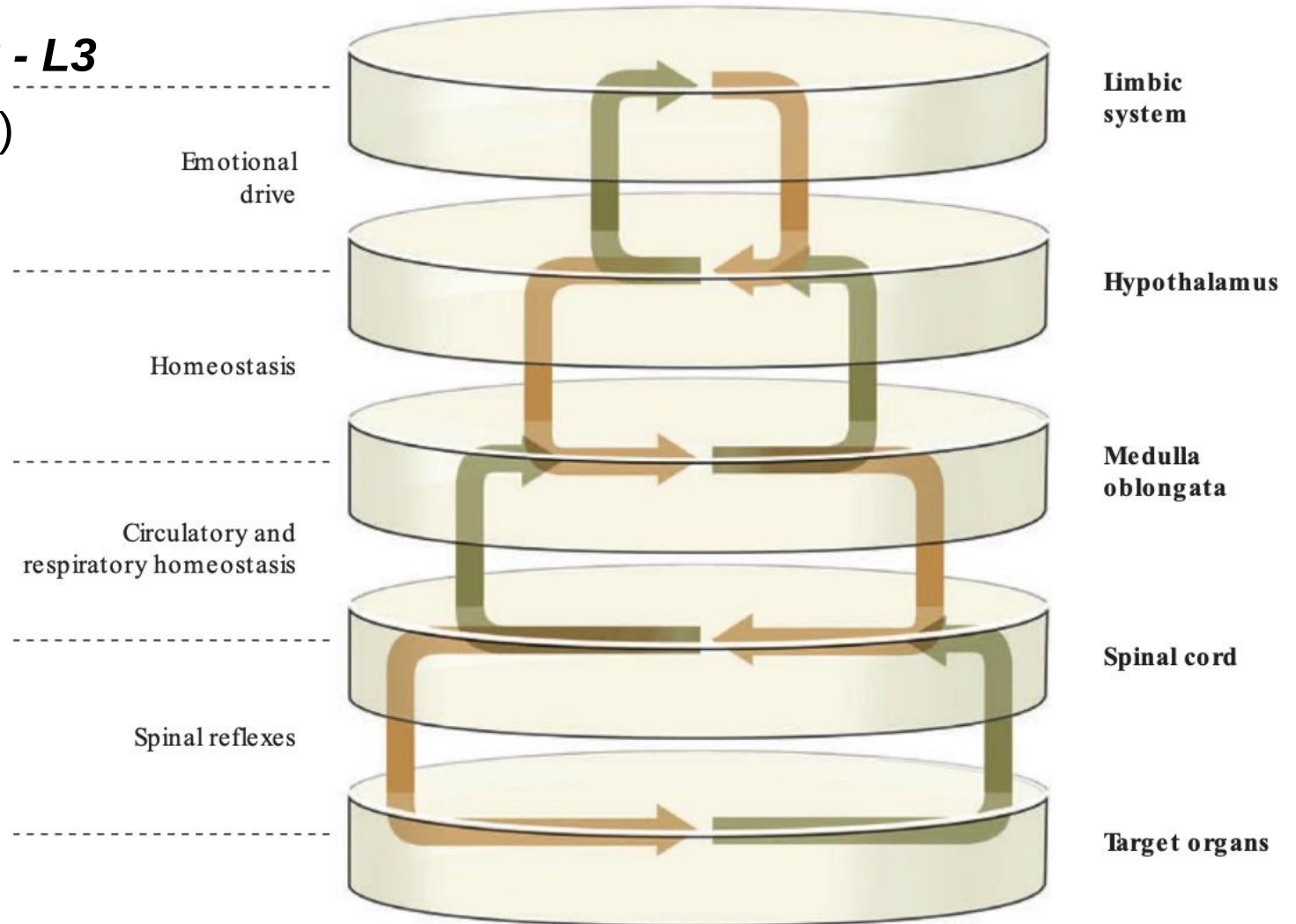


Neuroanatomy – autonomous nervous system

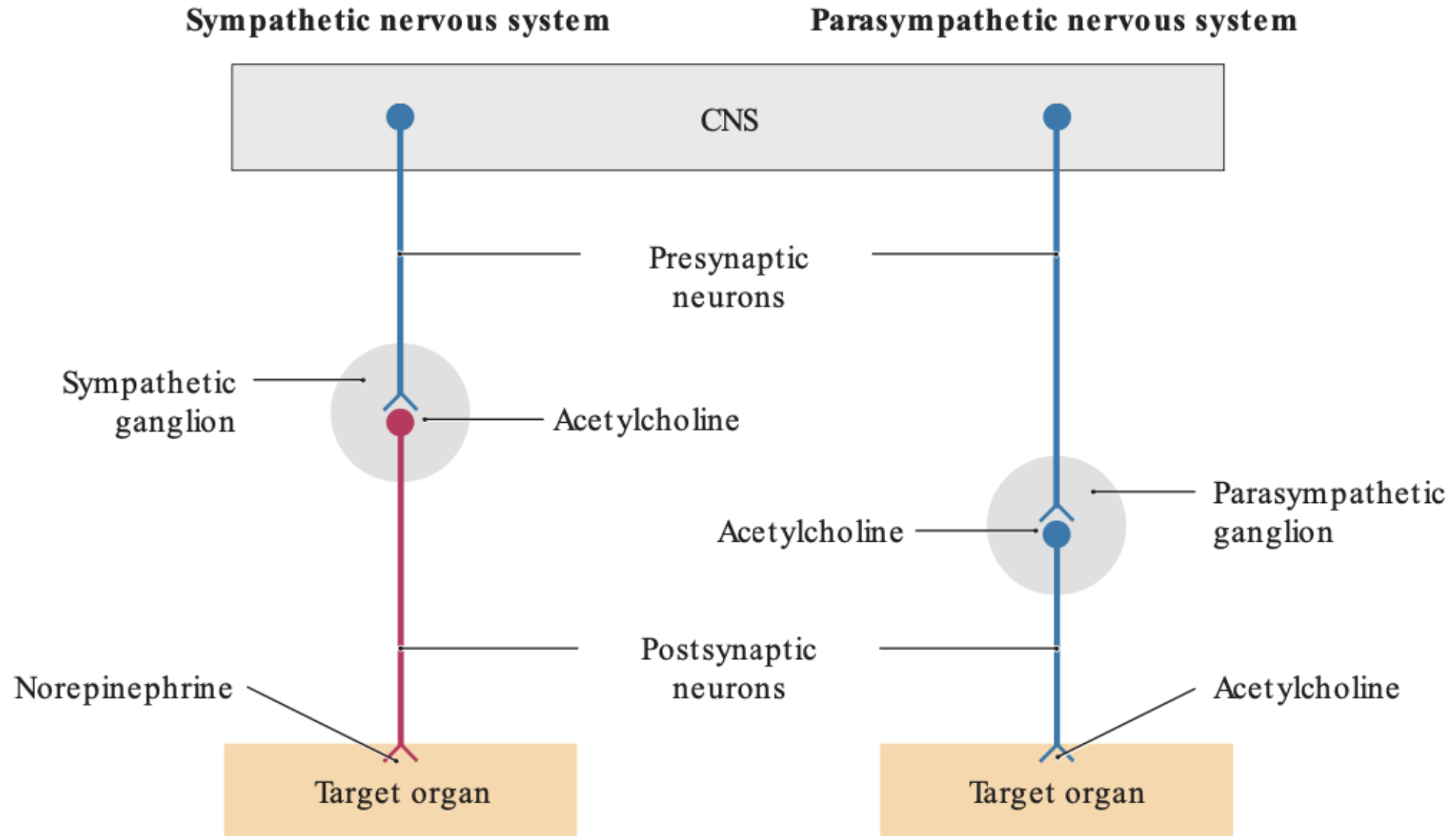
Prof. MUDr. Jiří Ferda, Ph.D.

Autonomous nerves

- ♦ **Pars sympathica**
- ♦ ***Systema (cervico)thoracolumbale C8 - L3***
- ♦ transmitter noradrenalin (norepinephrine)
- ♦ **Pars parasympathica**
- ♦ ***Systema craniosacrale***
- ♦ ***transmitter acetylcholin***
- ♦ *Columna lateralis medullae spinalis*
- ♦ *Nucleus intermediolateralis*
- ♦ *Ganglia trunci sympathici*
- ♦ *Parasympatická ganglia*



Autonomous nerves



Autonomous nerves

- ♦ **Almost all organs**
- ♦ *Antagonism of sympathetic and parasympathetic*
- ♦ *Onl soem organs only one supply*

- ♦ *only parasympatheticus – stomach and pancreas*
- ♦ *only sympathetius – vesseûs, sweat glands*

