

# CNS lecture 3

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# Intracranial hemorrhage

## Causes:

- 1. hypertension
- 2. vascular wall injury like in amyloidosis
- 3. structural lesions like AV malformations
- 4. tumors
- 5. ruptured aneurysms
- 6. trauma

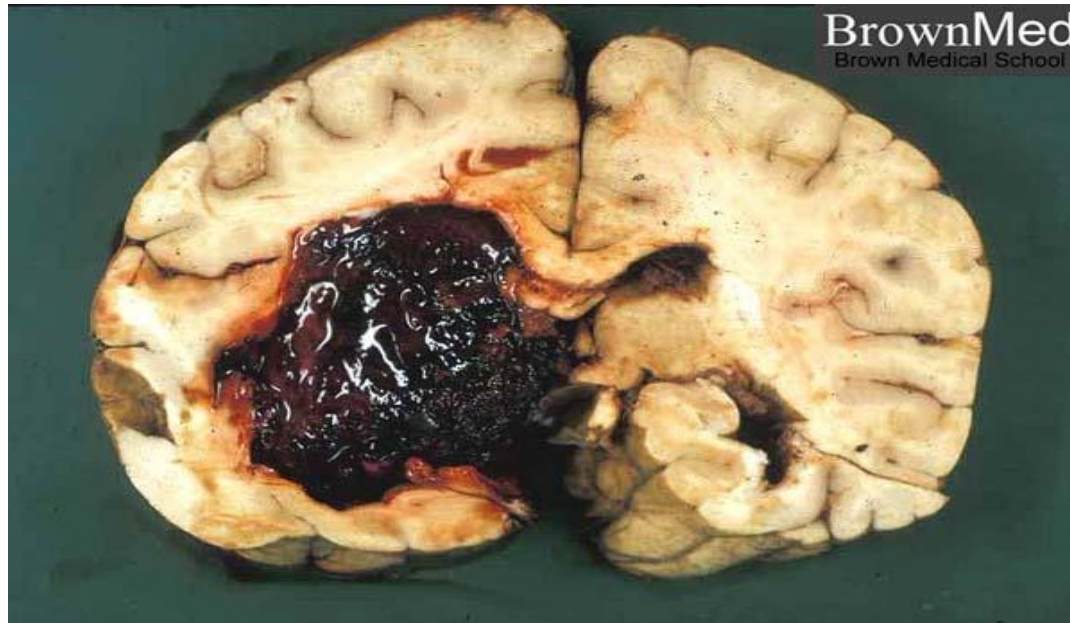
# Primary brain parenchymal hemorrhage

- Primary = spontaneous = non-traumatic.
- Peak 60 years
- Mostly due to rupture of a small intra-parenchymal vessel.
- **Hypertension** is the leading cause.
- Most affected sites: basal ganglia, thalamus, pons and cerebellum.
- Outcome depends of the site and extent of hemorrhage

# morphology

- Extravasated blood.
- With time.. Resolution and cavity formation

# Brain hemorrhage



# Cerebral amyloid angiopathy

- Amyloid deposition in the walls of arteries
- Causes weakness in vessel wall
- Bleeding , usually in the lobes of cerebral cortex (lobar hemorrhage)

