

Autonomic nervous system

Inervation of

smooth muscle

myocardium

glands

**relative independence on CNS
neurons in both CNS and PNS**

functionally is divided into:

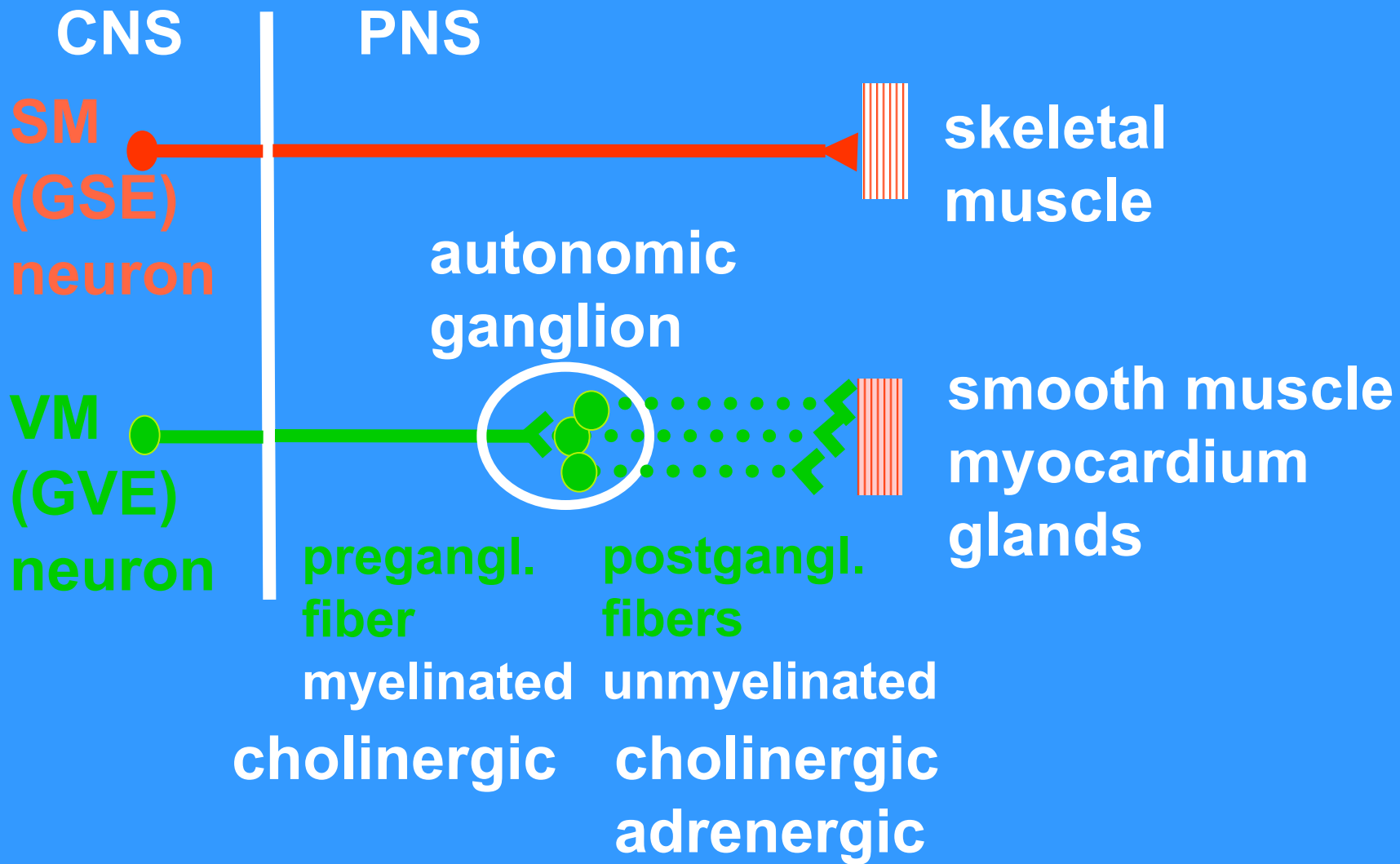
sympathetic system

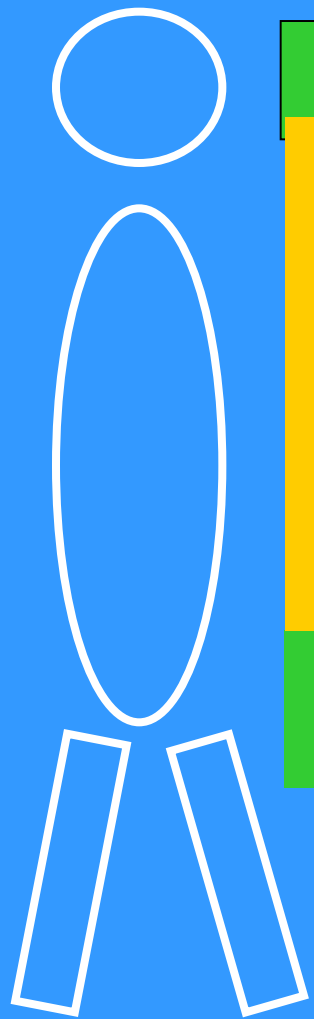
parasympathetic system

enteric system

afferent (viscerosensory) fibers

accompany efferent fibers





**cranial
parasympathetic
system**

**sympathetic
thoracic-lumbar
system**

**sacral
parasympathetic
system**

Parasympathetic system

Anabolic reactions (activities associated with conservation and restoration of body resources)

decreases heart rate

decreases cardiac output

constricts coronary arteries

relaxes bronchi

constricts pupil (miosis)

accommodation (near vision)

increases GIT motility

stimulates secretion of watery

saliva



Sympathetic system

Catabolic reaction (activities that are mobilized during emergency and stress situations, “fight, fright and flight” responses)

dilates coronary arteries

increases heart rate

increases cardiac output

dilates bronchi

inhibits GIT motility

dilates pupil (mydriasis)

stimulates sweat glands

secretion

stimulates secretion of

viscous saliva

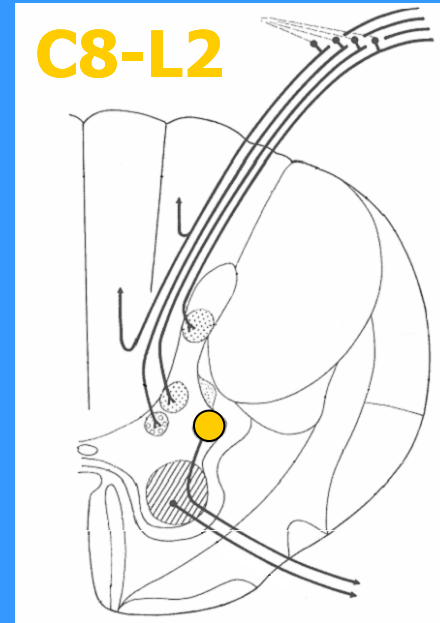


anatomie

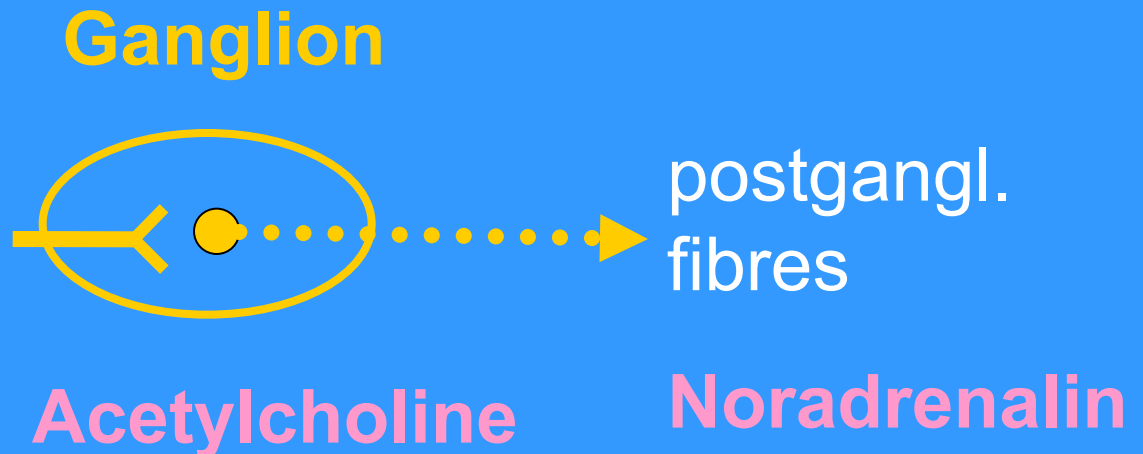


Sympathetic system

Central part:
ncl.
intermediolateralis

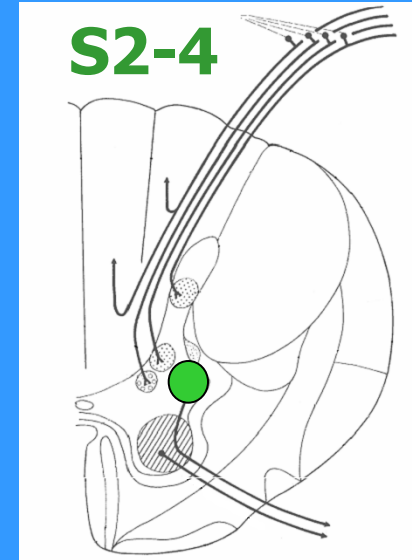
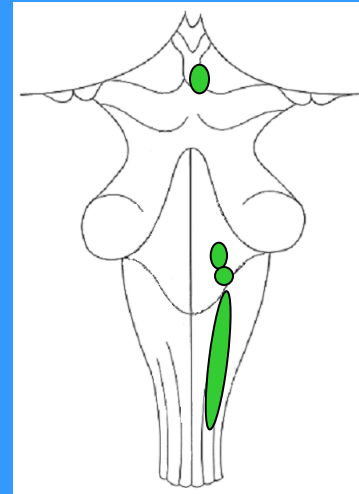


Peripheral part:
pregangl. fibres
rr.com. albi



Parasympathetic system

Central part:
CN III, VII, IX, X
ncl. intermediolat.



