

# Brain vessels

## Brain vessels

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Adequate supply of oxygenated blood is important for the proper functioning of the brain , thus ensuring nutrition for the brain.

### Blood flow through the brain

Blood flow through the brain depends on age. In a young individual, 750 ml / min flows at rest, after 50 years the blood flow decreases. With intense neuronal activity , blood flow can increase by up to 50%.

### Cerebral arteries

The brain is supplied with blood, which is supplied by two pairs of arteries: *aa. vertebrales*, *aa. internal carrots* . At the base of the brain, their branches are connected to the *circulus arteriosus cerebri (Willisi)* . Arteries at the base of the brain

#### Arteria vertebralis

*The vertebral artery* is a branch of the subclavian artery . In the neck section is then issued rr. musculares a rr. spinals

- *A. cerebelli inferior posterior* - the strongest branch of the vertebral artery, supplies the lower surface of the cerebellum .

*More detailed information can be found on the Arteria vertebralis page .*

#### Arteria basilaris

***The basilar artery is formed by the union of two aa. vertebrales on the lower edge of pons varoli . Through the sulcus basilaris pontis it runs to the upper edge of the pons Varolli, where it is divided into two aa. posterior cereals .***

*Arteria basilaris* produces small branches for the elongated spinal cord , Varol's bridge, porus acusticus internus ( *a. Labyrinthi* ) and cerebellum ( *aa. Cerebelli inferiores anteriores*, *aa. Cerebelli superiores* )

- *Aa. cerebri posteriores* - the final and strongest branches of the *basilar artery* , supplying the medial and lower surface of the temporal and occipital lobes.
- *Aa. communicantes posteriores* - branches *aa. cerebri posteriores* , conjunctions to the right and left internal carotid arteries .

#### Internal carotid artery

According to the course, it is divided into 4 parts:

- Pars cervicalis - sinus caroticus - enlarged onset of the internal carotid artery , where there are receptors in

the thinned wall that respond to pressure changes; a. The internal carotid artery does not show any branches on the neck.

- Pars petrosa - course through the canalis caroticus; gives off small branches for the mucous membrane of the middle ear cavity ( *aa. caroticotympanicae* ).
- Pars cavernosa - runs in the sinus cavernosus, issues small phrases for the pituitary gland , trigeminal ganglion and dura mater .
- Pars cerebralis - medially from the processus clinoideus anterior and laterally from the chiasma opticum are divided into two finite branches: *a. Cerebri anterior*, *a. Cerebri media* ; in addition, it releases *a. ophthalmica* (supplies the orbit , lacrimal gland , oculomotor muscles , nasal cavity , eyeball) and *a. choroida anterior* (supplies the plexus of the choroidus of the lateral ventricles).

*More detailed information can be found on the Arteria carotis interna page .*

## Circulus arteriosus cerebri ( Willisi ) edit source ]

The arterial circuit is formed at the base of the brain from the finite branches *aa. internal carotid artery. vertebrales* and their conjunctions. The final branches of the internal carotid artery ( *a. Cerebri anterior*, *a. Cerebri media* ) are connected by the *a. Communicans anterior* . *Aa. posterior communicators* connect both *aa. cerebri mediae* with both *aa. posterior cereals*. This creates a vertebrobasilar and carotid artery system that balances blood pressure and flow in both streams.

*More detailed information can be found on the page Circulus arteriosus cerebri .*

## Arterial arteries

### A. cerebri anterior

This is the final branch of the internal carotid artery. The right and left branches are connected by *a. Communicans anterior*. *The anterior cerebral artery* supplies the orbital area of the frontal lobe, the superior frontal gyrus, the praecentralis gon, the postcentralis g, the cingula gon and the praecuneus. The closure causes bilateral paralysis of the lower limbs (ie hemiplegia), frontal syndrome (ie dementia, behavioral disorders, gait disorders ...) or expressive speech disorder.

- pars precommunicalis - part of the artery from its origin to a. communicans anterior

*a. communicans anterior* - for chiasma opticum, hypothalamus, cingular gyrus

- pars postcommunicalis - from the point of connection with *a.communicans anterior*

*a. striata medialis distalis*

### A. cerebri media

It is the strongest branch of the internal carotid artery. This branch runs laterally and horizontally to the insuly base - numerous branches supplying the insular cortex, capsula extrema, claustrum, capsula externa. At the convexity of the hemisphere supplies the g.frontalis medius et inferior, most of the g. Praecentralis and postcentralis, the lobus parietalis, the anterior part of the lobus occipitalis, the g. Temporalis superior and the medius, the temporal pole. Vascular occlusion causes contralateral hemiplegia, affecting the upper limbs and mimic muscles, and bilateral sensory impairment.

