

Autonomic nervous system

Innervation of

■ smooth muscle

myocardium

glands

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

functionally is divided into:

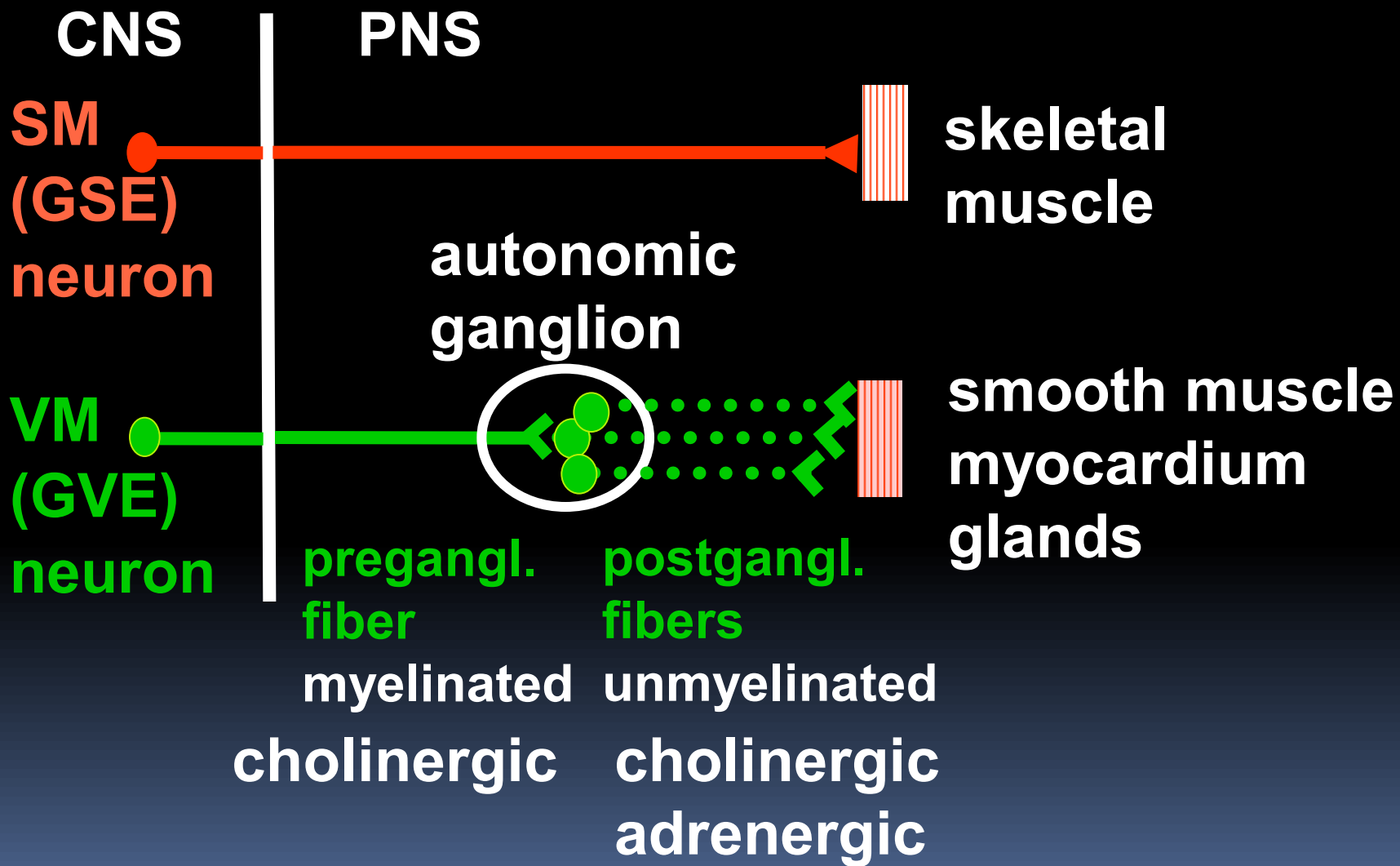
sympathetic system

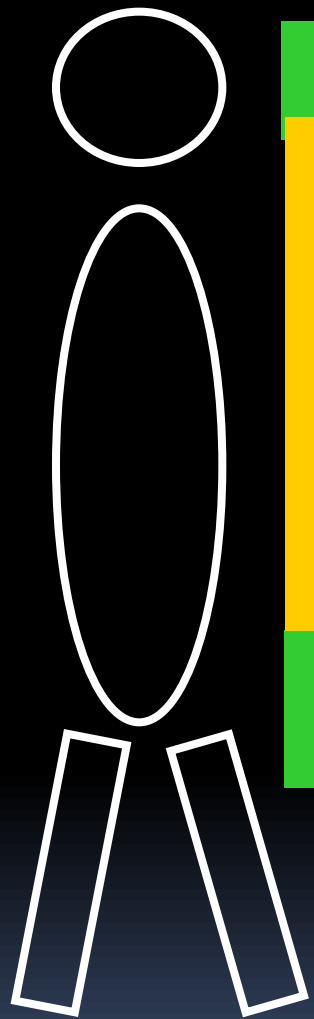
parasympathetic system

enteric system

afferent (viscerosensory) fibres

accompany efferent fibers





**cranial
parasympathetic
system**

**sympathetic
thoracic-lumbar
system**

**sacral
parasympathetic
system**

Sympathetic system

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

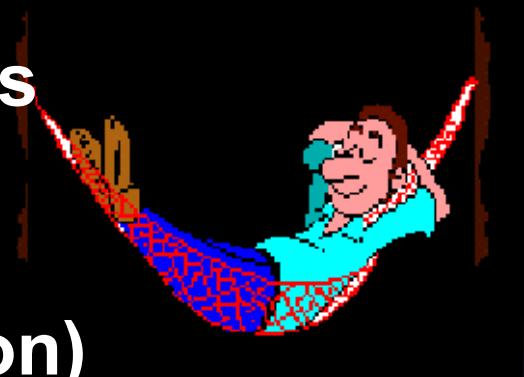
- dilates coronary arteries
- increases heart rate
- increases cardiac output
- dilates bronchi
- inhibits GIT motility
- dilates pupil (mydriasis)
- stimulates sweat glands secretion
- stimulates secretion of viscous saliva



Parasympathetic system

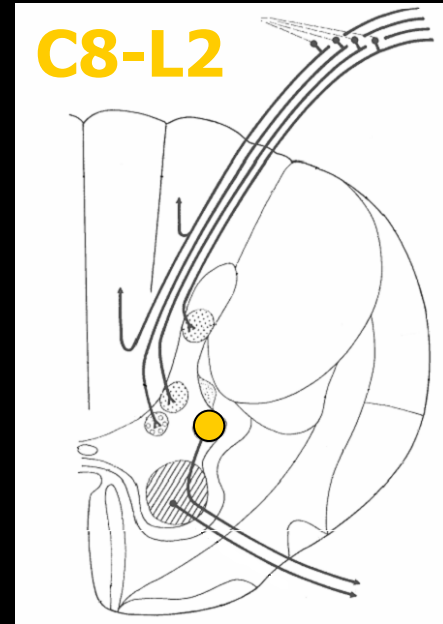
Anabolic reactions (activities associated with conservation and restoration of body resources “rest and digest” responses)

- decreases heart rate
- decreases cardiac output
- constricts coronary arteries
- constricts bronchi
- constricts pupil (miosis)
- accommodation (near vision)
- increases GIT motility
- stimulates secretion of watery saliva

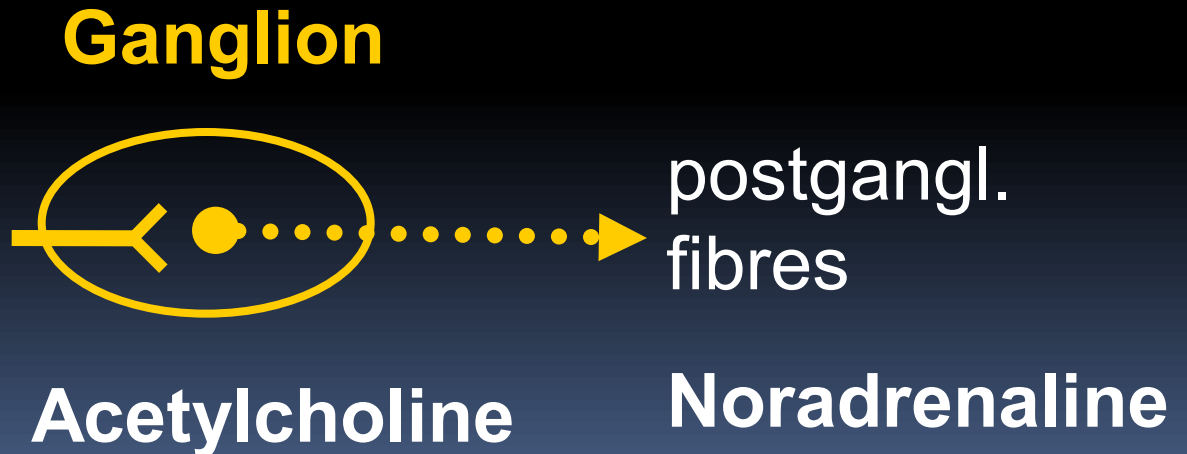


Sympathetic system

Central part:
ncl.
intermediolateralis

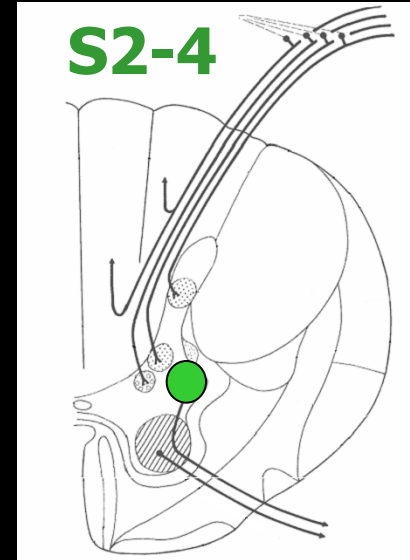
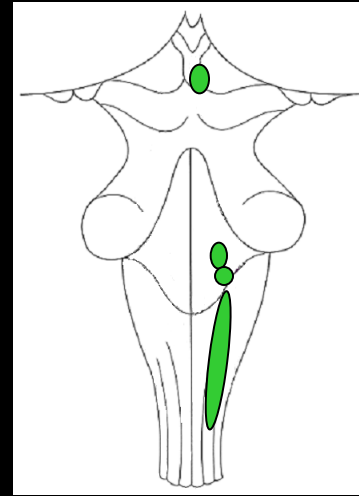


