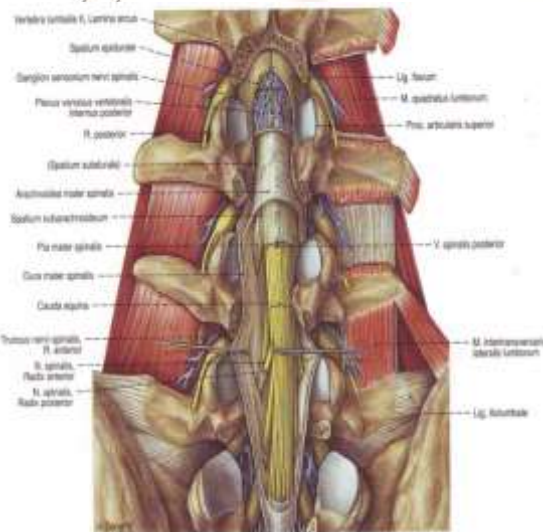
Dermatome innervation



The diagram illustrates the difference between a normal spine and a spine with a neural tube defect (Spina Bifida). On the left, a fetus is shown with a visible lump on its back, labeled 'Spina Bifida'. On the right, a normal spine is shown with labels for 'Vertebra', 'Meninges', 'Spinal Cord', and 'Spinal Fluid'. The diagram shows that in a normal spine, the spinal cord and meninges are contained within the vertebral column, while in Spina Bifida, they are displaced or malformed.



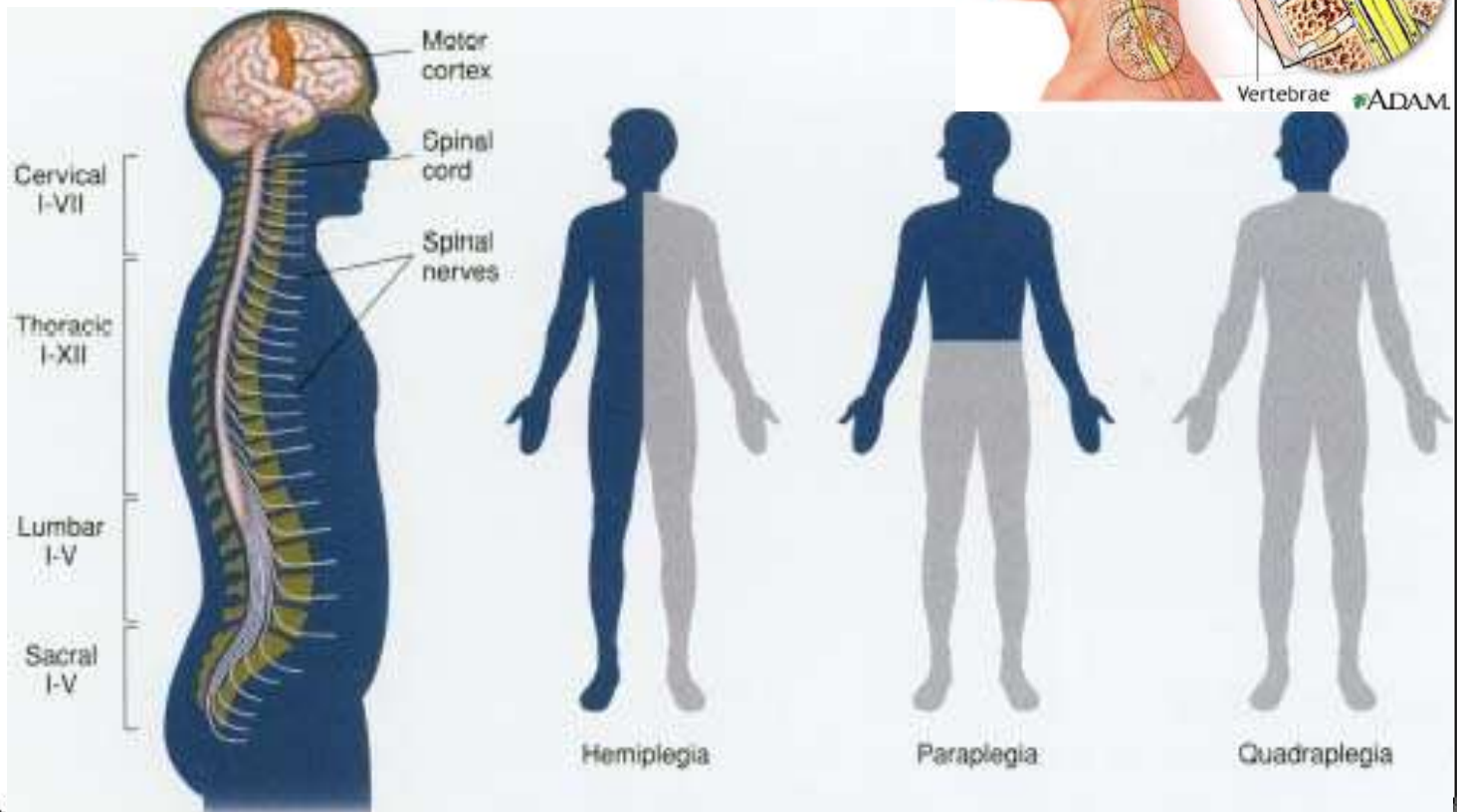
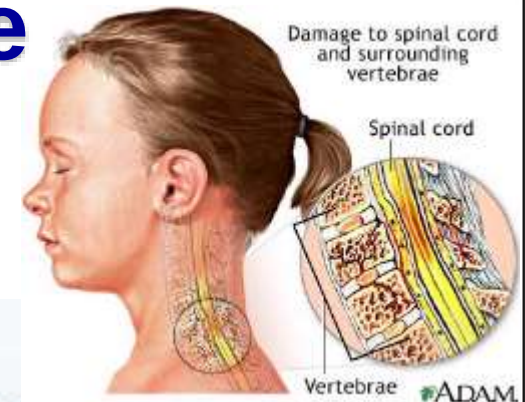
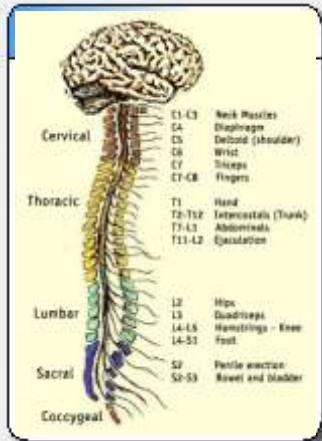
Defect in vertebrae allows spinal nerves to protrude