- ♦ **Transmission of impulses**
 - ♦ *Actylcholine and norepinephrine*

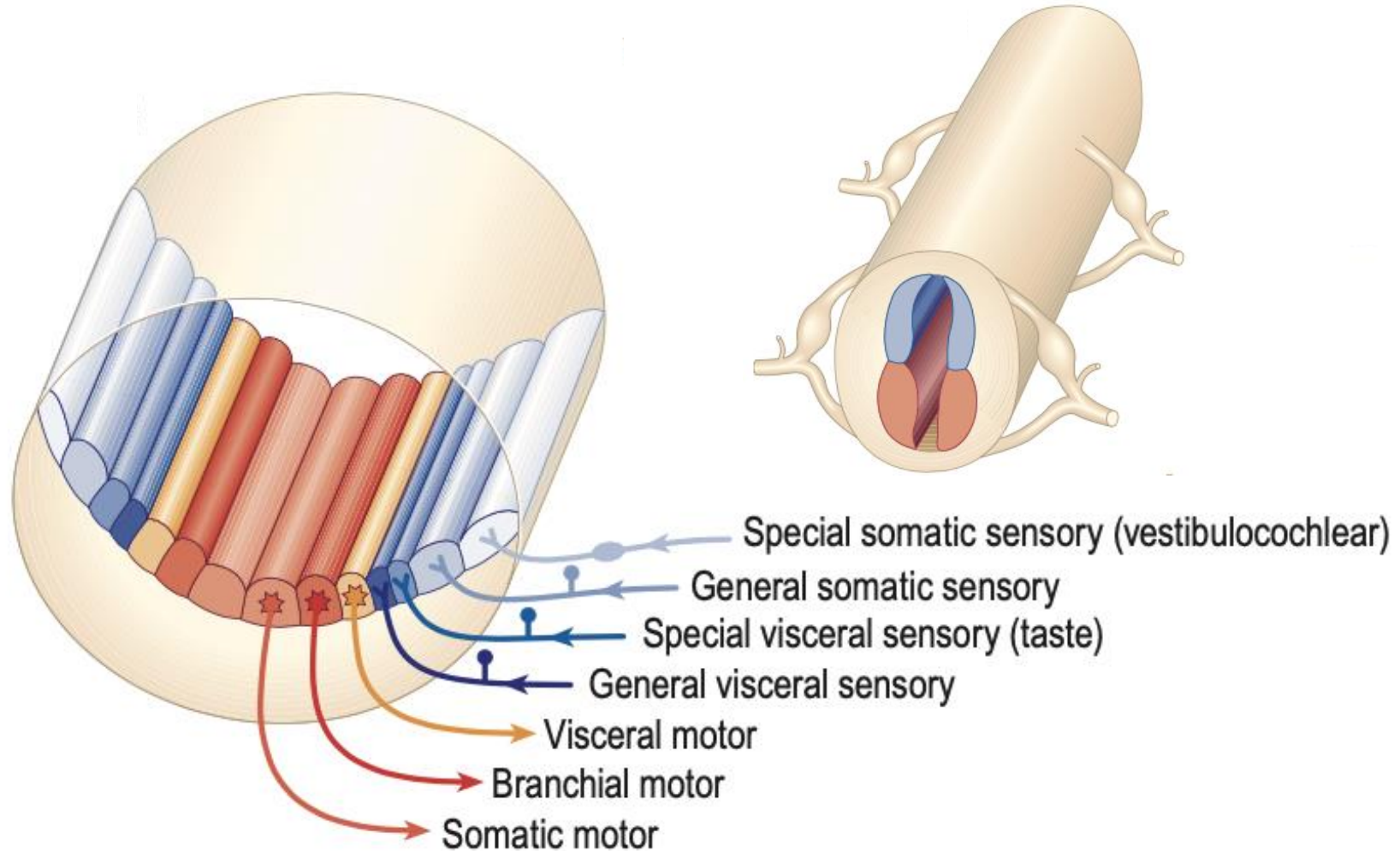
Neural tube

♦ Basal plate

Somatic motor
Branchial motor
Viceromotor

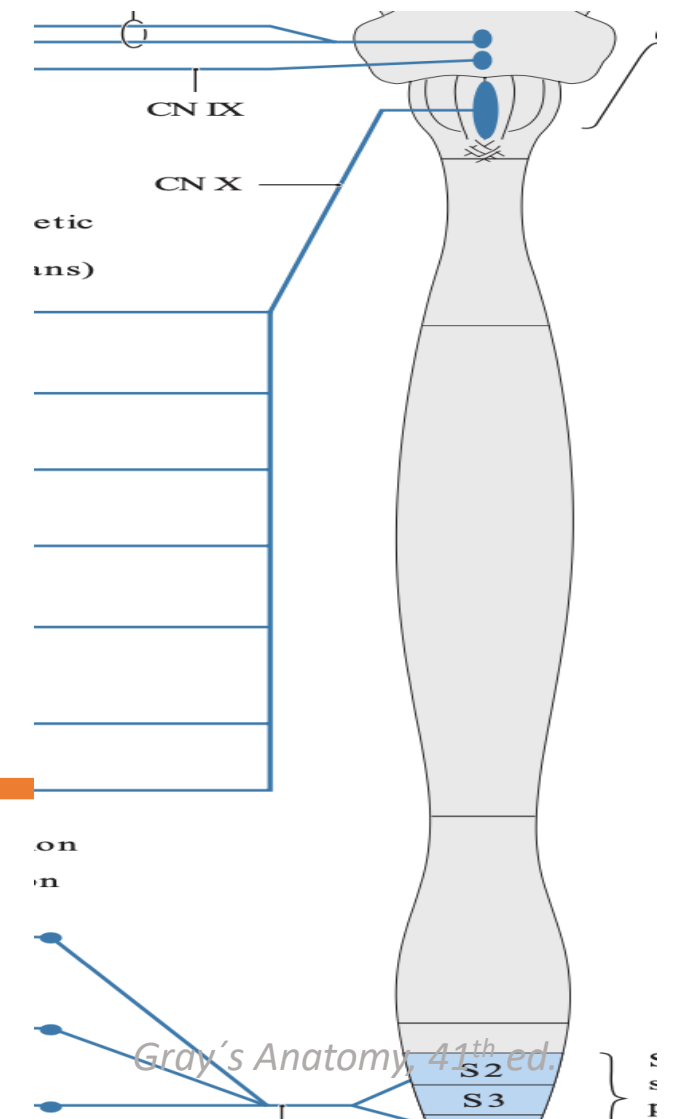
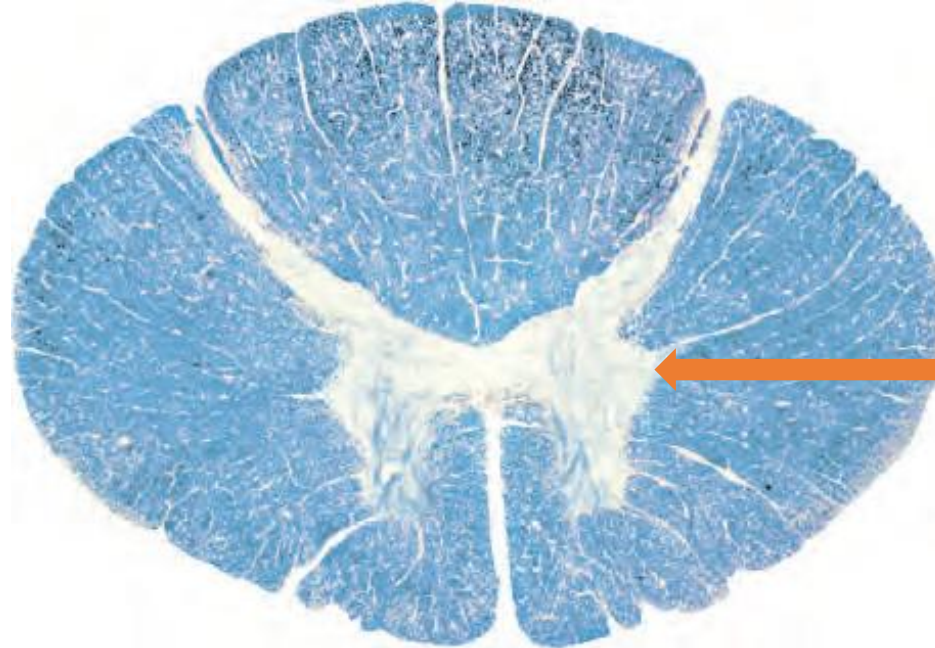
♦ Alar plate

♦ *viscerosensoric*
♦ *Taste*
♦ *somatsensoric*
♦ *vestibulocochlear*

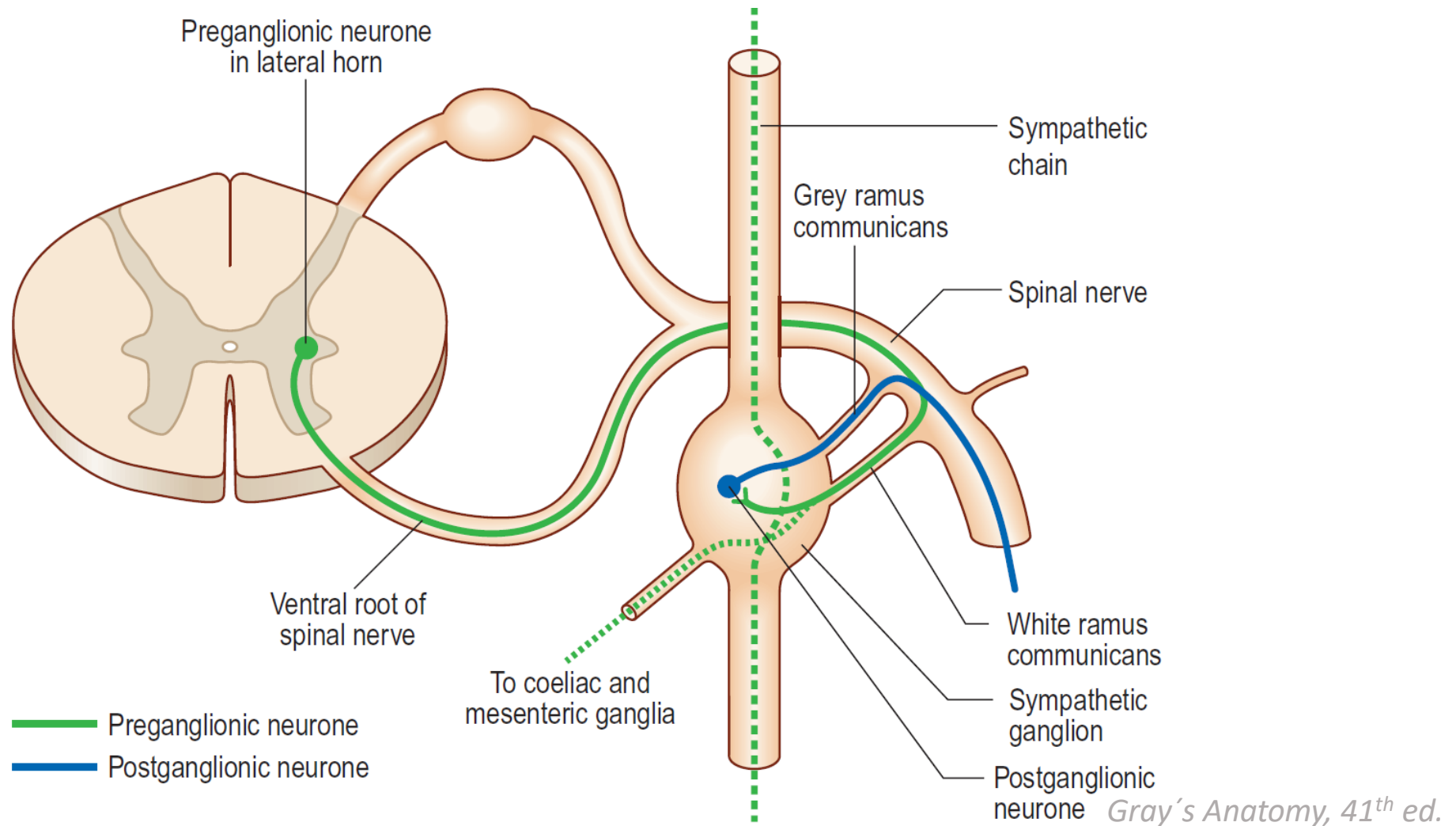


Autonomous nerves

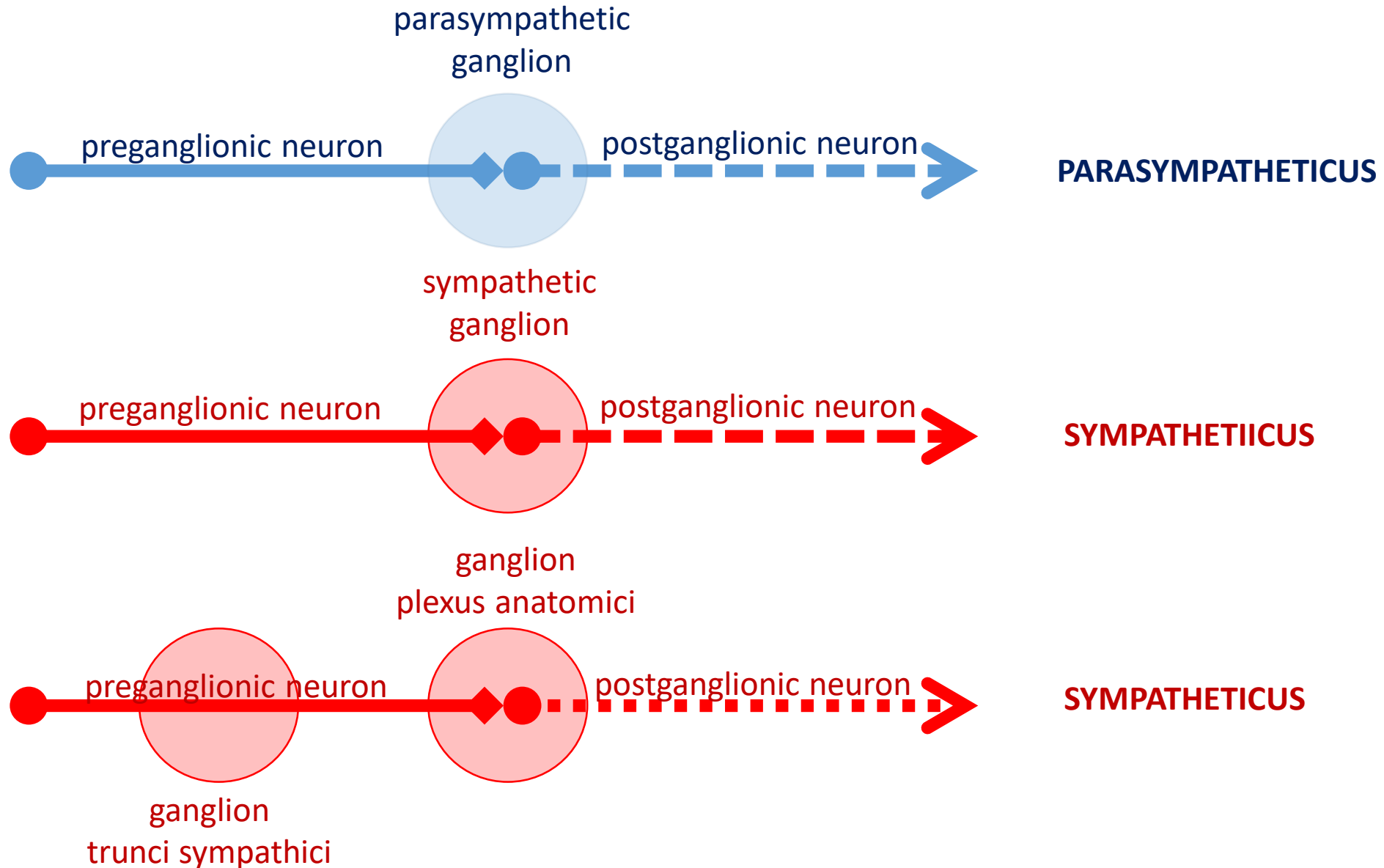
- Parasympathetic
- Sympathetic
- Diffuse enteral system