Peripheral part:
pregangl. fibres
rr.com. albi



Parasympathetic system

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

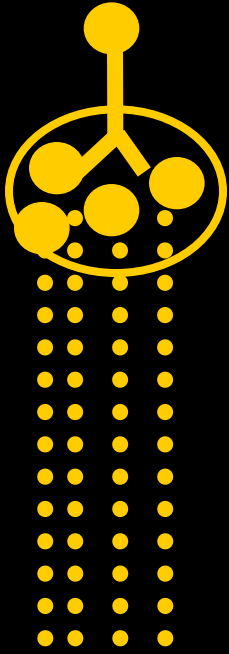


Peripheral part:

Ganglion



Ganglia



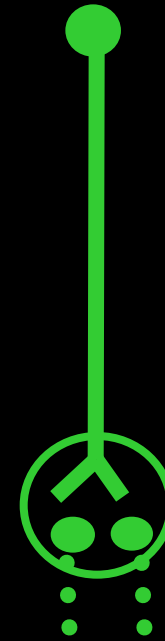
para
vertebral

Symp.
trunk



pre
vertebral

Aortic plexuses



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

Sympathetic

Parasympathetic



heart rate

increase

decrease

**coronary
arteries**

dilation

constriction

bronchioles

relaxation

constriction

pupil

**dilation
(mydriasis)**



**constriction
(miosis)**



gall bladder

contraction

relaxation

**salivary
secretion**

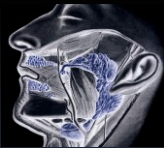
viscous

watery

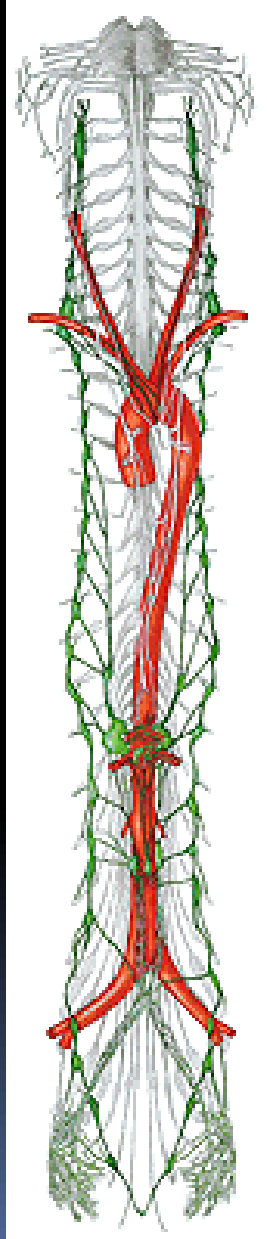
GIT

**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

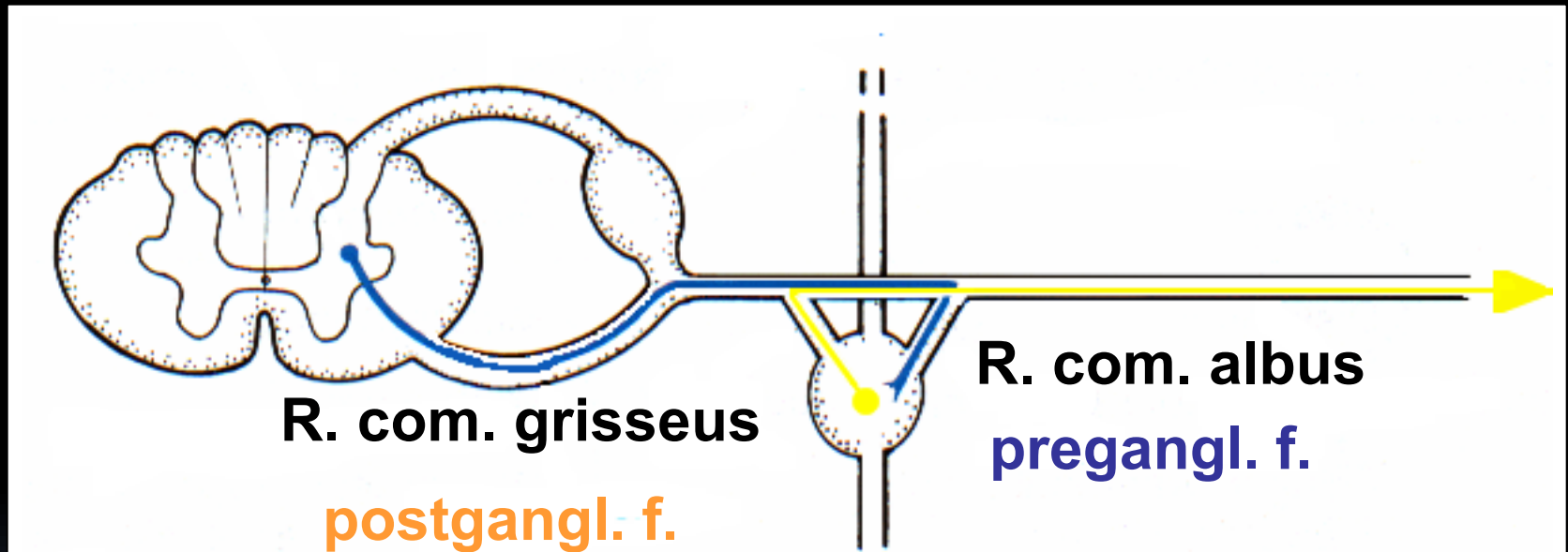
coeliacum

mesentericum sup.

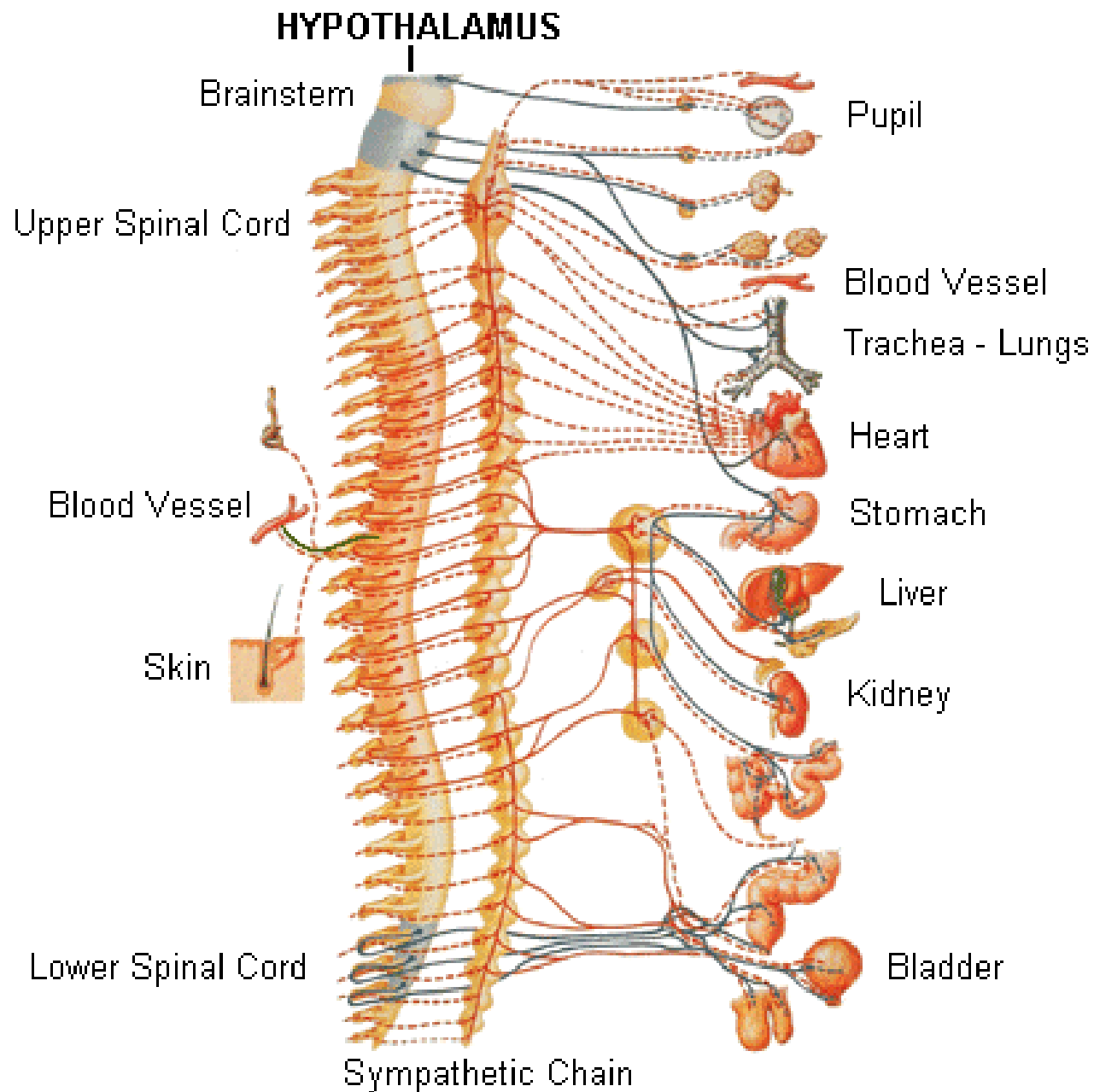
aorticorenale

mesentericum inf.