Peripheral part:

Ganglion

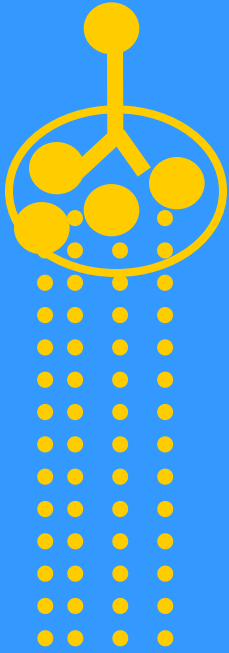


postgangl.
fibres

Acetylcholine

Acetylcholine

Ganglia



para
vertebral

Symp.
trunk



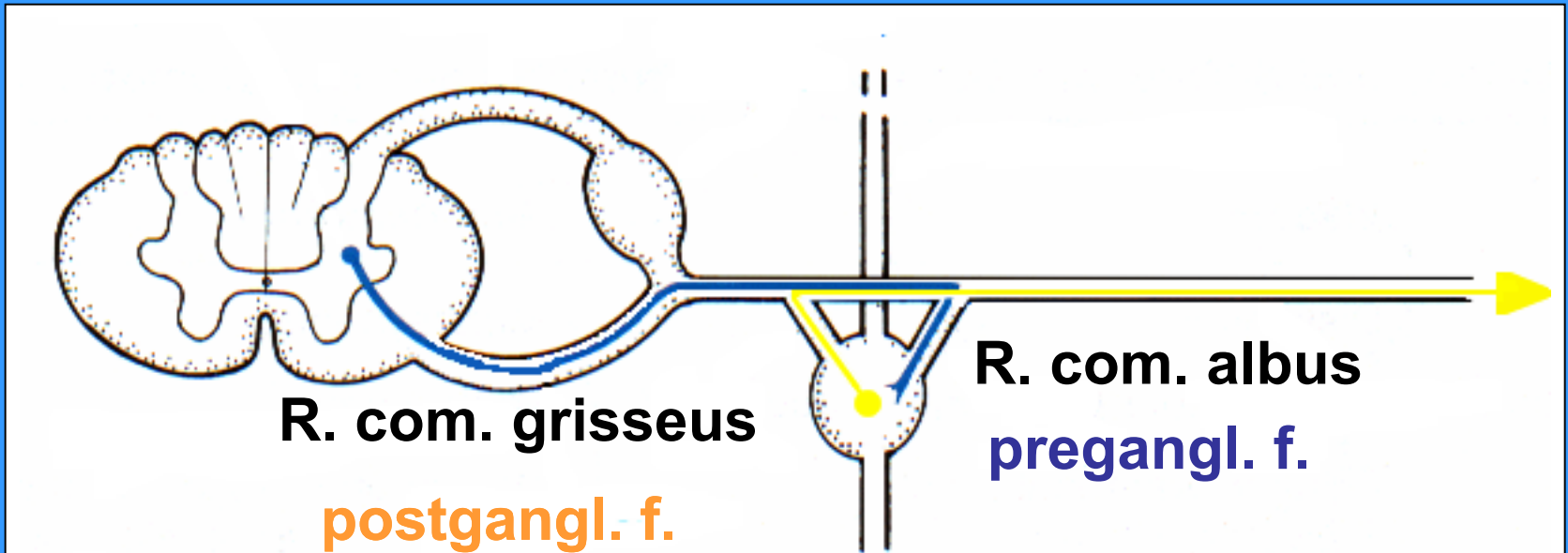
pre
vertebral

Aortic plexuses

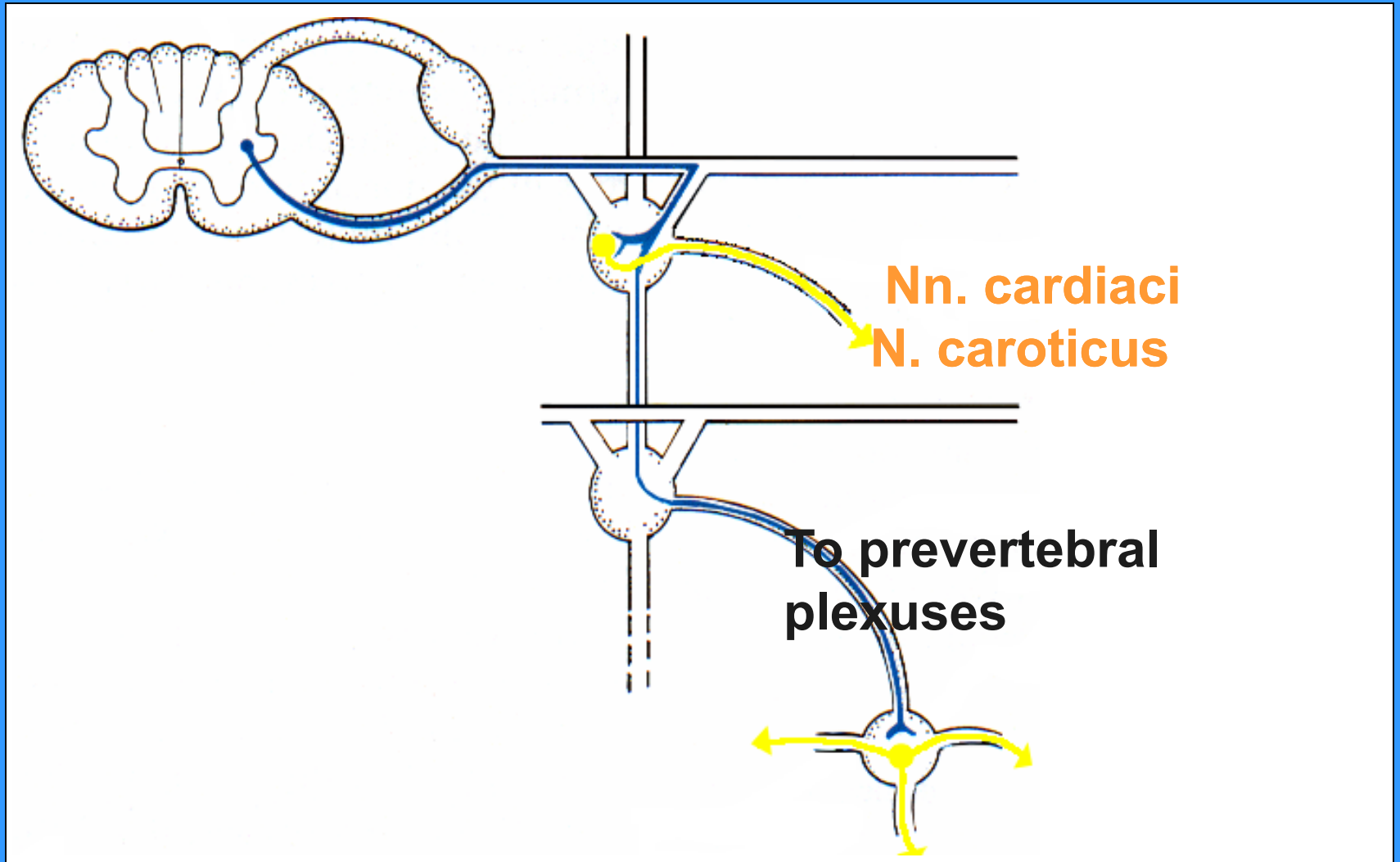


Ciliare, oticum,
submand., pterygop.
Ggll. in organs

Ganglia tr. sympathici



rr. viscerales
rr. vasculares



nn. splanchnici

Sympathetic

Parasympathetic



heart rate

increase

decrease

coronary arteries

dilation

constriction

bronchioles

relaxation

constriction

pupil

dilation
(mydriasis)



constriction
(miosis)



gall bladder

contraction

relaxation

salivary secretion

viscous

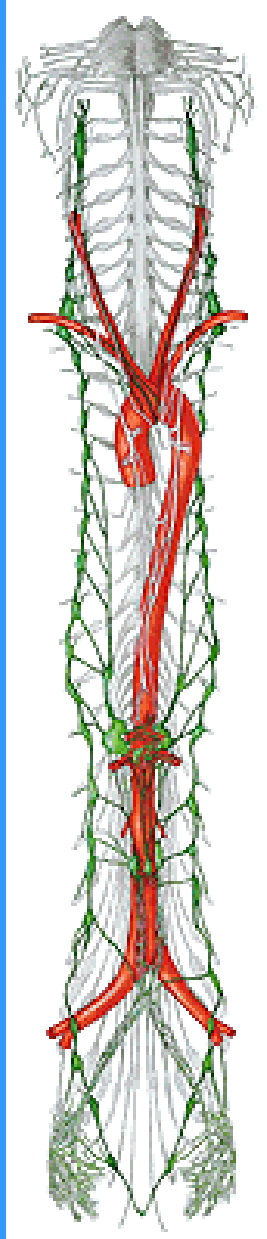
watery

GIT

inhibition of peristalsis

acceleration of peristalsis

I. Pars sympat.



Paravertebral ganglia

truncus sympathicus

cervical 3

thoracic 10 - 11

lumbar 4 - 5

sacral 4 - 5

ganglion impar

Prevertebral ganglia

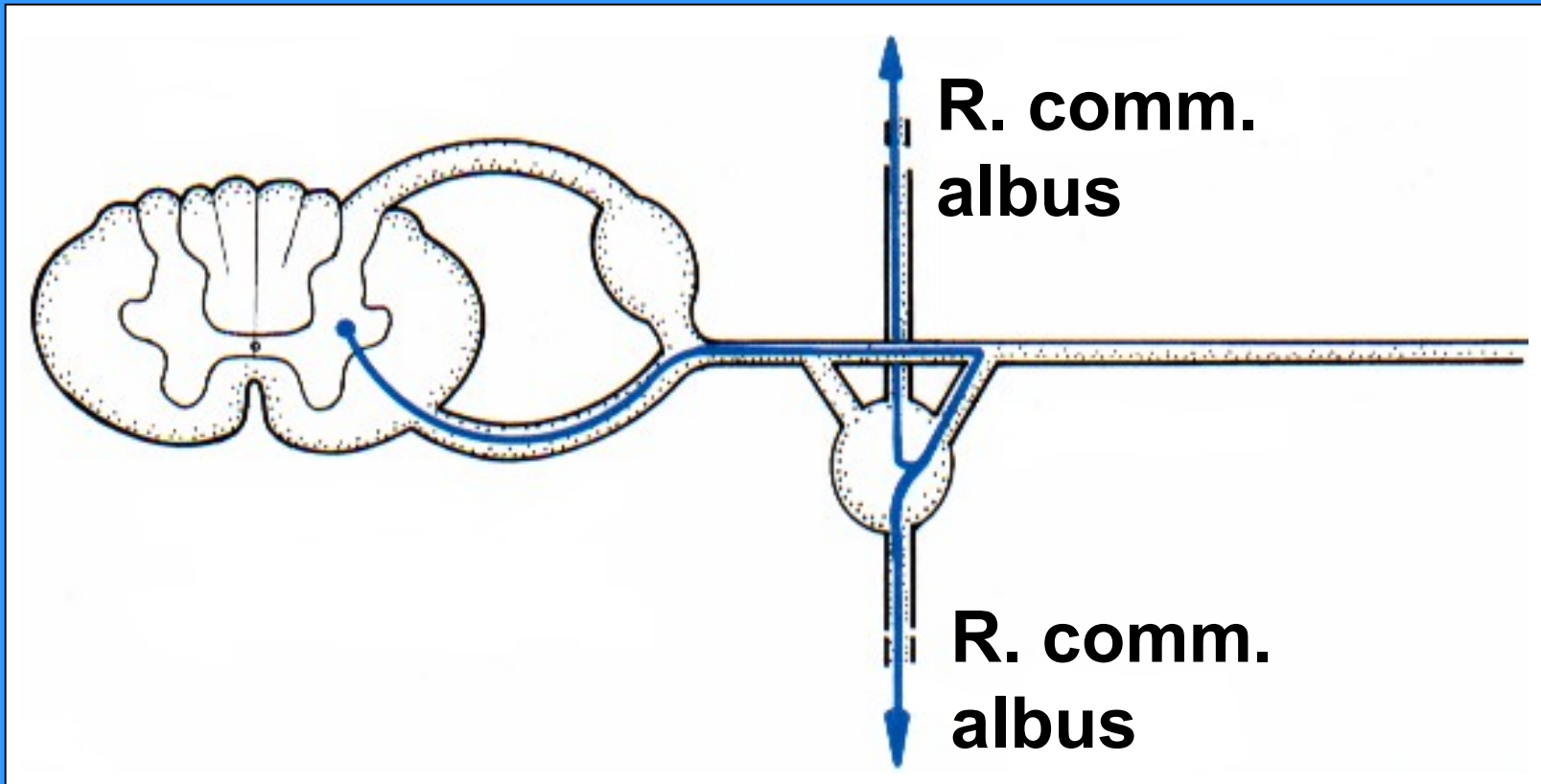
coeliacum

mesentericum sup.

