PRACTICE 3

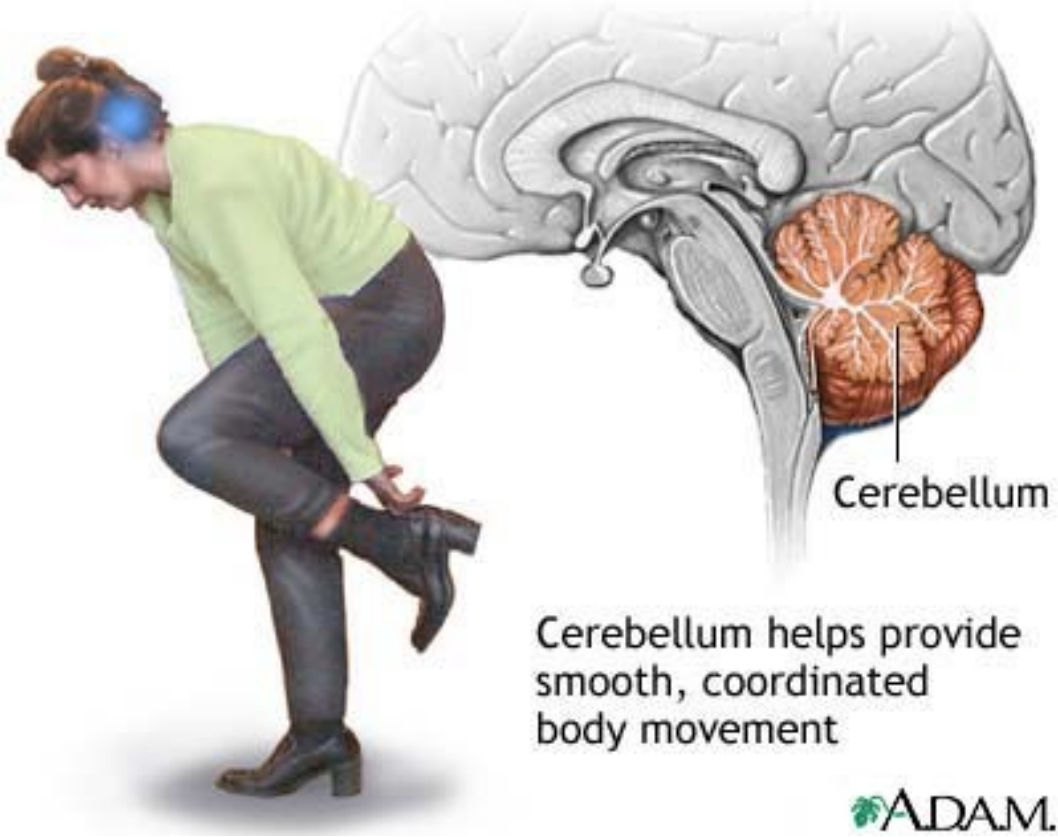
ANATOMY OF CEREBELLUM DIENCEPHALON

EXTERNAL STRUCTURE

Cerebellum

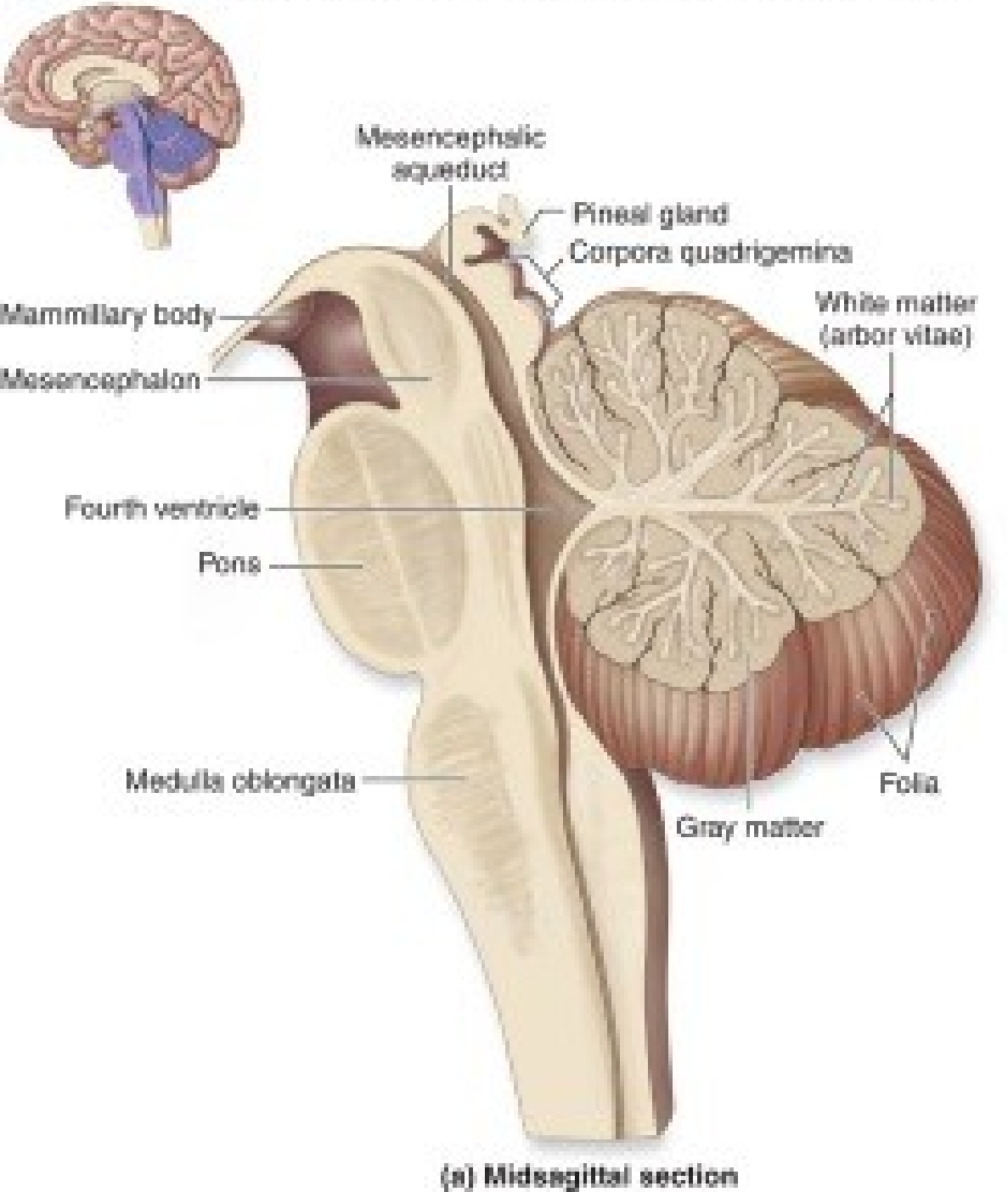
FUNCTION:

-adjustment of muscle tonus
-maintenance of equilibrium
-coordination of muscle action in both stereotyped and non-stereotyped movements
-special contribution to the synchronization of muscles that make up a functional group (contraction of the proper muscles at appropriate time, each with correct force)



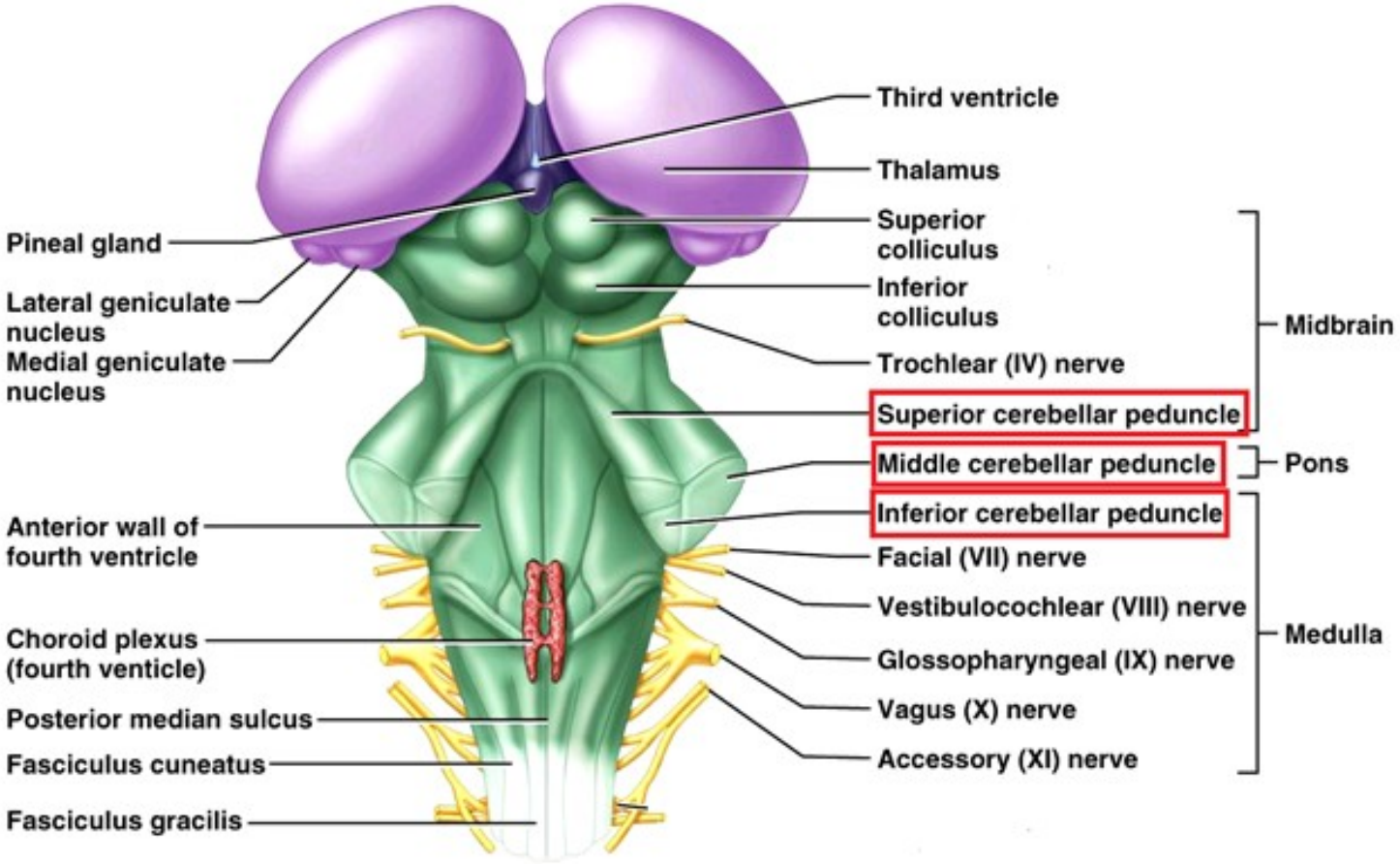
Cerebellar lession:

disturbance of motor function without paralysis
hypotonia of muscles
patient is unsteady, disturbance of equilibrium, walks on a wide base and sways from side to side, movements tend to be ataxic
dysmetria