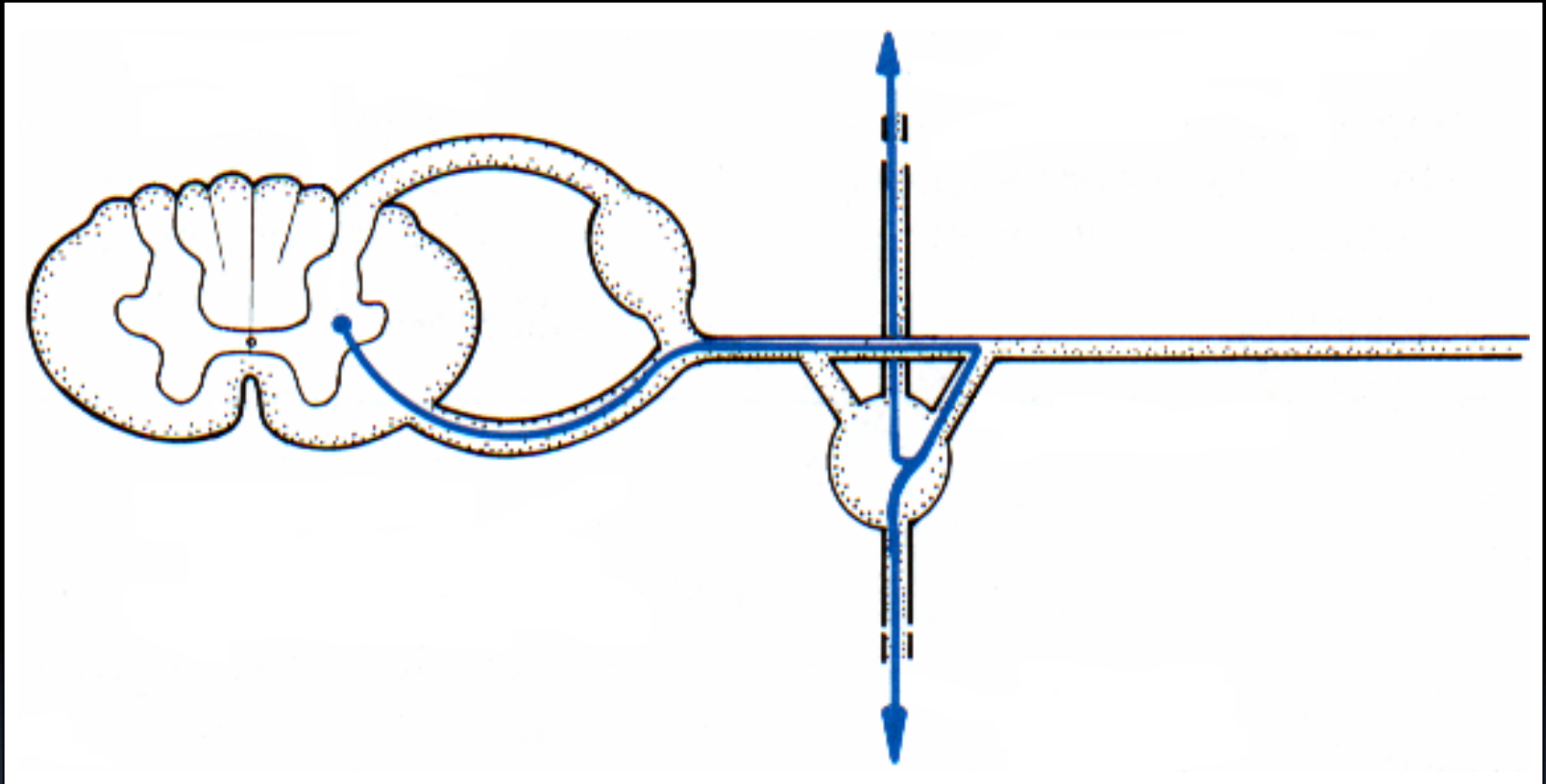
Ganglia tr. sympathici



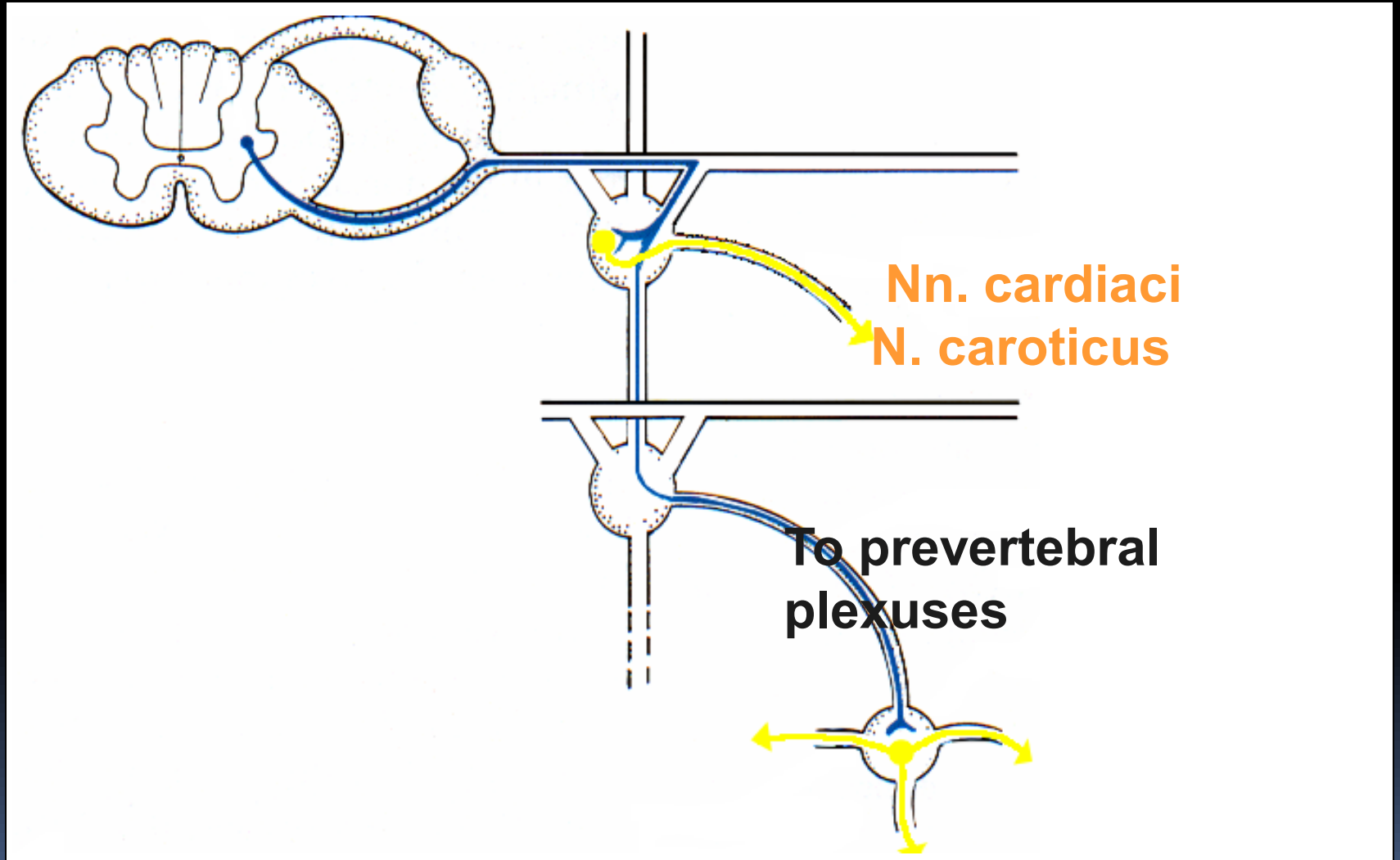
Autonomic Nervous System



rr. interganglionares

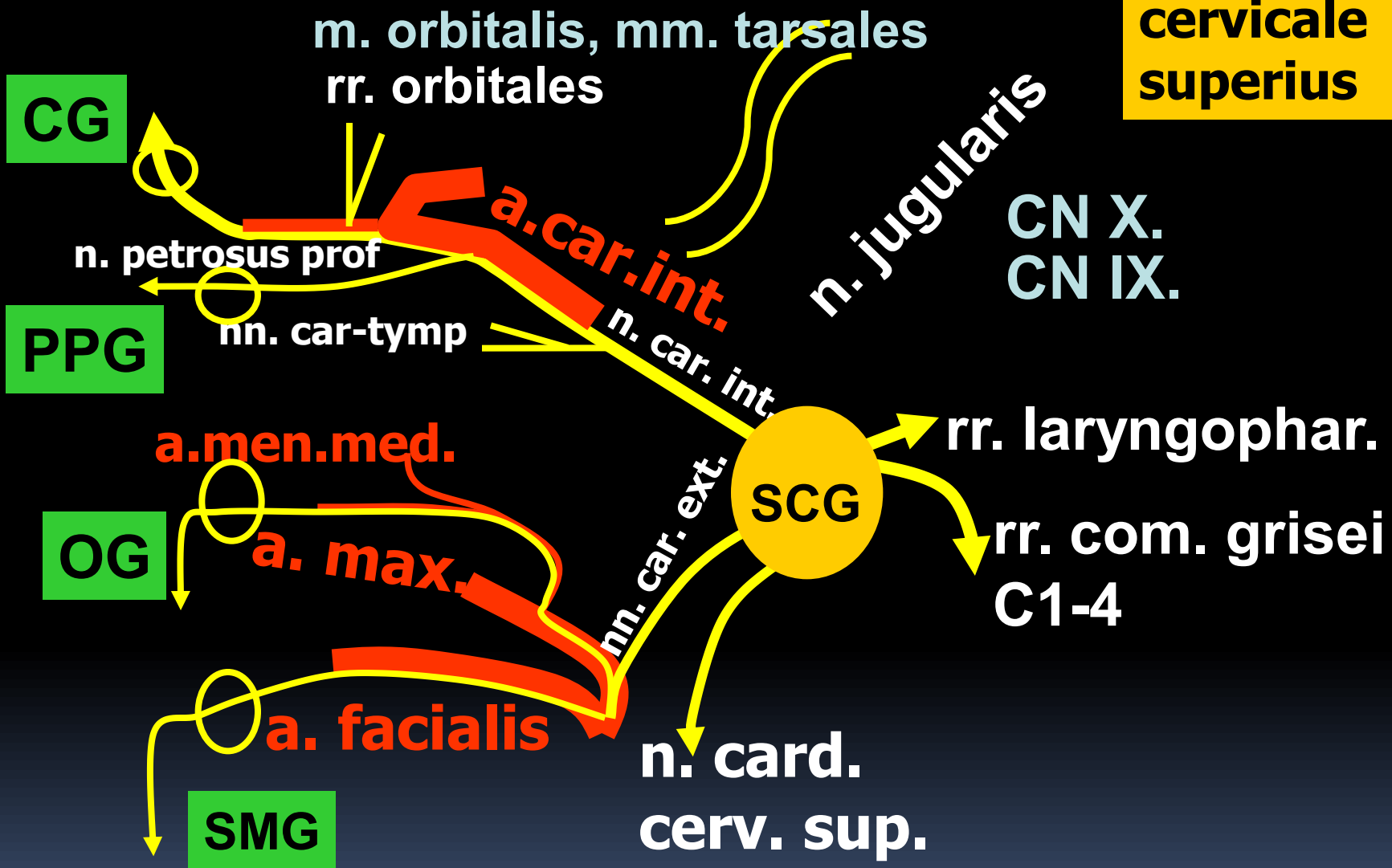


rr. viscerales
rr. vasculares



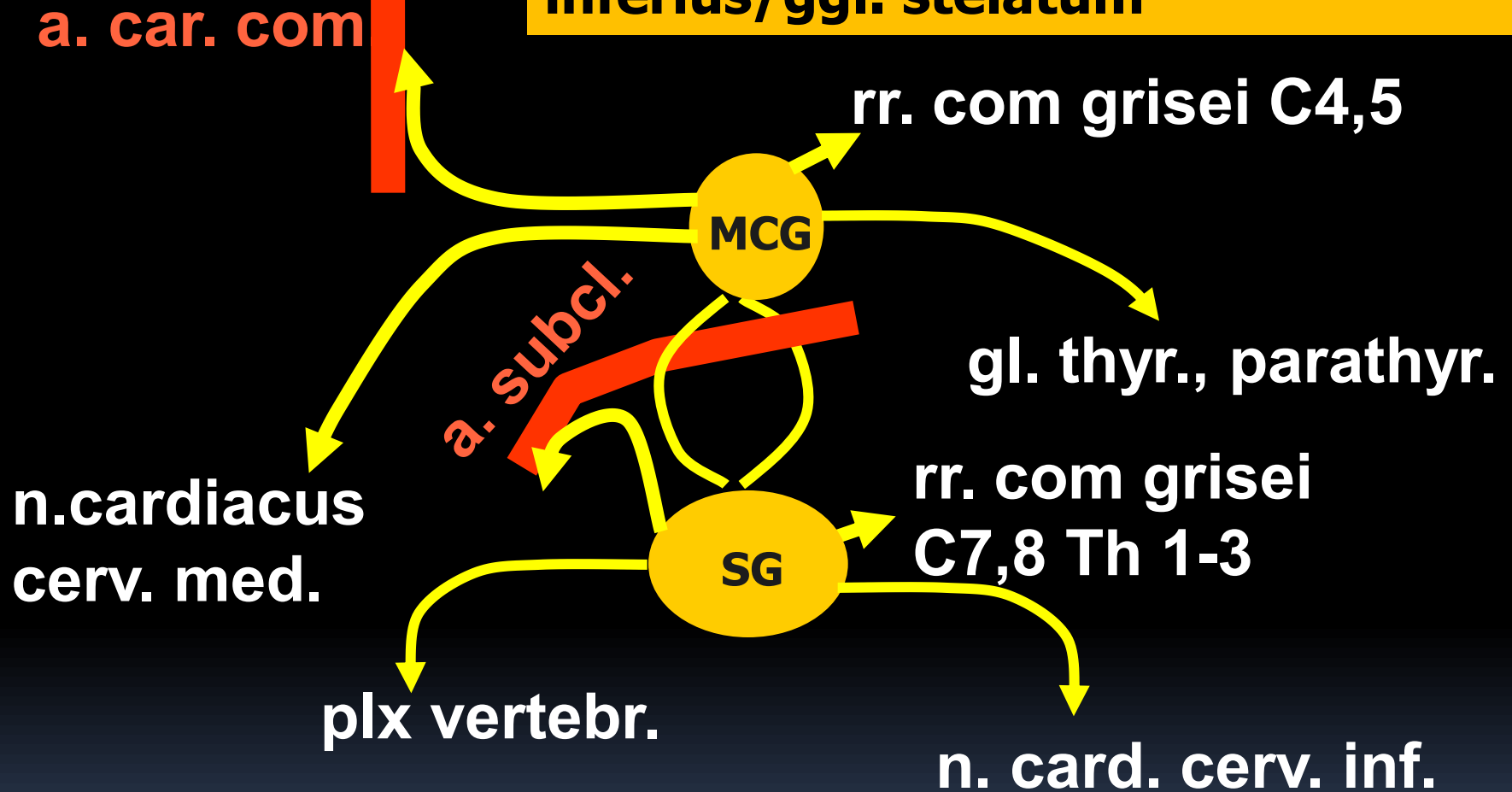