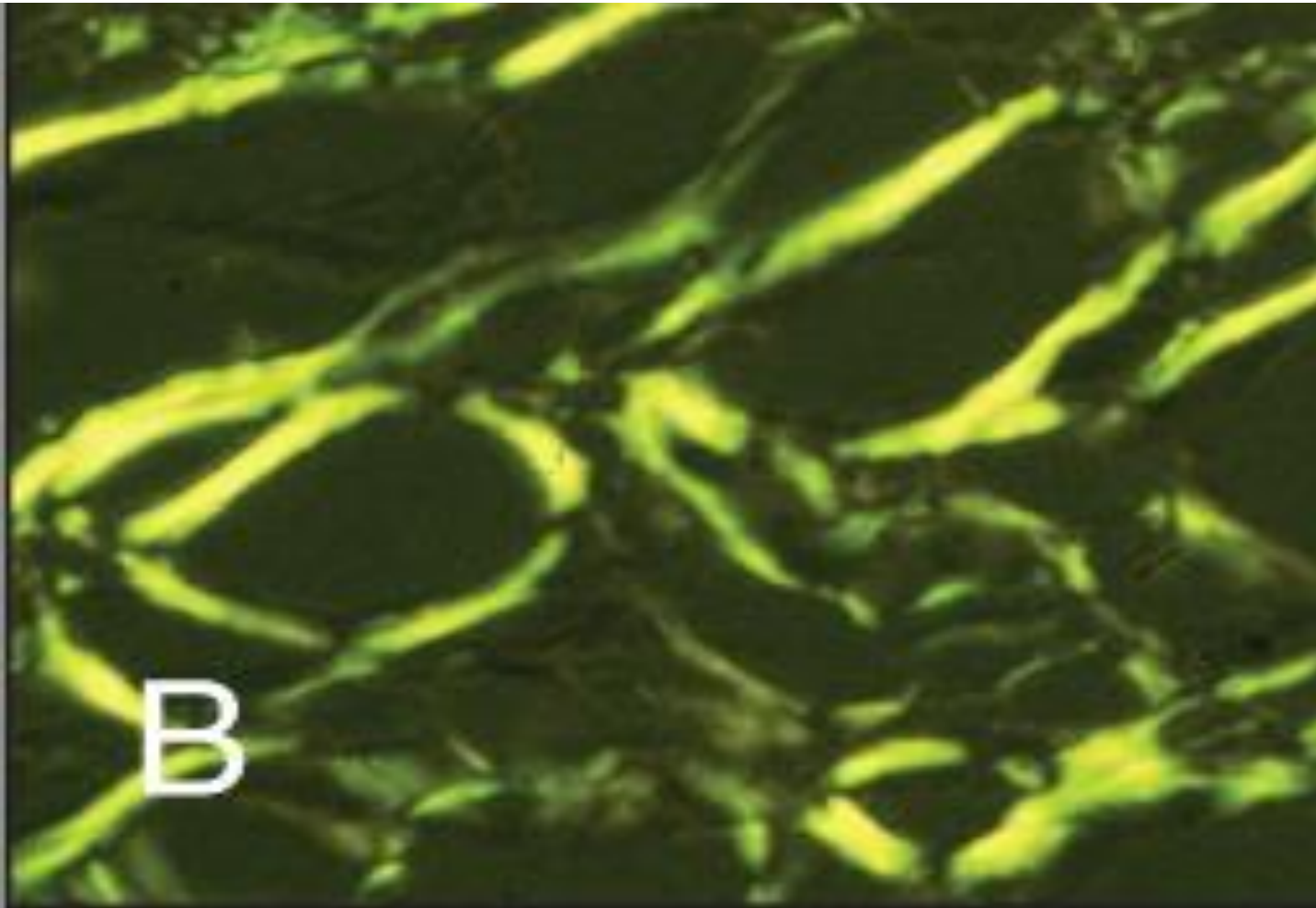
## amyloidosis

- deposition of extracellular fibrillar proteins
- These abnormal fibrils are produced by the aggregation of misfolded proteins (which are soluble in their normal folded configuration).

- Amyloid is deposited in the extracellular space in various tissues and organs of the body
- These fibillary proteins are responsible for tissue damage and functional compromise