Cerebellum

- **is situated in the posterior cranial fossa in fossae cerebellares of the occipital bone**
- **is located dorsally from the brainstem**
- **between cerebellum and brainstem is the IV. ventricle**



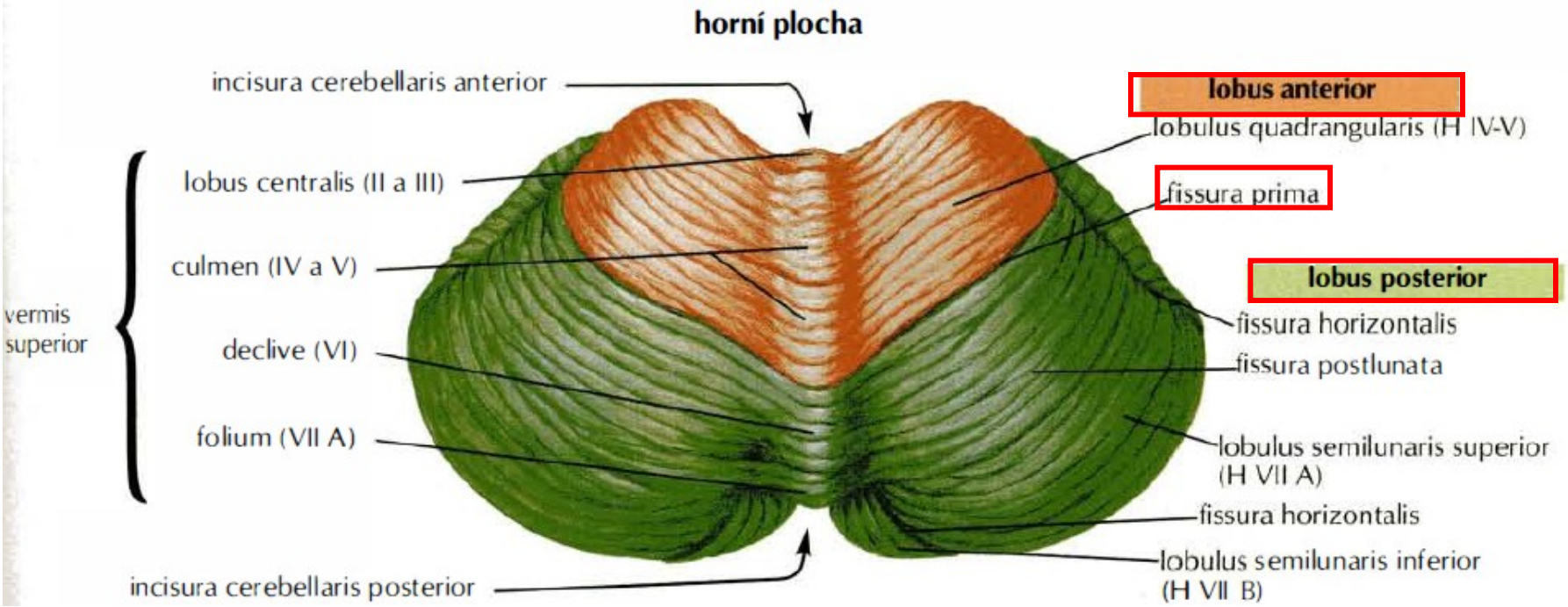
Connections of cerebellum:

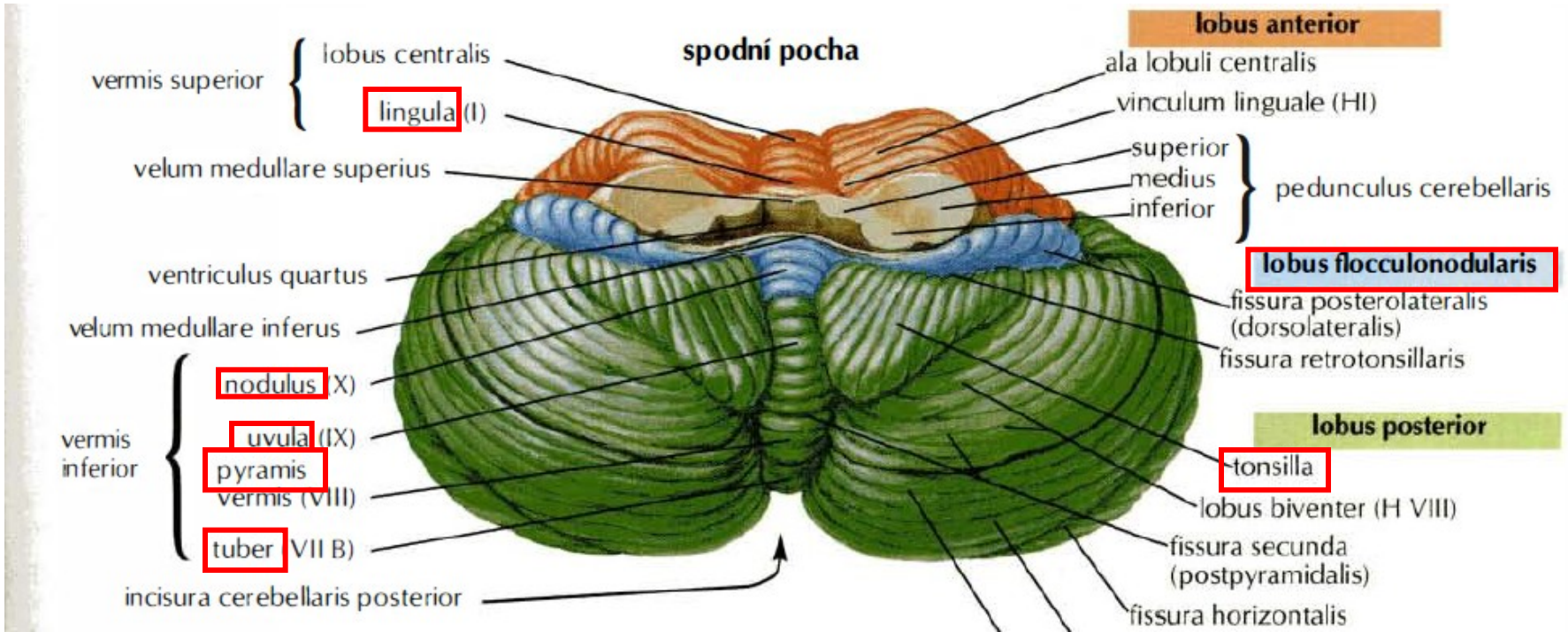
1. **Pedunculi cerebellares superiores (with midbrain)**
   velum medullare superius
2. **Pedunculi cerebellares medii (with pons Varoli)**
3. **Pedunculi cerebellares inferiores (with medulla oblongata)**
   velum medullare inferius
   fastigium (is turned up to the ventricle)

Parts of cerebellum

1. **vermis cerebelli**
   middle part (lingula, nodulus)

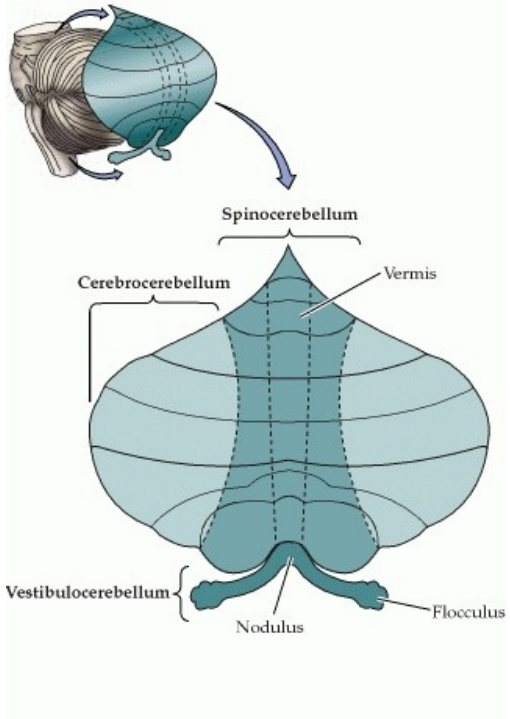
2. **hemisheria cerebelli (lobus anterior, lobus posterior, floculus)**
   lateral widening
   Surface of hemisphers and vermis form – sulci and folia cerebelli

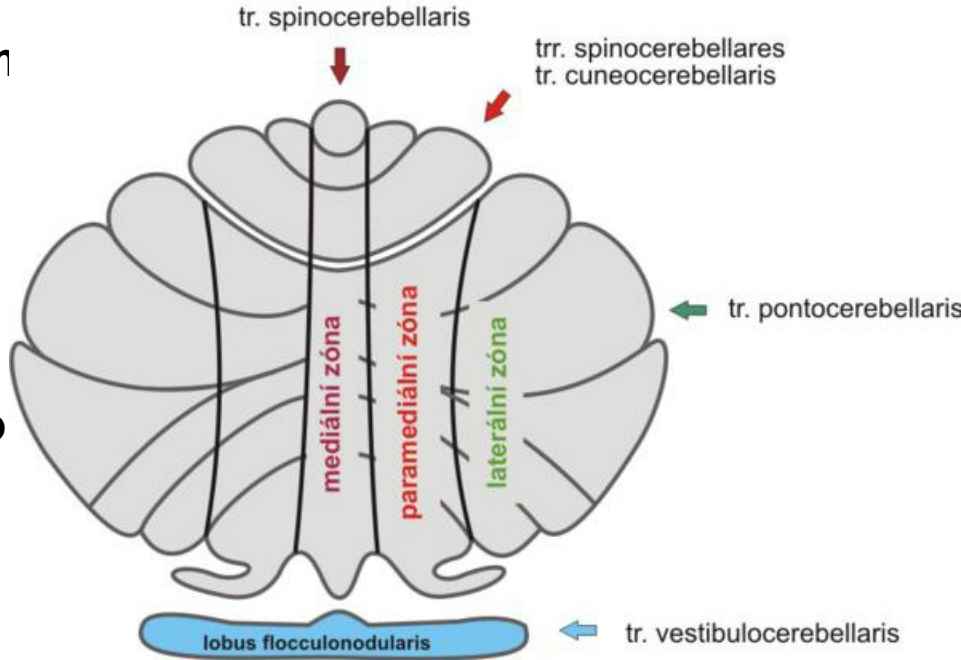

horní plocha
incisura cerebellaris anterior
lobus anterior
lobulus quadrangularis (H IV-V)
lobus centralis (II a III)
fissura prima
culmen (IV a V)
lobus posterior
vermis superior
declive (VI)
fissura horizontalis
fissura postlunata
folium (VII A)
lobulus semilunaris superior (H VII A)
fissura horizontalis
lobulus semilunaris inferior (H VII B)
incisura cerebellaris posterior