nn. splanchnici

**Ganglion
cervicale
superius**



Anterior to transverse processes of C2-4

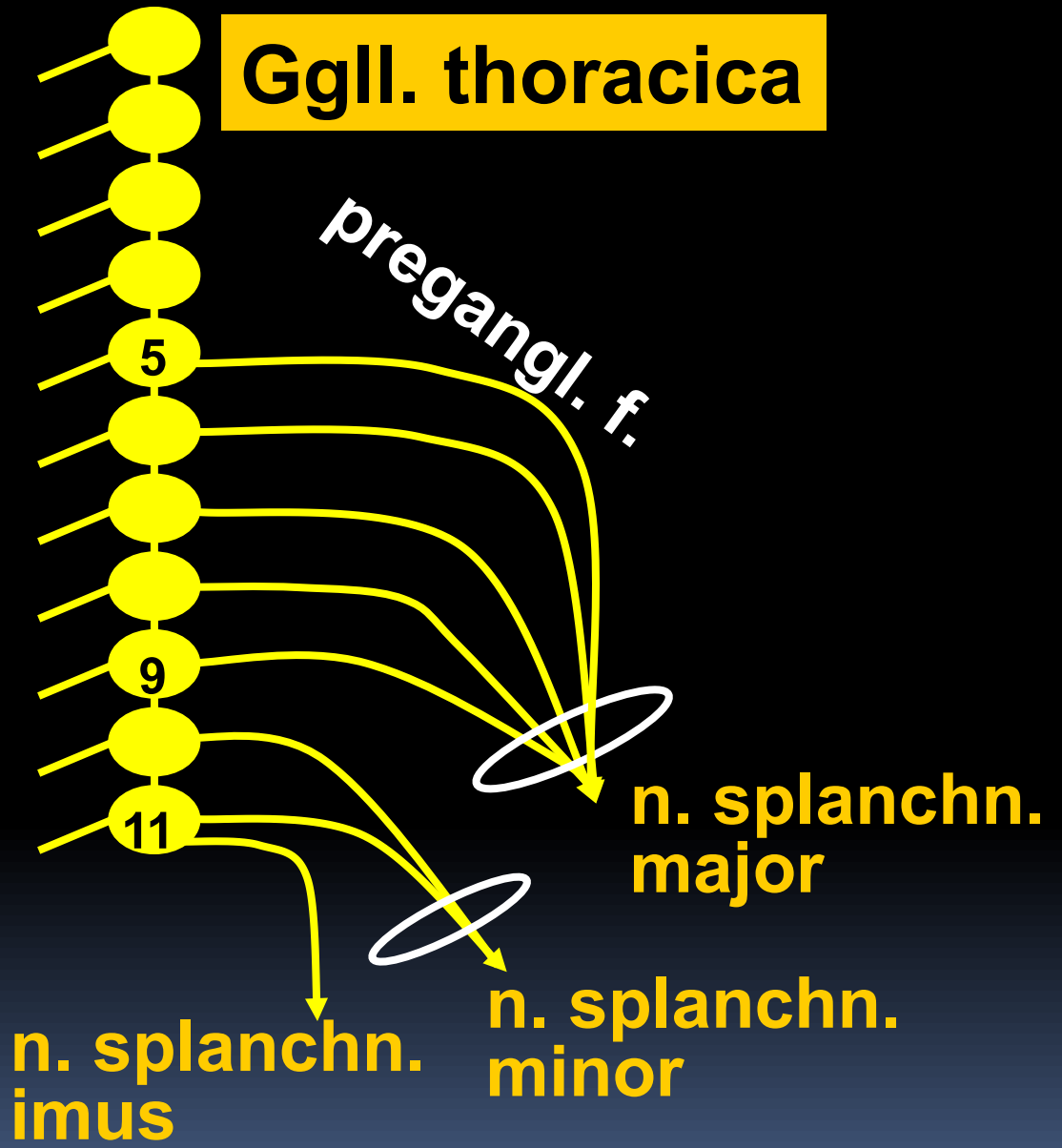
Ganglion cervicale medium et inferius/ggl. stelatum



Anterior to transverse processes of C6 and C7

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.