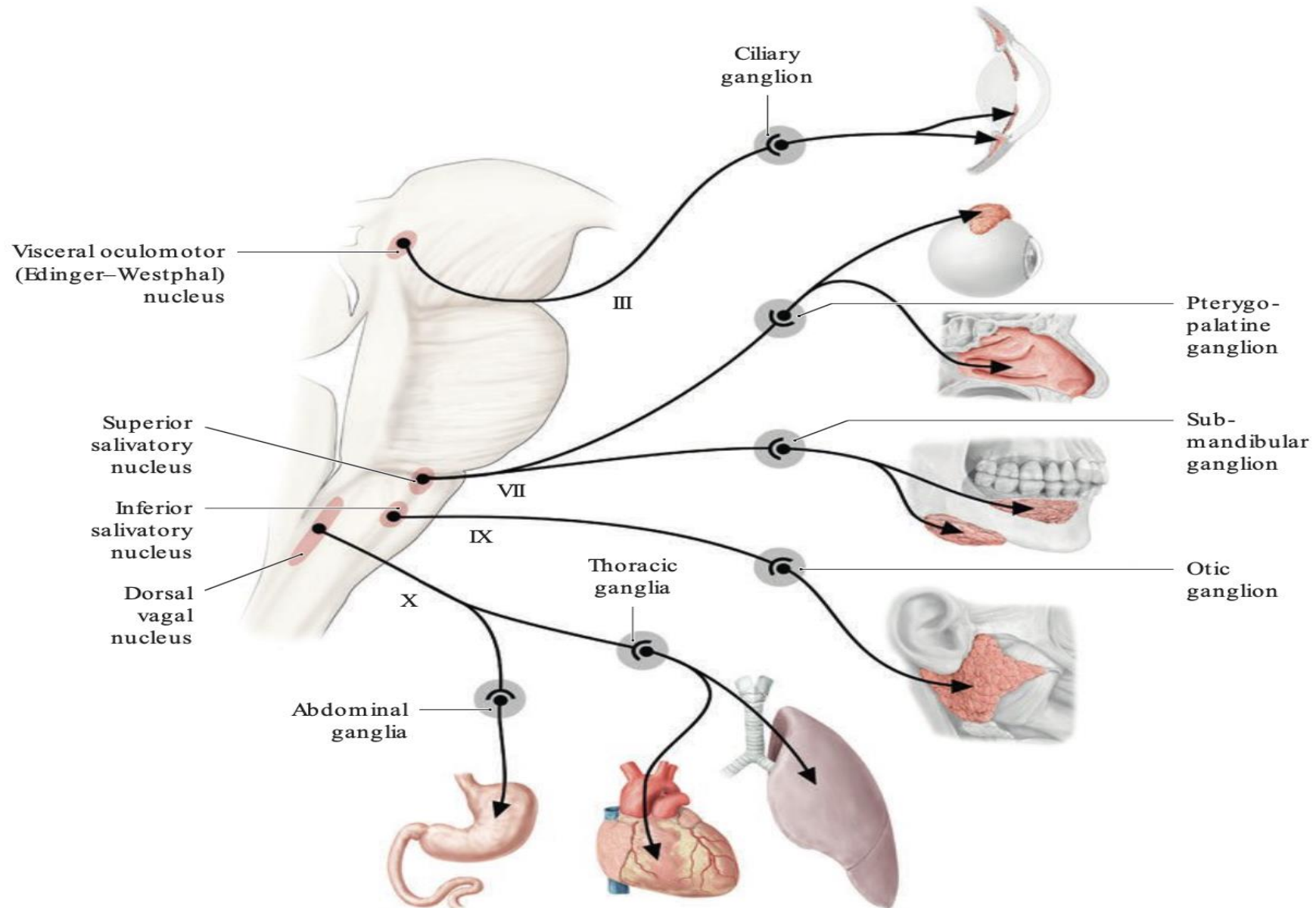
Autonomous nerves

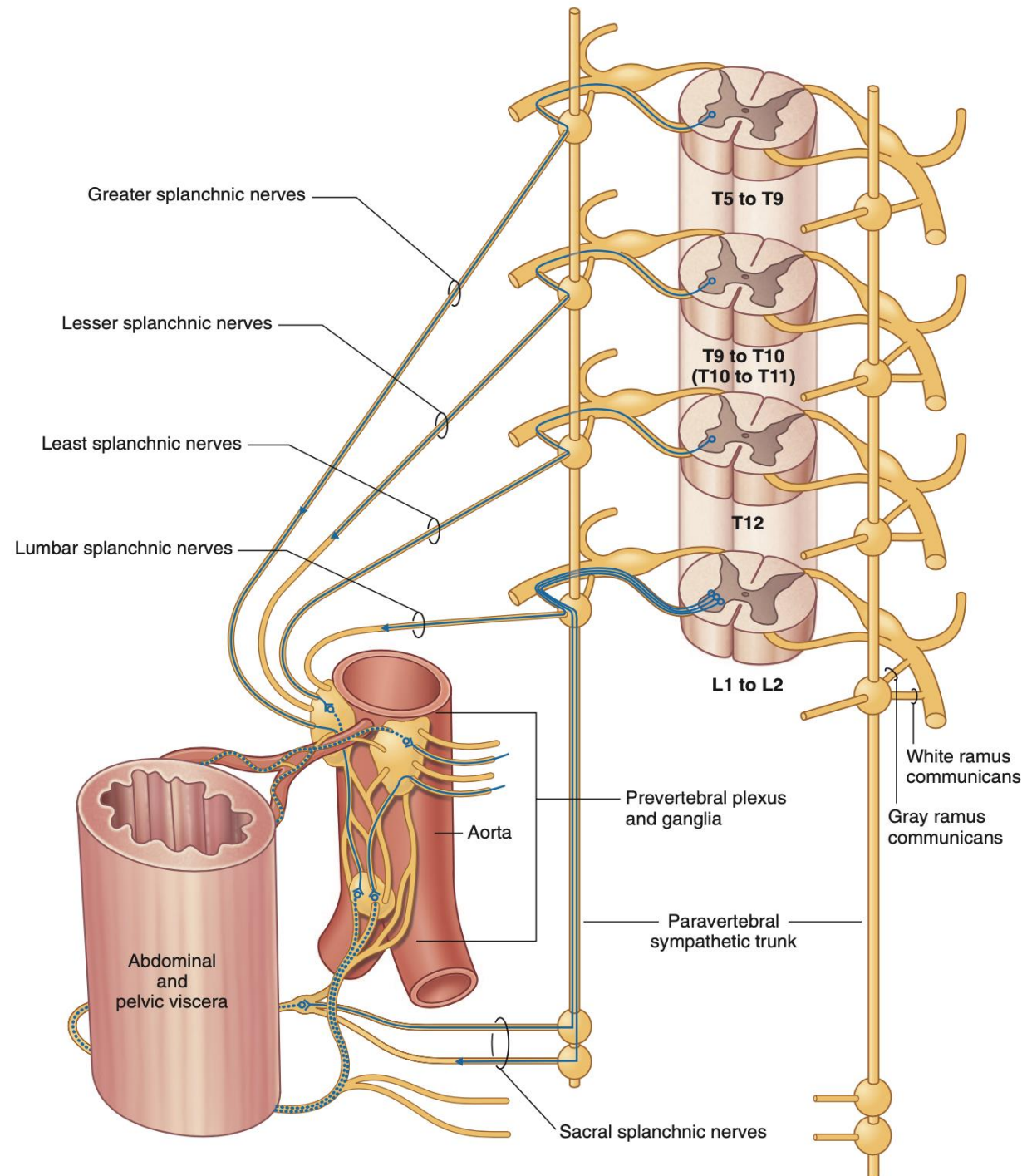


Autonomous nerves



Parasympathetic cranialis



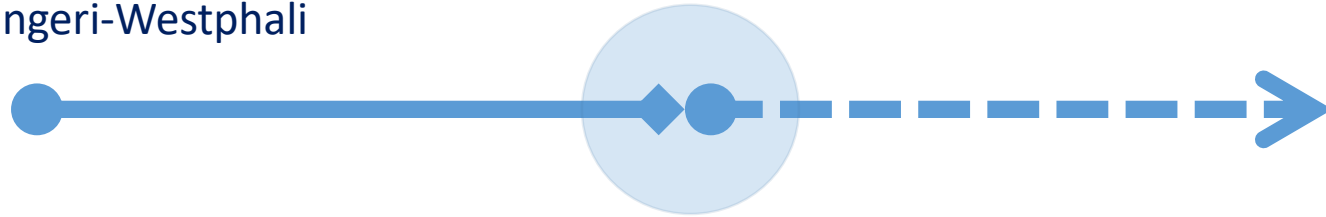


Parasympathetic cranialis

Nervus oculomotorius (N. III)

Ganglion ciliare

Nc. Edingeri-Westphali



m. sphincter pupillae, m. ciliaris

Parasympathetic cranialis

Nervus facialis (N. VII)

Ganglion pterygopalatinum

Nc. salivatorius cranialis



Ganglion submandibulare

Nc. salivatorius cranialis

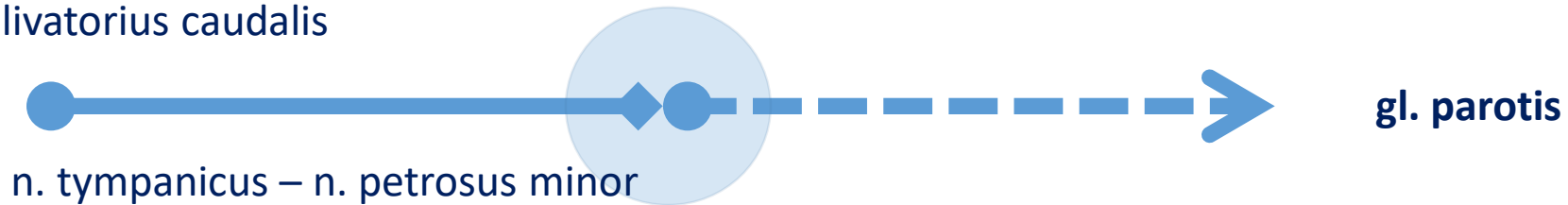


Parasympathetic cranialis

Nervus glossopharyngeus (N. IX)

Ganglion oticum

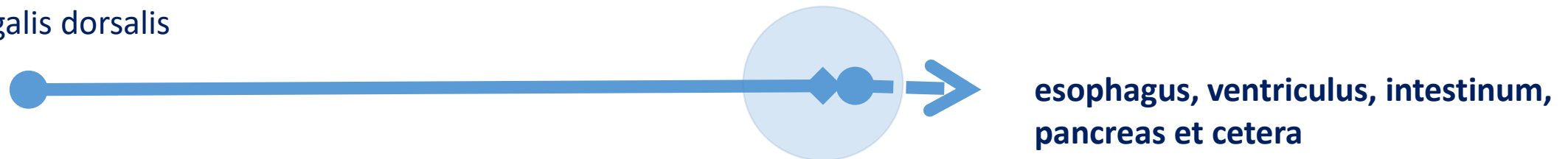
Nc. salivatorius caudalis



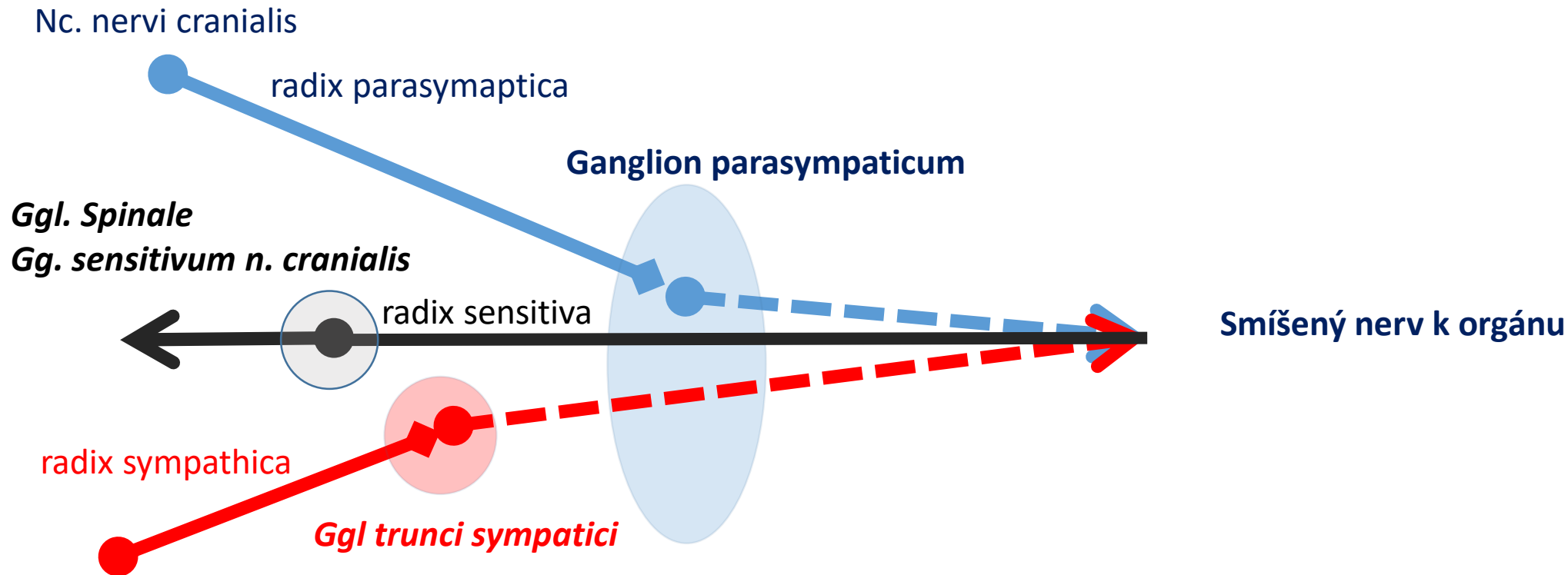
Nervus vagus (N. X)

