

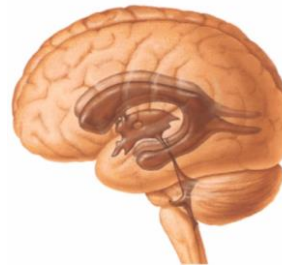
## Brain ventricles, meninges, blood supply of the CNS

MUDr. Marek Joukal, Ph.D.

Department of Anatomy



### Brain ventricles



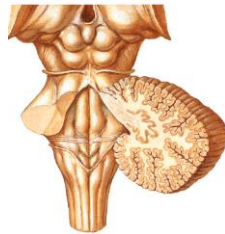
- Ventriculi laterales
- foramen interventriculare
- Ventriculus tertius
- aqueductus mesencephali
- Ventriculus quartus
- canalis centralis



### VENTRICULUS QUARTUS

#### Fossa rhomboidea

- sulcus medianus
- sulci limitantes
- eminentia medialis
- pars superior, intermedia, inferior
- Tegmen ventriculi quarti
- velum medullare superius
- fastigium
- velum medullare inferius



### Fossa rhomboidea

#### Pars superior

- fovea superior (n. V.)
- locus coeruleus

#### Pars intermedia

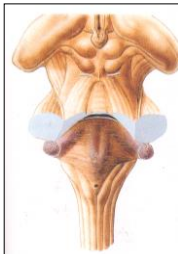
- stria medullaris, recessus lat.
- colliculus facialis (n. VI.)
- area vestibularis
- tuberculum acusticum

#### Pars inferior

- trigonum nervi hypoglossi
- trigonum nervi vagi (fovea inferior)



### Tegmen ventriculi quarti



- velum medullare superius
- fastigium
- velum medullare inferius
- tela choroidea ventriculi IV. (pia mater)
- plexus choroideus ventriculi IV.
- apertura mediana ventriculi IV. (for. Magendie)
- aperturæ laterales ventriculi IV. (for. Luschaë)



### VENTRICULUS TERTIUS

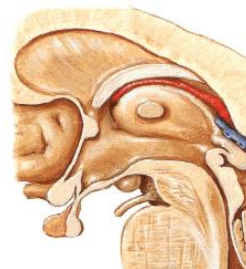
#### Thalamus

- adhesio interthalamica
- sulcus hypothalamicus
- foramen interventriculare

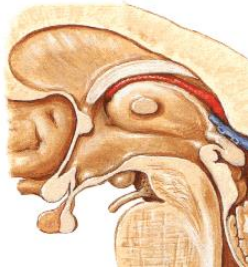
#### Hypothalamus

#### Basal (inferior wall):

- Hypothalamus
- Recessus opticus
- Recessus infundibularis



**VENTRICULUS TERTIUS**



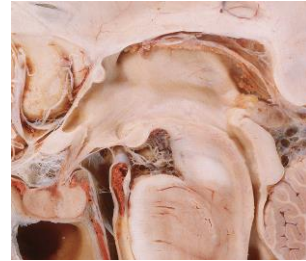
**Anterior wall:**

- lamina terminalis
- commisura ant.
- pars libera columnae fornicis

**Posterior wall:**

- recessus suprapinealis
- commisura habenularum
- recessus pinealis
- commisura posterior
- aqueductus cerebri

**VENTRICULUS TERTIUS**



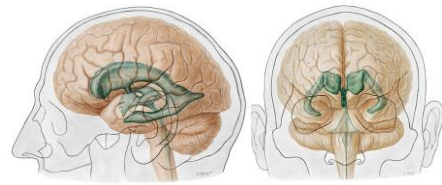
**VENTRICULUS TERTIUS**



**Roof:**

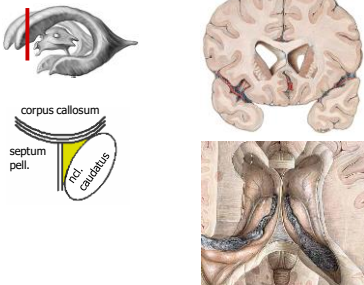
- tela choroideae ventriculi III. (taenia thalami, trigonum habenulae, commisura habenularum)
- recessus suprapinealis