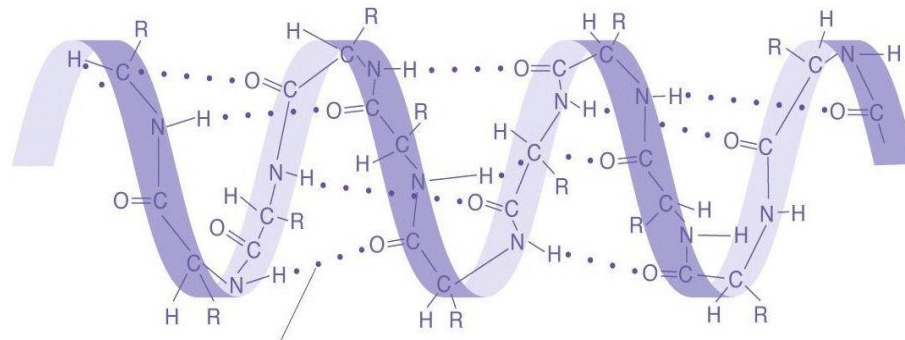


# Congo red stain



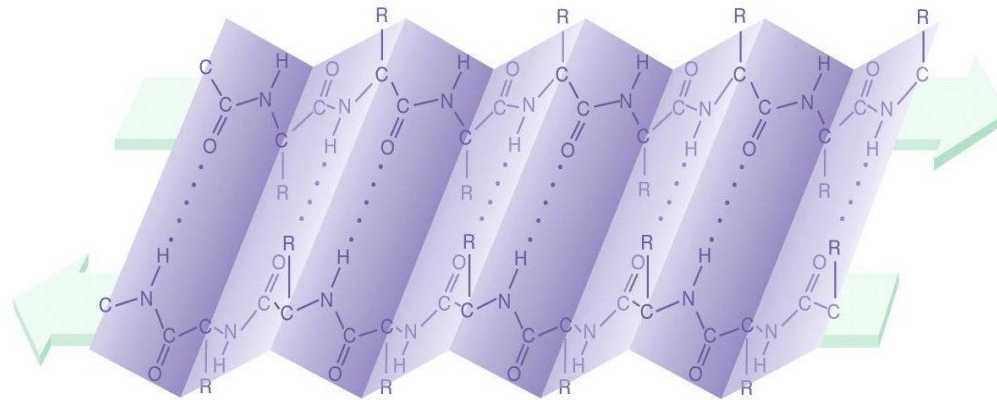
# By electron microscope

- All types of amyloid consist of **continuous, non-branching fibrils** with a diameter of approximately 7.5 to 10 nm. With a **cross- $\beta$ -pleated sheet** conformation



Hydrogen bonds between amino acids  
at different locations in polypeptide chain

$\alpha$  helix



Pleated sheet

- **Chemical Properties of Amyloid Proteins**
  - Amyloid is **not** a single chemical entity.
  - Several types exist

# Subarachnoid hemorrhage

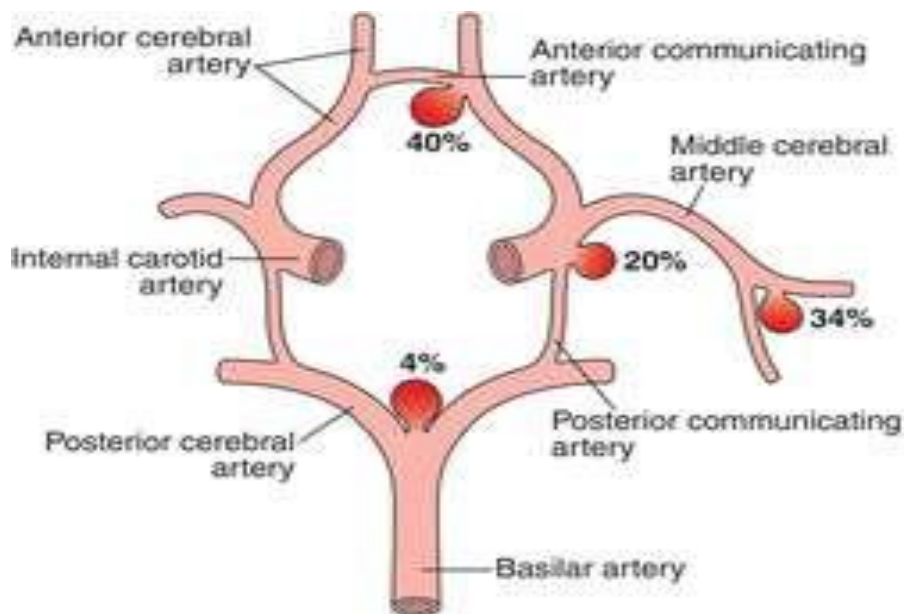
- Most common cause: ruptured berry aneurysm.
- Other causes: vascular malformations, trauma, tumors, hematological disturbances.

# Ruptured berry aneurysm

- Rupture happens usually due to increased intracranial pressure.
- Sudden severe headache followed by loss of consciousness
- 25-50% die
- Survivors: risk of recurrent bleeding

# Berry aneurysm

- 90% in the anterior circulation
- Near major arterial branching points
- Multiple in 20 – 30 % of cases