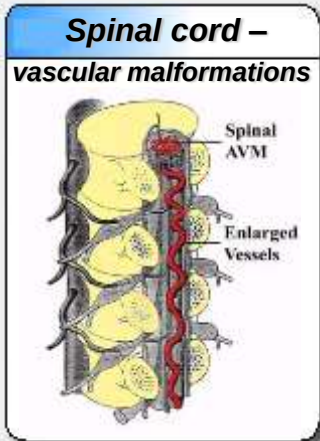


- Prof. Nikolai Lazarov*

segmental skeletalotopy

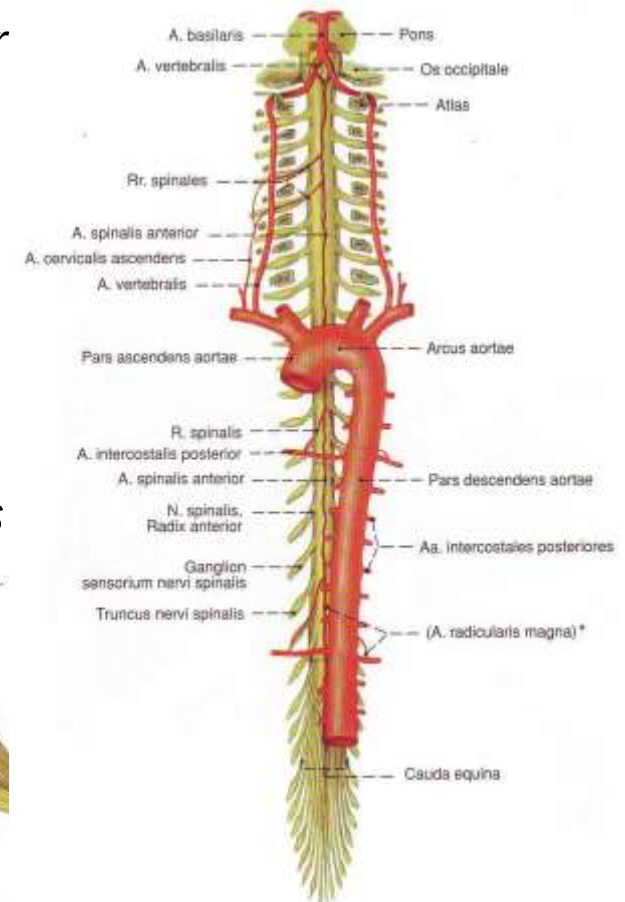
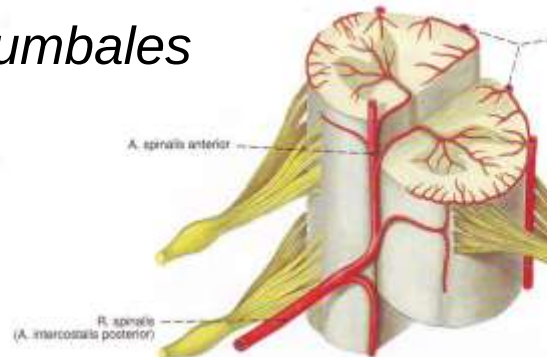
The spinal cord – clinical significance