**VENTRICULUS LATERALIS**



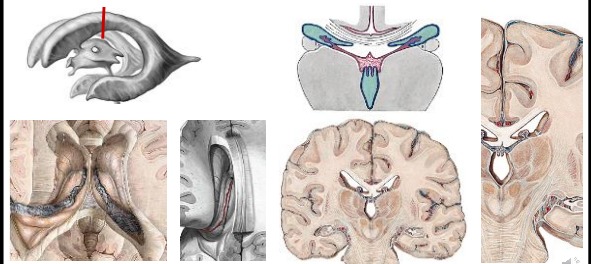
- Cornu anterius - frontale (lobus frontalis), pars centralis (lobus parietalis),
- cornu posterius - occipitale (lobus occipitalis), cornu inferius - temporale (lobus temporalis)

**VENTRICULUS LATERALIS – cornu anterius (frontale)**

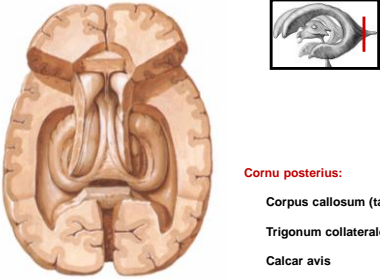


**VENTRICULUS LATERALIS – Pars centralis:**

Corpus callosum, ncl. caudatus, stria terminalis, lamina affixa thalami, tela choroidea ventriculi lat., fornix



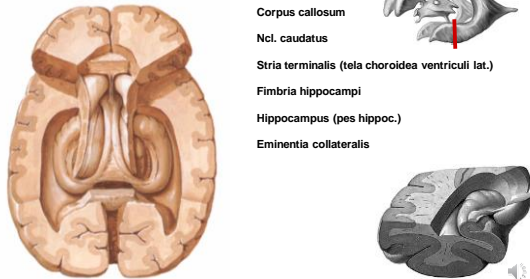
**VENTRICULUS LATERALIS – cornu posterius (occipitale)**



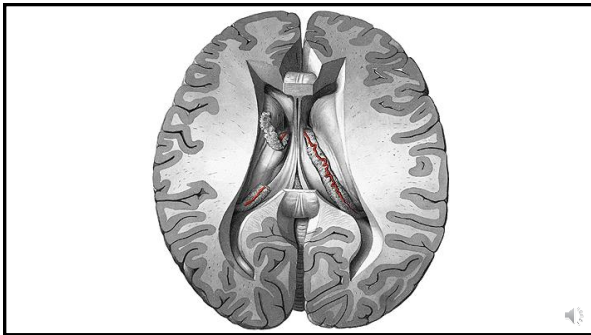
**Cornu posterius:**

- Corpus callosum (tapetum)
- Trigonum collaterale
- Calcar avis

**VENTRICULUS LATERALIS – cornu inferius (temporale)**



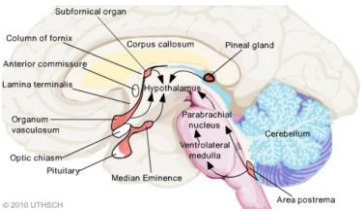
- Corpus callosum
- Ncl. caudatus
- Stria terminalis (tela choroidea ventriculi lat.)
- Fimbria hippocampi
- Hippocampus (pes hippoc.)
- Eminentia collateralis



**Circumventricular organs**

In wall of ventricles

- No BBB** – information from the blood to the CNS
  - area postrema
  - subfornical organ,
  - lamina terminalis (organum vasculosum)
- neurosecretion**
  - neurohypophysis
  - epiphysis
  - eminencia mediana
  - subcomisural organ

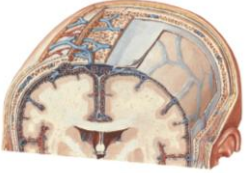


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**Meninges**


Meninx primitiva

ectomeninx (**dura mater**) + endomeninx (**arachnoidea + pia matter**)