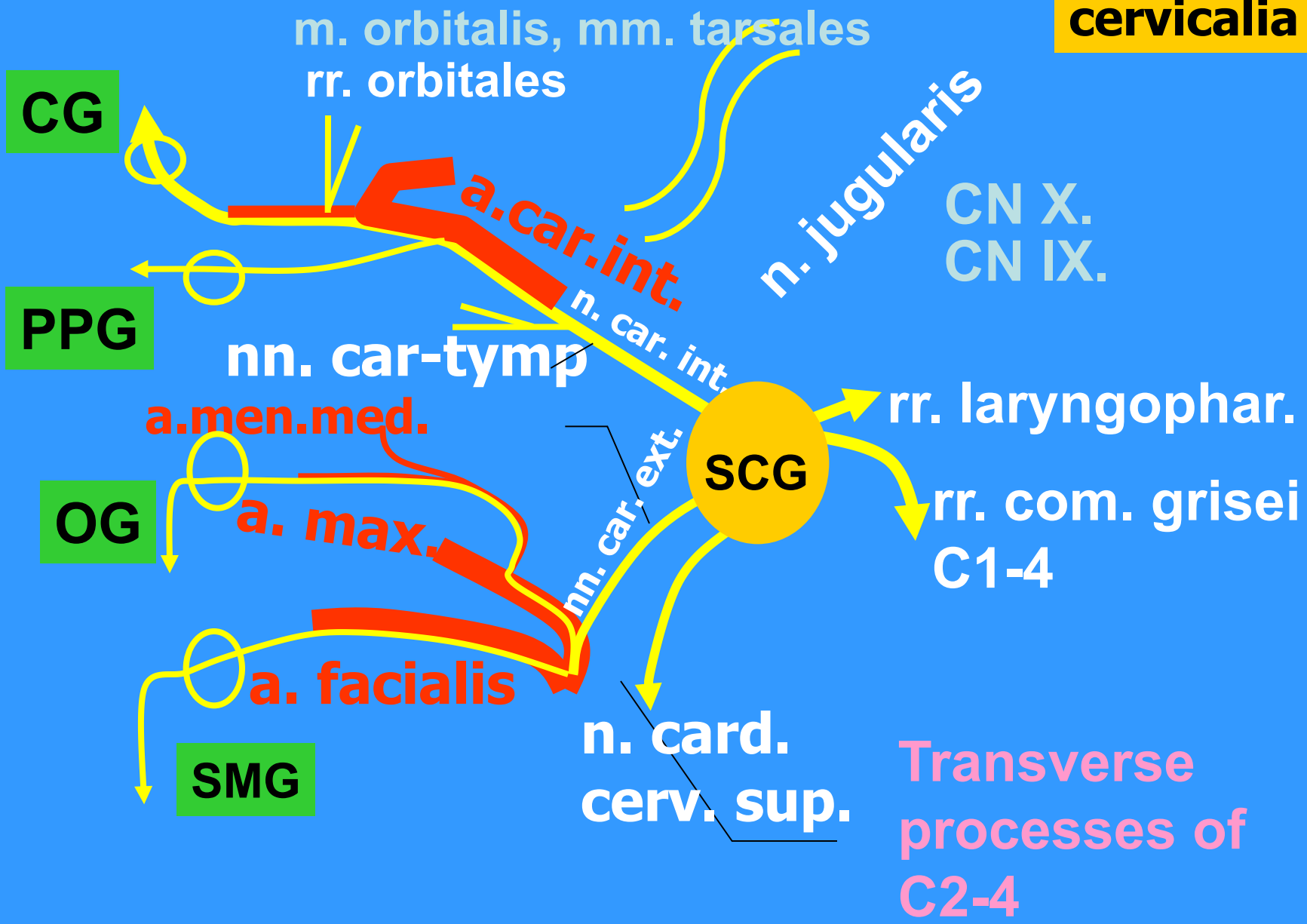
aorticorenale

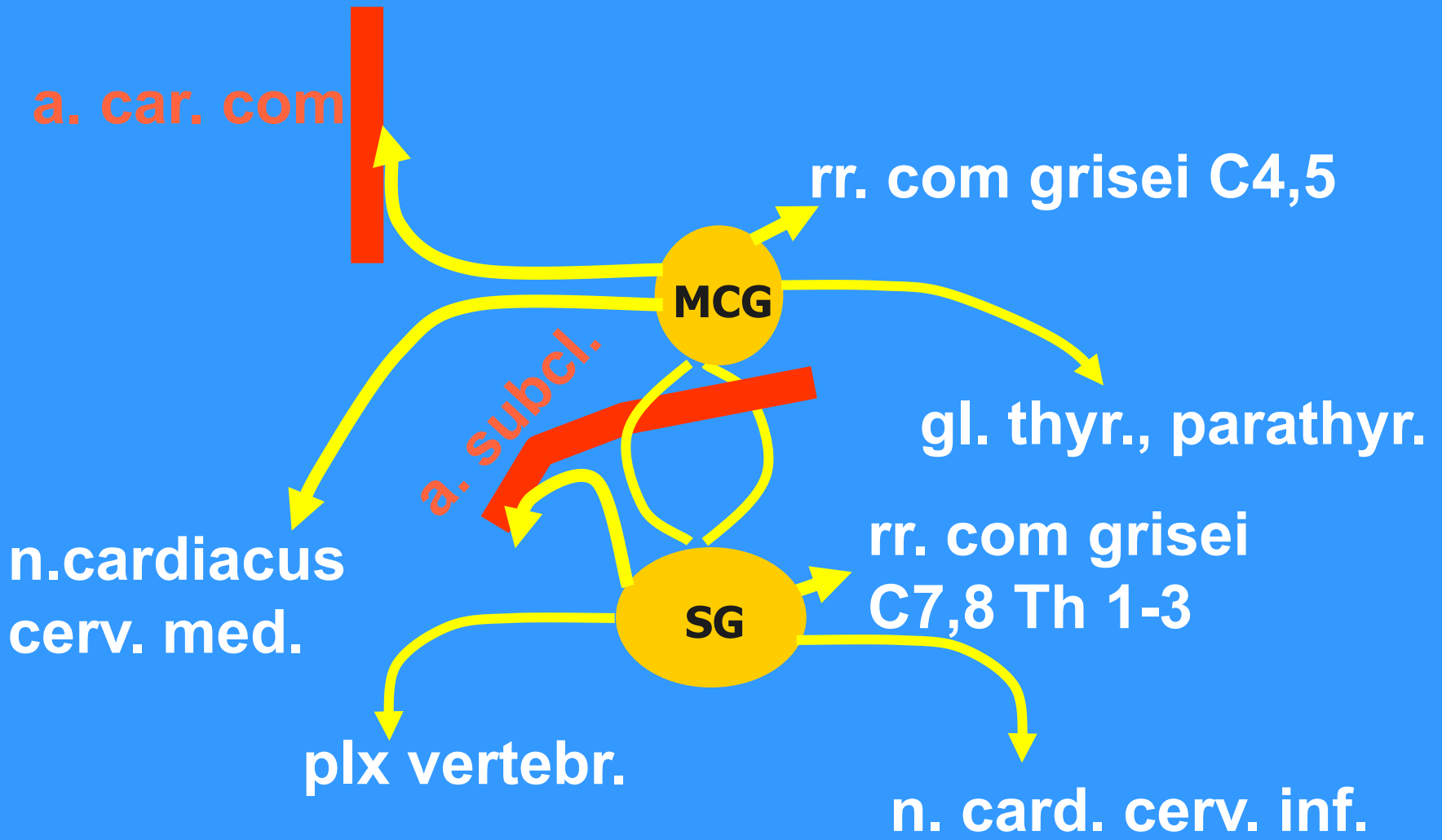
mesentericum inf.

rr. interganglionares



Ganglia cervicalia





a. car. com

rr. com grisei C4,5

MCG

gl. thyr., parathyr.

a. subcl.

n. cardiacus
cerv. med.