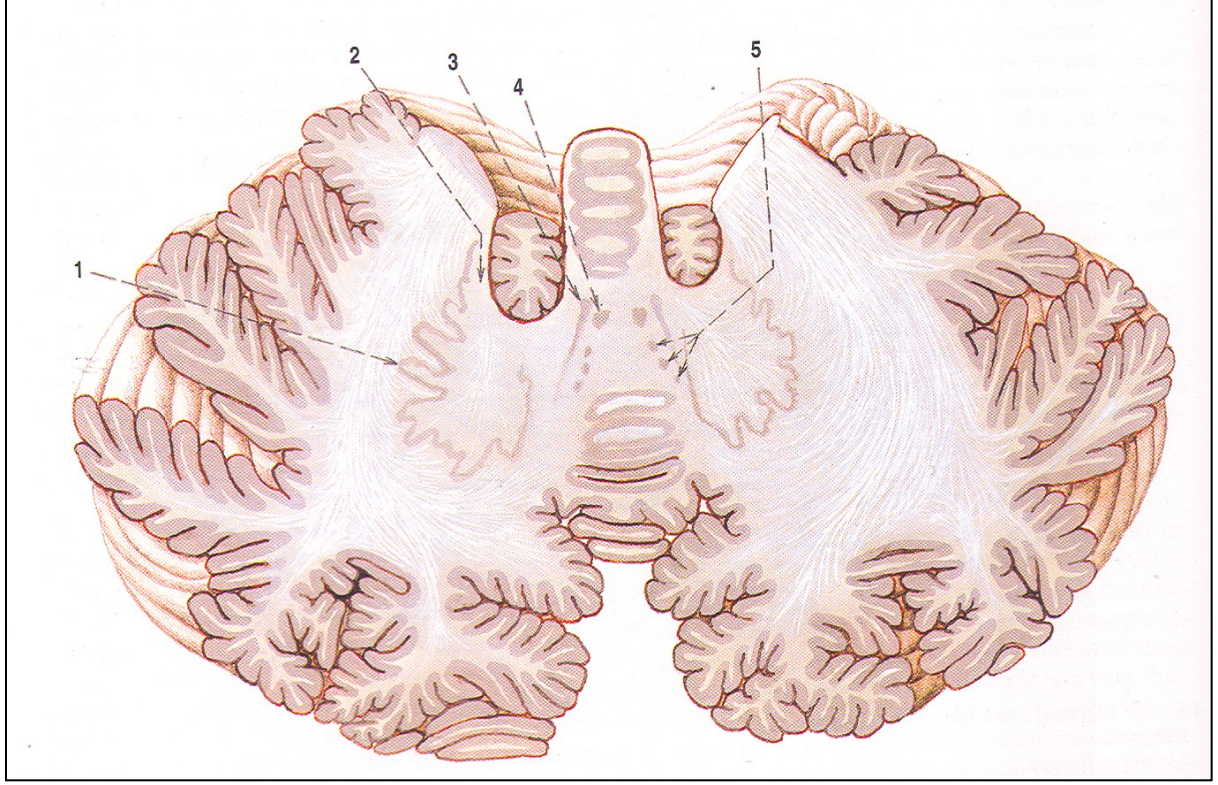

spodní pocha
lobus anterior
vermis superior
lobus centralis
ala lobuli centralis
lingula (I)
vinculum linguale (HI)
velum medullare superius
superior
medius
inferior
pedunculus cerebellaris
ventriculus quartus
lobus flocculonodularis
fissura posterolateralis (dorsolateralis)
velum medullare inferus
fissura retrotonsillaris
nodulus (X)
lobus posterior
vermis inferior
uvula (IX)
tonsilla
pyramis vermis (VIII)
lobus biventer (H VIII)
tuber (VII B)
fissura secunda (postpyramidalis)
incisura cerebellaris posterior
fissura horizontalis

Cerebellar parts:

1. **vestibular** cerebellum
   (archicerebellum)
   lingula, pars nodulofloccularis
   - maintenance of balance
   - afferent information is transmitted from vestibular apparatus
2. **spinal** cerebellum
   (paleocerebellum)
   medial a paramedial zone
   lobus anterior and posterior
   - adjustment of muscle tonus and coordination of muscle action
   - afferent information is transmited from medulla
3. **cerebral** cerebellum
   (neocerebellum)
   lateral zone lobus anterior and posterior
   - control of planned movements, contro of voluntary movements
   - afferent information is transmitted from pons Varolli







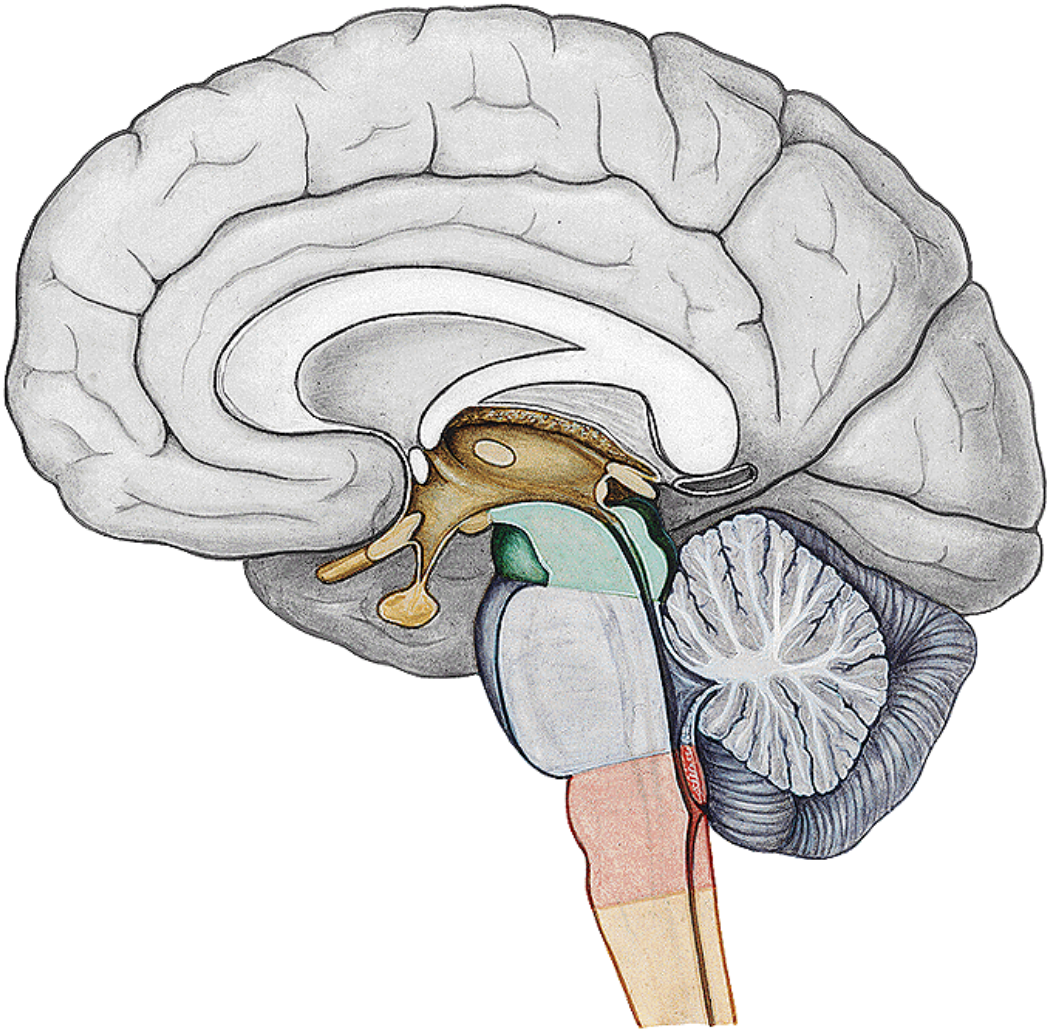
Gray matter :

- **cortex cerebelli - Surface of hemisphers and vermis**
- **nuclei cerebelli – located inside of hemisphers (ncll. fastigii, ncl. emboliformis, ncl. globosus, ncl. dentatus)**

White matter :

- **located beneath the cortex, created typical picture called arbor vitae (tree of life)**

Diencephalon



covered by hemispheres of the telencephalon

Consists of:

Thalamencephalon – dorsal part

Hypothalamus and subthalamus – ventral (basal) part

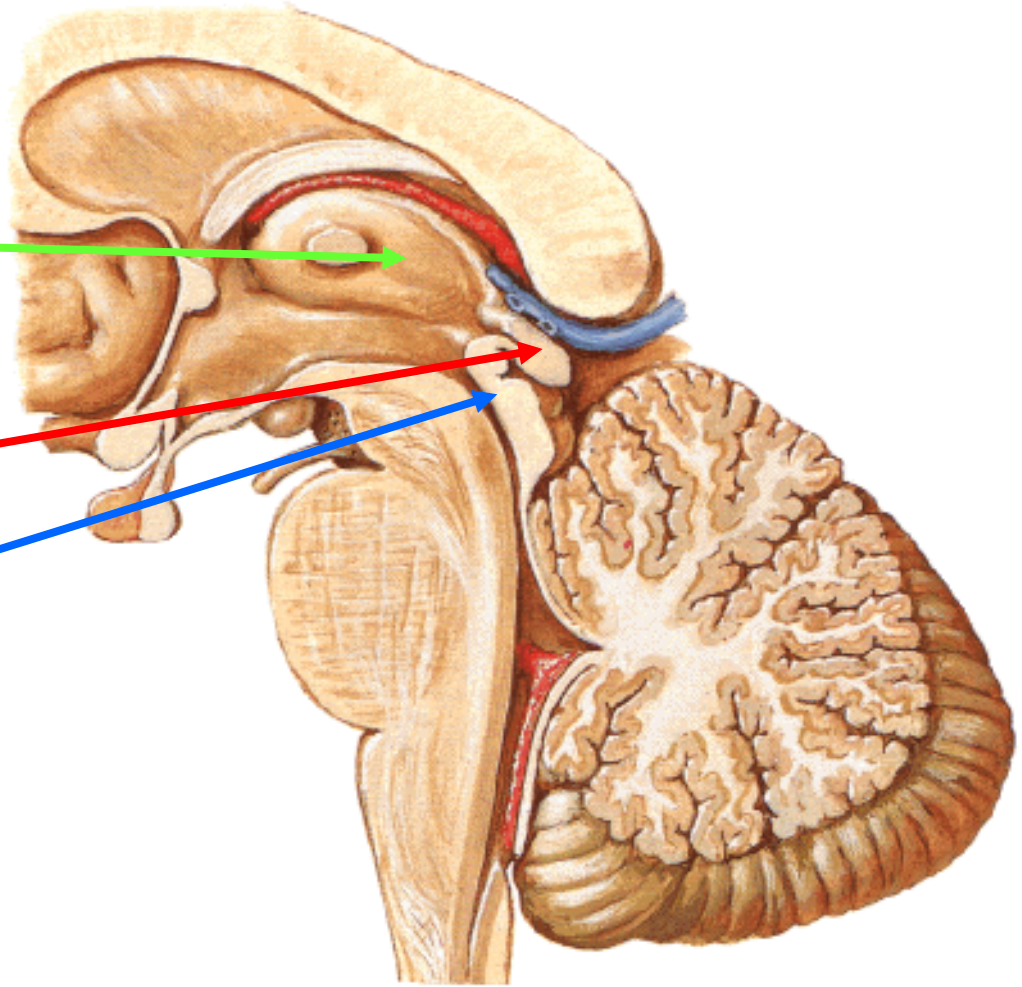
(between is sulcus hypothalamicus)

Thalamencephalon:

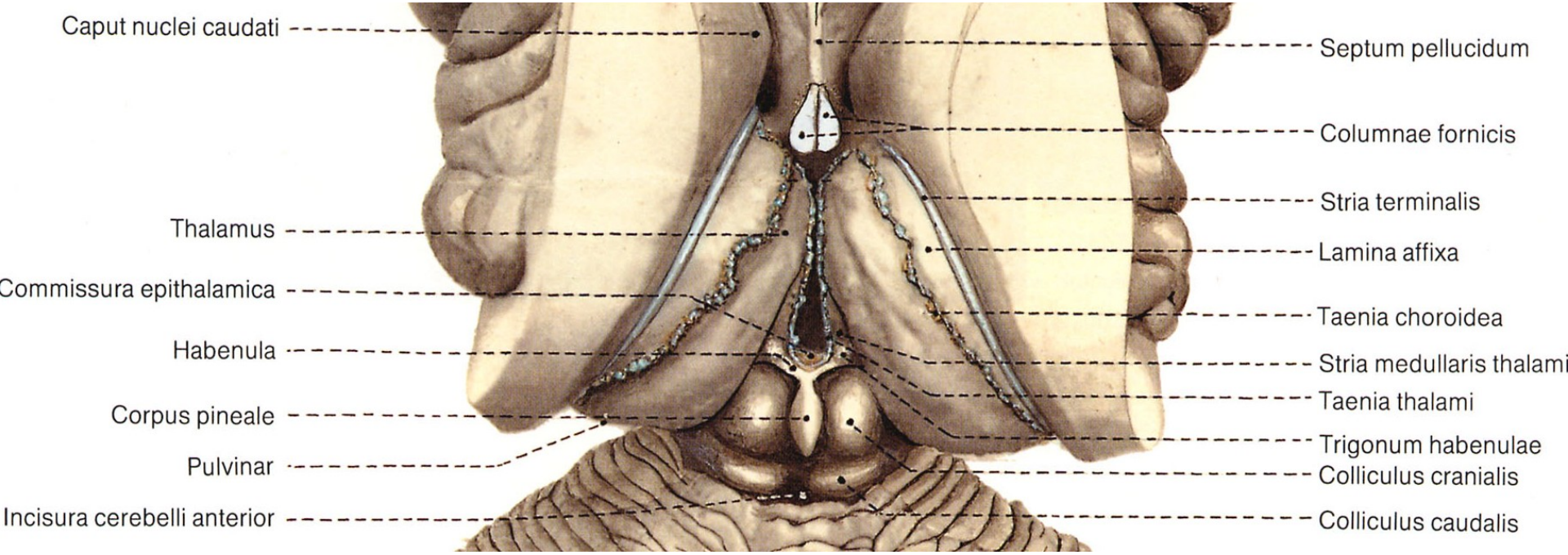
1. thalamus – gray matter of ovoid shape on dorsal part of diencephalon

2. epithalamus – epiphysis, posterior part of diencephalon

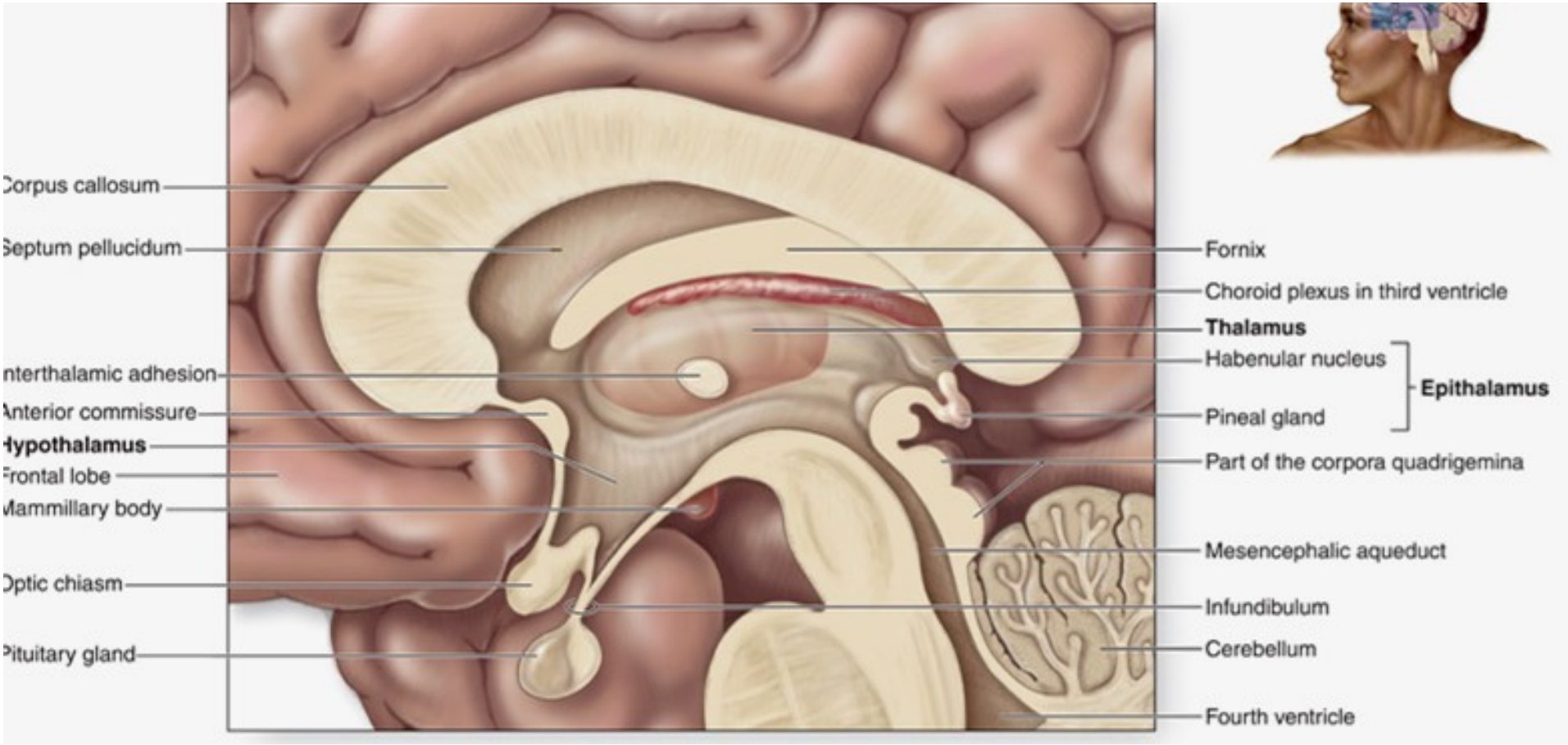
3. metathalamus - corpus geniculatum mediale et laterale