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

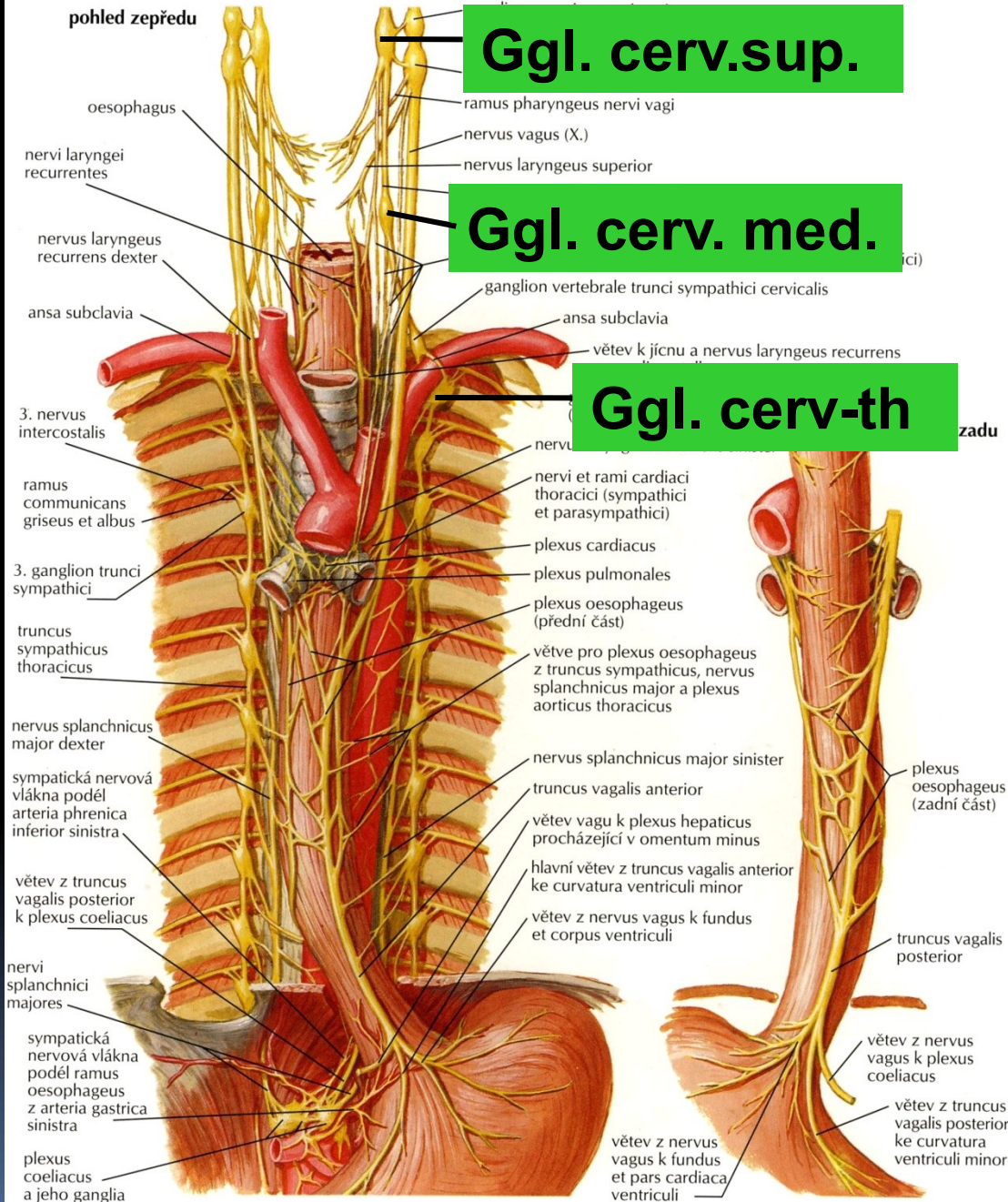
Ggl. cerv. med.

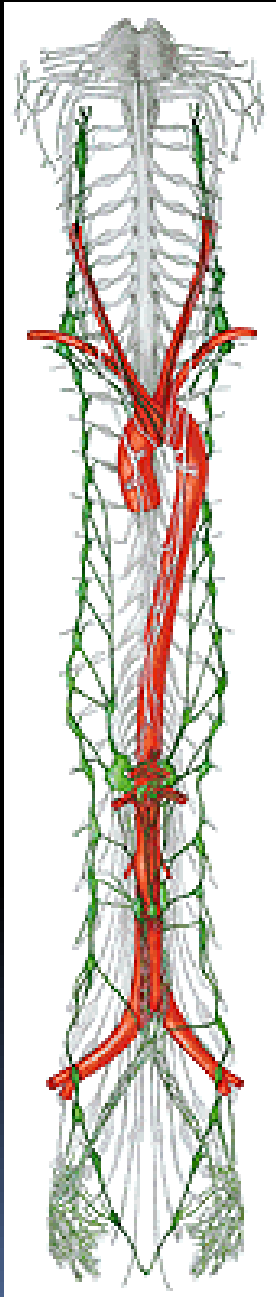
ramus pharyngeus nervi vagi
 nervus vagus (X.)
 nervus laryngeus superior
 ganglion vertebrale trunci sympathici cervicalis
 ansa subclavia
 větev k jícnu a nervus laryngeus recurrens

Ggl. cerv-th

zadu

nervi et rami cardiaci thoracici (sympathici et parasympathici)
 plexus cardiacus
 plexus pulmonales
 plexus oesophageus (přední část)
 větve 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
 plexus oesophageus (zadní část)
 truncus vagalis posterior
 větev z nervus vagus k plexus coeliacus
 větev z truncus vagalis posterior ke curvatura ventriculi minor
 větev z nervus vagus k fundus et pars cardiaca ventriculi



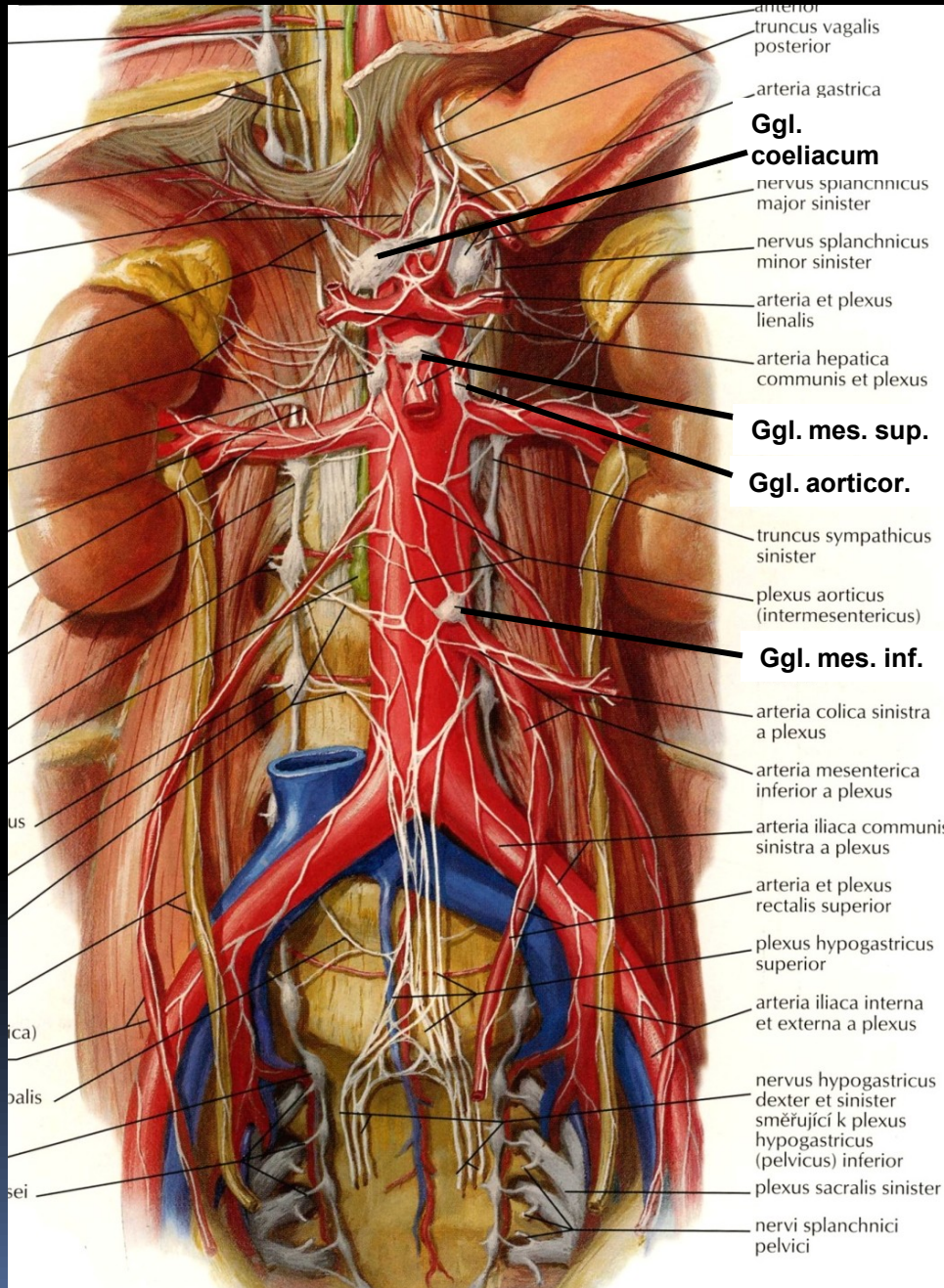


Ganglia lumbalia	4-5
Ganglia sacralia	4-5
Ganglion impar	1

Rr. com. grisei (L1 – Co)