rr. com grisei
C7,8 Th 1-3

SG

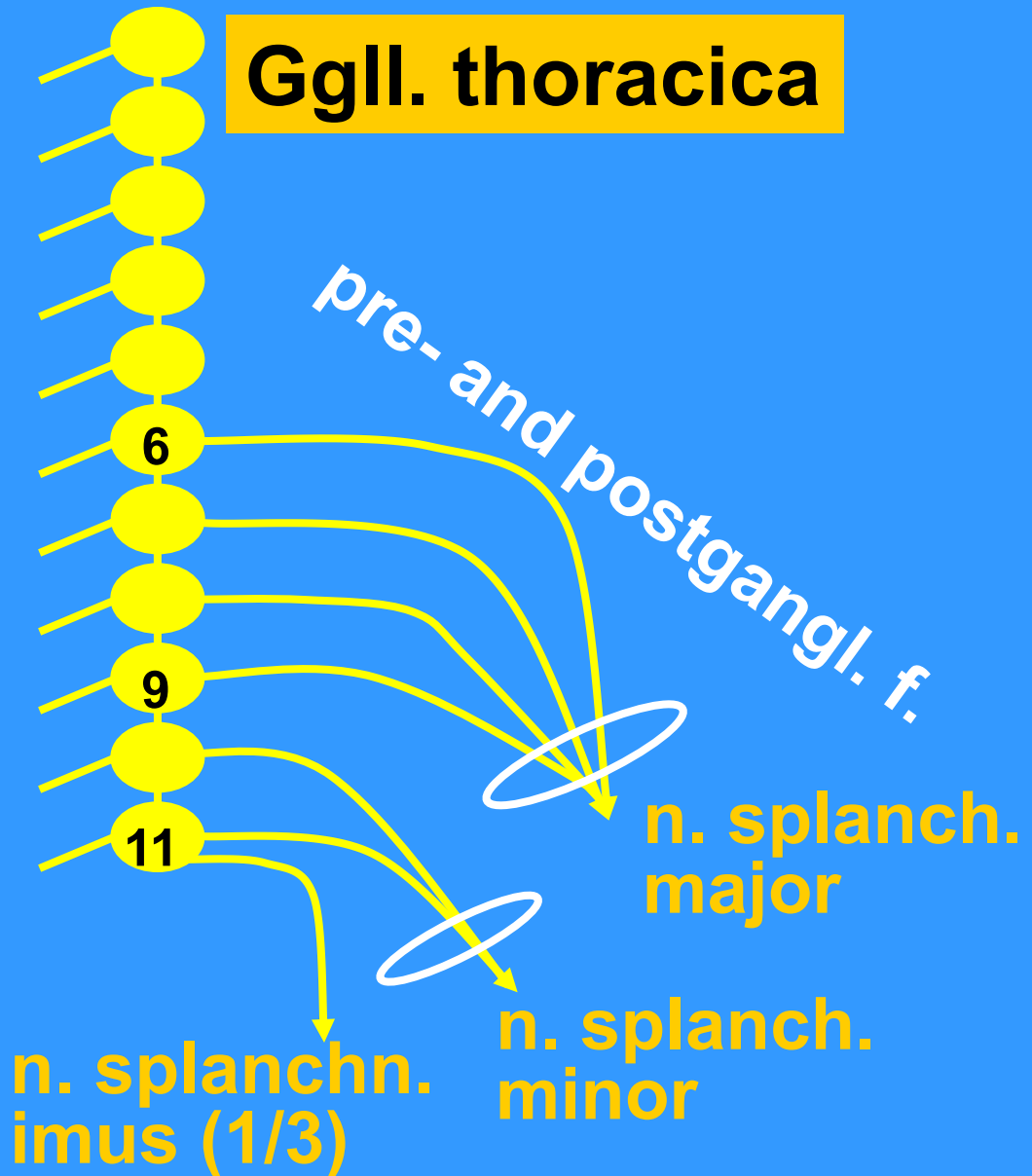
plx vertebr.

n. card. cerv. inf.

Transverse
processes of C 6,7

rr. com grisei
- nn. intercost.
nn. cardiaci th.
rr. pulmonales
rr. oesophagei

rr. vasculares
- aa. intercost.
- aorta > plx.
aorticus thorac.



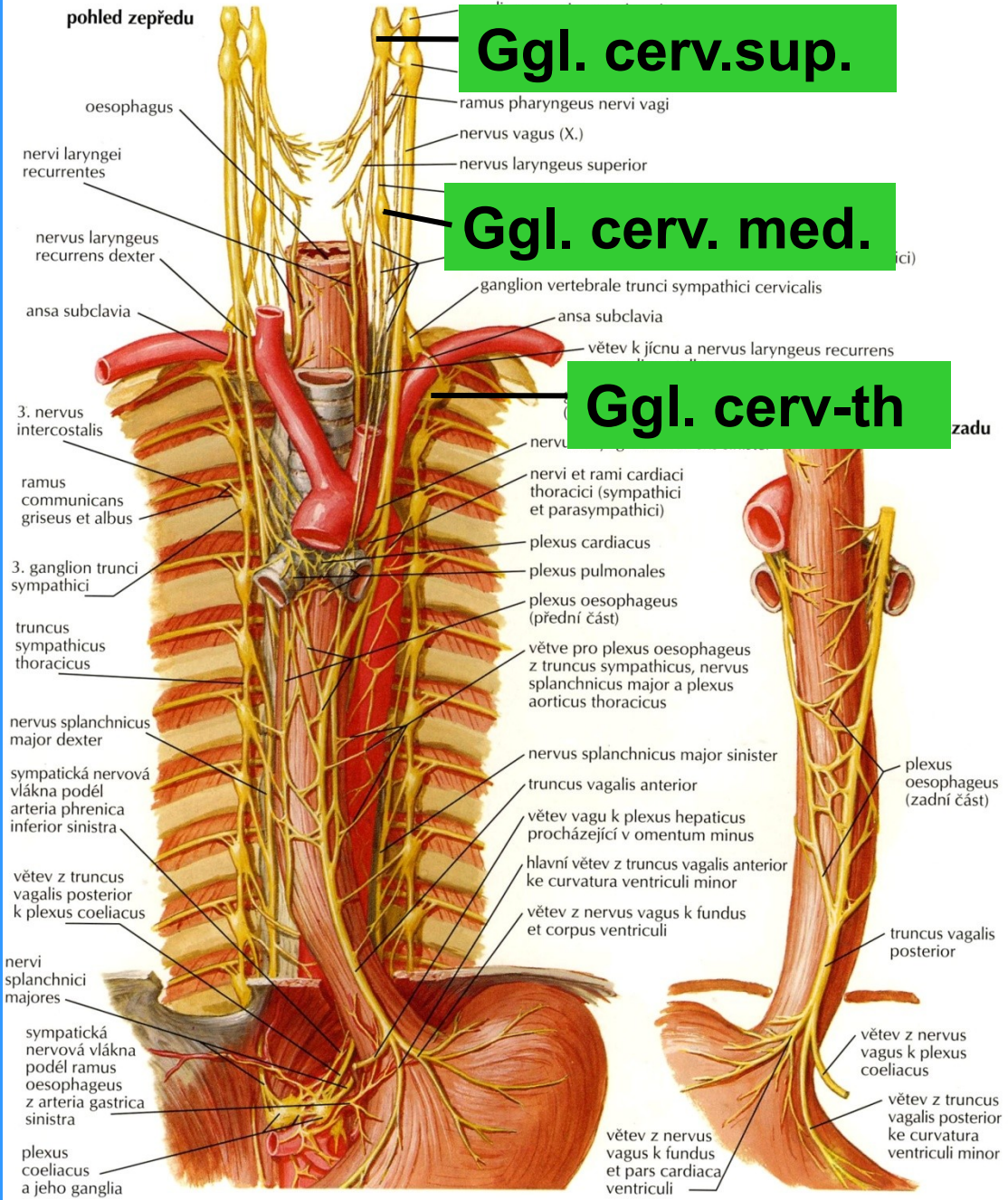
pohled zepředu

Ggl. cerv.sup.

Ggl. cerv. med.

Ggl. cerv-th

zadu



oesophagus

nervi laryngei recurrentes

nervus laryngeus recurrens dexter

ansa subclavia

3. nervus intercostalis

ramus communicans griseus et albus

3. ganglion trunci sympathici

truncus sympathicus thoracicus

nervus splanchnicus major dexter

sympatická nervová vlákna podél arteria phrenica inferior sinistra

větev z truncus vagalis posterior k plexus coeliacus

nervi splanchnici majores

sympatická nervová vlákna podél ramus oesophageus z arteria gastrica sinistra

plexus coeliacus a jeho ganglia

ramus pharyngeus nervi vagi

nervus vagus (X.)

nervus laryngeus superior

ganglion vertebrale trunci sympathici cervicalis

ansa subclavia

větev k jícnu a nervus laryngeus recurrens

nervus

nervi et rami cardiaci thoracici (sympathici et parasympathici)

plexus cardiacus

plexus pulmonales

plexus oesophageus (přední část)

větvě pro plexus oesophageus z truncus sympathicus, nervus splanchnicus major a plexus aorticus thoracicus

nervus splanchnicus major sinister

truncus vagalis anterior

větev vagu k plexus hepaticus procházející v omentum minus

hlavní větev z truncus vagalis anterior ke curvatura ventriculi minor

větev z nervus vagus k fundus et corpus ventriculi

větev z nervus vagus k fundus et pars cardiaca ventriculi

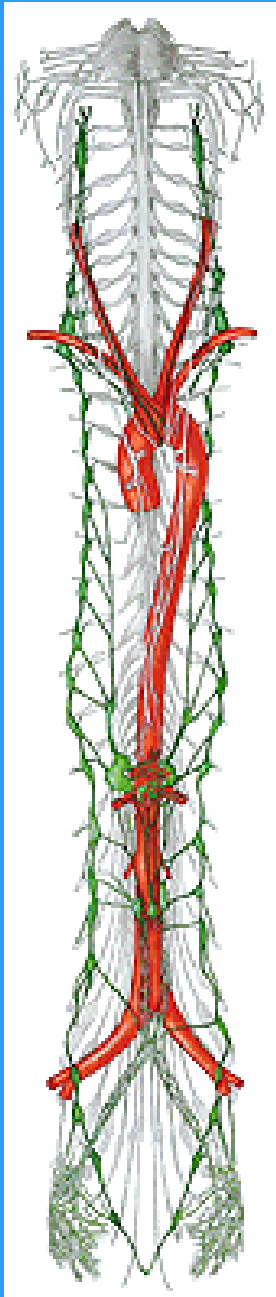
ici

plexus oesophageus (zadní část)