Ganglion intramurale

Nc. vagalis dorsalis

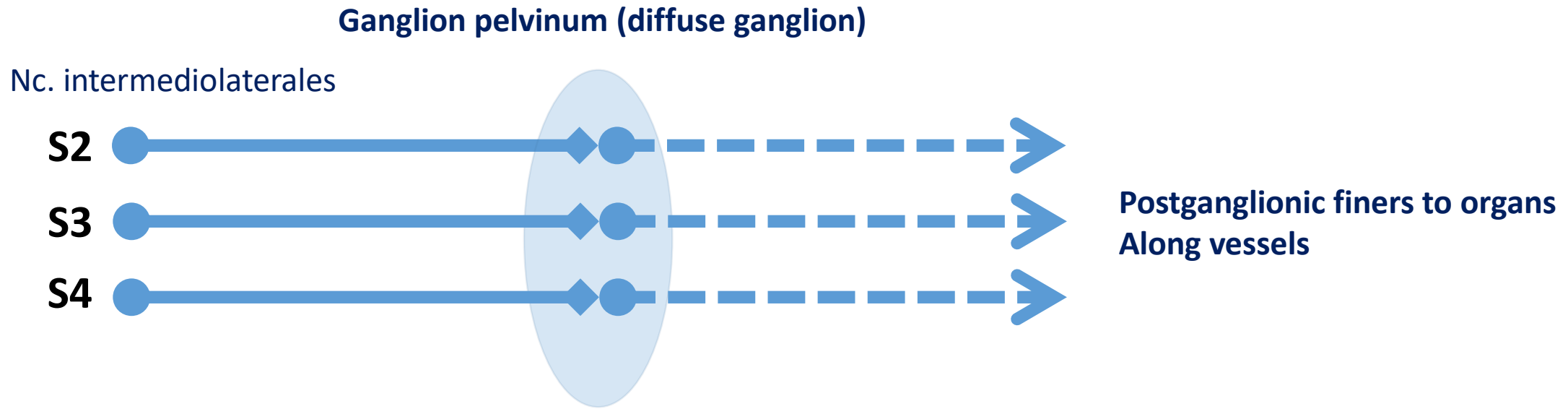


„parasympathetic ganglia n. trigemini“

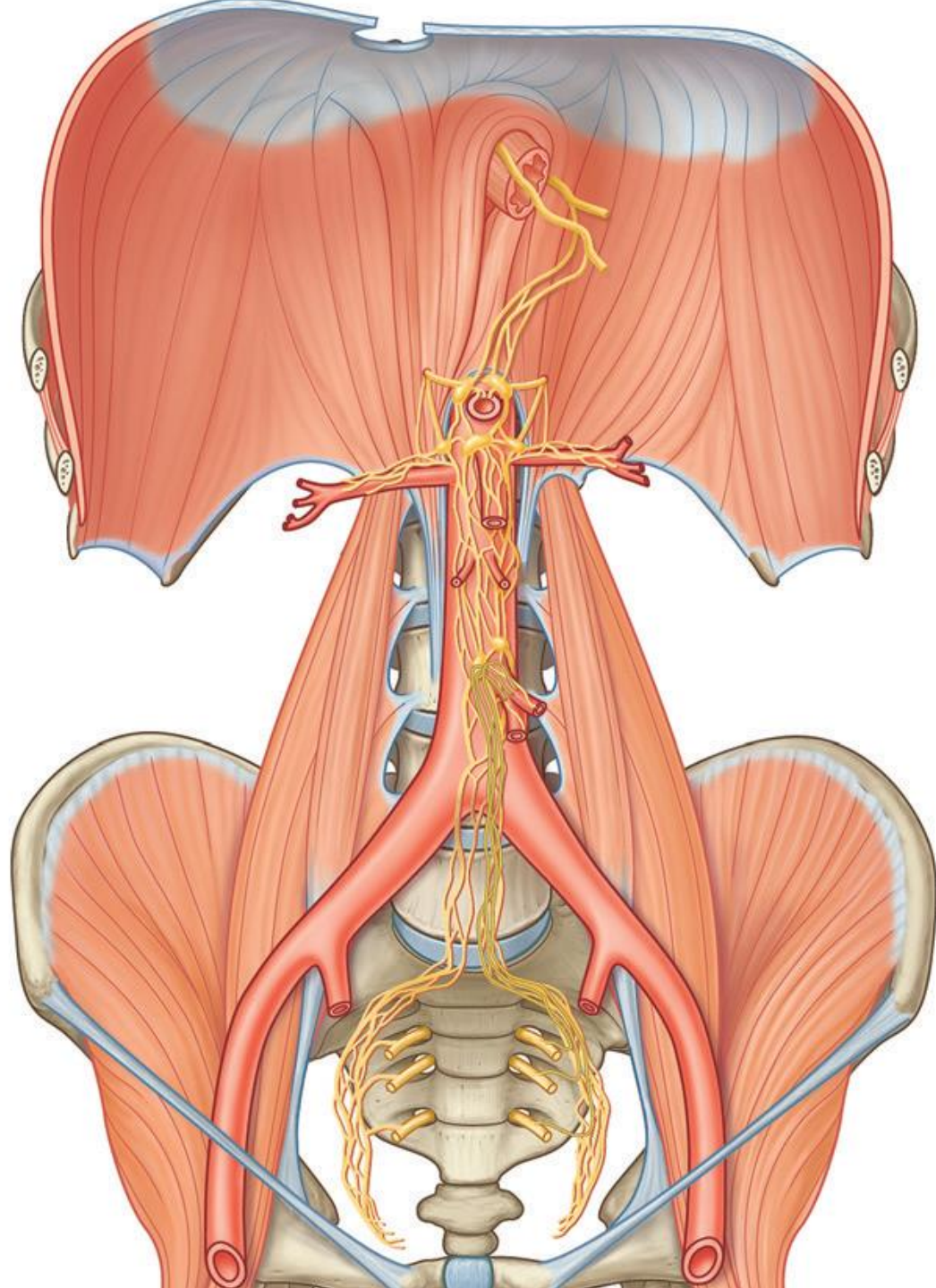


- ♦ **N. ophtalmicus – ganglion ciliare (parasympathicus N. III)**
- ♦ **N. maxillaris – ganglion pterygopalatinum (parasympathicus N. VII)**
- ♦ **N. mandibularis - ganglion submandibulare (paras. N. VII), ganglion oticum (N. IX)**

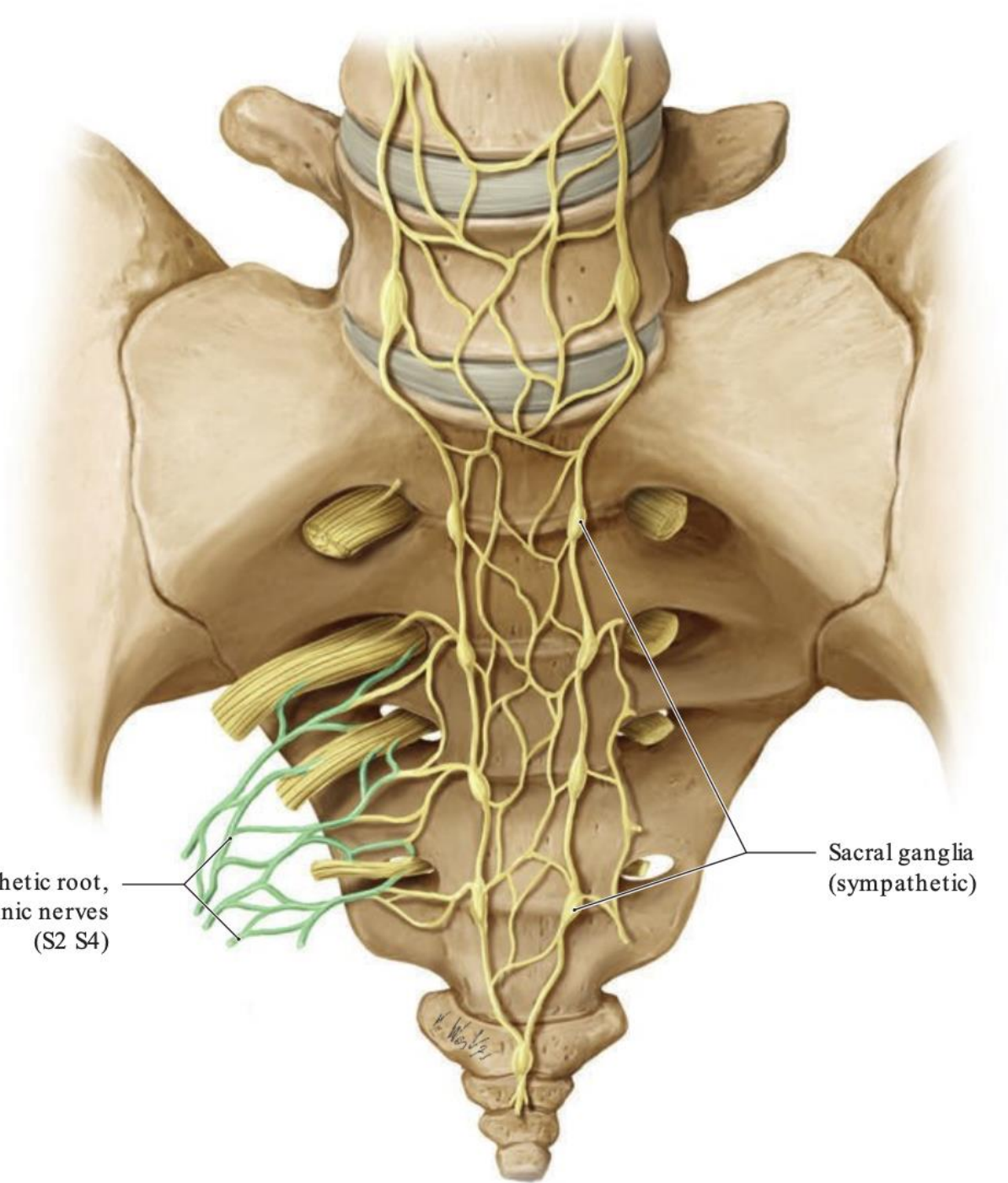
Parasympathetic sacralis



- Large bowel distal from lienal flexure
- Vesica urinaria – muscularis, m. sphincter urethrae
- Penis - erektion



🔴 N.X
🔴 S2-4



sympathetic root,
splanchnic nerves
(S2-S4)

Sacral ganglia
(sympathetic)

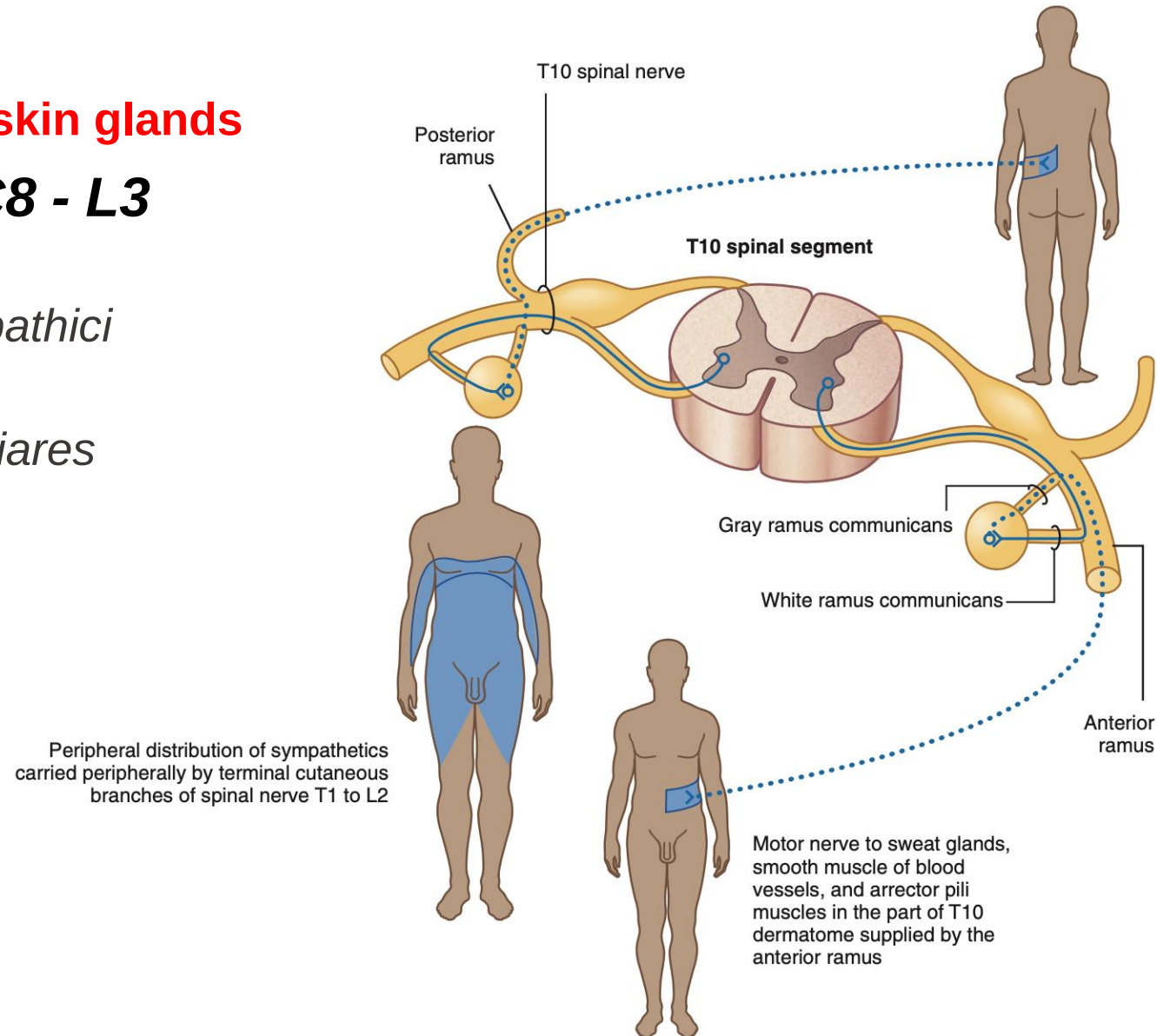
Sympattheticus

♦ Pars sympathica

- ♦ Smooth muscles, skin, arrectores pili, skin glands

♦ Systema (cervico)thoracolumbale C8 - L3

- ♦ C8 – L3
- ♦ *rami communicantes albi to ggl trunci sypathici*
- ♦ *Truncus sympathicus*
- ♦ *Ganglial interconnection – rami intergangliares*
- ♦ *Passing fibers going to distal ganglia*