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

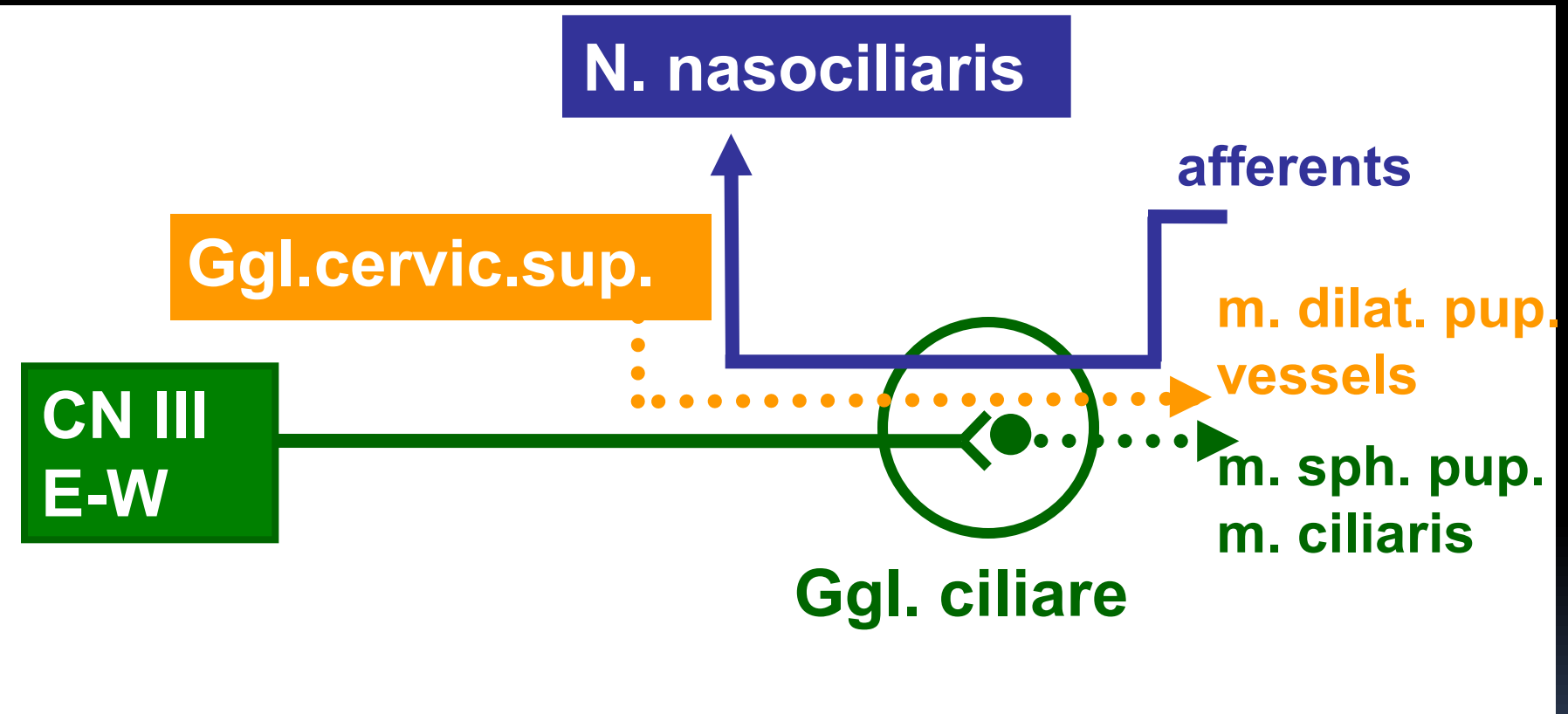
Nn. splanchn. sacrales (plx. hypogastr.)



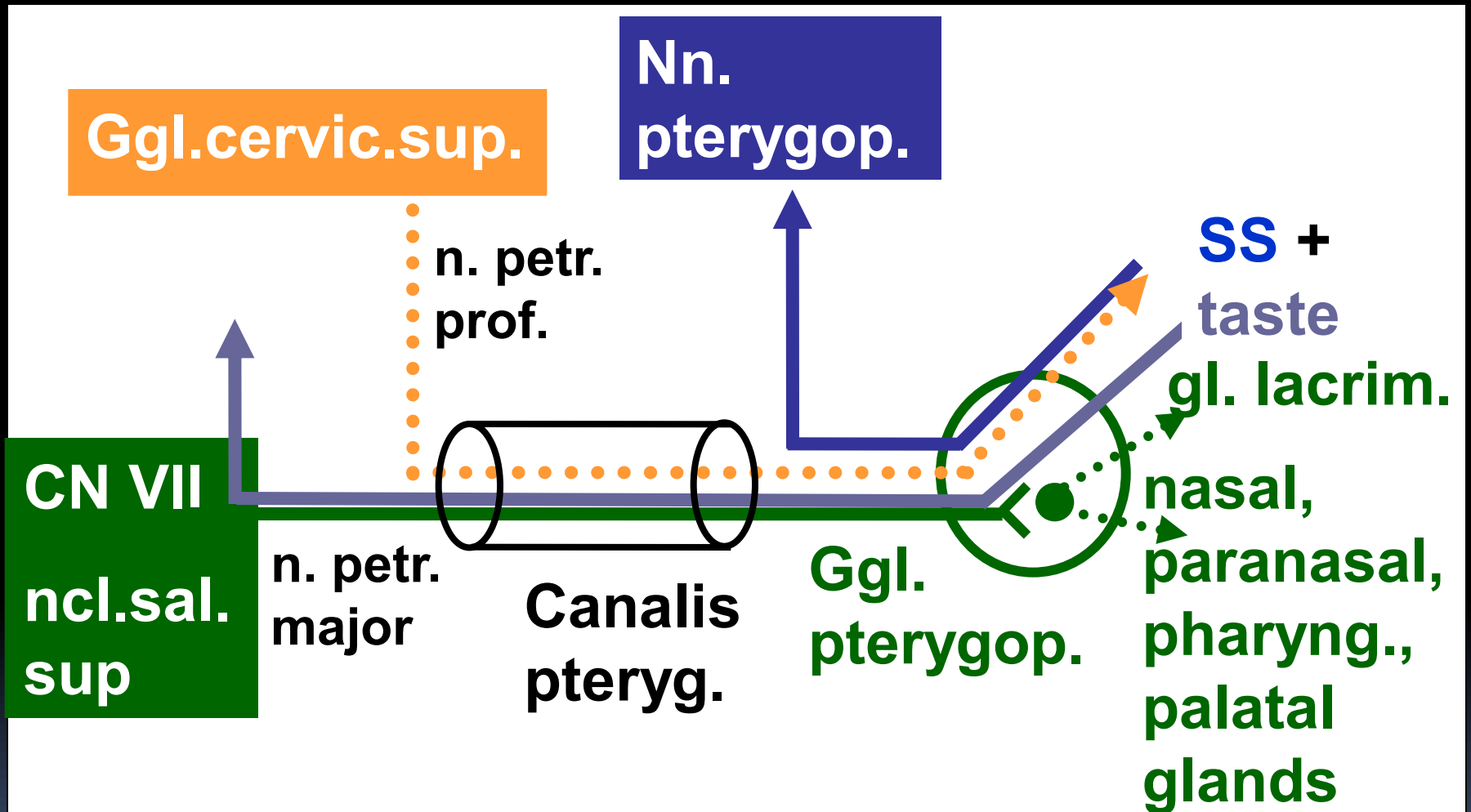
Prevertebral ganglia

Coeliacum
Mesentericum sup.
Aorticorenale
Mesentericum inf.

