Optimal viewing

- These slides are best viewed on a desktop or laptop computer running genuine Adobe Acrobat Reader.
- They have been tested on and are known to work on University classroom PCs.
- You may need to Enable playing of 3D content in Edit → Preferences → 3D & Multimedia.
- The slides don’t work properly on mobile devices, even with genuine Adobe Acrobat Reader—especially the embedded 3D models.
- Navigate through the slides with the Page Up or Page Down keys. Clicking on the headings in the margin or the small slide icons below also works.
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Nervous system lecture 32: Pathology of cerebrovascular disease: Review of cerebrovascular anatomy

Nervous system learning objectives:
- List the main blood vessels in the brain
- Identify the common anatomical locations of aneurysms
- Identify the common medical complications of aneurysmal intracranial haemorrhage
- The anatomical brain and vascular localisation of stroke
How to use this online tutorial

- Have your favourite neuroanatomy textbook beside your computer (or an online equivalent)
How to use this online tutorial

- Have your favourite neuroanatomy textbook beside your computer (or an online equivalent)
  - (This is how radiologists approach new problems in working life!)
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- Find the labelled structures in your textbook on the 3D model
- Turn and zoom the model as needed to improve your understanding of the 3D structure
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  - (This is how radiologists approach new problems in working life!)
- Find the labelled structures in your textbook on the 3D model
- Turn and zoom the model as needed to improve your understanding of the 3D structure
- Labelled 2D screenshots are provided as slides after the model
How to control the model

- Pre-defined views can be chosen from Views in the floating menu, e.g. “the basilar artery”
How to control the model

- Pre-defined views can be chosen from Views in the floating menu, e.g. “the basilar artery”
- Hold the left mouse button while moving the mouse to rotate the model
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- Rolling the mouse wheel zooms the model
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- Right click brings up a context menu for Tools->Pan
What are the main blood vessels in the brain?

- The right and left internal carotid arteries

Arteries of the brain

Home of the brain

The right and left internal carotid arteries

The right and left vertebral arteries

The basilar artery

The right and left anterior cerebral arteries

The right and left middle cerebral arteries

The right and left posterior cerebral arteries

The anterior communicating artery

The right and left posterior communicating arteries

Bonus point: this patient has a right middle cerebral artery aneurysm
What are the main blood vessels in the brain?

- The right and left internal carotid arteries
- The right and left vertebral arteries
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- The right and left vertebral arteries
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- The right and left vertebral arteries
- The basilar artery
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- The basilar artery
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Limitations of this model

- Arteries which pass close to each other appear to coalesce
Model slow loading

The next slide contains the model and it loads slowly
3D Circle of Willis with the cortical arterial branches cropped
Internal carotid arteries viewed from anterior

Right internal carotid artery

Left internal carotid artery
Vertebrobasilar system viewed from inferior

Arteries of the brain

Arnab Rana

Background

3D model simplified

Labelled 2D screenshots

Brain aneurysm quick facts

Stroke vascular anatomy quick facts

3D model with cortical branches

Feedback
Middle cerebral arteries viewed from anterior
Posterior cerebral arteries viewed from superior

Left posterior cerebral artery

Right posterior cerebral artery
Anterior cerebral arteries viewed from a 45° left posterior position
Anterior communicating artery viewed from posterior
Posterior communicating arteries viewed from inferior
Right middle cerebral artery aneurysm viewed from superior
Brain aneurysm quick facts

- Prevalence of aneurysms

Prevalence of aneurysms

2% (Rinkel 1998 review of autopsy and angiographic studies)

Incidence of subarachnoid haemorrhage 6.9 per 100,000 person-years (Menghini 1998 Olmsted County Minnesota)

Diagnosis of subarachnoid haemorrhage

- History and examination
- Unenhanced CT
- Exclusion by absence of blood products in CSF

Common anatomical locations of aneurysms

- Most intracranial aneurysms arise from the branch points of the Circle of Willis

Treatment of ruptured intracranial aneurysm

- Endovascular coil embolization
- Surgical clipping
- Treating complications such as hydrocephalus, vasospastic infarcts and disability
Brain aneurysm quick facts

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Prevalence of aneurysms

Incidence of subarachnoid haemorrhage
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  - Endovascular coil embolization
  - Surgical clipping
  - Treating complications such as hydrocephalus, vasospastic infarcts and disability
The right middle cerebral artery supplies left body strength and left body sensation.
Stroke vascular anatomy quick facts

- The right middle cerebral artery supplies left body strength and left body sensation
- The left middle cerebral artery supplies right body strength, right body sensation and language
Stroke vascular anatomy quick facts

- The right middle cerebral artery supplies left body strength and left body sensation
- The left middle cerebral artery supplies right body strength, right body sensation and language
- The right posterior cerebral artery supplies perception of the left visual field
Stroke vascular anatomy quick facts

- The right middle cerebral artery supplies left body strength and left body sensation
- The left middle cerebral artery supplies right body strength, right body sensation and language
- The right posterior cerebral artery supplies perception of the left visual field
- The left posterior cerebral artery supplies perception of the right visual field
A short note on cerebellar strokes

- The cerebellum is supplied by the posterior inferior, anterior inferior and superior cerebellar arteries.
A short note on cerebellar strokes

- The cerebellum is supplied by the posterior inferior, anterior inferior and superior cerebellar arteries
- Cerebellar strokes cause ataxia and/or nystagmus
A short note on cerebellar strokes

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- Cerebellar strokes cause ataxia and/or nystagmus
- There are other causes of an acute cerebellar syndrome such as alcohol intoxication
Model slow loading

The next slide contains a model with the cortical branches of the middle cerebral arteries and it loads slowly.
3D model with middle cerebral artery (MCA) cortical branches
Feedback contact

- Thank you for viewing this presentation
- Any feedback, positive or negative, will be appreciated
- Feedback can e-mailed to 3d@imagingsense.com