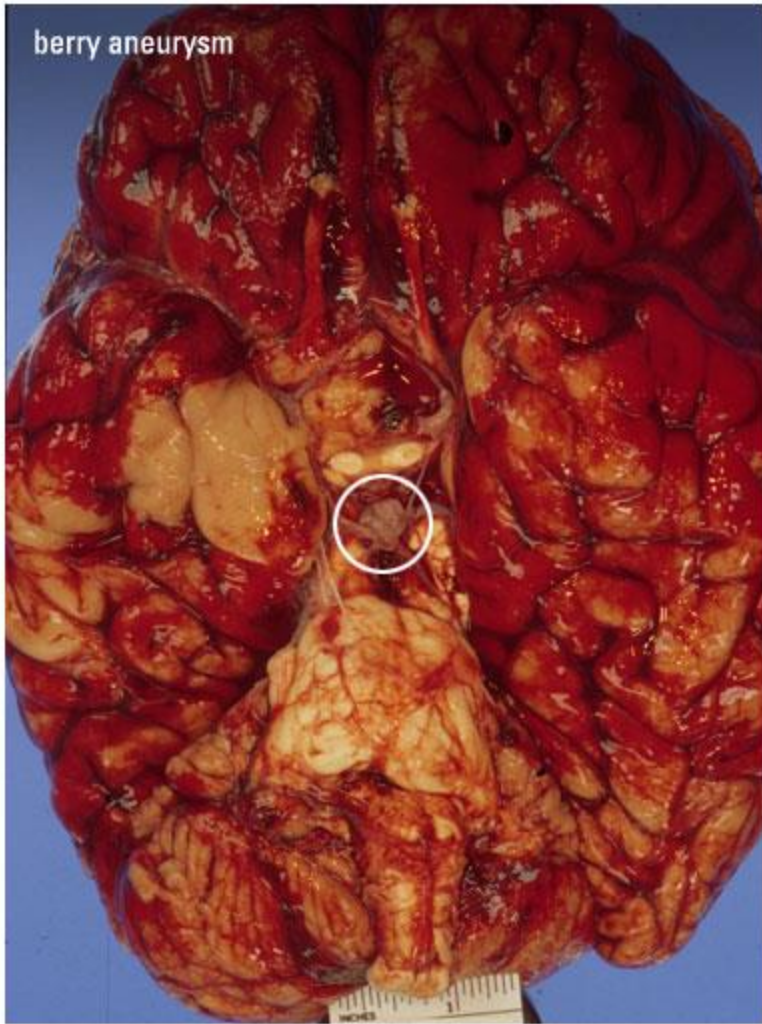


# morphology

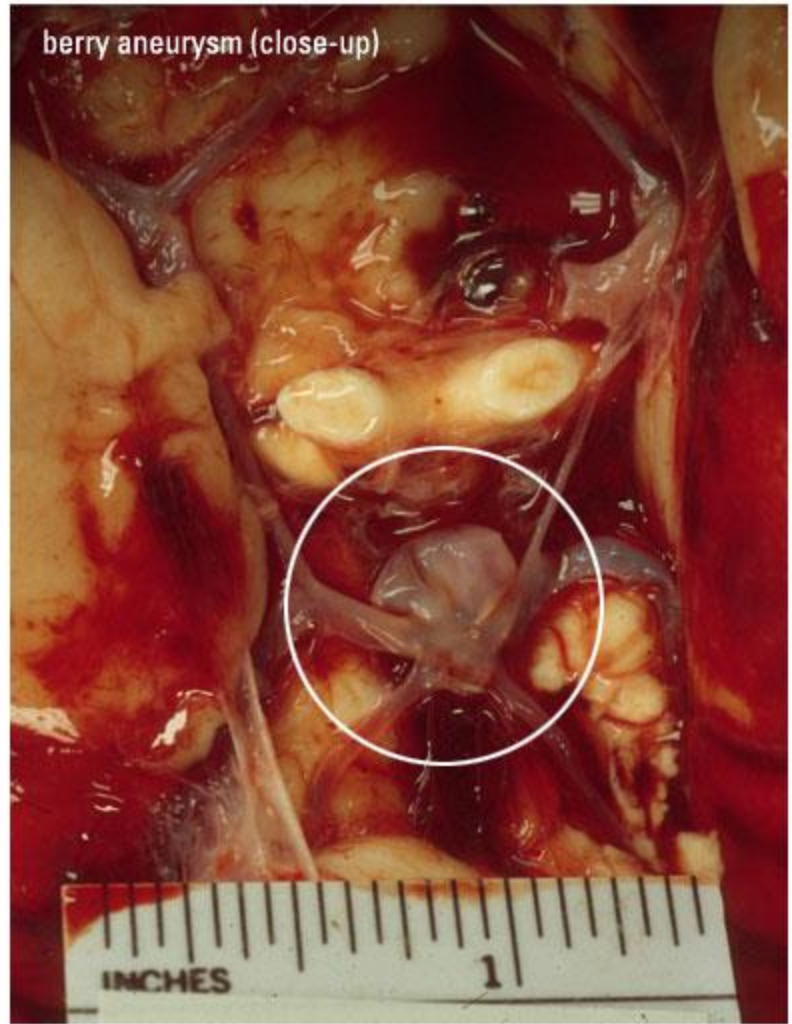
- Berry aneurysm: thin walled outpouching of an artery



berry aneurysm



berry aneurysm (close-up)



# Subarachnoid Hemorrhage



**\* Restricted use. PEIR; University of Alabama at Birmingham, Department of Pathology**

# Vascular malformations

- Arteriovenous malformations
- Cavernous malformations
- Capillary telengectasia
- Venous angioma

# AV malformation

- Most common type of vascular malformation
- Males more than females
- Present at 10-30 years of age
- Symptoms: seizures and intracranial hemorrhage

# Morphology of AV malformation

- Network of disorganised vascular channels



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