truncus vagalis posterior

větev z nervus vagus k plexus coeliacus

větev z truncus vagalis posterior ke curvatura ventriculi minor

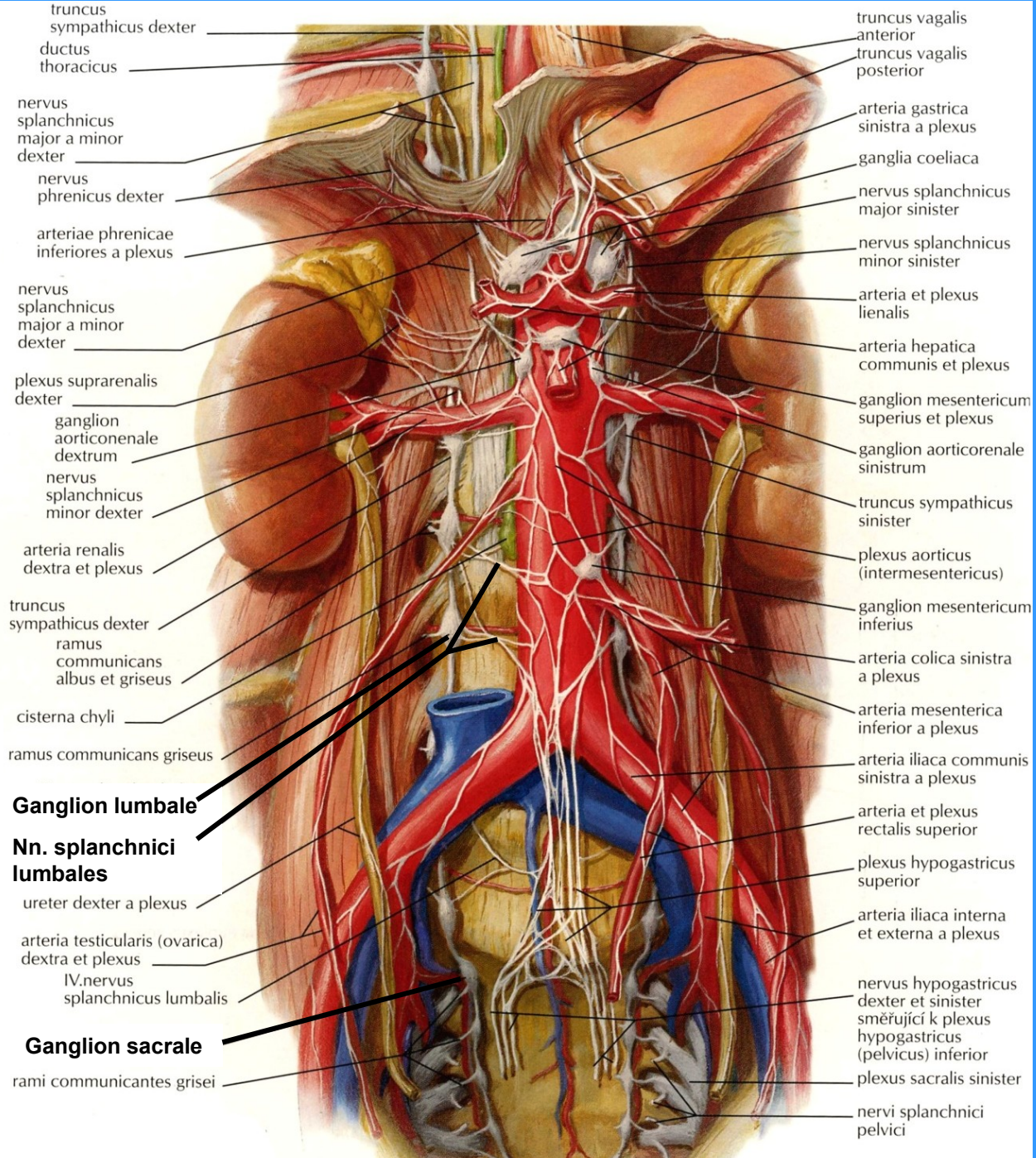


Ganglia lumbalia	4-5
Ganglia sacralia	4-5
Ganglion impar	1

Rr. com. grisei (L1 – Co)

Nn. splanchn. lumb. (plx. aorticus abd.)

Nn. splanchn. sacrales (plx. hypogastr.)



truncus
sympathicus dexter

ductus
thoracicus

nervus
splanchnicus
major a minor
dexter

nervus
phrenicus dexter

arteriae phrenicae
inferiores a plexus

nervus
splanchnicus
major a minor
dexter

plexus suprarenalis
dexter

ganglion
aorticorenale
dextrum

nervus
splanchnicus
minor dexter

arteria renalis
dextra et plexus

truncus
sympathicus dexter
ramus
communicans
albus et griseus

cisterna chyli

ramus communicans griseus

Ganglion lumbale

**Nn. splanchnici
lumbales**

ureter dexter a plexus

arteria testicularis (ovarica)
dextra et plexus

IV.nervus
splanchnicus lumbalis

Ganglion sacrale

rami communicantes grisei

truncus vagalis
anterior

truncus vagalis
posterior

arteria gastrica
sinistra a plexus

ganglia coeliaca

nervus splanchnicus
major sinister

nervus splanchnicus
minor sinister

arteria et plexus
lienalis

arteria hepatica
communis et plexus

ganglion mesentericum
superius et plexus

ganglion aorticorenale
sinistrum

truncus sympathicus
sinister

plexus aorticus
(intermesentericus)

ganglion mesentericum
inferius

arteria colica sinistra
a plexus

arteria mesenterica
inferior a plexus

arteria iliaca communis
sinistra a plexus

arteria et plexus
rectalis superior

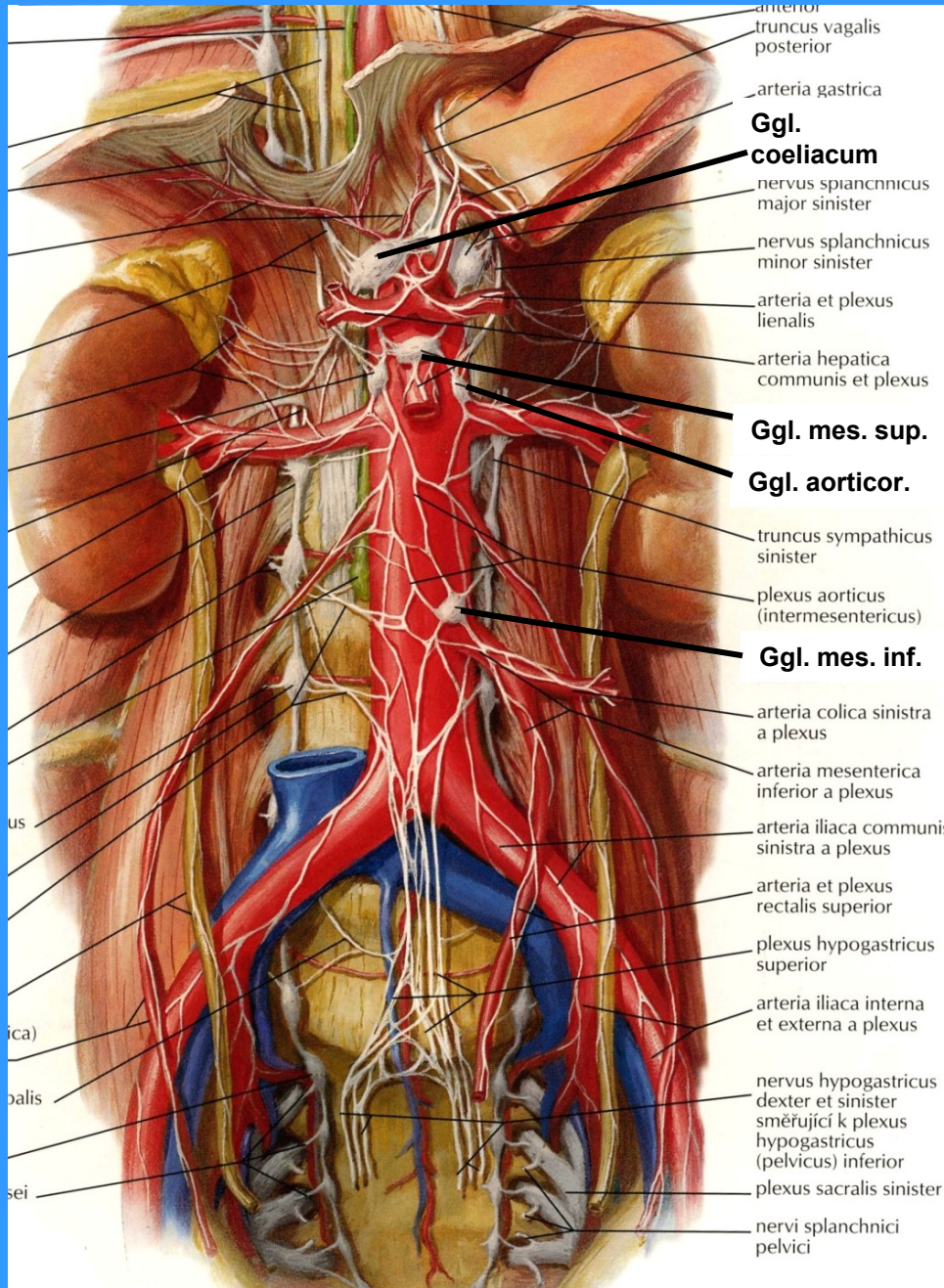
plexus hypogastricus
superior

arteria iliaca interna
et externa a plexus

nervus hypogastricus
dexter et sinister
směřující k plexus
hypogastricus
(pelvicus) inferior

plexus sacralis sinister

nervi splanchnici
pelvici



Prevertebral ganglia

Coeliacum
Mesentericum sup.
Aorticorenale
Mesentericum inf.

Ggl. ciliare

N. nasociliaris

Ggl. cervic. sup.