Sympathicus

- ♦ **Rami viscerales et vasculares**

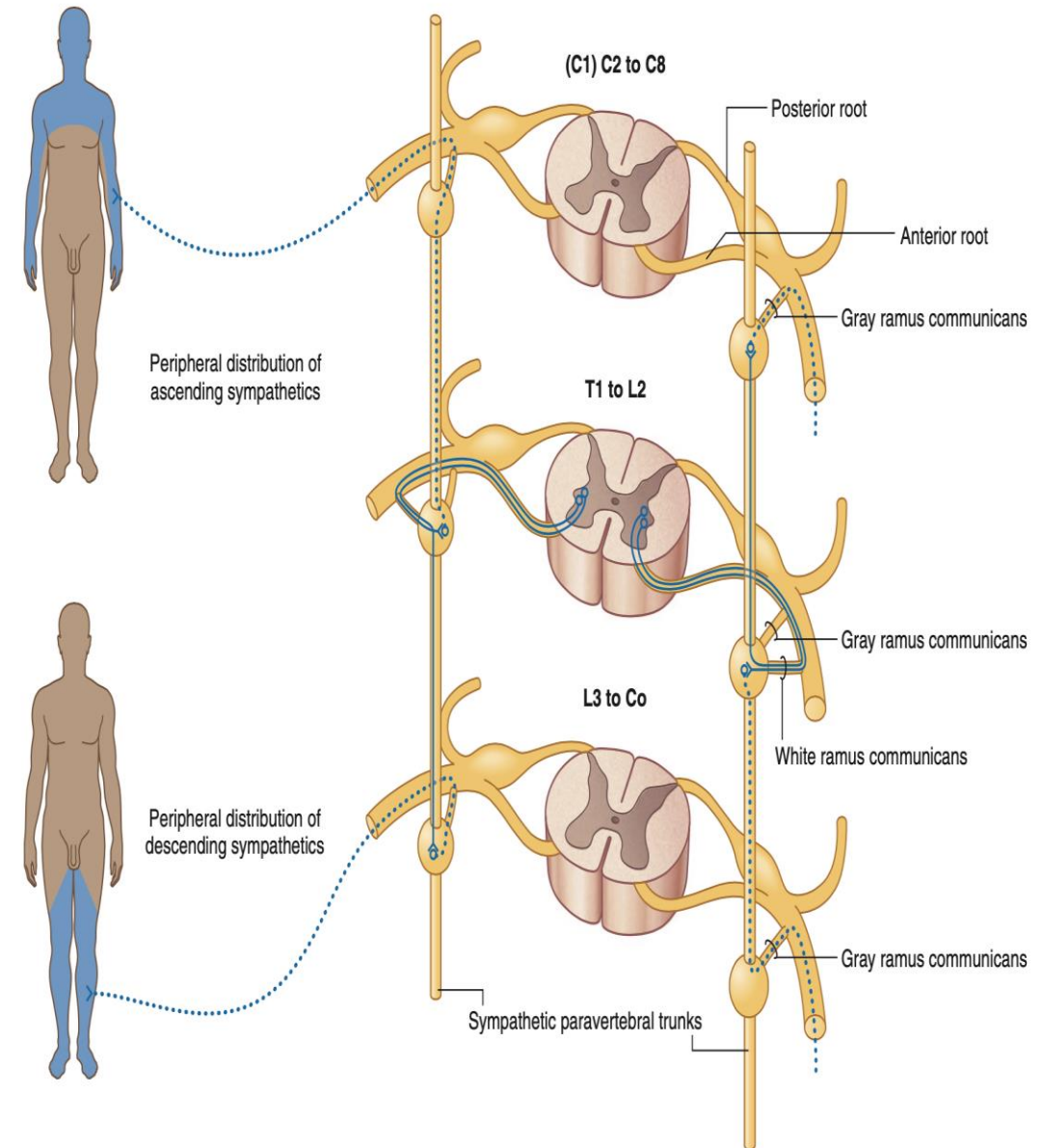
- ♦ *Periarterial plexus*
- ♦ *Some true nerves*

- ♦ **Nervi splanchnici**

- ♦ *Abdominal viscera*

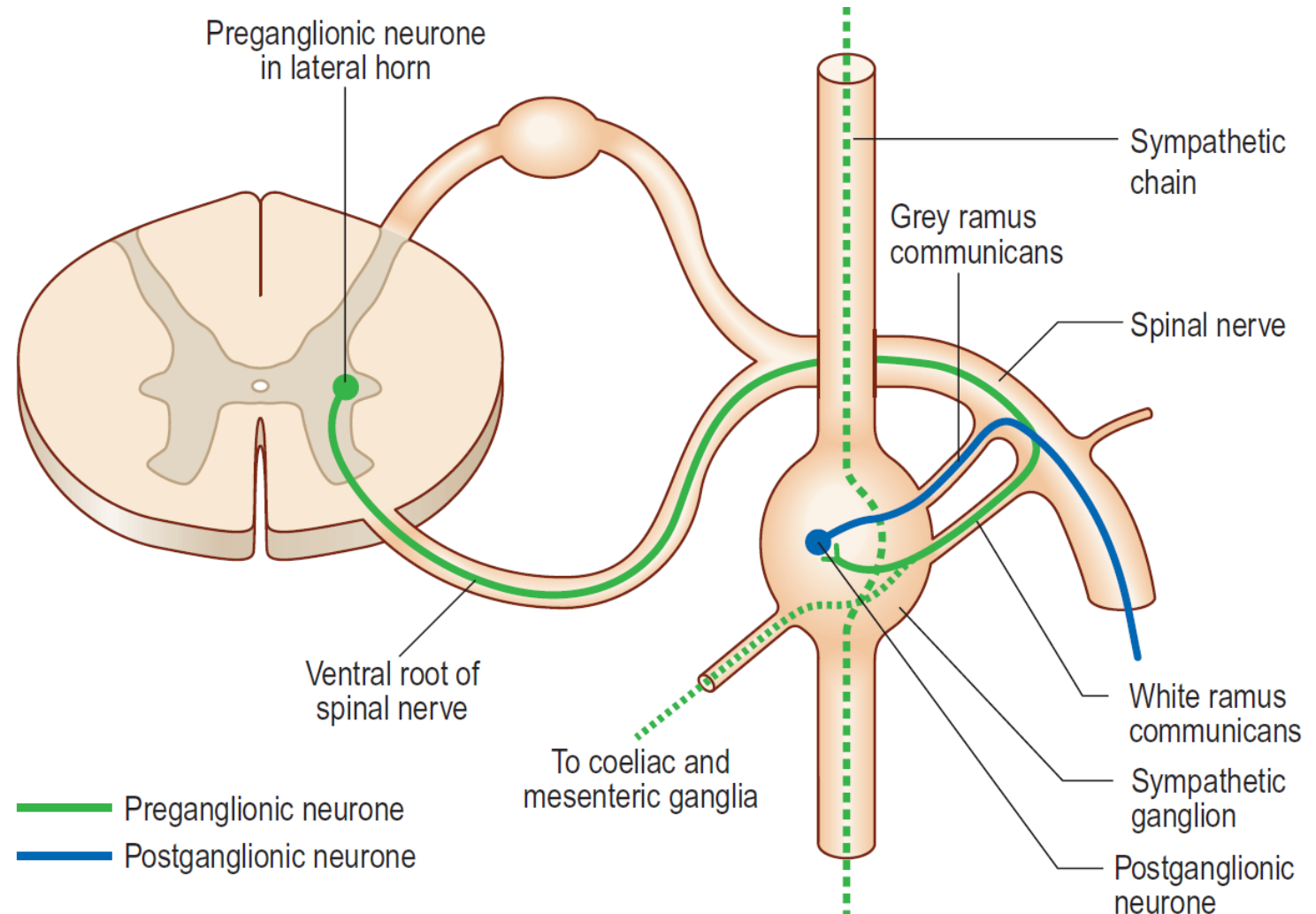
- ♦ **With sensitive fibers**

- ♦ *To CNS*



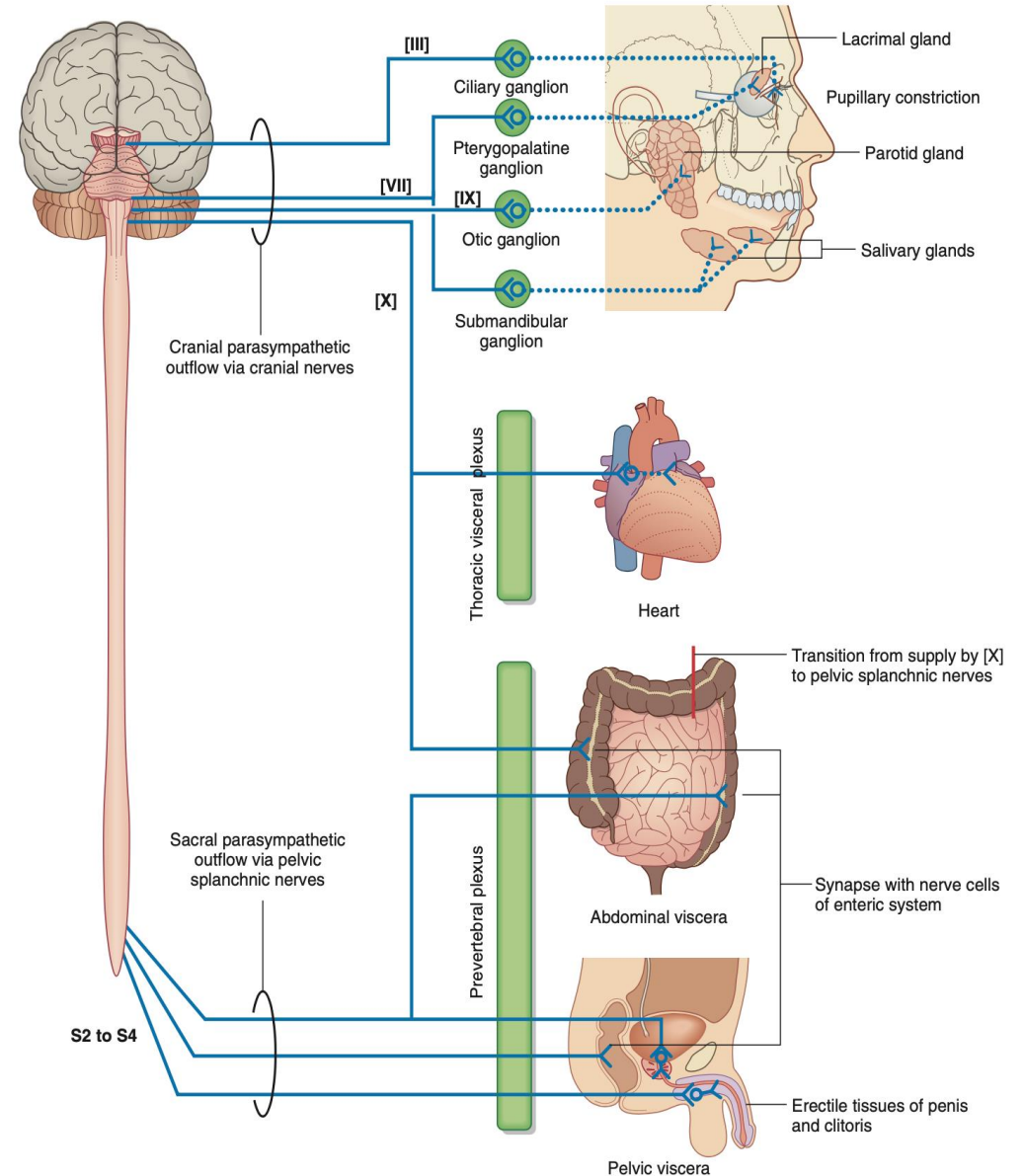
Sympathetic

- ♦ *rr. communicantes albi*
- ♦ *rr. communicantes grisei*



Sympathicus

- ♦ **Ganglion cervicale superius**
- ♦ **Ganglion cervicale medium**
- ♦ **Ganglion cervicotoracicum = stellatum**
- ♦ **10 - 11 ganglia thoracica**
 - ♦ *Nervus splanchnicus major TH 6 – 9*
 - ♦ *Nervus splanchnicus minor Th 10 - 11*
- ♦ **4 – 5 ganglia lumbalia**
- ♦ **4 ganglia sacralia**
- ♦ **Ganglion impar**



Truncus sympathicus

Preganglionic fibers only C8 – L3

♦ Ganglion cervicale superius

- ♦ Centrum ciliospinale – Budge – C8 – TH1
- ♦ Plexus caroticus internus
- ♦ Horner syndrome – ptosa, miosa, enophthalmus