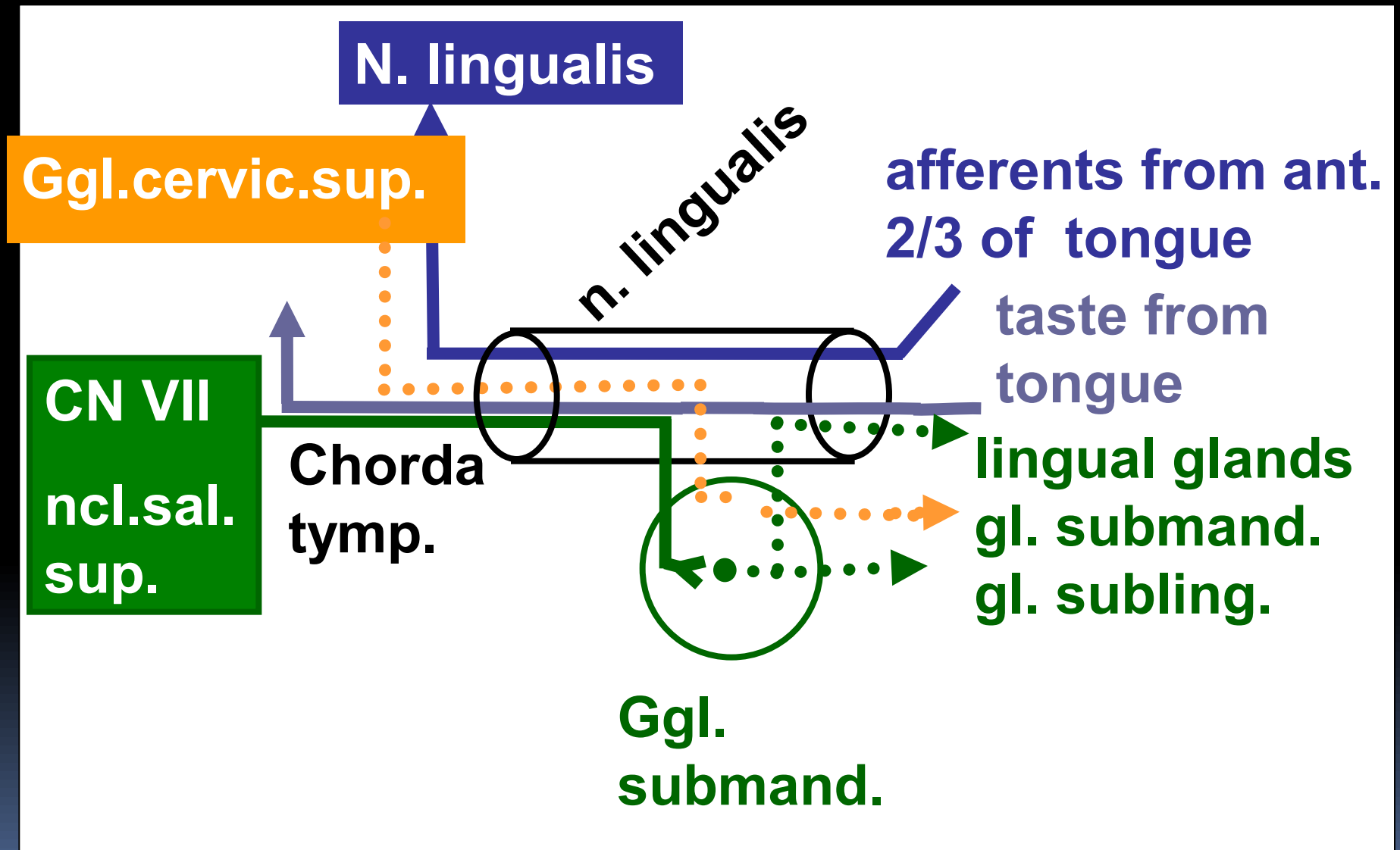
Ggl. ciliare



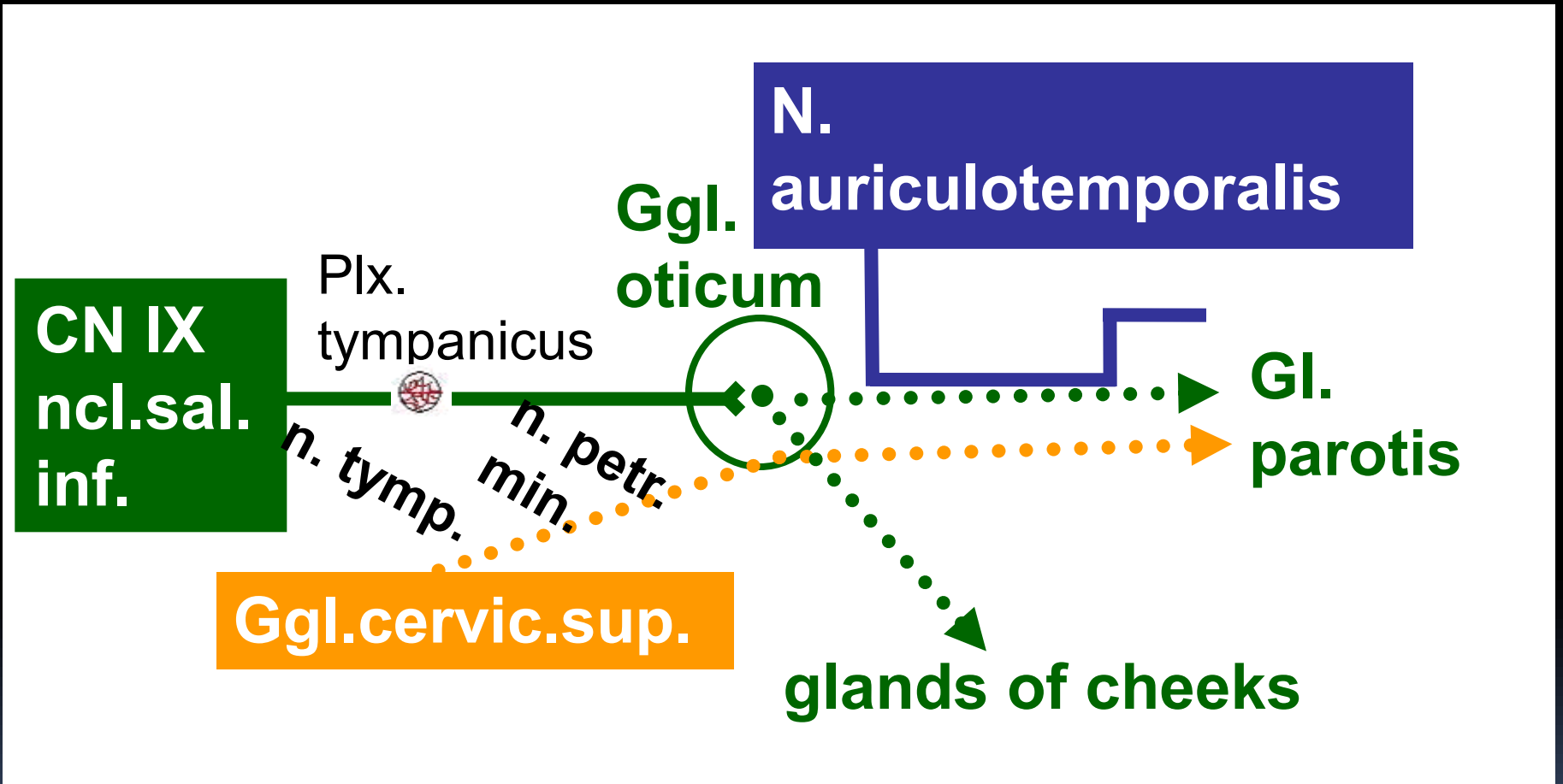
Ggl. pterygopalat.



Ggl. submand.

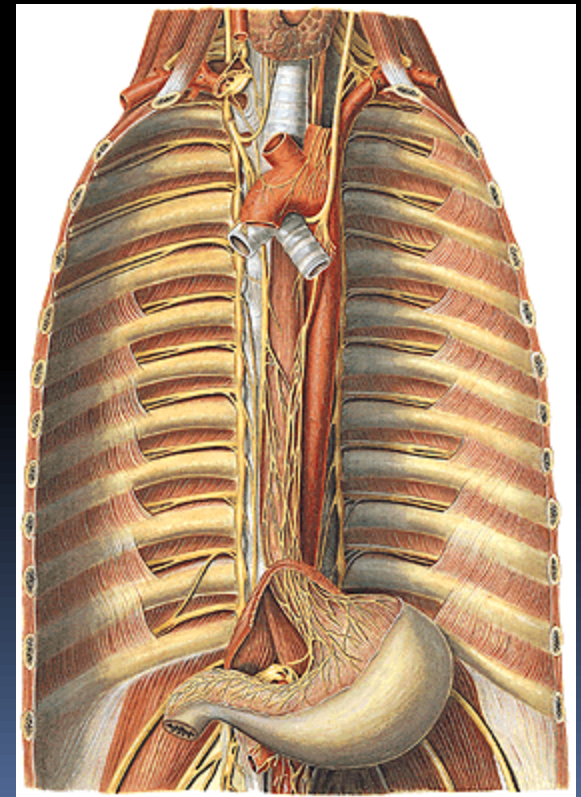
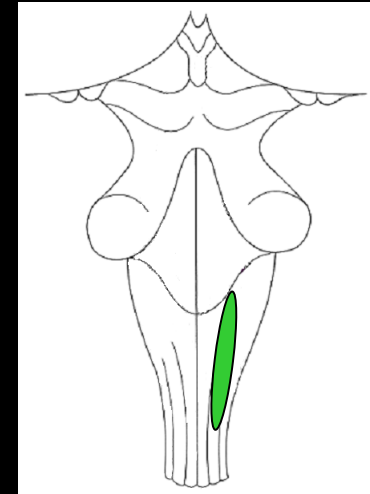


Ggl. oticum



Ncl. p. CN X

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



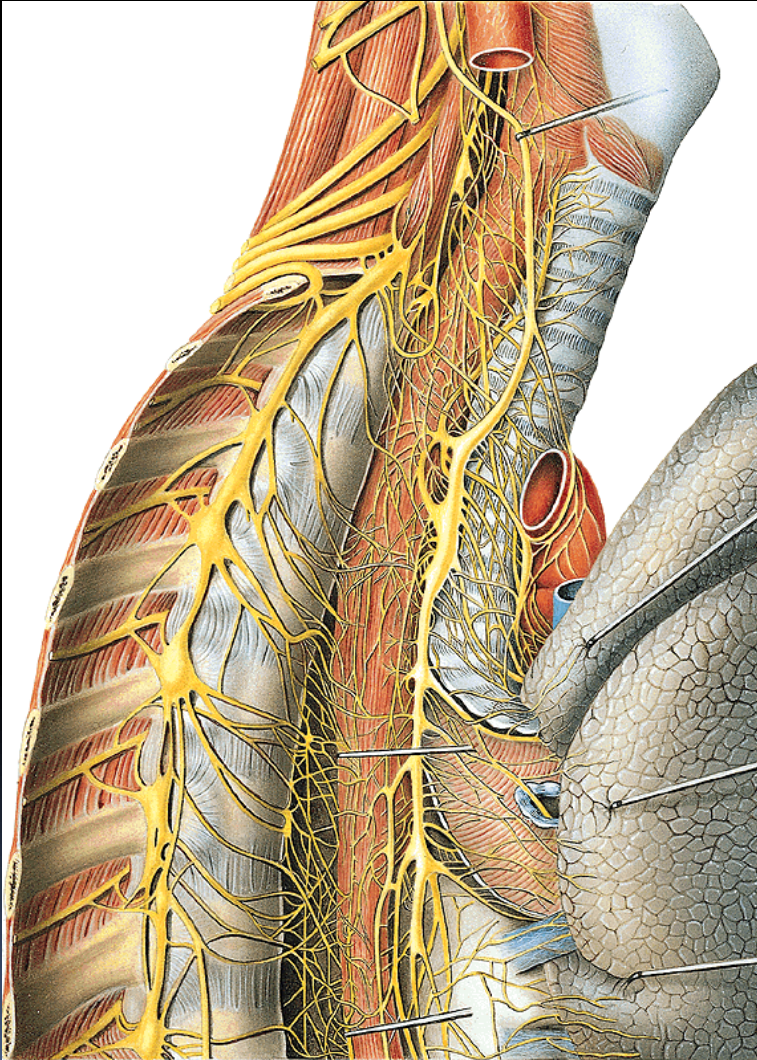
Sacral parasympathetic s.