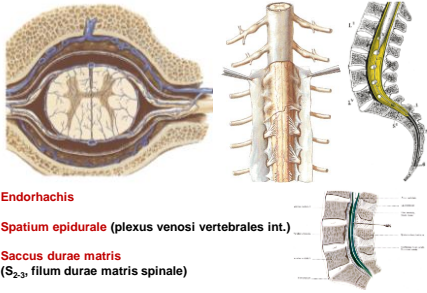
- Calvaria
- Spatium epidurale (spinal cord I)
- Dura mater (encephali, spinalis)**
- Spatium subdurale
- Arachnoidea**
- Spatium subarachnoideale (liquor cerebrospinalis)
- Pia mater**

**DURA MATER ENCEPHALI (periosteum et ektomeninx)**



- Falx cerebri** (fissura longit. cerebri)
- Falx cerebelli** (incisura cerebelli post.)
- Tentorium cerebelli** (fissura transv. cerebri) incisura tentorii
- Diaphragma sellae**
- Cavum trigeminale**
- Vagina nervi optici**
- Sinus durae matris**

### DURA MATER SPINALIS

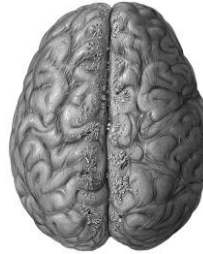


Endorhachis

Spatium epidurale (plexus venosi vertebrales int.)

Saccus durae matris  
(S<sub>2-3</sub>, filum durae matris spinale)

### ARACHNOIDEA



Spatium subdurale

Arachnoidea encephali

Granulationes arachnoidales

Spatium subarachnoideale



### PIA MATER ENCEPHALI



Spatium subarachnoideale

Liquor cerebrospinalis

Cisternae subarachnoidales

Pia mater encephali

Tela choroidea ventriculorum

Plexus choroidei

(liquor cerebrospinalis)

### CISTERNAE SUBARACHNOIDALES

Cerebellomedullaris

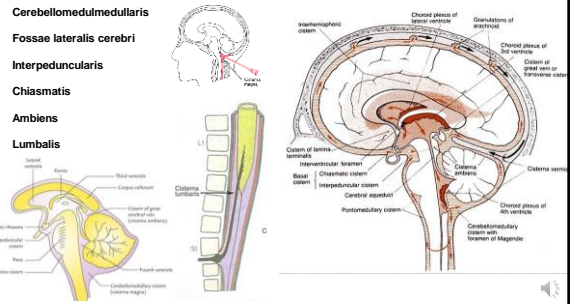
Fossae laterales cerebri

Interpeduncularis

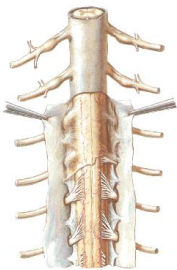
Chiasmatis

Ambiens

Lumbalis



### ARACHNOIDEA ET PIA MATER SPINALIS

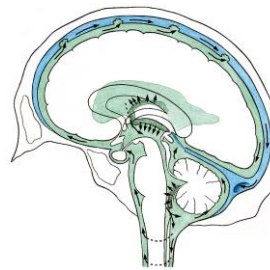


Arachnoidea spinalis

Pia mater spinalis  
(ligamentum denticulatum)

Spatium subarachnoideale  
(cisterna lumbalis - cauda equina)

### LIQUOR CEREBROSPINALIS 80-150 ml (500-800 ml/day)



Plexus choroideus ventriculi lateralis  
(+ ventriculi III., IV.)

foramen interventriculare  
(ventriculus III.)

aqueductus cerebri  
(ventriculus IV.)

canalis centralis  
(medulla spinalis)

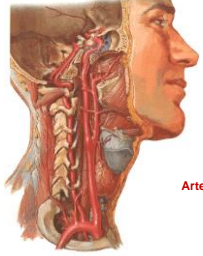
apertura mediana, later. ventriculi IV.  
(spatium subarachnoideale)

sinus sagittalis superior

vv. radicales of the spinal cord

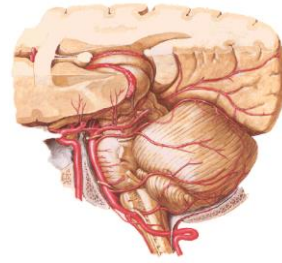
**Blood supply of the CNS**

**Arteria carotis interna**



- Arteria ophthalmica
- Arteria choroidea ant. (tela choroidea ventr. lat.)
- Arteria communicans posterior (circulus arteriosus cerebri)
- Arteria cerebri media (BG, a. haemorrhagica) (circulus arteriosus cerebri)
- Arteria cerebri anterior (circulus arteriosus cerebri)
- Arteria vertebralis**
  - r. spinalis
  - a. basilaris