♦ Ganglion cervicale medium

♦ Ganglion cervicotoracicum = stellatum

- ♦ Cardiac pain

♦ 10 - 11 ganglia thoracica

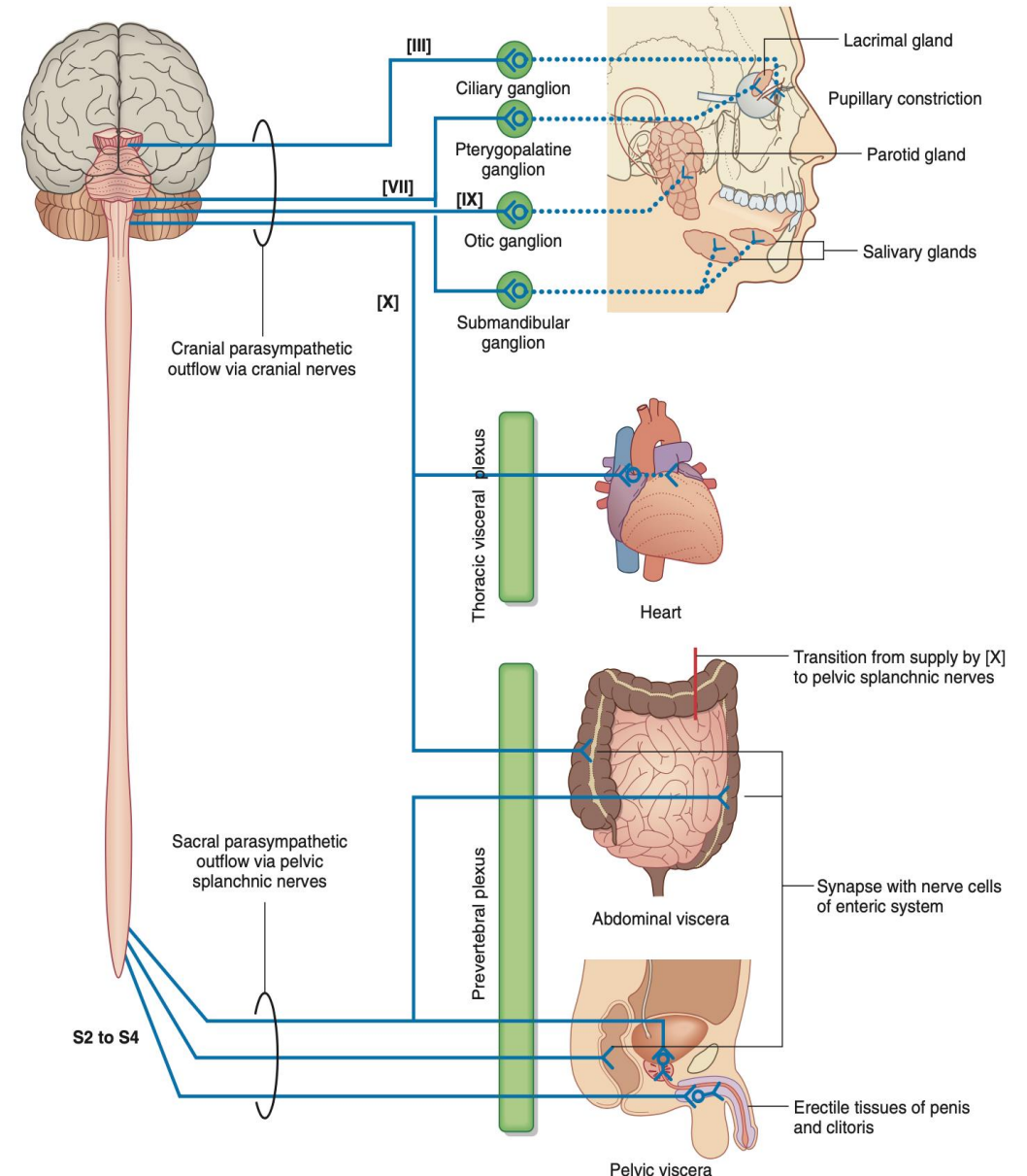
- ♦ Nervus splanchnicus major TH 6 – 9
- ♦ Nervus splanchnicus minor Th 10 - 11

♦ 4 – 5 ganglia lumbalia

♦ 4 ganglia sacralia

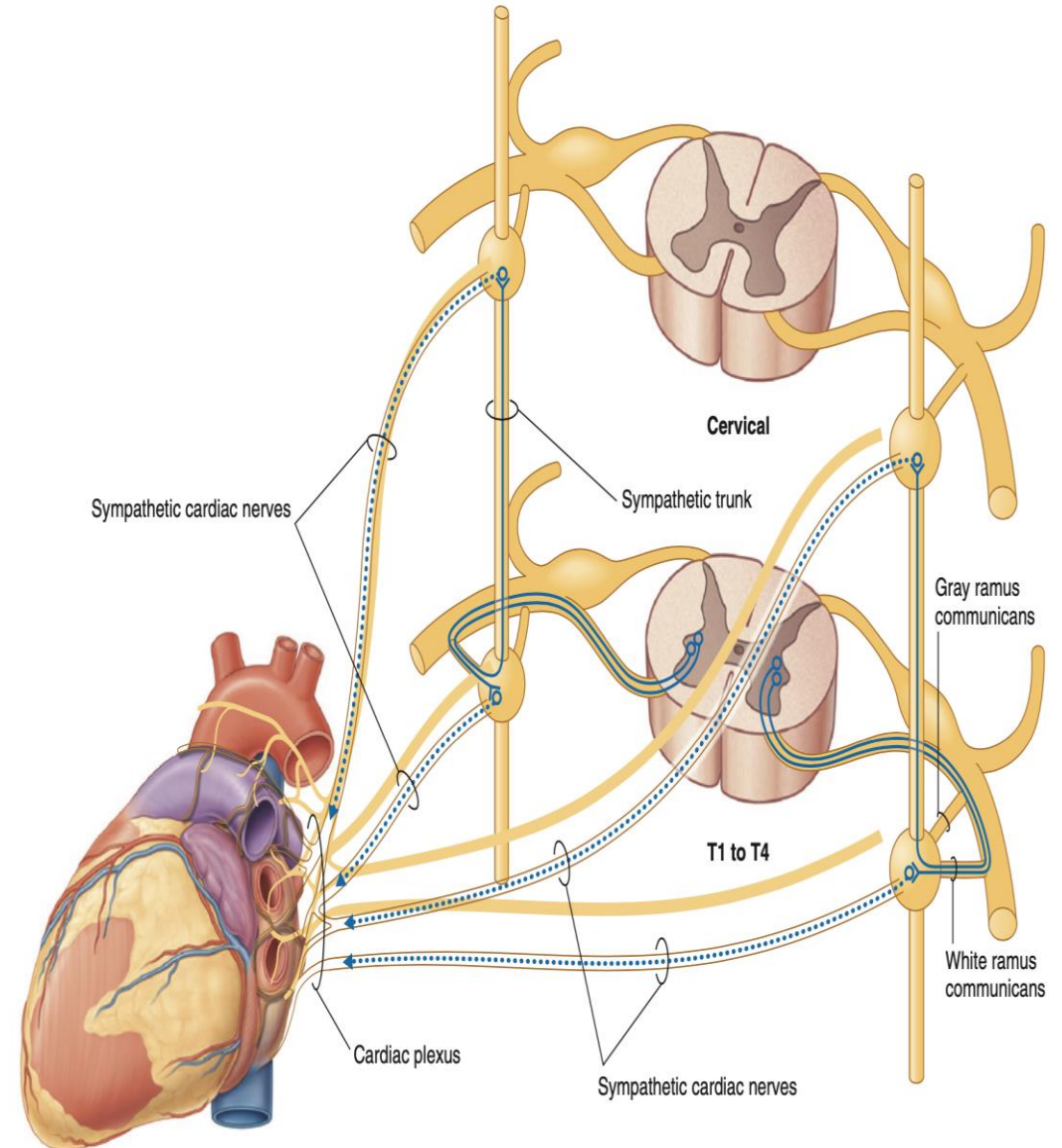
♦ Ganglion impar

- ♦ In the front of os coccygeum

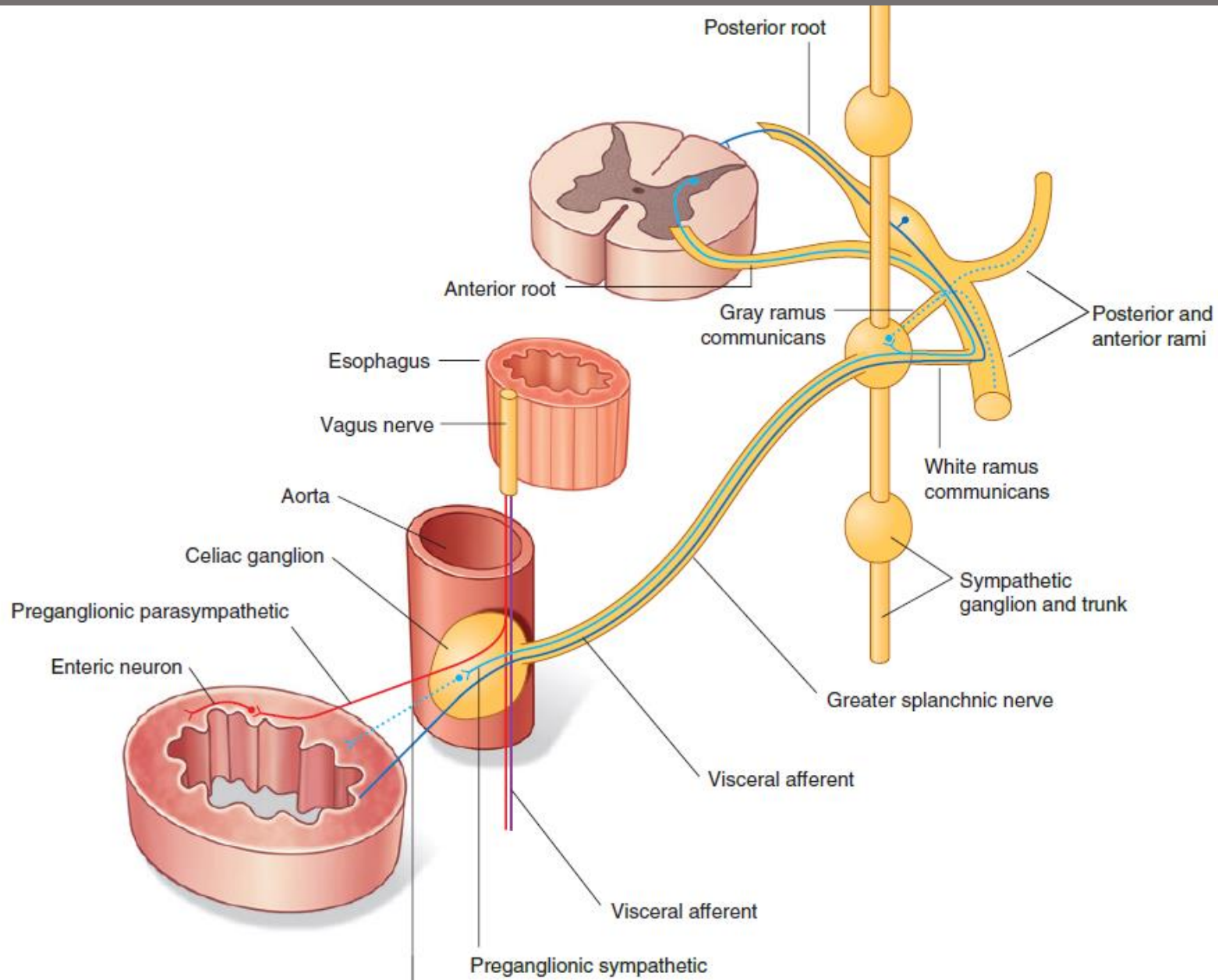


Nervi cardiaci

- ♦ **Parasympathicus – n. vagus**
 - ♦ bradycardia
 - ♦ Coronary constriction
- ♦ ***R. cardiacus superior***
- ♦ ***R. cardiacus medius***
 - ♦ (*n. laryngeus recurrens*)
- ♦ ***R. cardiacus inferior***
- ♦ **Sympathicus**
 - ♦ tachycardia
 - ♦ Coronary dilatation
- ♦ **Ganglion cervicale superius**
 - ♦ *n. cardiacus superior*
- ♦ **Ganglion cervicale medium**
- ♦ ***N. cardiacus medius***
- ♦ **Ganglion cervicothoracicum (stellatum)**
 - ♦ *n. cardiacus inferior (+ sensoric fibers)*