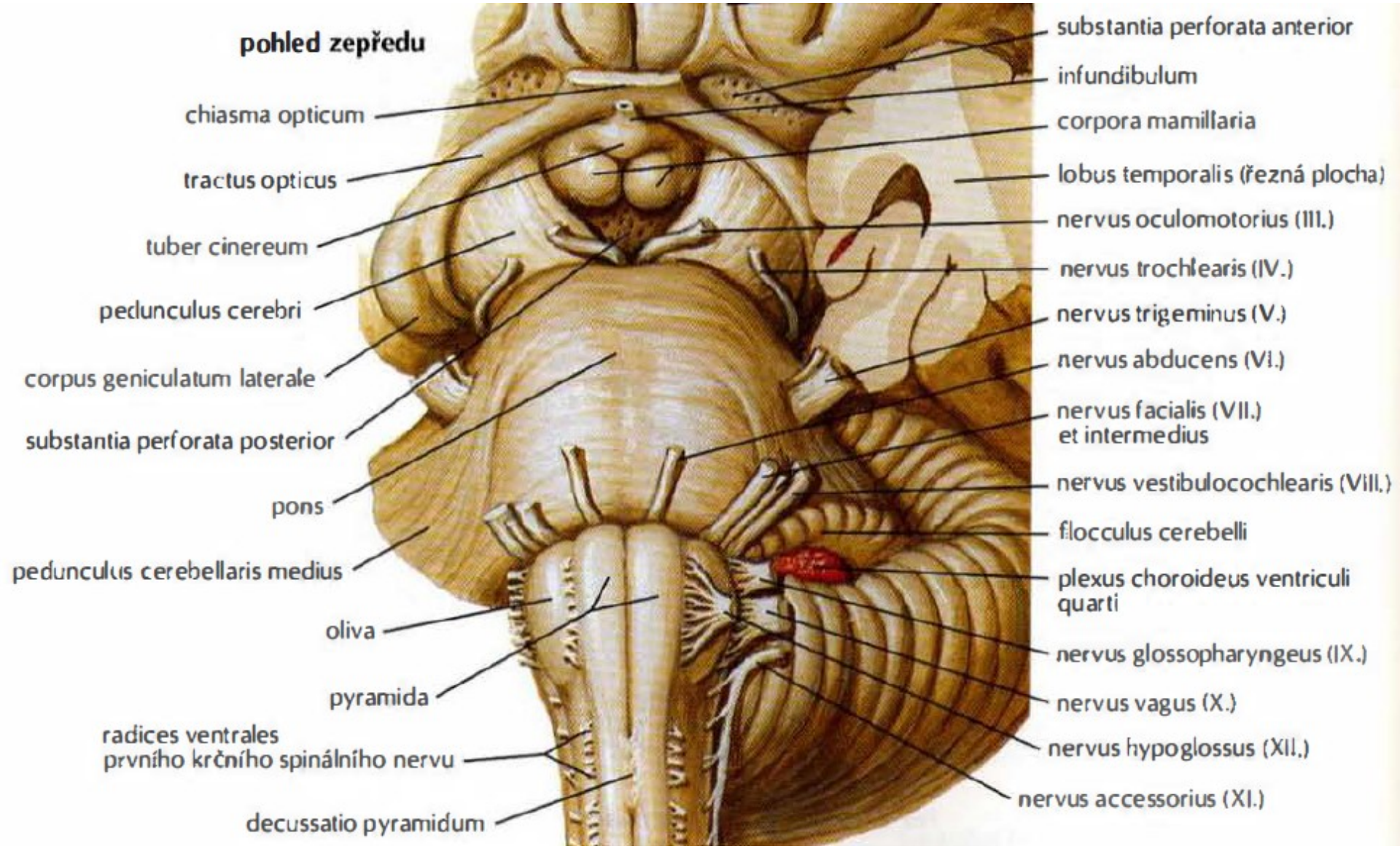
Horizontal section – removal of the hemisphares of cerebrum
dorsal view of thalamus:



Midsagittal section - through the III. ventricle
Medial view of diencephalon:



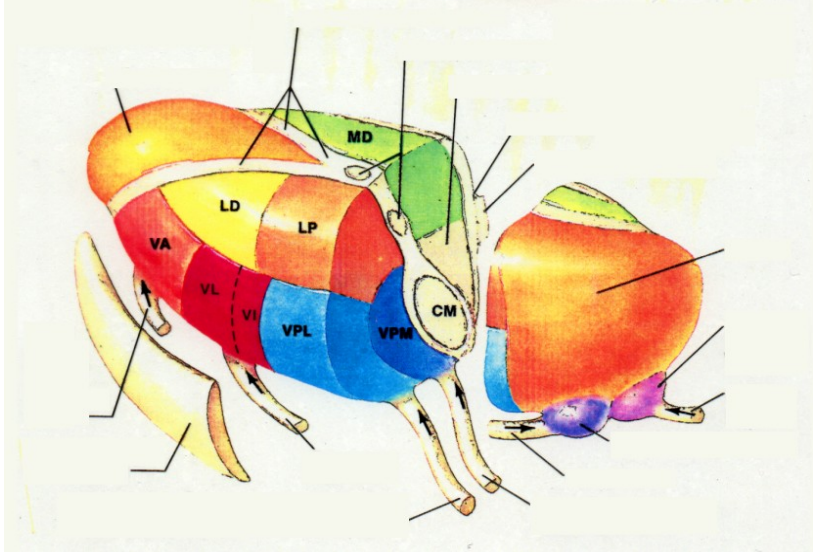
Ventral view of hypothalamus:

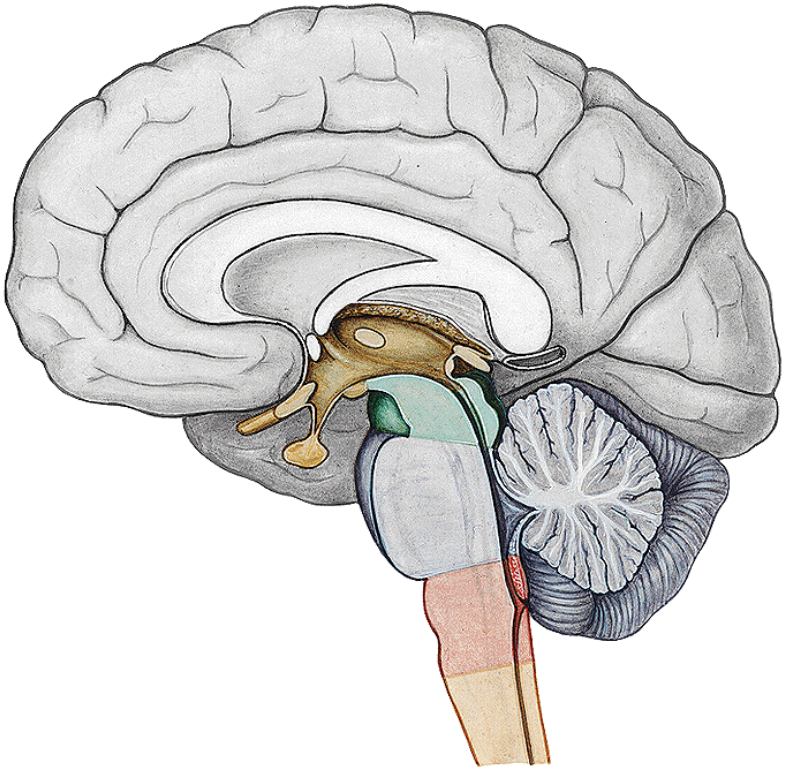


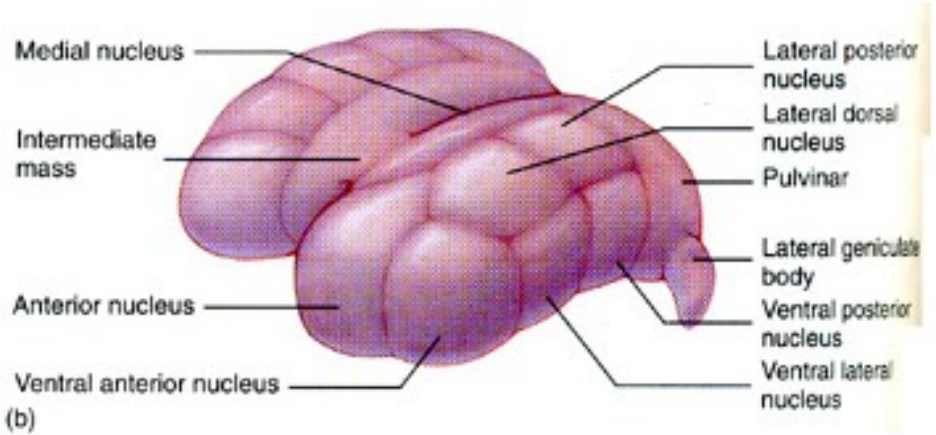
THALAMUS

gray matter of ovoid shape

- **contains lot of nuclei**
- **„entrance of consciousness“ – relay station for sensory tracts, from here they continue to the cortex**
- **is in connection for motor activities, too**
- **is called „ brain secretary “**

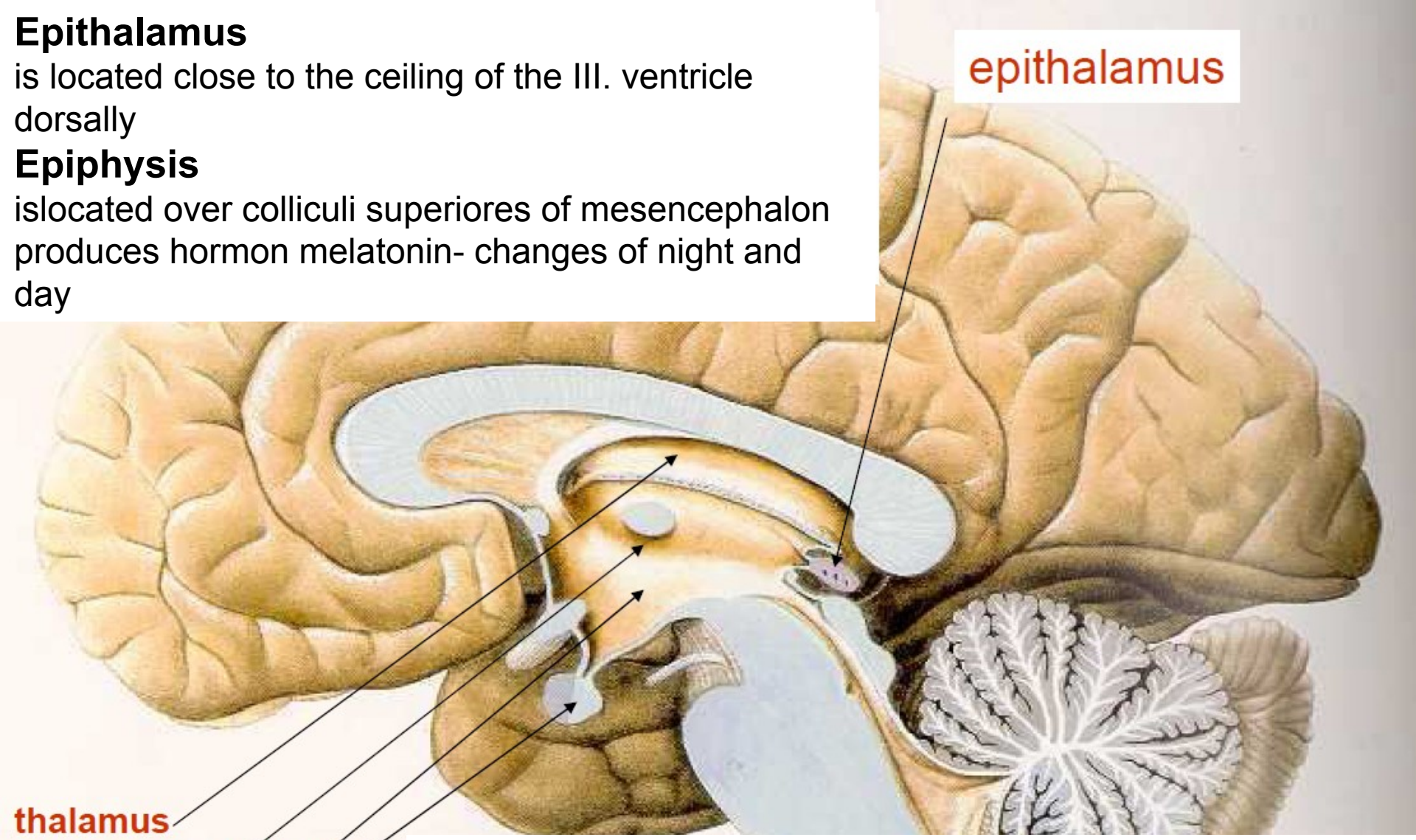






Epithalamus
is located close to the ceiling of the III. ventricle dorsally

Epiphysis
islocated over colliculi superiores of mesencephalon produces hormon melatonin- changes of night and day