- pars sphenoidalis - between the circulus arteriosus cerebri and the cortex of the insula

*a. polaris temporalis*

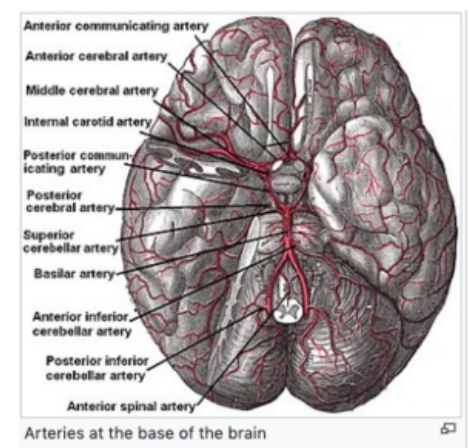
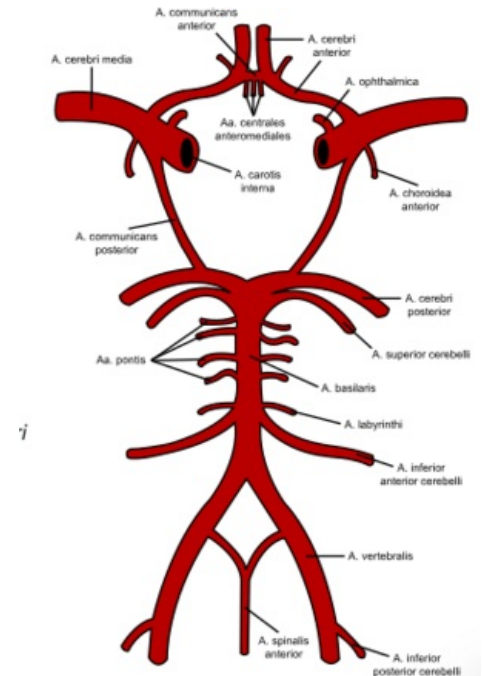
- pars insularis on the surface of the insula - *aa.insulares*
- Rami terminales inferiores - end section of the middle cerebral artery, on the surface of the frontal, parietal and temporal lobe

*r. temporal anterior*

- Rami terminales superiores - divided for the frontal and parietal lobes

*a. frontobasalis lateralis*

### A. cerebri posterior



It is located around the pedunculus cerebri and reaches the medial area of the temporal lobe and occipitalis. It supplies the medial area of the temporal and occipital lobes. Vascular occlusion causes impaired vision in the contralateral visual field (preservation of vision in the macular area).

1. precommunical part - segment P1
2. pars postcommunicalis - segment P2
3. A. occipitalis lateralis - P3
4. A. occipitalis medialis - P4

pars precommunicalis - reaches for connection with a. communicans posterior a. thalami perforans pars

postcommunicalis - around the midbrain to the lower surface of the hemisphere a. thalamogeniculata A. occipitalis lateralis - in the cortex of the temporal lobe - rr. temporary

A. occipitalis medialis r. corporis callosi dorsalis

## Central arteries ( basal )

There are small arteries protruding from the initial sections of the cortical arteries. They dive into the brain tissue around the Willis circuit.

- Aa. centrales anteromediales - supply the anterior striatum, preoptic area, anterior hypothalamus.
- Aa. centrales anterolaterales - supply nc. lentiformis, caput et corpus nuclei caudati, putamen, globus pallidus, anterior part of internal capsule.
- Aa. centrales posteromediales - supply the posterior thalamus and hypothalamus, subthalamus, globus pallidus, tegmentum mesencephali.
- Aa. centrales posterolaterales - supply the posterior thalamus, corpora geniculata, corpus pineale, internal capsule, tectum mesencephali.

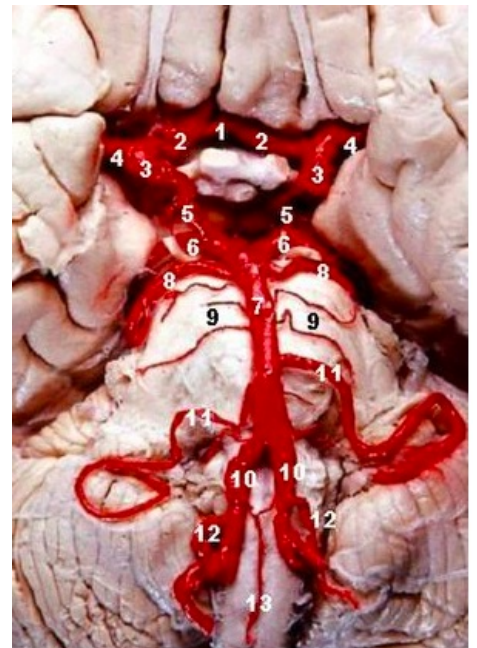
## Arteries supplying the choroid plexus

- A. choroidea anterior - branches for the plexus choroideus of the temporal horn of the lateral ventricle, glomus, plexus choroideus in the central part of the lateral ventricle; other branches for hippocampal formation, amygdala, globus pallidus, crus posterior capsulae internae.

expand

Another branch

- A. choroidea posterior - branches for plexus choroideus ventriculi III., Tectum, medial part of thalamus.