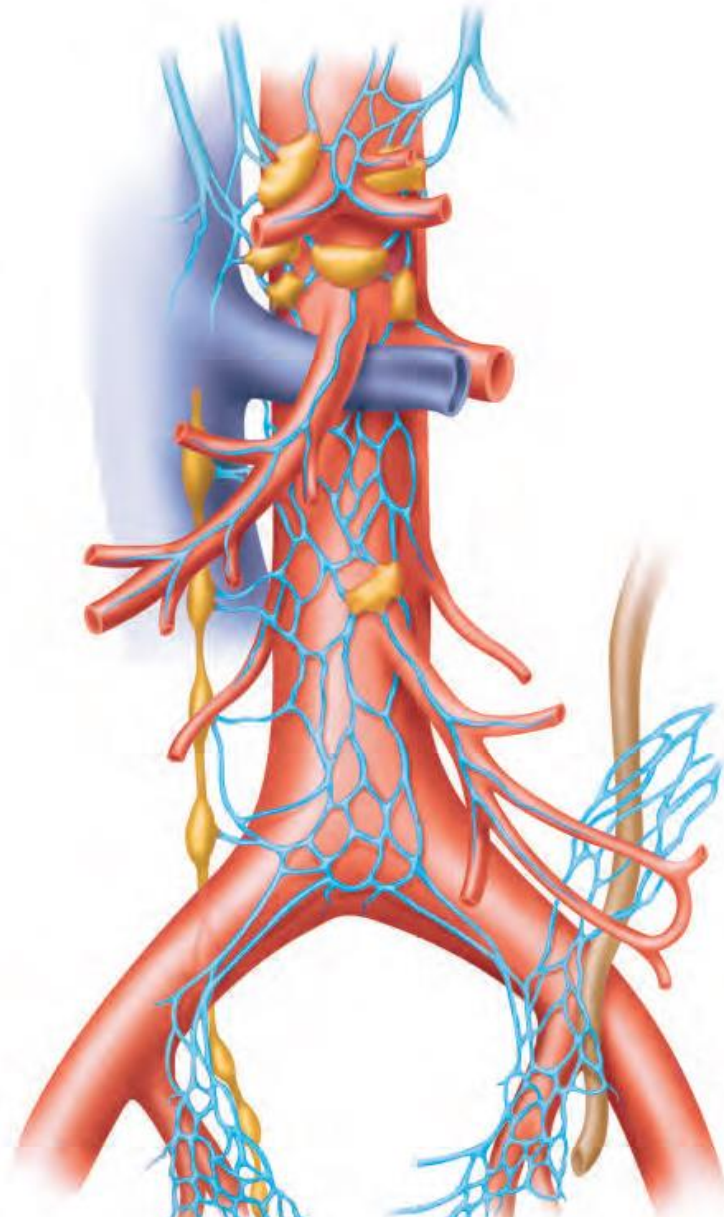
Autonomous and sensoric fibers



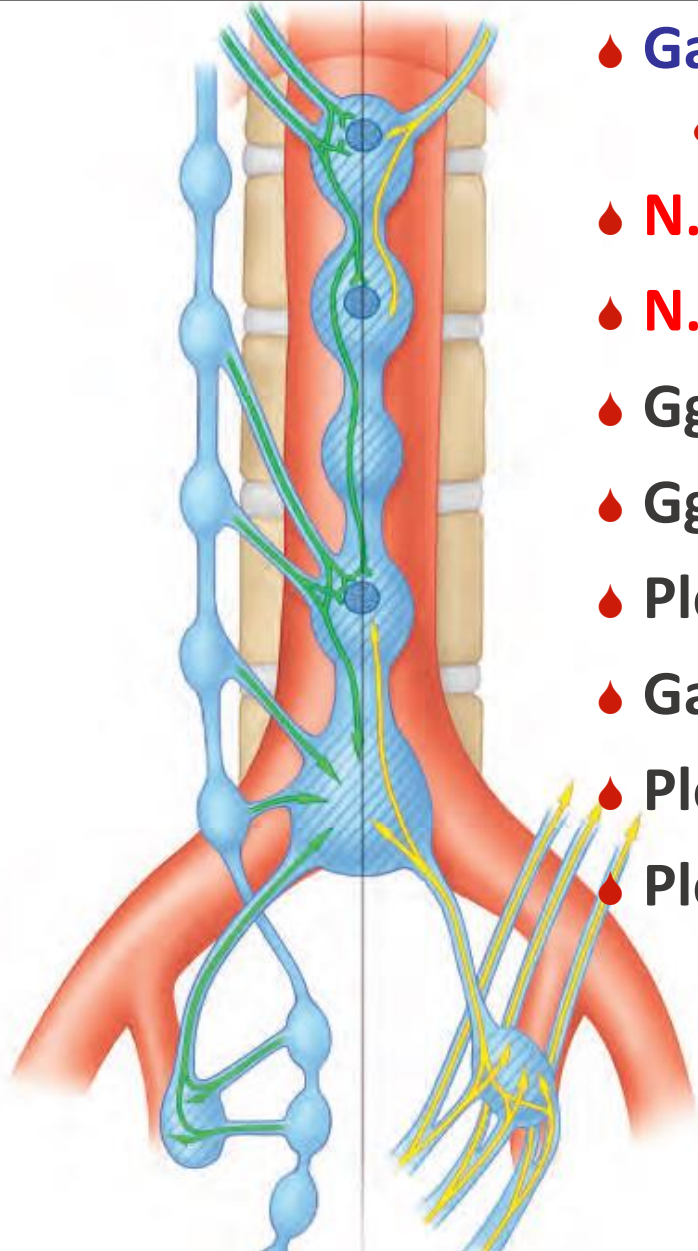
Autonomous ganglia and plexus

- ♦ **N. splanchnicus major**
- ♦ **N. splanchnicus minor**
- ♦ **Plexus solaris**
 - ♦
- ♦ **Plexus mesentericus superior**
- ♦ **Plexus mesentericus inferior/aorticus**
- ♦ **Plexus hypogastricus superior**
- ♦ **Plexus hypogastricus inferior**

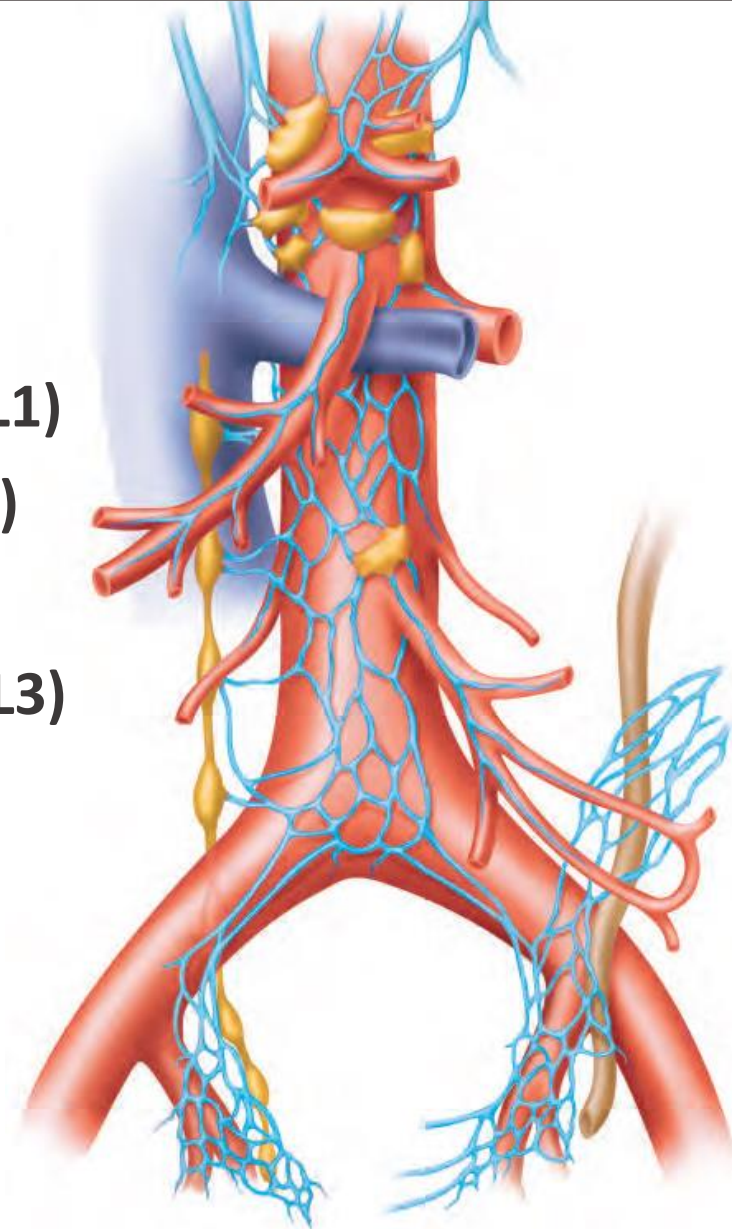
- ♦ **Ganglia coeliaca dexter et sinister**
- ♦ **Gaglion mesentericum superious**
- ♦ **Ganglion mesentericum inferius**
- ♦ **Ganglia aorticorenale dexter et sinister**



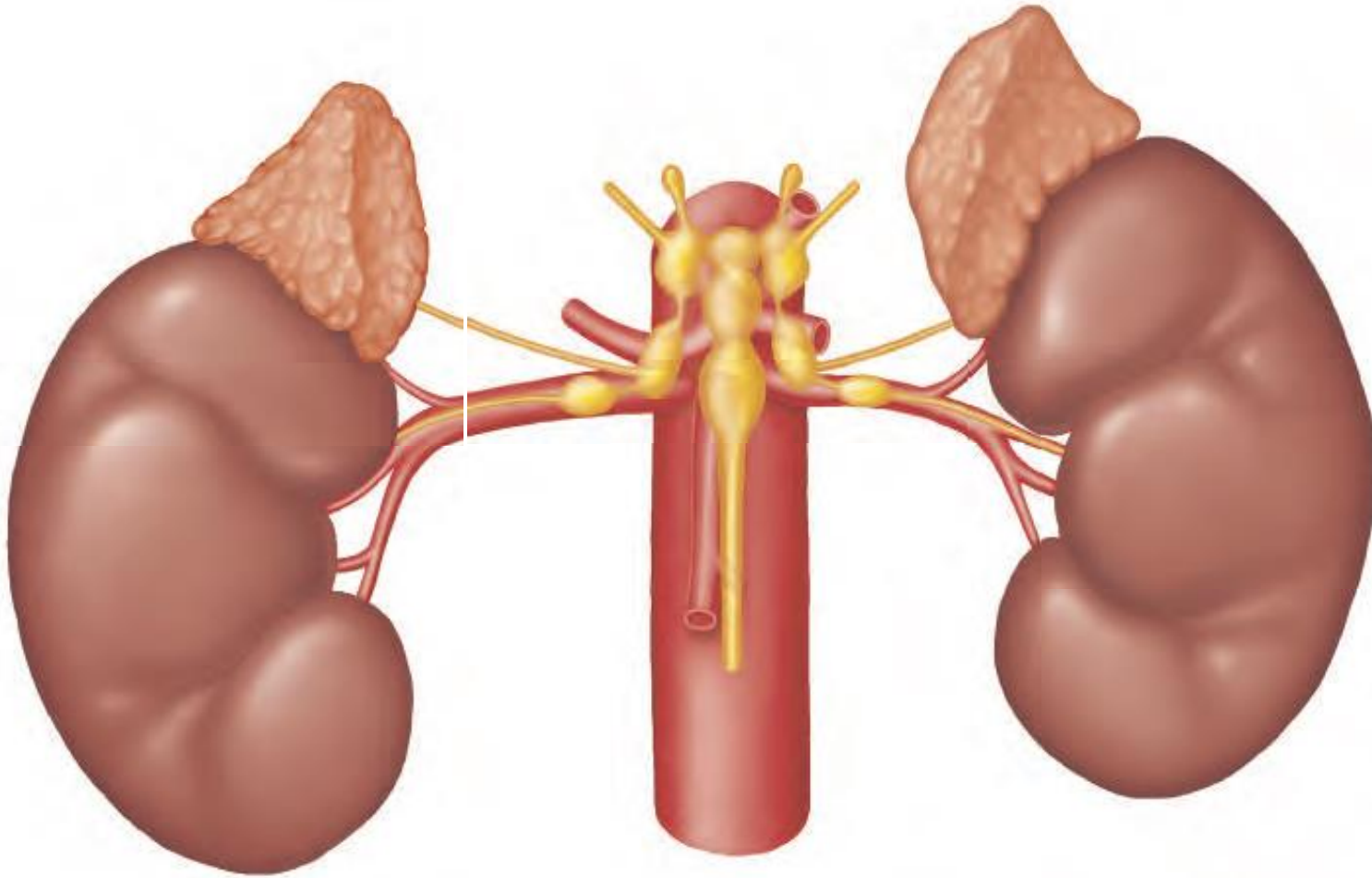
Plexus et ganglia



- ♦ Ganglion pelvinum (S2-4)
- ♦
- ♦ **N. splanchnicus major (ggl. Th 6 - 9)**
- ♦ **N. splanchnicus minor (ggl. Th 10, 11)**
- ♦ Ggl. coeliaca dx/sin, plexus solaris (Th12/L1)
- ♦ Ggl. mesentericum superius + plexus (L1/2)
- ♦ Plexus aorticus (L2)
- ♦ Ganglion mesentericum inferius + plexus (L3)
- ♦ Plexus hypogastricus superior (L5)
- ♦ Plexus hypogastricus inferior (S1)