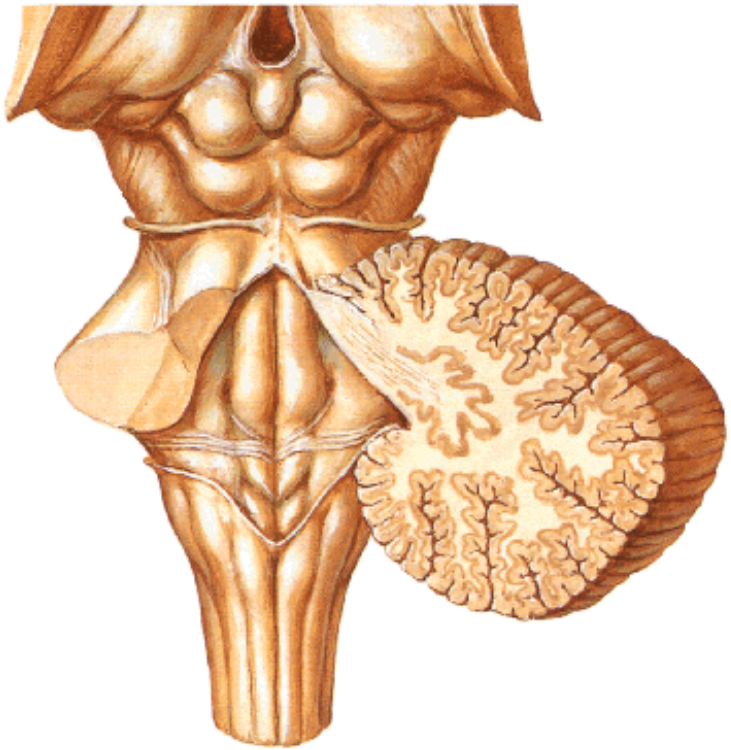
corpus pineale (epiphysis)
– endocrine gland in lower animals is called „parietal eye“
trigonum habenulae, commisura habenularum
– relay station for efferent tracts of limbic system

Metathalamus

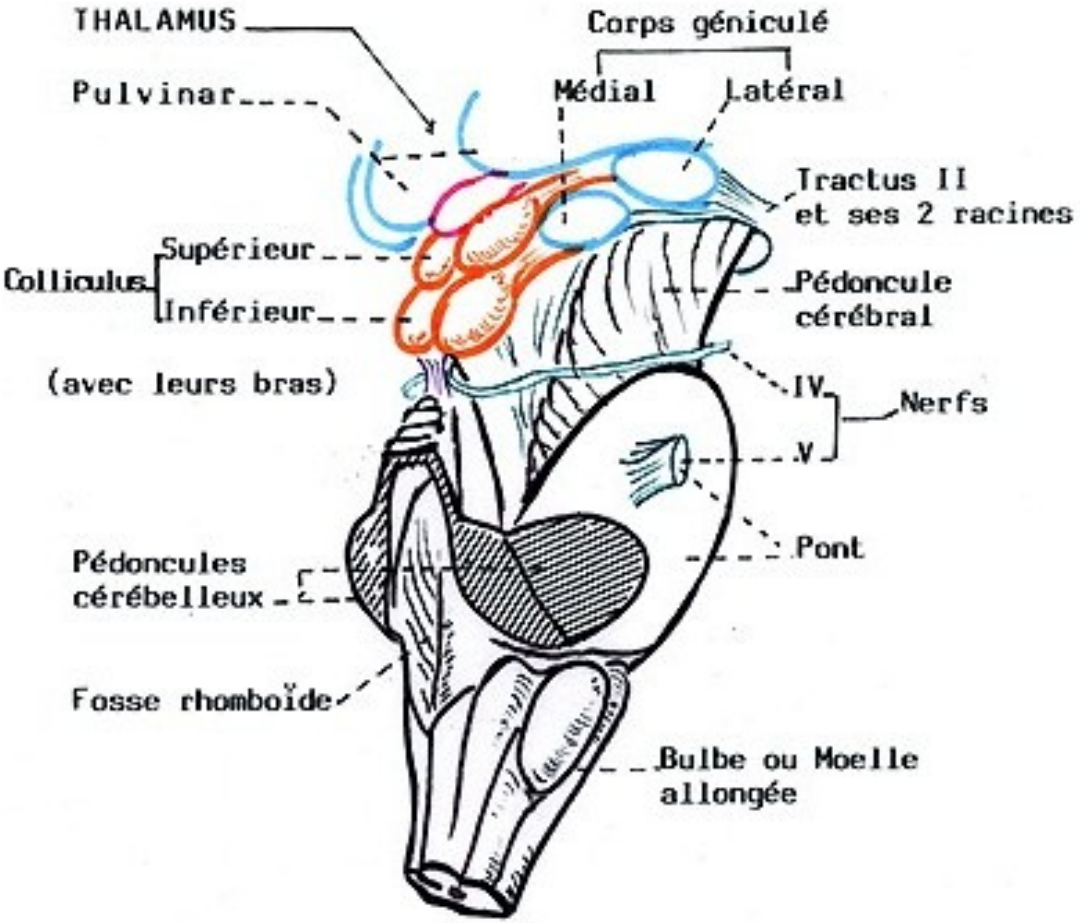
- is located on the dorsal part of thalamus

- corpus geniculatum mediale
  relay station of acustic tract

- corpus geniculatum laterale
  relay station of optic tract



METATHALAMUS ET LAME TECTALE
SUR UNE VUE POSTERO-LATERALE DROITE
du TRONC CEREBRAL

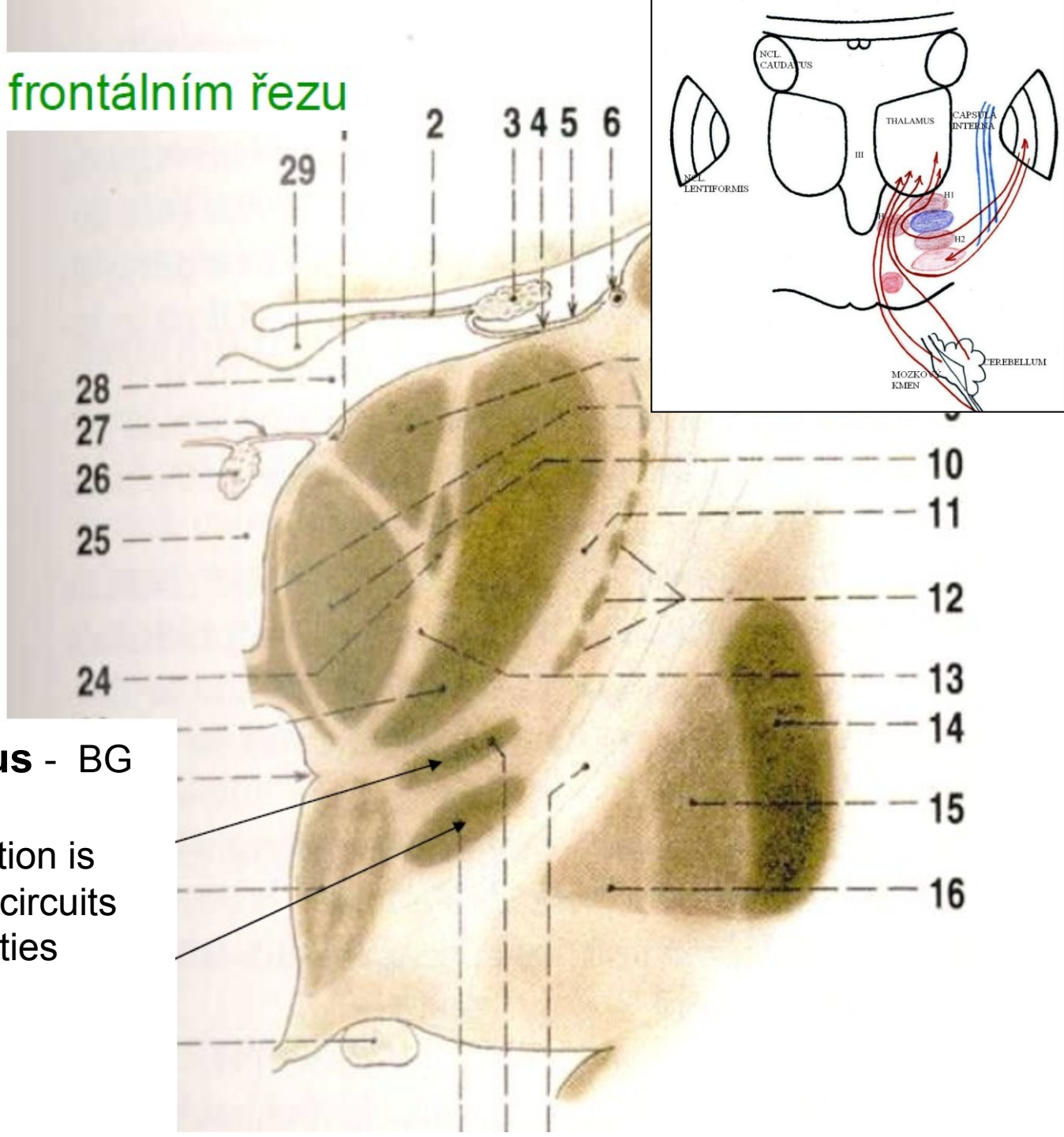


Le METATHALAMUS = 2 corps géniculés latéral (II) et médial (VIII coch.) reliés par 2 bras aux deux collicules supérieur et inférieur

Diencephalon na frontálním řezu

Subthalamus

gray matter situated ventrocaudally from thalamus and laterally from hypothalamus involved in involuntary movements (motor circuits)