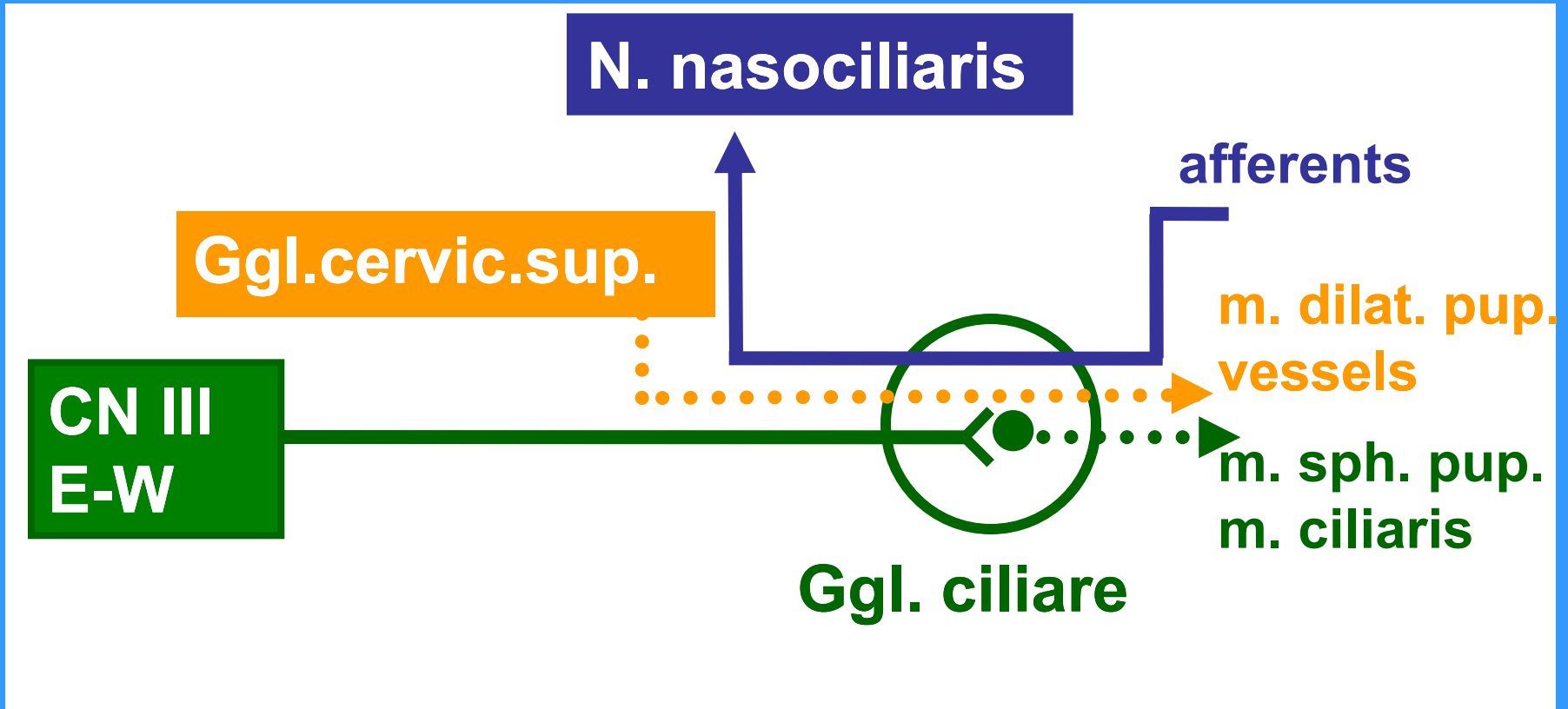
CN III
E-W

afferents

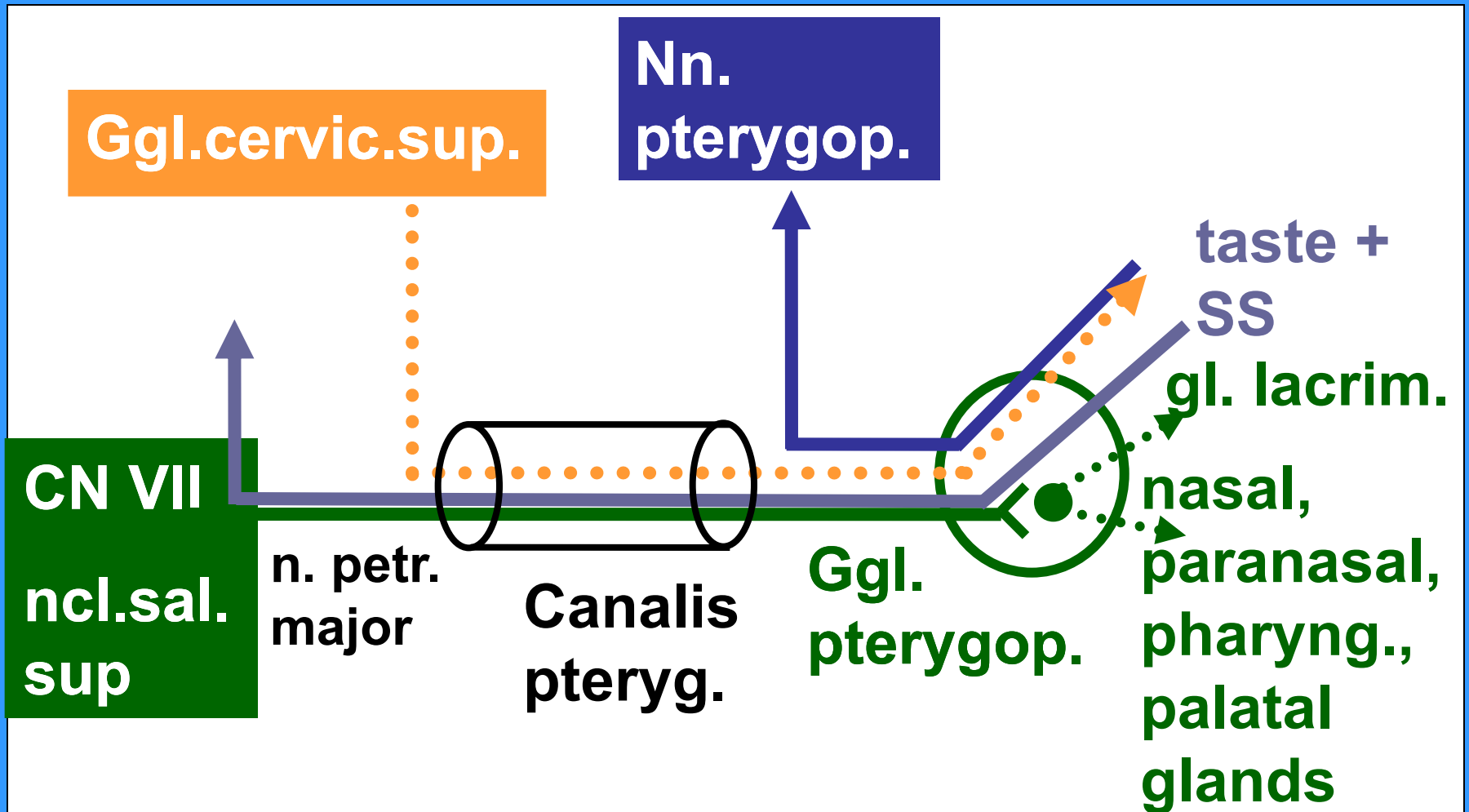
m. dilat. pup.
vessels

m. sph. pup.
m. ciliaris

Ggl. ciliare



Ggl. pterygopalat.



Ggl. submand.

N. lingualis

Ggl. cervic. sup.

CN VII
ncl. sal.
sup.

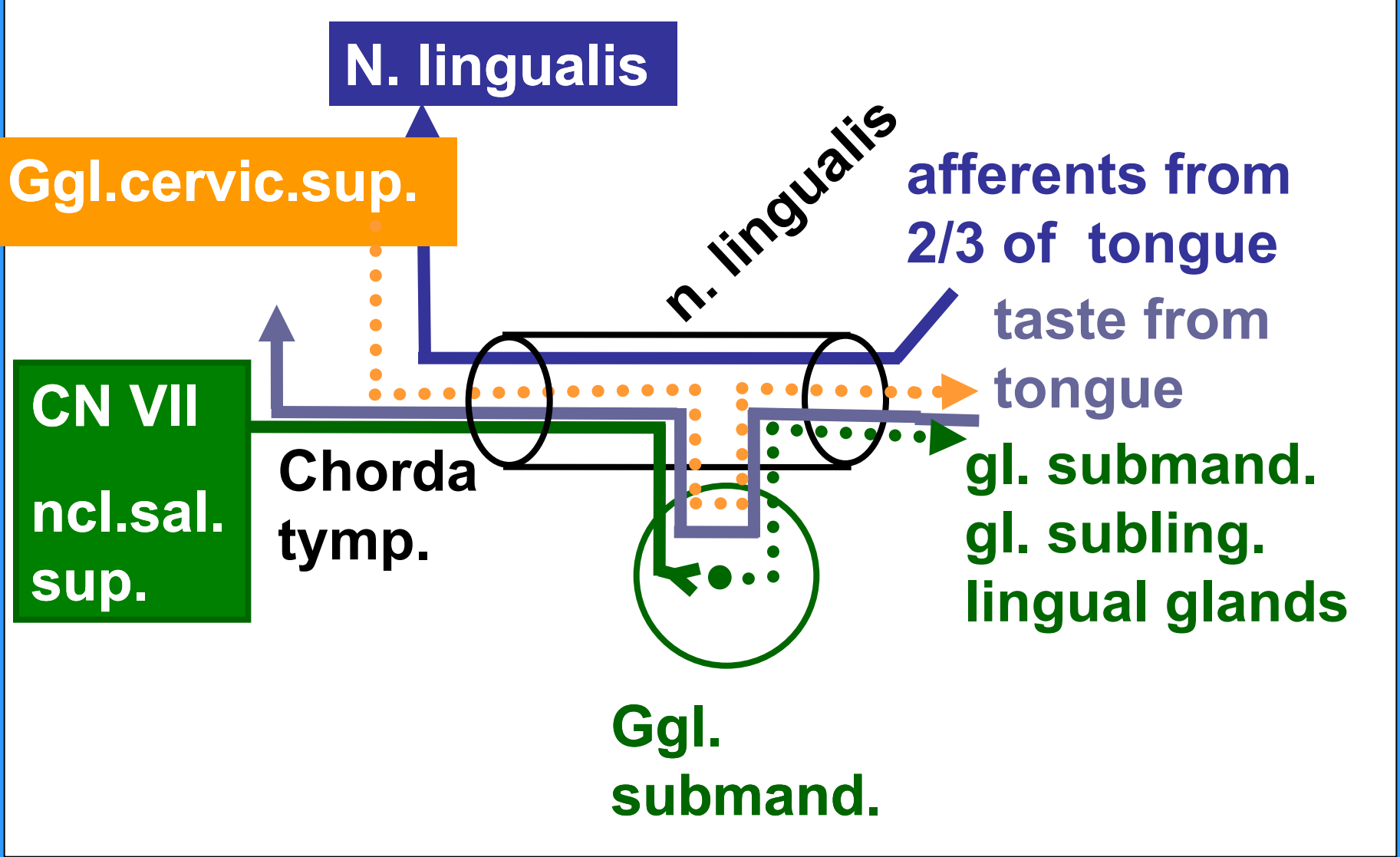
Chorda
tymp.

n. lingualis

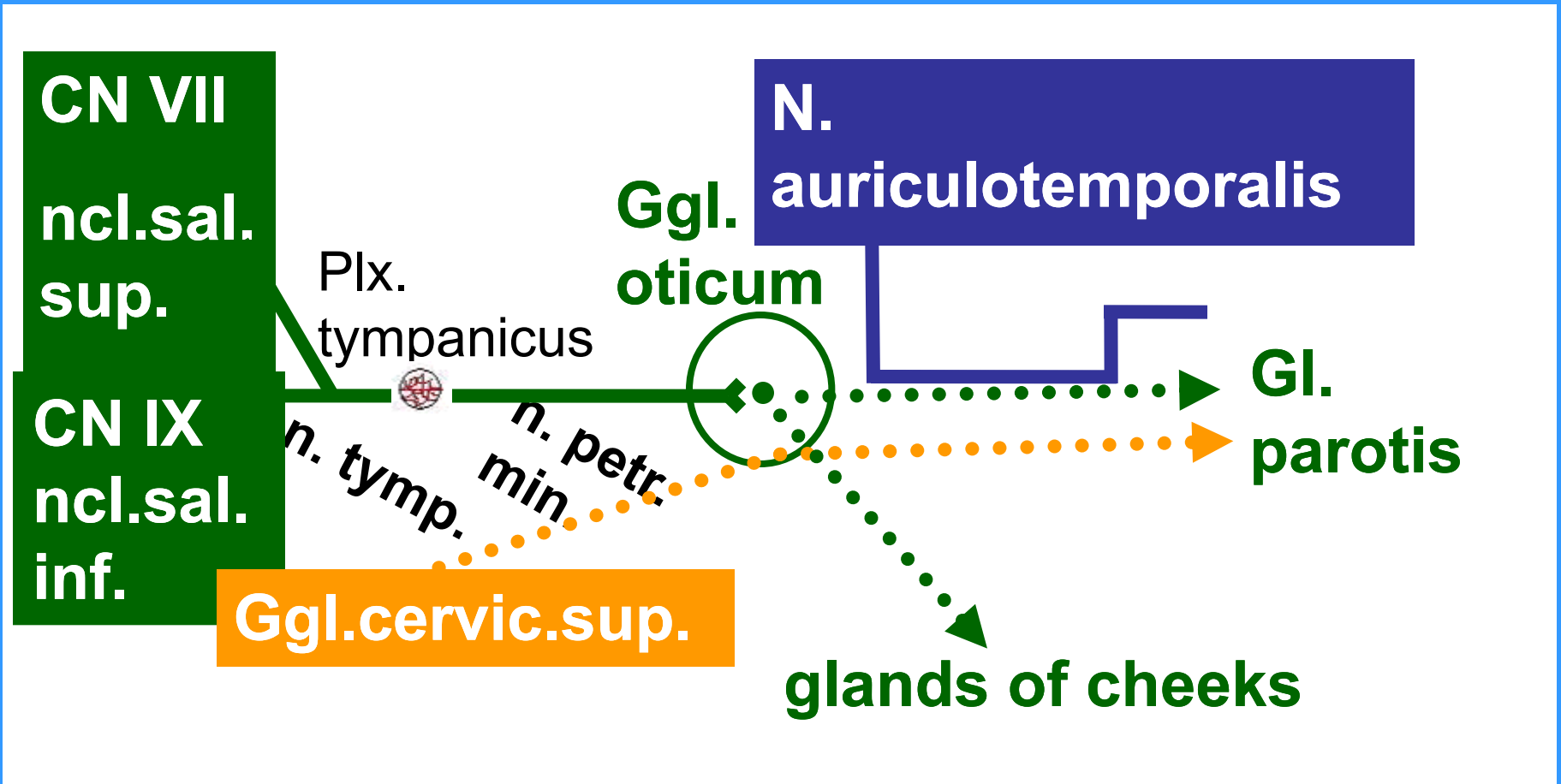
afferents from
2/3 of tongue
taste from
tongue