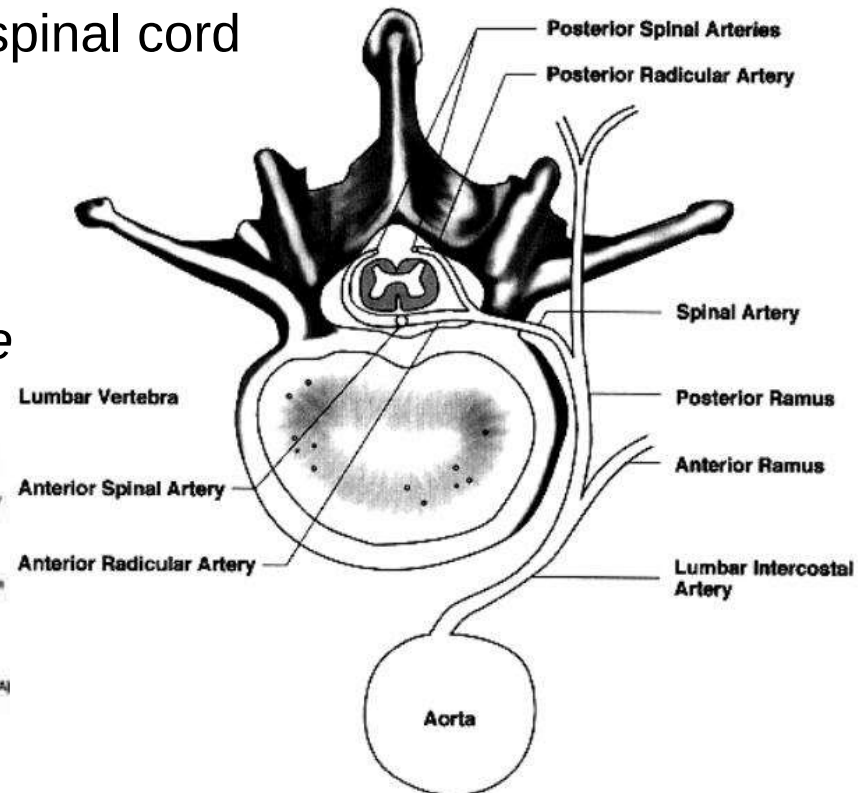
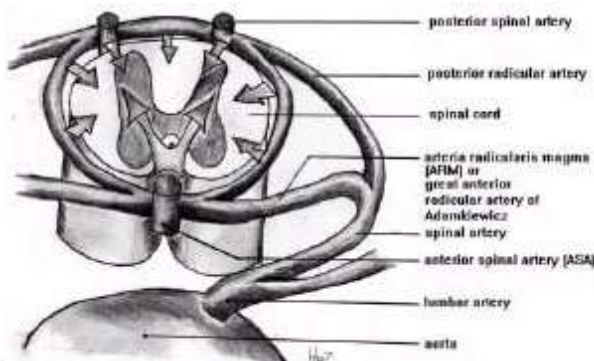
Blood supply of the spinal cord

- longitudinal column (*a. vertebralis*):
 - ✓ unpaired *a. spinalis anterior*
 - ✓ *aa. spinales posteriores*
- segmental supply:
 - ✓ *a. cervicalis ascendens*
 - ✓ *a. cervicalis profunda*
 - ✓ *a. vertebralis*
 - ✓ *aa. intercostales posteriores*
 - ✓ *aa. lumbales*



Blood supply of the spinal cord – clinical significance

- *a. radicularis magna* (artery of Adamkiewicz):
 - ✓ inferior part of the spinal cord
 - ✓ lower limb palsy
 - ✓ paraplegia
 - ✓ loss of sensitivity
 - ✓ *incontinentio urinae*



Thank you ...



"I'M THE ONE WITH THE MEDICAL DEGREE, I'LL DETERMINE
IF YOUR BACK IS BOTHERING YOU, OR NOT..."