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**

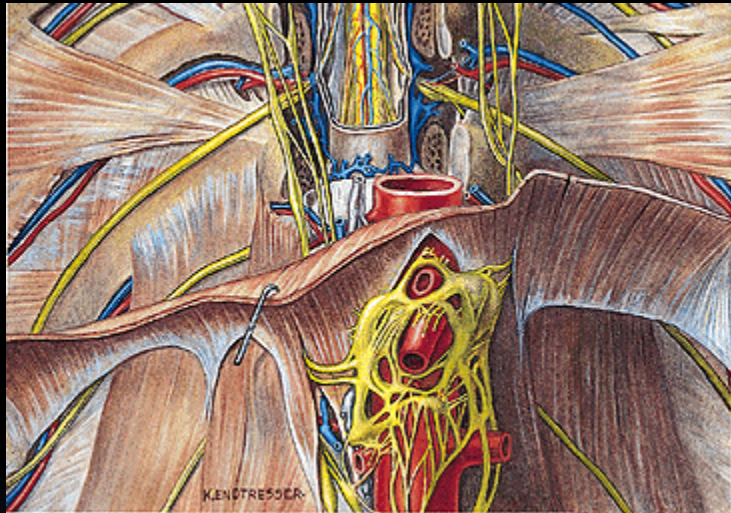


Thorax

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

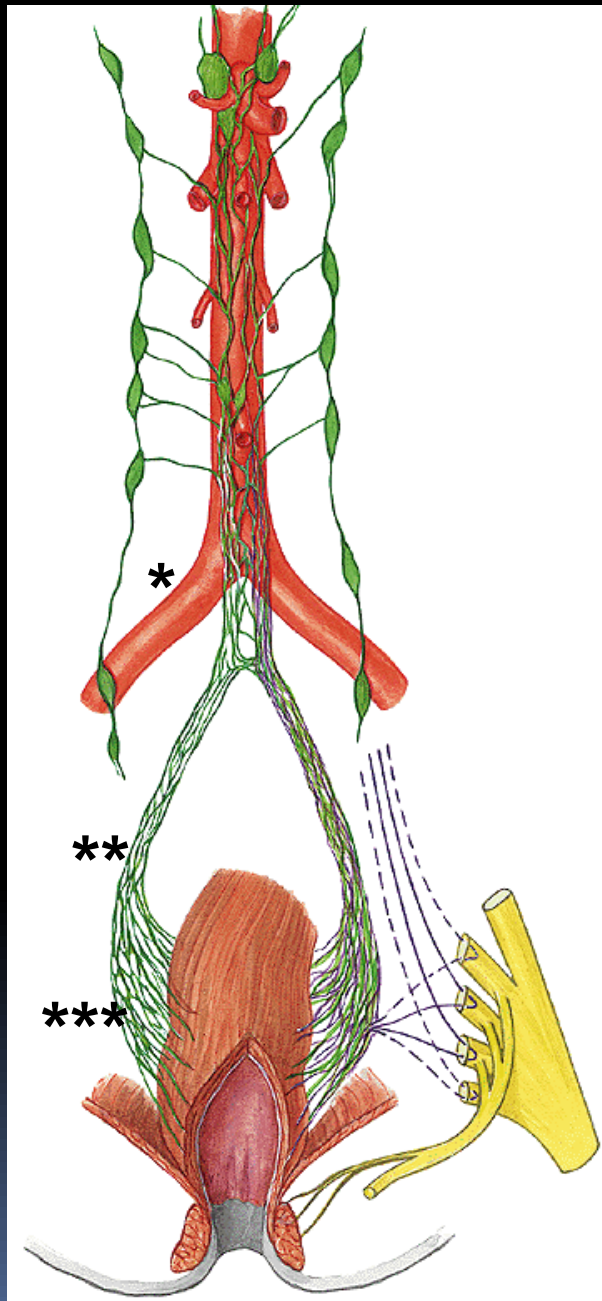
Abdomen

Plex. aorticus abdom.



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

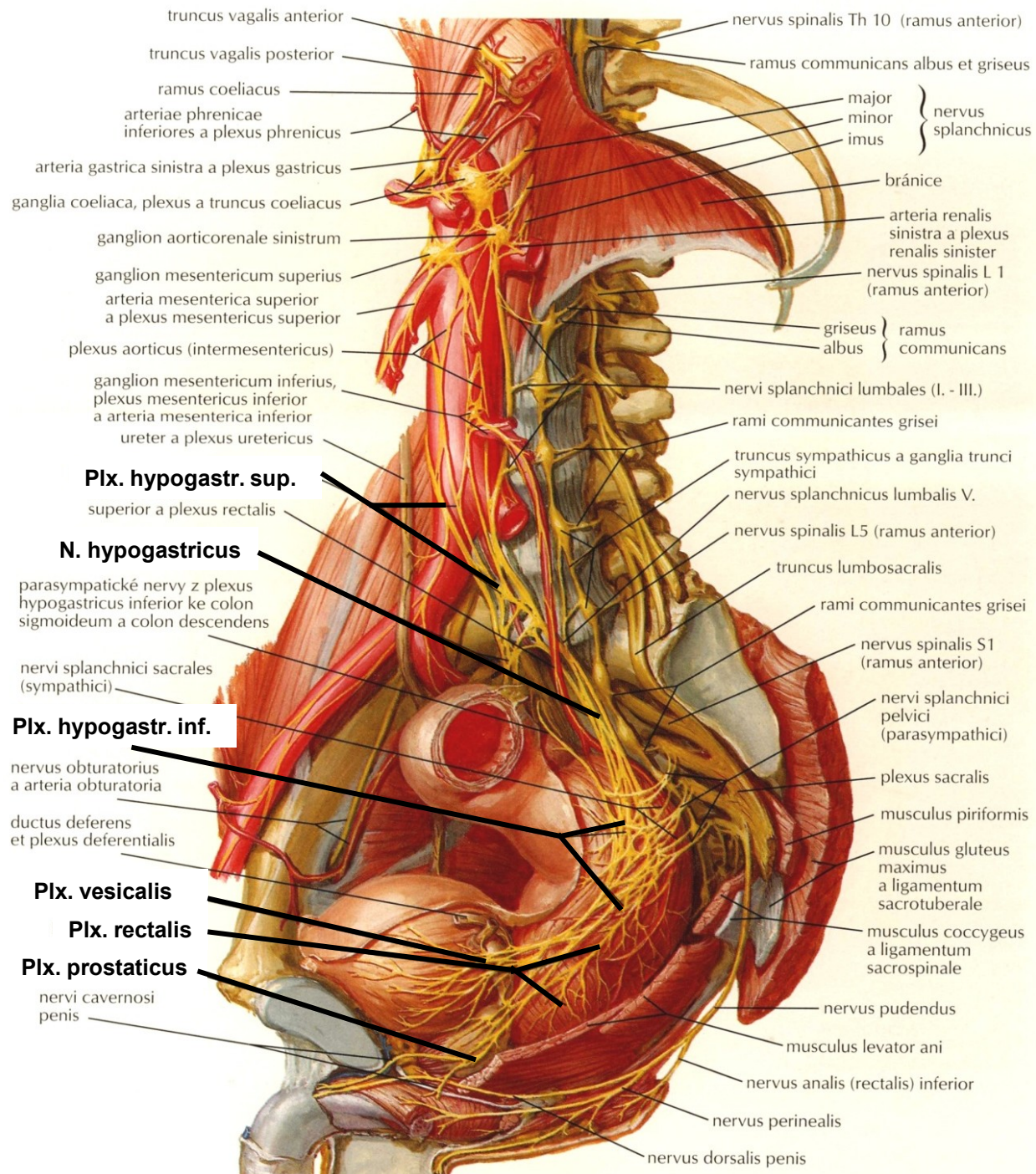
Pelvis



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

> plexus:

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

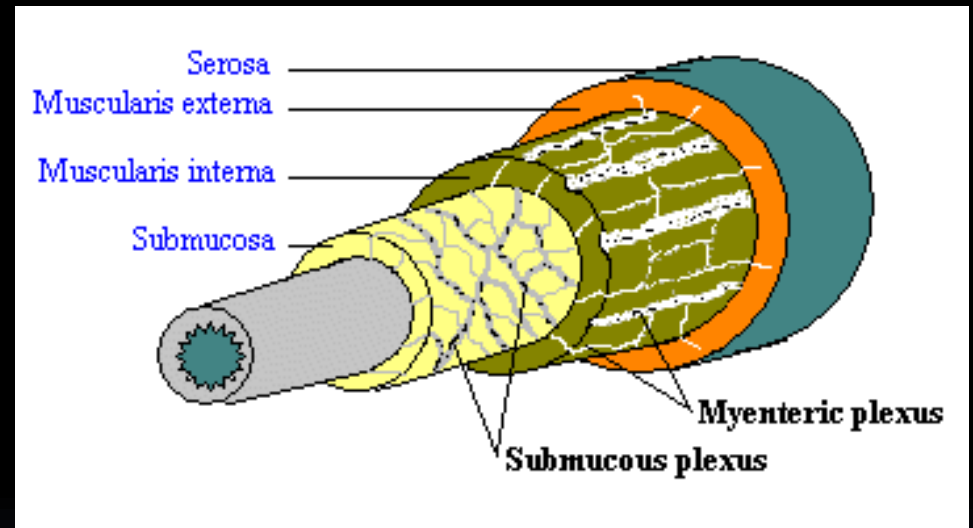


Enteric system

neurons and interneurons in the wall of digestive tube

Plex. myentericus
Auerbachii

Plex. submucosus
Meissneri



plexuses contain small ganglia

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