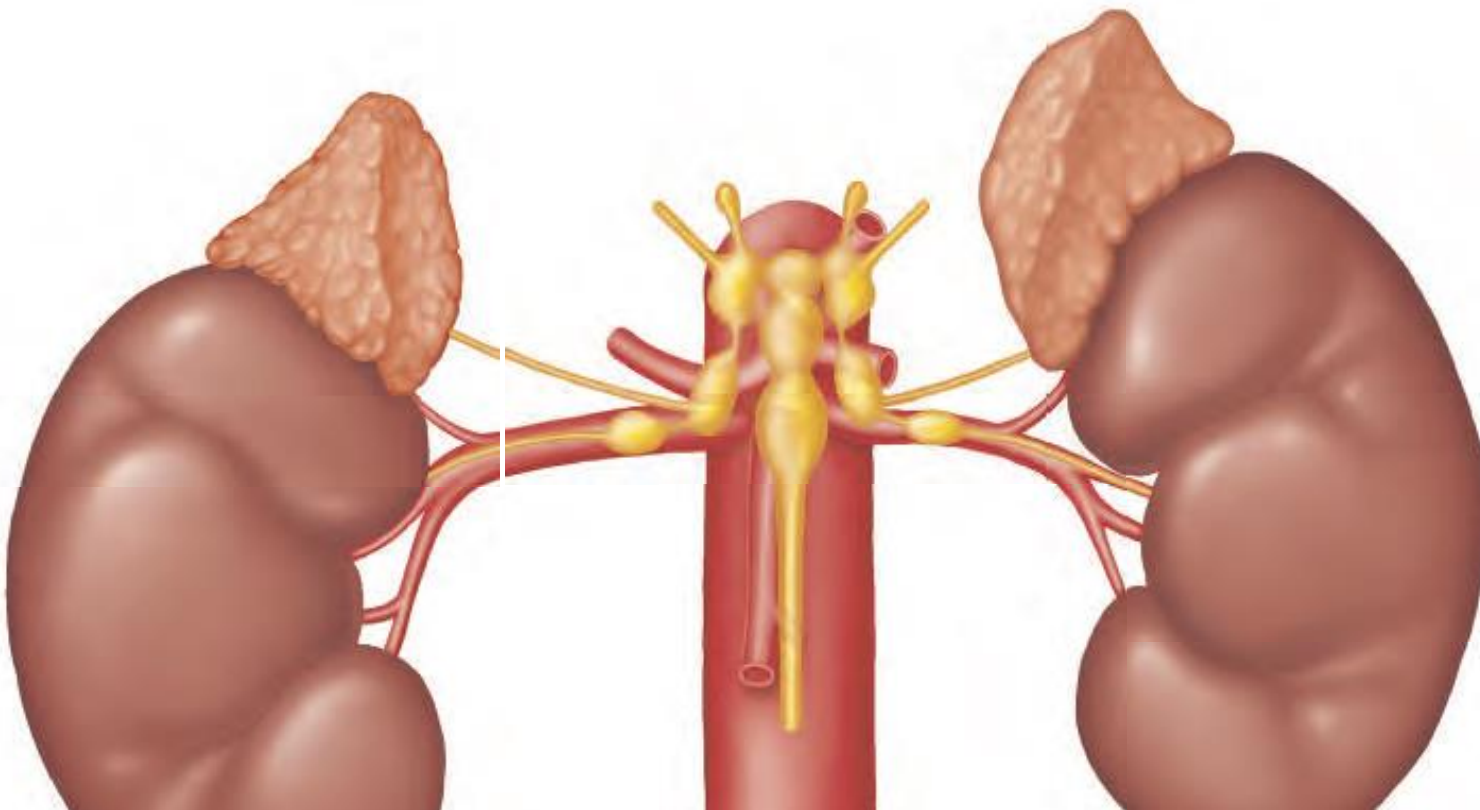
Plexus et ganglia



- ♦ **Plexus phrenicus**
- ♦ **N. splanchnicus major**
- ♦ **N. splanchnicus minor**
- ♦ **Ggl. coeliaca dx/sin**
- ♦ **plexus solaris**
- ♦ **Ggl. mesentericum superius**
- ♦ **Ggl. aorticirenales**
- ♦ **Plexus mesentericus superius**
- ♦ **Plexus aorticus**

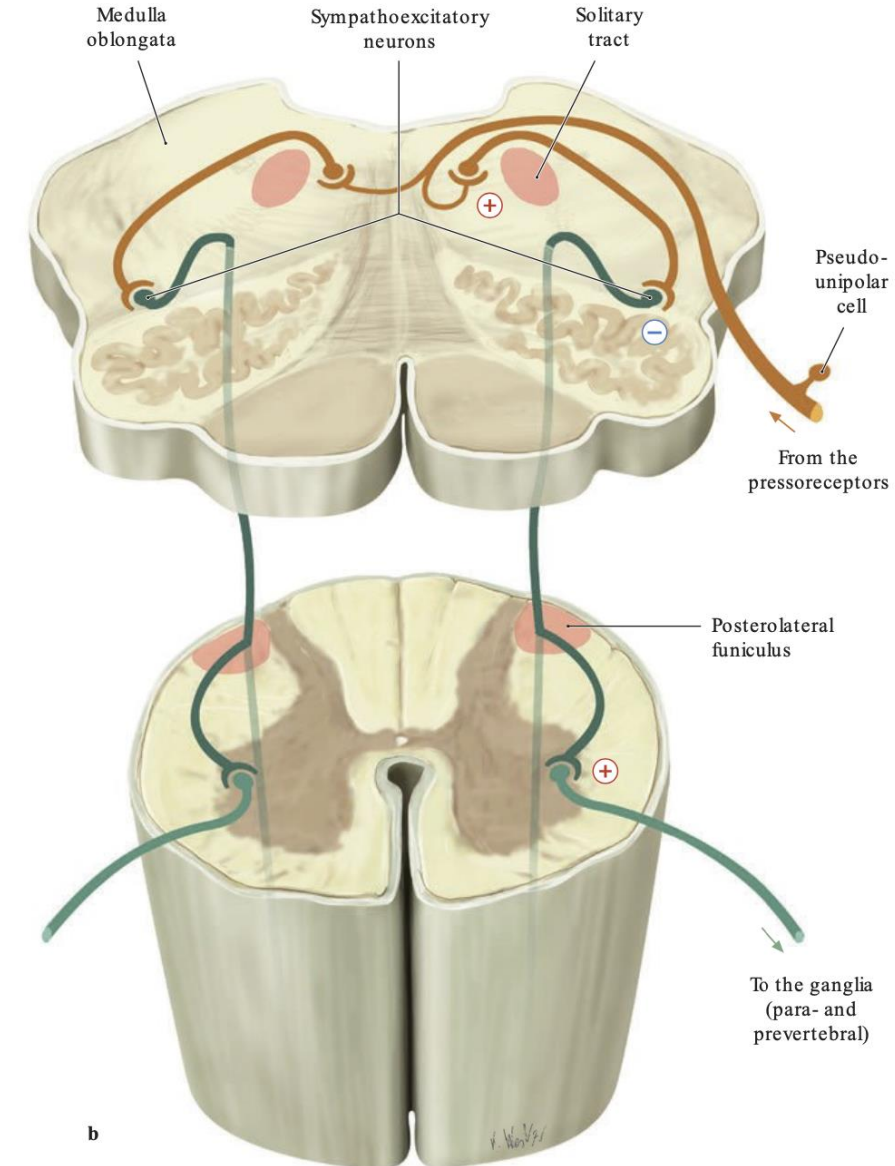
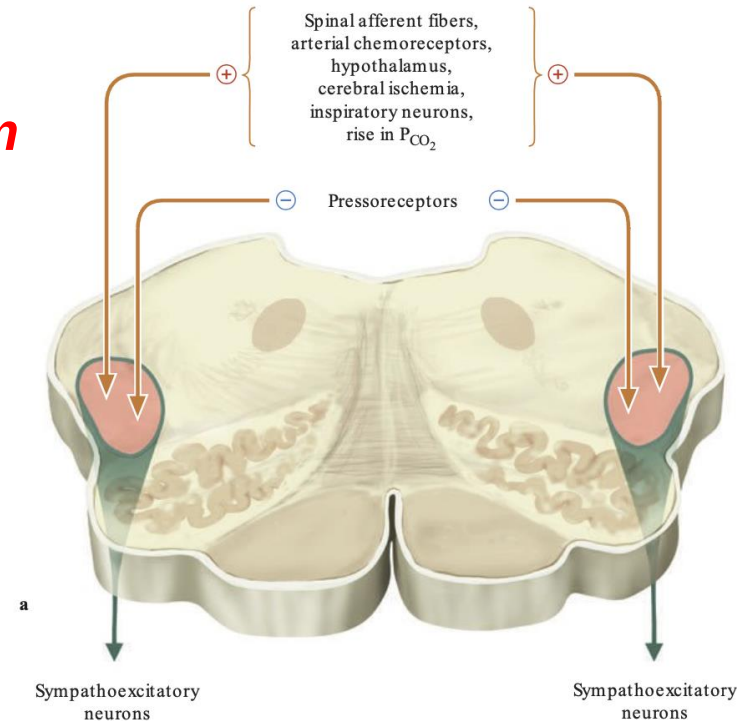
Sympathetic paraganglia

- ♦ **sympathetic**
 - ♦ *adrenalin, noradrenalin, katecholaminy*
- ♦ ***Paraganglion suprarenale – suprarenal medulla***
- ♦ ***Paraganglion aorticum lumbale – Zuckercandel organ***
- ♦ ***By a. mesenteria inferior***

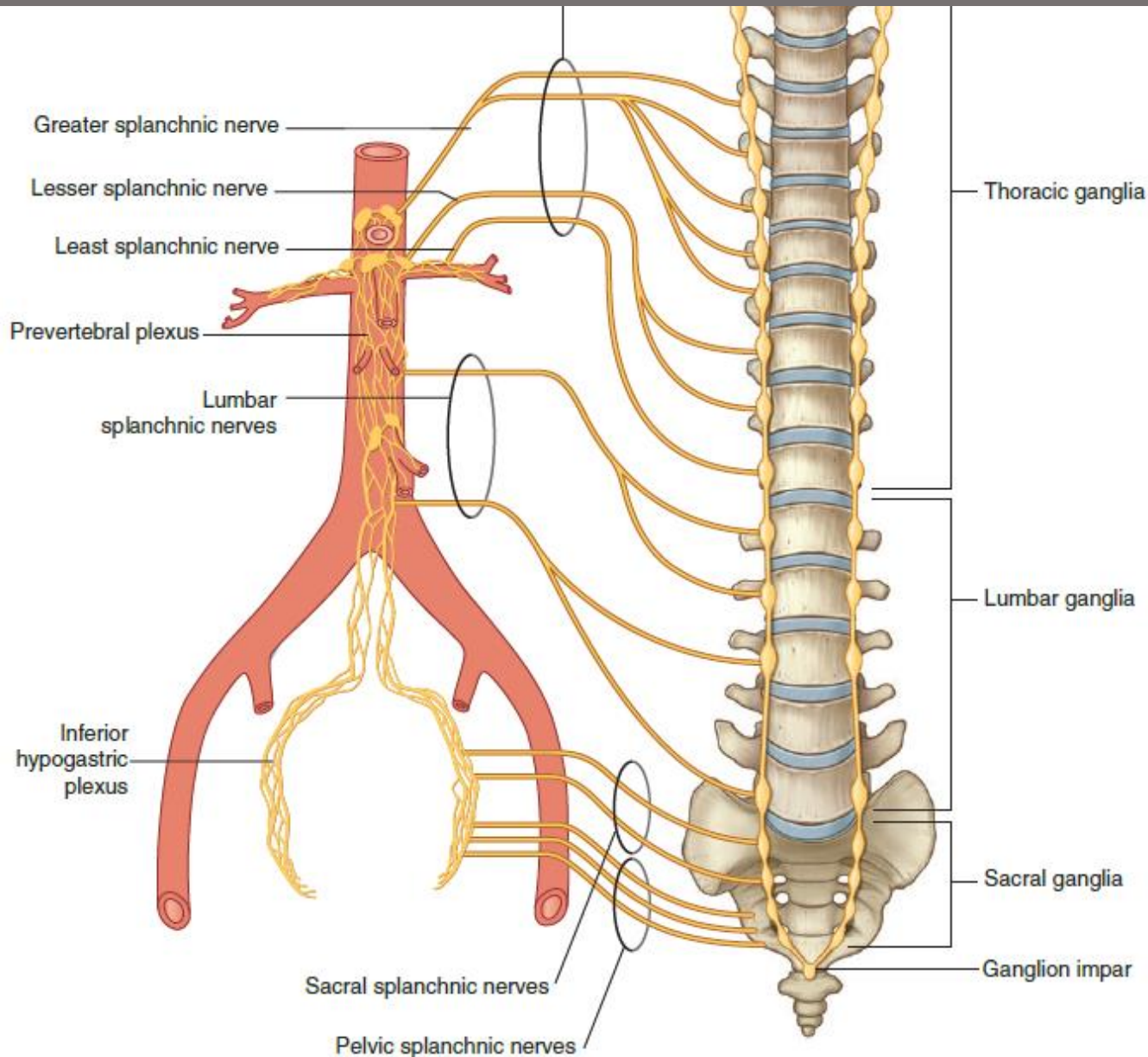


Parasympathetic paraganglia

- ◆ **Parasympathetic paraganglia**
- ◆ **Presoreceptoric nerves**
- ◆ **Glomus caroticum**
- ◆ **Innervate n. IX. and n. X:**
- ◆ **Chemoreceptors - O_2**
- ◆ **Paraganglion supraaorticum**
- ◆ **Innervate n. X.**
- ◆ **baroreceptors**
- ◆ **Paraganglion jugulare**
- ◆ **Paraganglion tympanicum**
- ◆ **paragangliomas**



Abdominal autonomous nervous system



♦ Parasympaticus

- ♦ *N. vagus (N. X)*
- ♦ *Ggl. pelvinum (S2 - S4),*
- ♦ *nn. planchnici pelvines*

♦ Sympaticus

♦ *Nervi splanchnici*

- ♦ *Sympatická ganglia Th12-L5*
- ♦ *N. splanchnicus major (ggl. Th 6 - 9)*
- ♦ *N. splanchnicus minor (ggl. Th 10, 11)*
- ♦ *Ggl. coeliaca dx/sin, plexus solaris (Th12/L1)*
- ♦ *Ggl. mesentericum superius + plexus (L1/2)*
- ♦ *Ggl. aorticorenalis, plexus aorticus (L2)*
- ♦ *Ganglion mesentericum inferius + plexus (L3)*
- ♦ *Plexus hypogastricus superior (L5), inferior (S1,2)*

Neuroanatomy

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