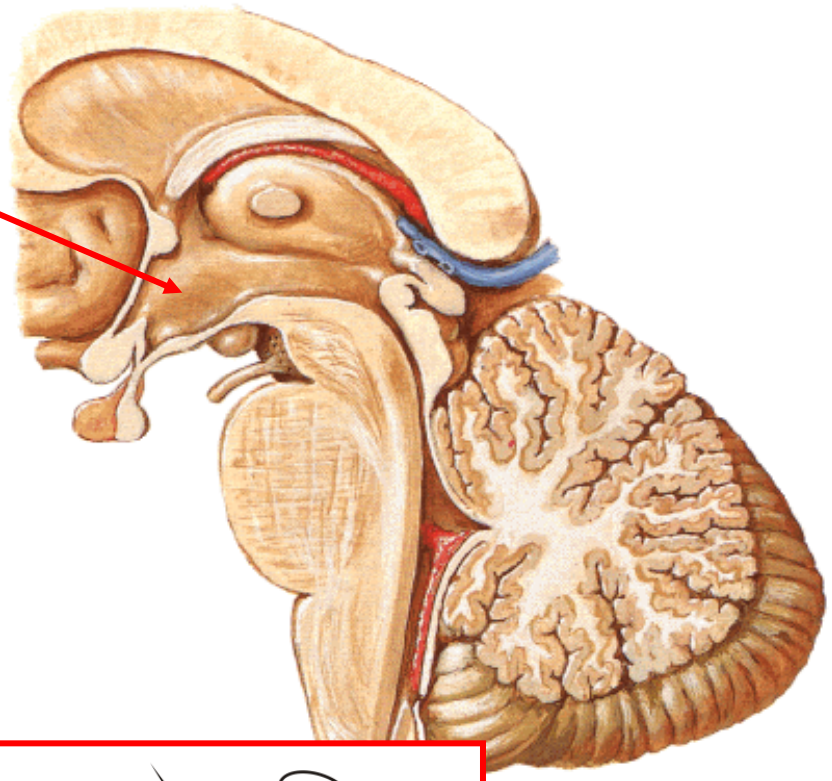


Nucleus subthalamicus - BG circuits

and **zona incerta** – function is unclear, mabye within FR circuits both serve for motor activities

Hypothalamus

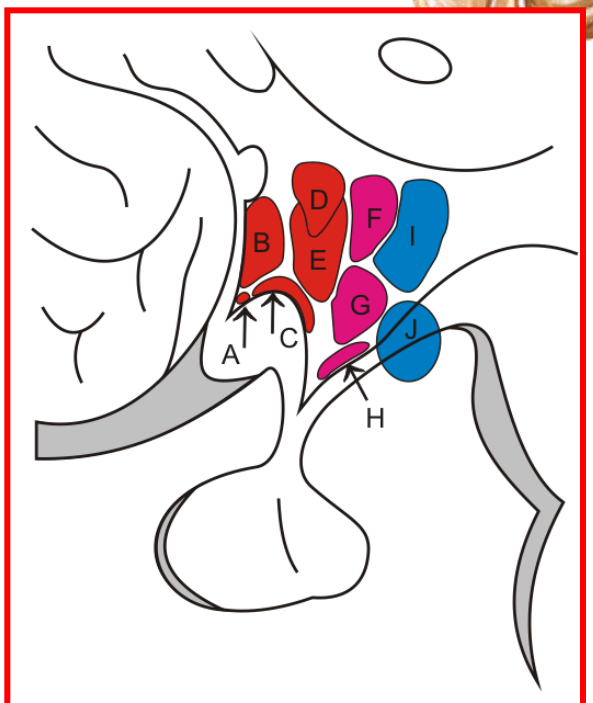
- originates from basal – motor plate
- the part of hypothalamus is hypophysis

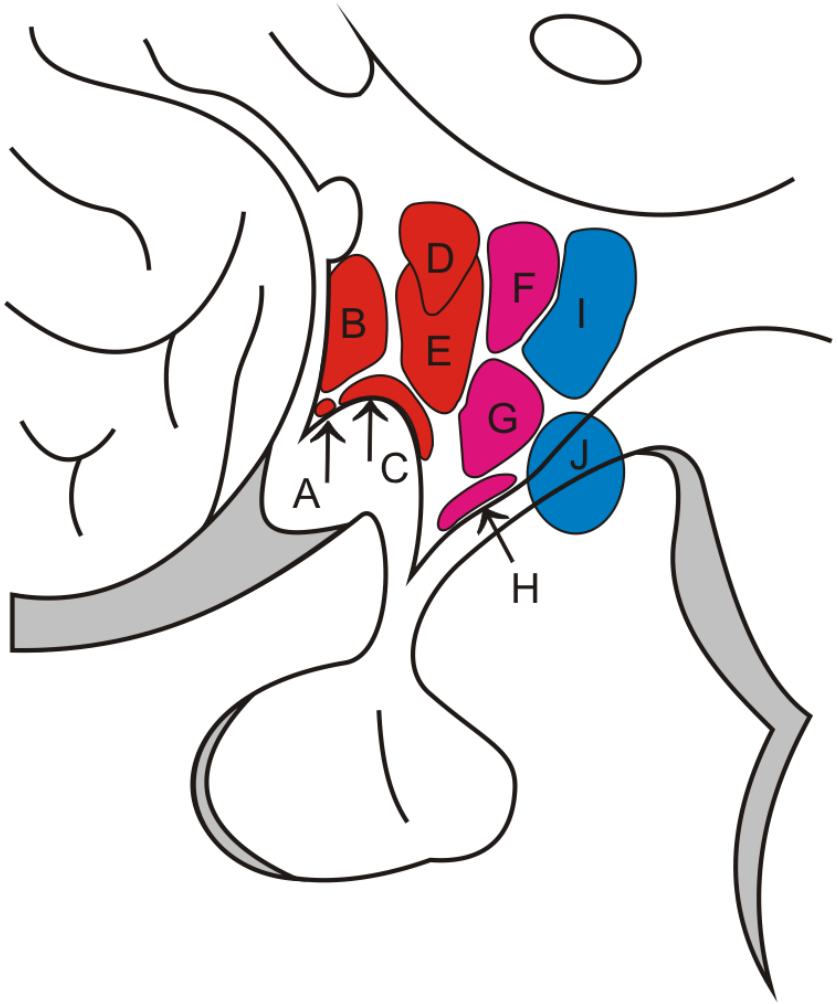


Function:

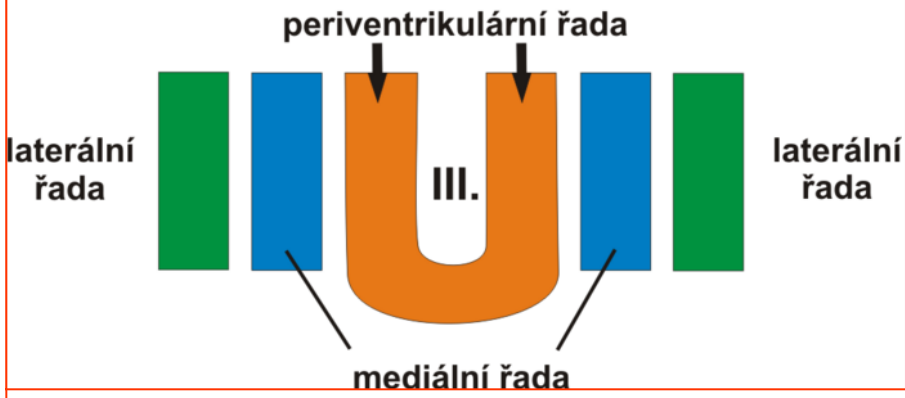
- highest regulatory center of autonomic – vegetative nervous system
- it has influence on breathing, osmotic preassure, temperature and level of various hormons in the body
- it has a major role in producing responses to emotilnal changes, activity of digestive system and it is responsible for constant internal enviroment (homeostasis)

- a lot of nuclei (several groups)