gl. submand.
gl. subling.
lingual glands

Ggl.
submand.

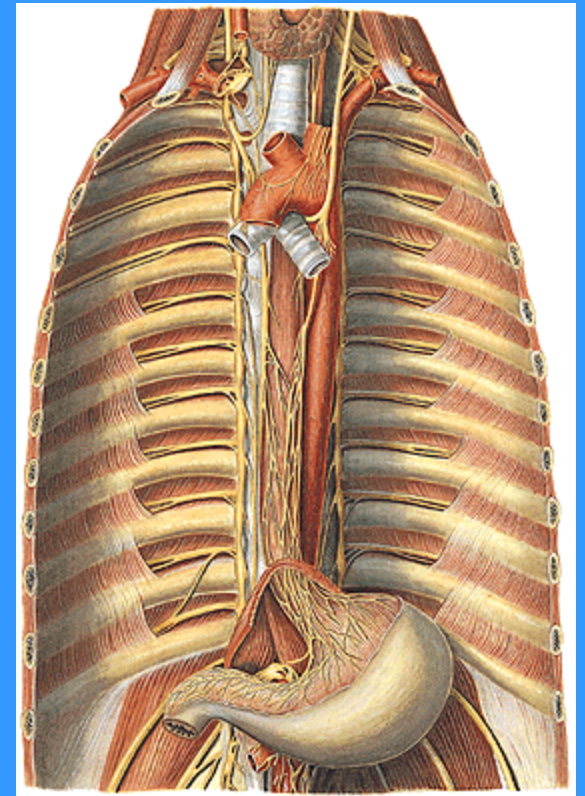
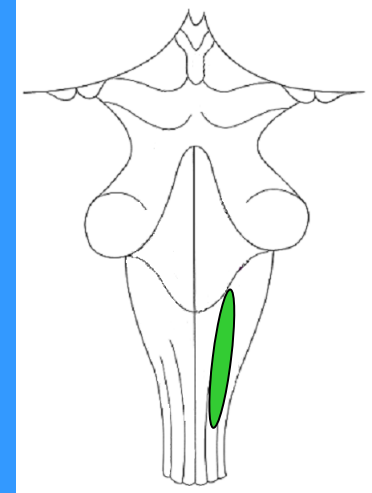


Ggl. oticum



Ncl. p. CN X

pharynx, oesophagus, trachea,
bronchi, lungs, heart, stomach,
liver, kidneys, intestine to flex.
coli sin., genital glands



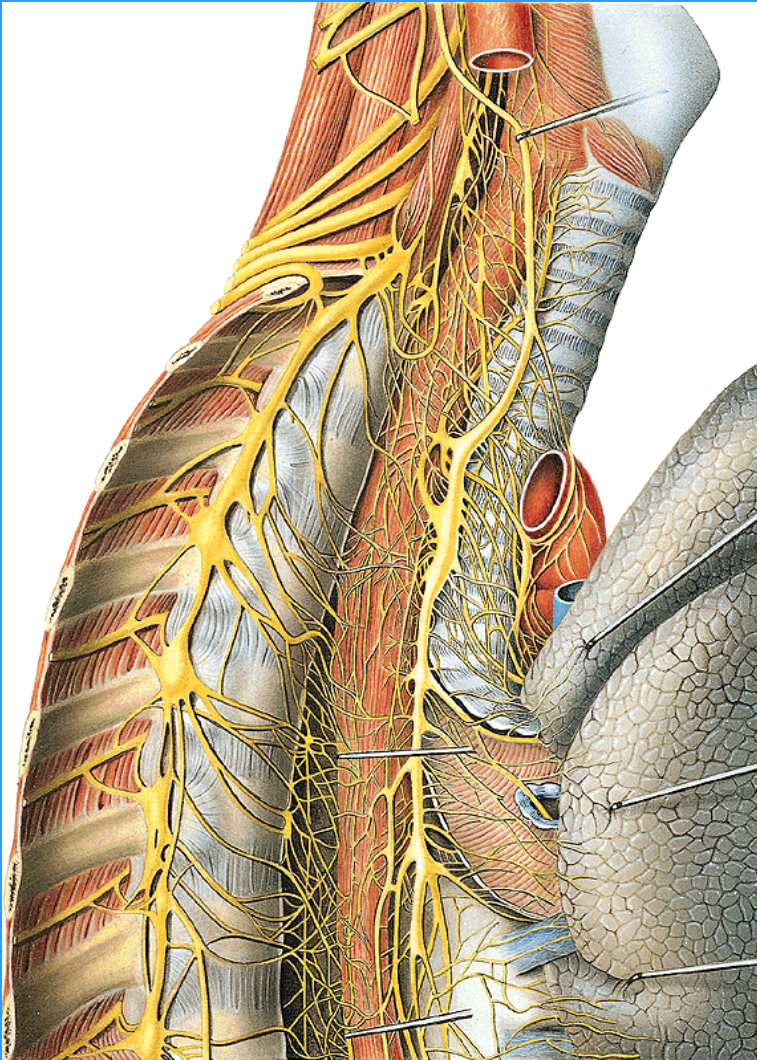
Sacral parasympathetic s.

Ncl. intermediolat.

pregangl. f. - nn. splanchn. pelvici to plx. hypog.
sup. et inf. - ganglia pelvica
> postgangl. f. - effectors

intestine from flexura coli sin.
organs of pelvis (except genital glands)
erectile bodies of penis and clitoris

ANS innervates organs of thorax, abdomen and pelvis through **mixed autonomic plexuses**

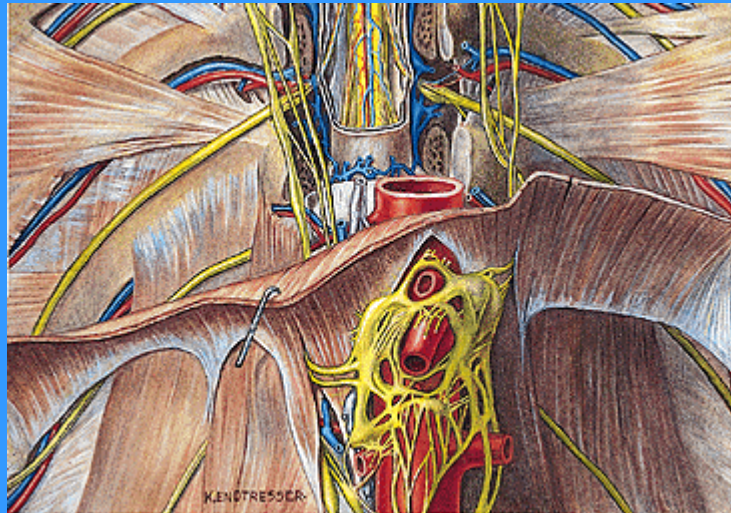


Thorax

Plx. card. superf. et prof.
Plx. aorticus thoracicus
Plx. pulmonalis
Plx. eosophageus

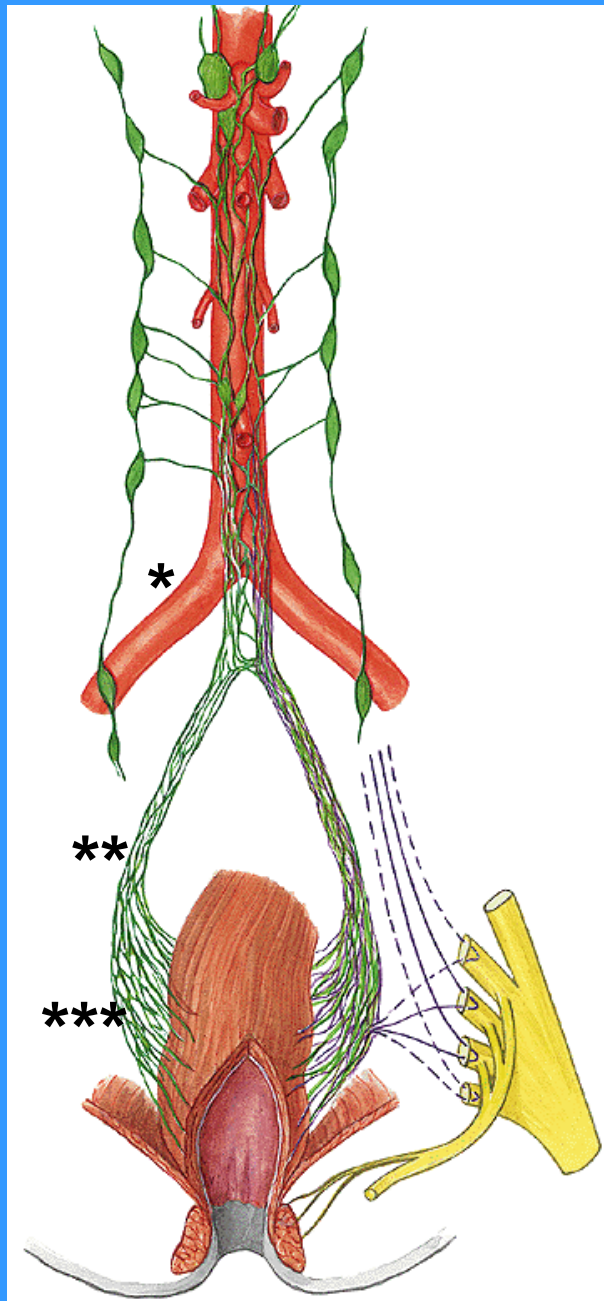
Abdomen

Plex. aorticus abdom.