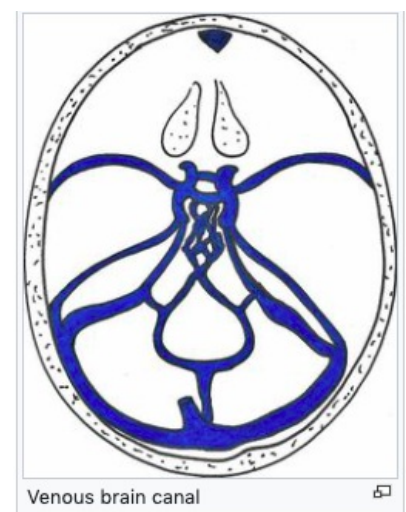
## Brain veins

Venous brain canal

### Surface

**Vv. cerebri superiores - blood from the upper convexity of the hemisphere; estuary to the superior sagittal sinus.**

- V. cerebri media superficialis - opens into the sinus sphenoparietalis or into the sinus cavernosus; its conjunction with the superior cerebral vein is called *the magnitude anastomotica (Trolard vein)*; the conjunction with the transverse sinus is *in the inferior anastomotica*.
- V. cerebri media profunda - ústí do v. Basalis.
- Vv. cerebri inferiores - blood from the lower part of the convexity and from the lower surface of the hemisphere; estuary to sinus cavernosus and sinus petrosus sup. and inf ..
- V. basalis - is formed by the connection of the v. Cerebri media profunda and v. Cerebri anterior; it heads back around the crura cerebri and empties into the v. magna cerebri.



### Deep

- Vv. cerebri internae - paired, on the ceiling of the 3rd ventricle; beginning with confluence 3 veins in the area of interventricular foramen: v. anterior septi pelucidi, v. choroidea superior, v. thalamostriata superior; both vv. cerebri internae combine to form *the magna cerebri (Galenii)*.
- V. cerebri magna (Galenii) - unpaired, formed by the *confluence of both vv. cerebri internae* v oblasti cisterna venae cerebri magna; is only 1-2 cm long; it takes up the superficial v. basalis and opens into the sinus

## Sinus durae matris

**They are wide venous canals deposited in the algae of the dura mater, covered on the inside by the endothelium.**

- Sinus sagittalis superior - runs in the midline at the upper edge of the falx cerebri, begins in front of the crista galli, ends at the protuberantia occipitalis interna in the so-called *confluens sinuum* ; the protrusions of the arachnoid arch into the sinus, through which the cerebrospinal fluid is absorbed into the blood.
- Sinus sagittalis inferior - runs at the lower edge of the falx cerebri, opens into the sinus rectus at the point of attachment of the falx cerebri to the tentorium cerebelli.
- Sinus occipitalis - begins at the edge of the foramen magnum, runs up the crista occipitalis interna, where it flows into the confluens sinuum or into the sinus transversus.
- Sinus rectus - located at the junction of the falx cerebri and tentorium cerebelli; estuary *v. magna cerebri* .
- Sinus transversus - paired, stored in the sulcus sinus transversi; it connects laterally to the sigmoid sinus.
- Sinus sigmoideus dexter et sinister - continuation of sinus transversus; ends in the foramen jugulare, flows into the internal jugular vein .
- Confluens sinuum - confluence of rafts in the area of protuberantia occipitalis interna (superior sagittal sinus, rectus sinus, occipital sinus); blood flows from there to the transverse sinus; confluence to 1 place occurs in about 10% of cases - considerable variability.
- Sinus cavernosus - from the superior orbitalis fissura to the tip of the pyramid; *the internal carotid artery* and *the oculomotor nerve* , *the trochlearis* , *the 1st and 2nd branches of the trigeminal nerve* run through the sinus ; estuary *v. ophtalmica superior* .
- Sinus sphenoparietalis - medially flows into the sinus cavernosus.
- Superior petrosus sinus - connects the cavernosus sinus with the sigmoid sinus.
- Sinus petrosus inferior - connects the sinus cavernosus and the foramen jugulare.
- Plexus basilaris - venous plexus of the occipital clivus; it connects the cavernosus sinus, the marginal sinus and the spinal canal veins.

## Cerebral circulation control

Local humoral (metabolic) autoregulatory mechanisms predominate in the management of the cerebral circulation - vasodilatory effects are caused by *hypoxia* , *hypercapnia* , but also by *NO* . Blood flow through the brain is determined by the pressure gradient and peripheral resistance. Thanks to an efficient autoregulatory myogenic mechanism, blood flow is constant even with large pressure changes.

## Links

<https://www.wikiskripta.eu/index.php?curid=29009>

## Related Articles

- Willis circuit
- Brain
- Brain sheaths

## External links

Brain autopsy - YouTube presentation (English)

## References

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