JÁDRA HYPOTHALAMU



PŘEDNÍ SKUPINA

Periventrikulární řada

A - ncl. suprachiasmaticus

Mediální řada

B - ncl. preopticus

C - ncl. supraopticus

D - ncl. paravetricularis

E - ncll. anteriores

STŘEDNÍ SKUPINA

F - ncl. dorsomedialis

G - ncl. ventromedialis

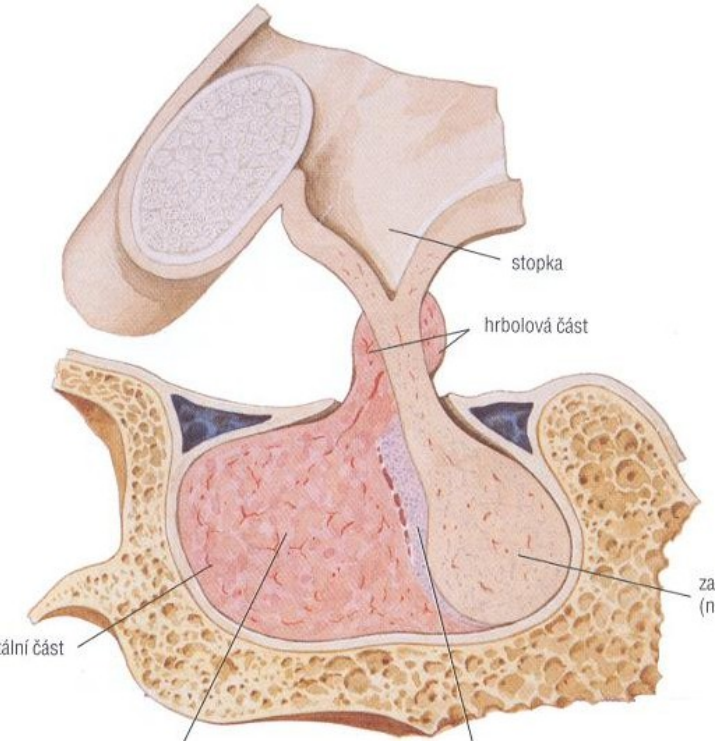
H - ncl. arcuatus

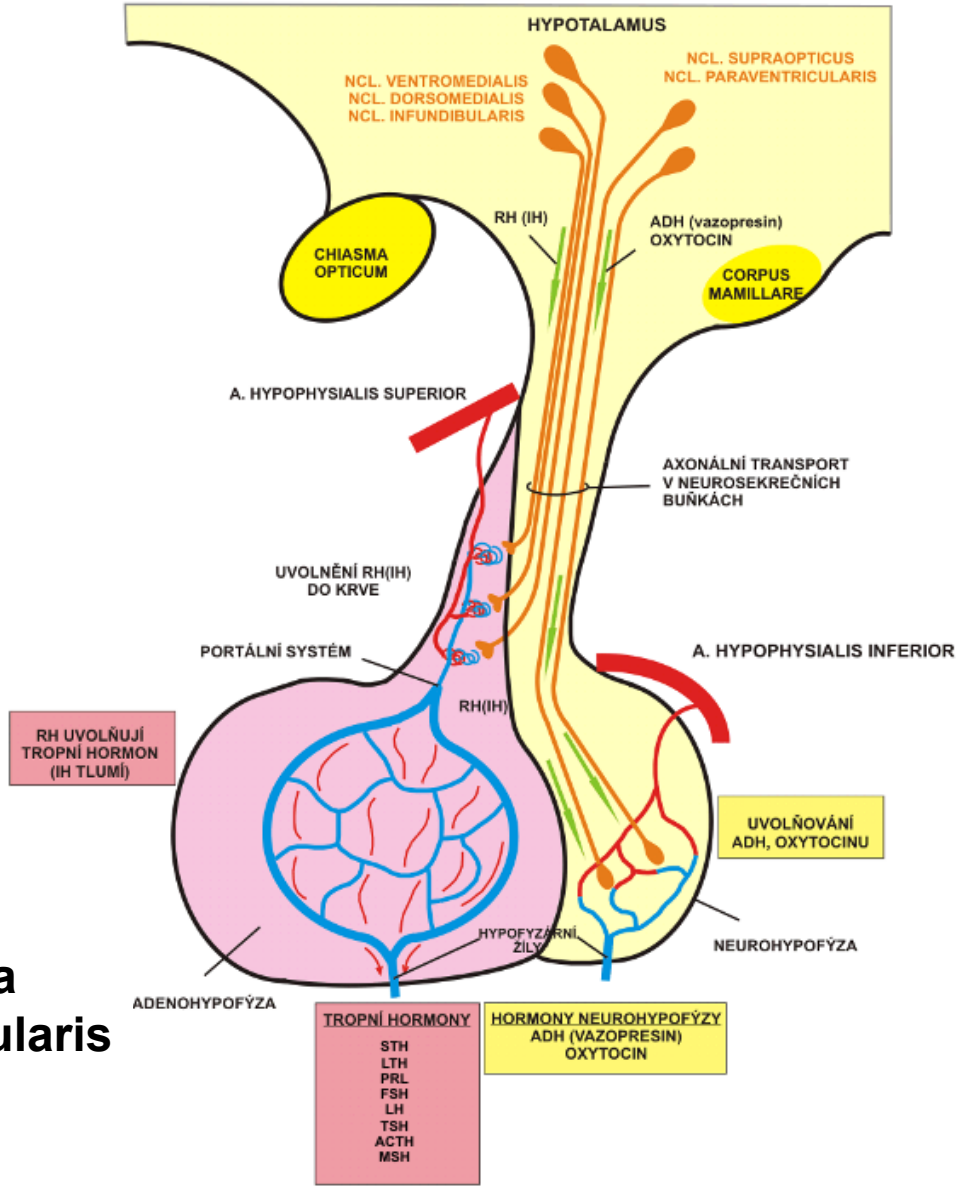
ZADNÍ SKUPINA

I - ncl. posterior

J - ncl. mamillaris

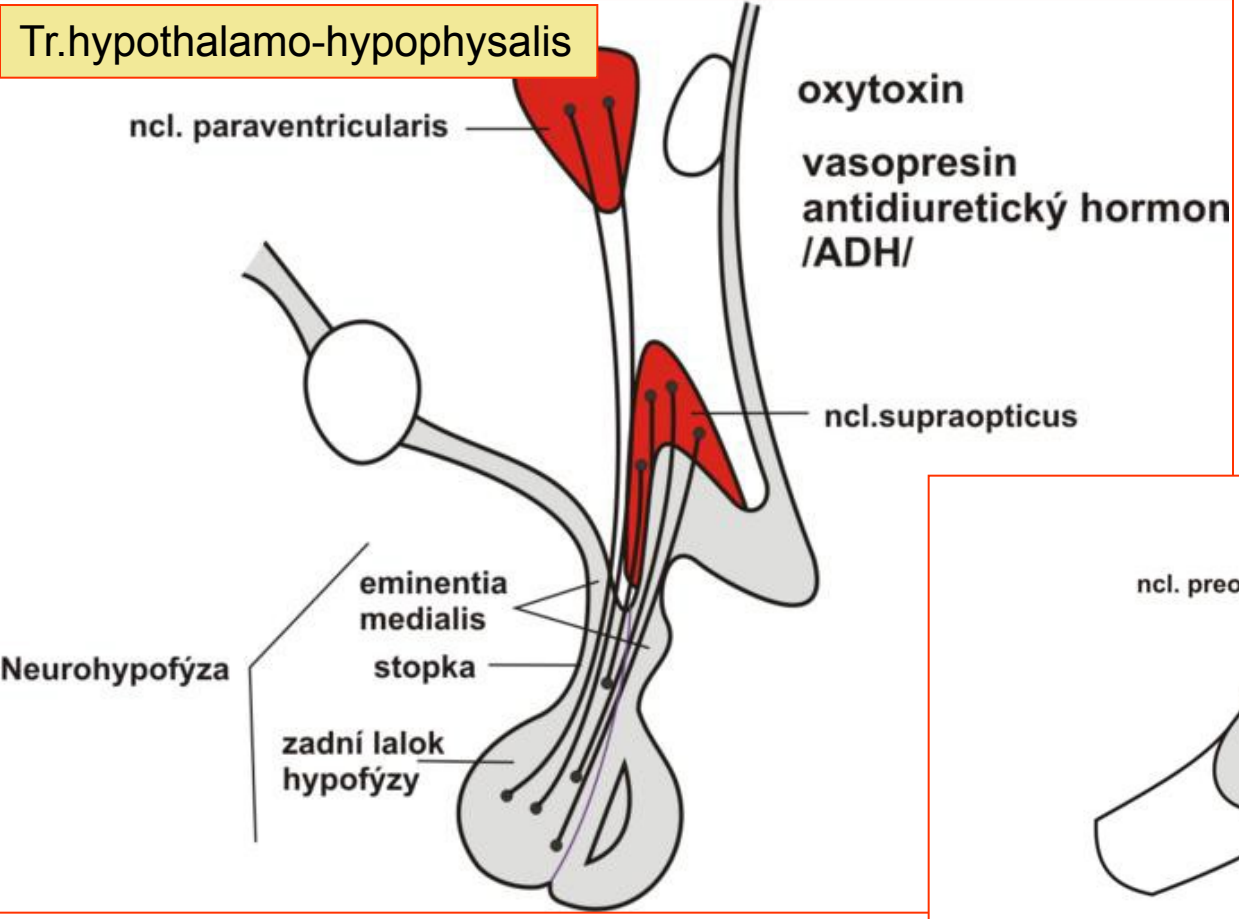
Hypophysis cerebri (pituitary gland)
endocrine gland
located in the fossa hypophysealis of the sphenoid bone
superior position to other endokrine glands





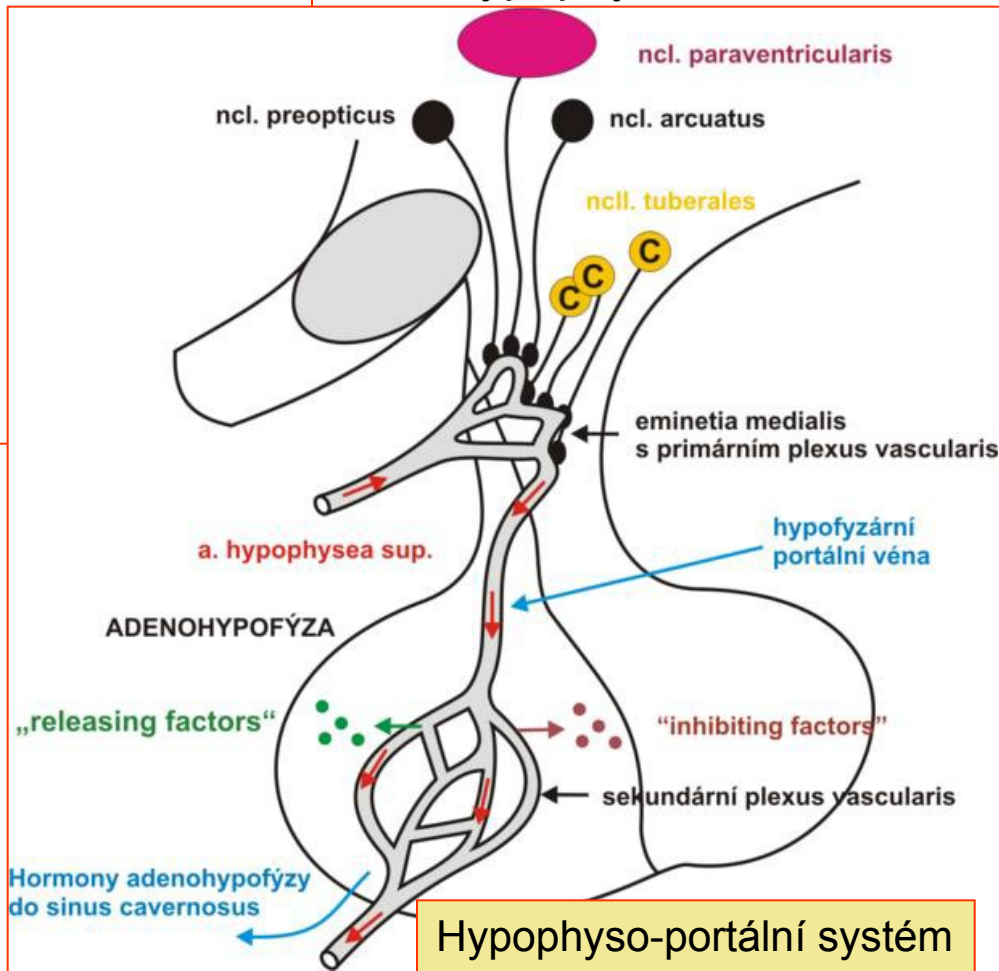
Adenohypophysis (lobus anterior)
Pars intermedia
Neurohypophysis – eminentia mediana
- processus infundibularis
- lobus posterior

Tr.hypothalamo-hypophysalis



the axons of magnocellular neurons
in the supraoptic and paraventricular nuclei constitute **hypothalamo-hypophyseal tracts**, which terminate in the neurohypophysis

the parvocellular neurons secrete releasing
or release-inhibitory factors into the portal vascular system
to stimulate or inhibit secretion
of hormones from the adenohypophysis.



Hypophyso-portální systém