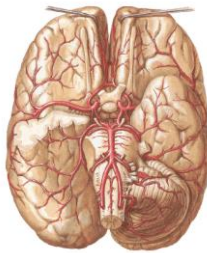
**ARTERIA VERTEBRALIS – intracranial branches**



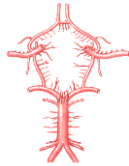
- rr. spinales
- aa. cerebellares inferiores post.
- arteria basilaris (sulcus basilaris)
  - a. cerebellares inferiores ant.
  - a. labyrinthi
  - rr. ad medullam oblongatam
  - rr. ad pontem
- aa. cerebellares superiores
- aa. cerebri posteriores (aa. choroideae post.) (circulus arteriosus cerebri)

**CIRCULUS ARTERIOSUS CEREBRI**

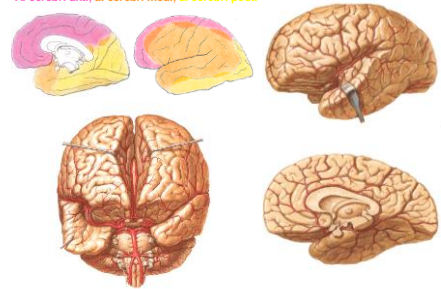
**Arteriae cerebri anteriores**



- Arteria communicans anterior
- Arteriae cerebri mediae**
- Arteria communicans posterior
- Arteriae cerebri posteriores**

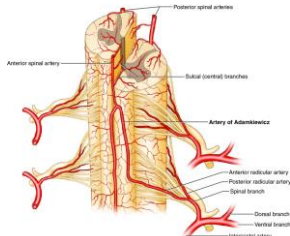


**A. cerebri ant., a. cerebri med., a. cerebri post.**

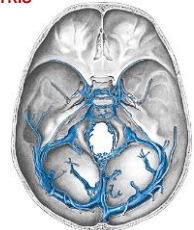
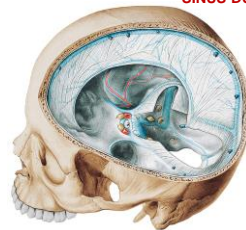


**Arteries of the spinal cord**

- rr. spinales aa. vertebrales, aa. cervicales asc., aa. cervicales prof., aa. intercostales supremae, aa. intercostales, aa. lumbales, aa. iliolumbales, aa. sacrales laterales, a. sacralis mediana)
- aa. radicales ant.
- aa. radicales post.
- a. spinalis ant. fissura mediana ant.)
- 2 aa. spinales post. sulcus posterolateralis)
- vasocorona



**SINUS DURAE MATRIS**



- Sinus sagittalis sup., inf.
- Sinus occipitalis
- Sinus transversus
- Sinus rectus
- Sinus sigmoideus
- Sinus petrosus sup., inf.
- Sinus cavernosus (sinus intercavernosi) Sinus sphenoparietalis
- Plexus basilaris

**Deep veins of the brain**

Vena septi pellucidi  
+  
Vena choroidea  
+  
Vena thalamostriata

↓

Vena cerebri interna  
(vena basilaris)

↓

Vena cerebri magna

↓

Sinus rectus

**Superficial veins of the brain**

Vv. cerebri superiores  
(sinus sagittalis superior)

V. cerebri media superficialis  
(sinus sphenoparietalis or  
sinus cavernosus)

Vena anastomatica sup.

Vena anastomatica inf.

V. cerebri media profunda  
(vena basalis)

Vv. cerebri inferiores  
(sinus transversus)

Vv. cerebri inferiores  
Parts drains to the vena basilaris  
(v. cerebri magna)

**Veins of the spinal cord (venae spinales)**

Plexus venosi vertebrales interni (vv. spinales, vv. basiverteb.)

Vv. intervertebrales

Plexus venosi vertebrales externi

Adjacent vessels:

vv. sacrales lat.

vv. lumbales

vv. intercostales

vv. cervicales prof et spf.

vv. vertebrales

plexus venosus suboccipitalis

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