**coeliacus ... hepaticus, gastrici,
lienalis, pancreaticus
renalis et suprarenalis
testicularis / ovaricus
uretericus
mesent. sup. (n. vagus)
mesent. inf. (sacral parasymp.)**

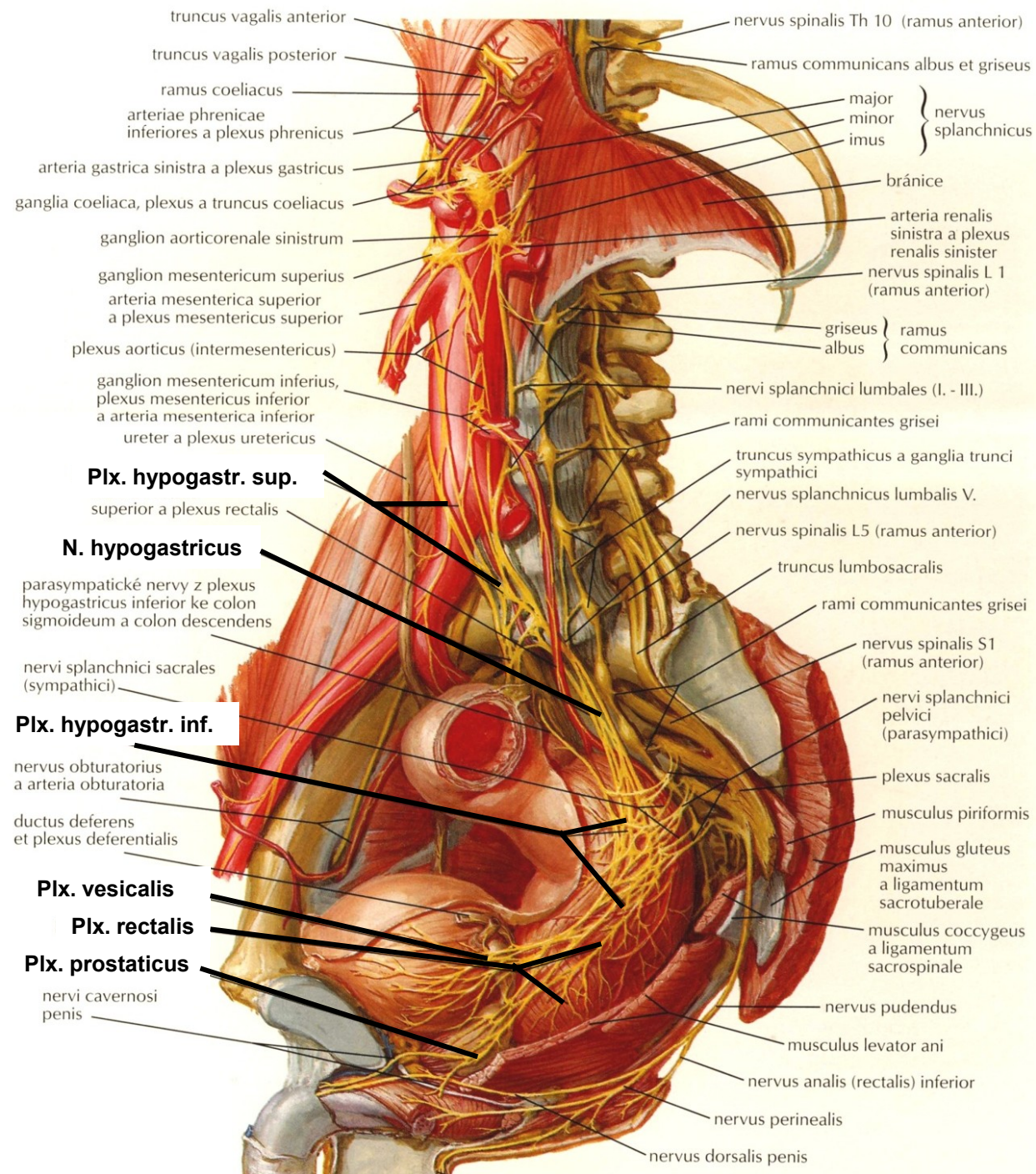
Pelvis



- * **Plex. hypogastr. sup.**
- ** **N. hypogastr. dx. et sin.**
- *** **Plex. hypogastr. inf.**

> plexus:

rectales medii et inferiores
vesicales
prostaticus
deferentialis
uterovaginalis
cavernosi penis / clitoridis

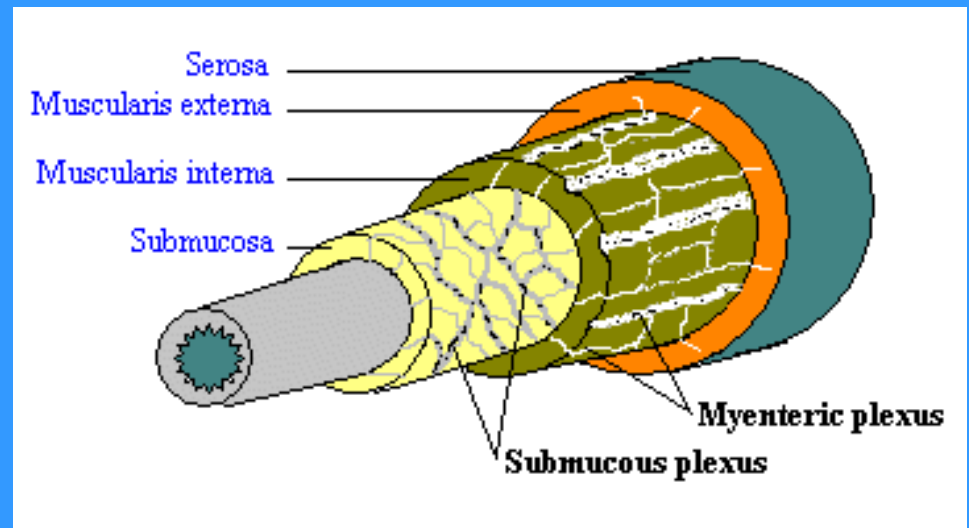


Enteric system

neurons and interneurons in the wall of digestive tube

Plx. myentericus
Auerbachii

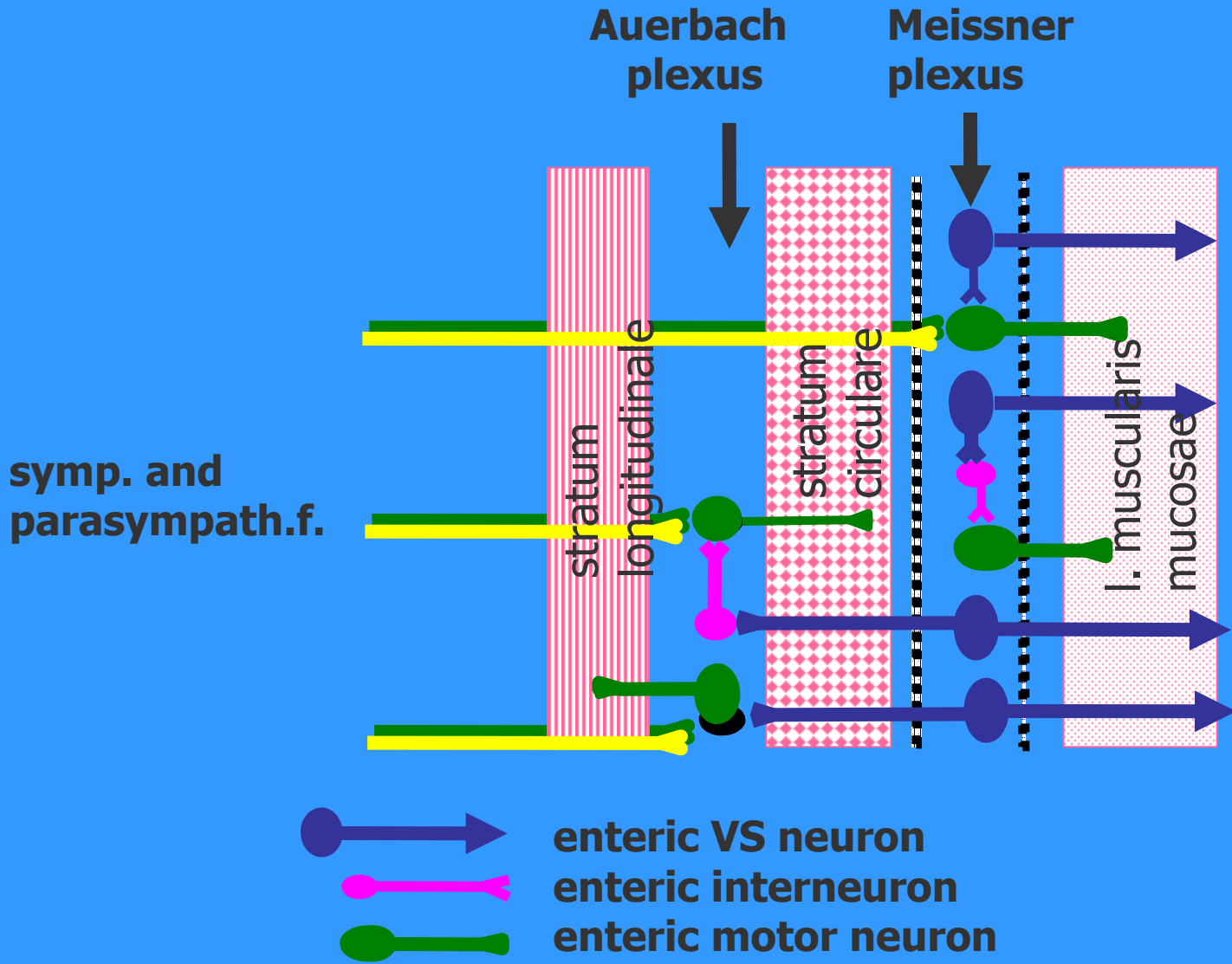
Plx. submucosus
Meissneri



plexuses contain small ganglia

ganglia receive signals:
from receptors of GIT
from CNS via symp. a parasymp. nerves
through interneurons

control activity of GIT through stimulation or inhibition of motoneurons of enteric system
= **controls tonus and motions of digestive tube and secretion of glands**



Illustrations and photographs were copied from:
Atlas der Anatomie des Menschen/Sobotta.
Putz,R., und Pabst,R. 20. Auflage. München:
Urban & Schwarzenberg, 1993
Netter: Interactive Atlas of Human Anatomy.
Windows Version 2.0