CENTRAL NERVOUS SYTEM TUMORS(1)

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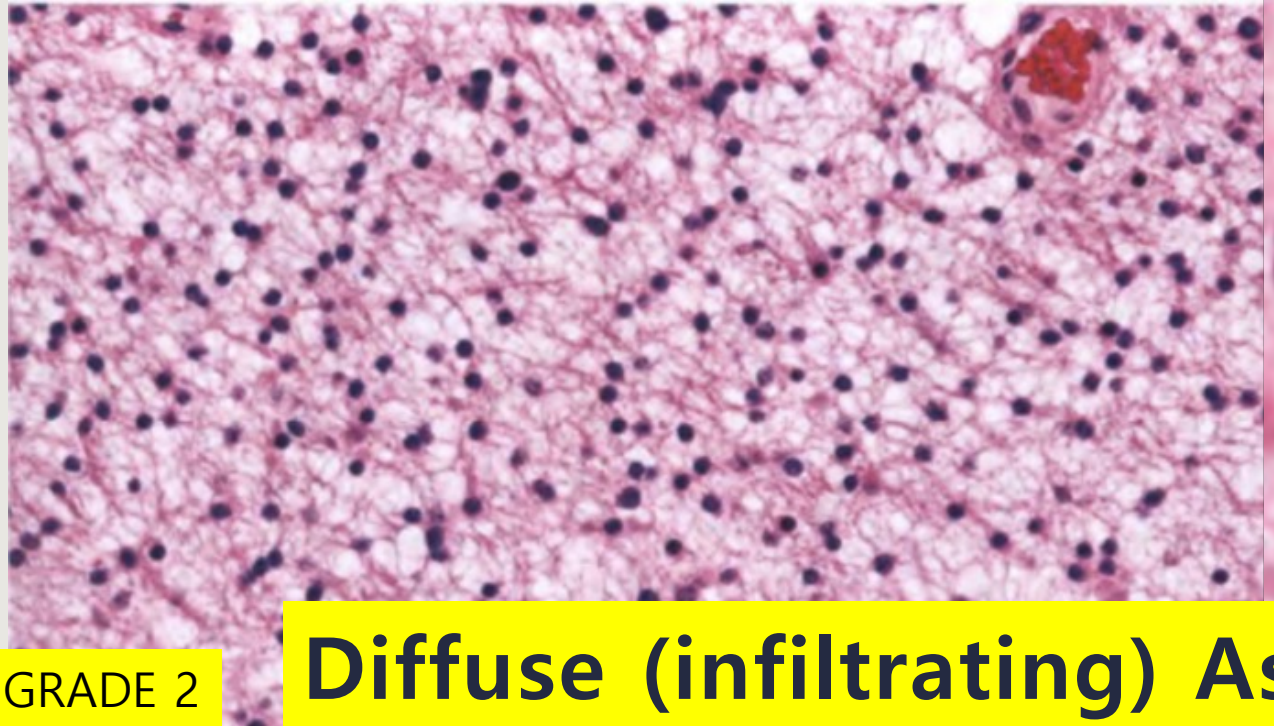
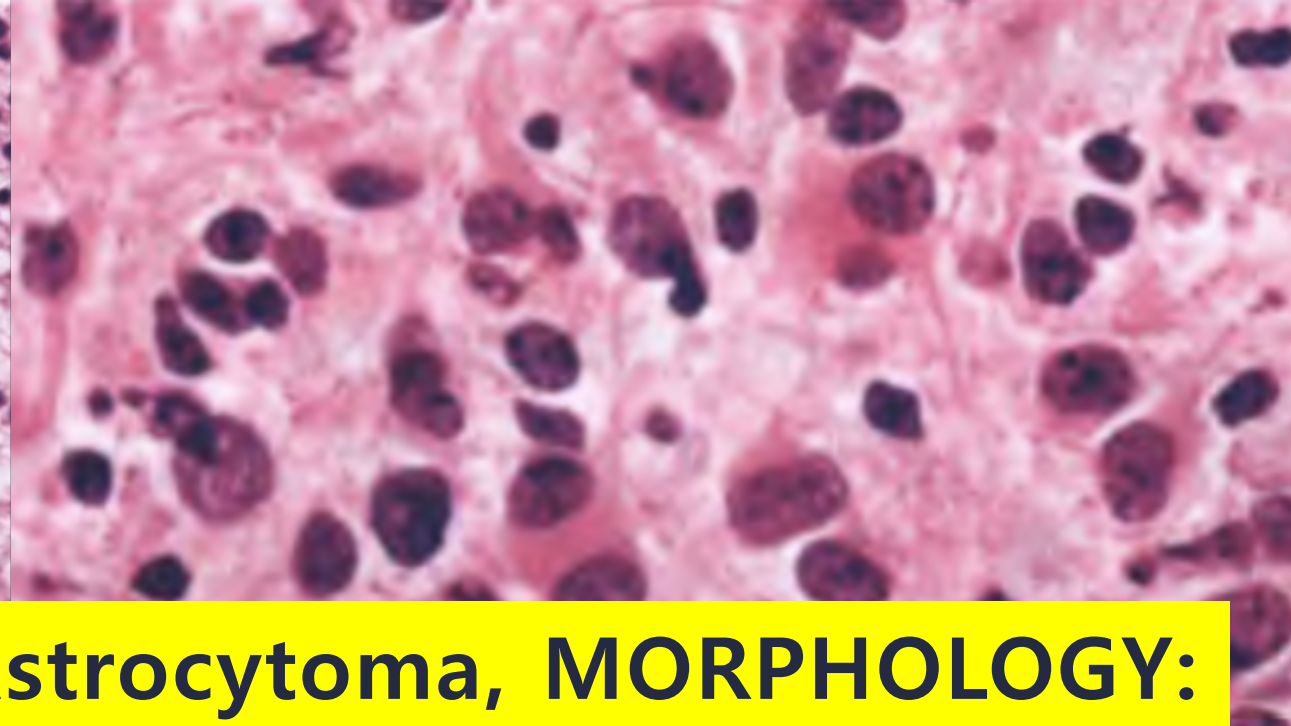
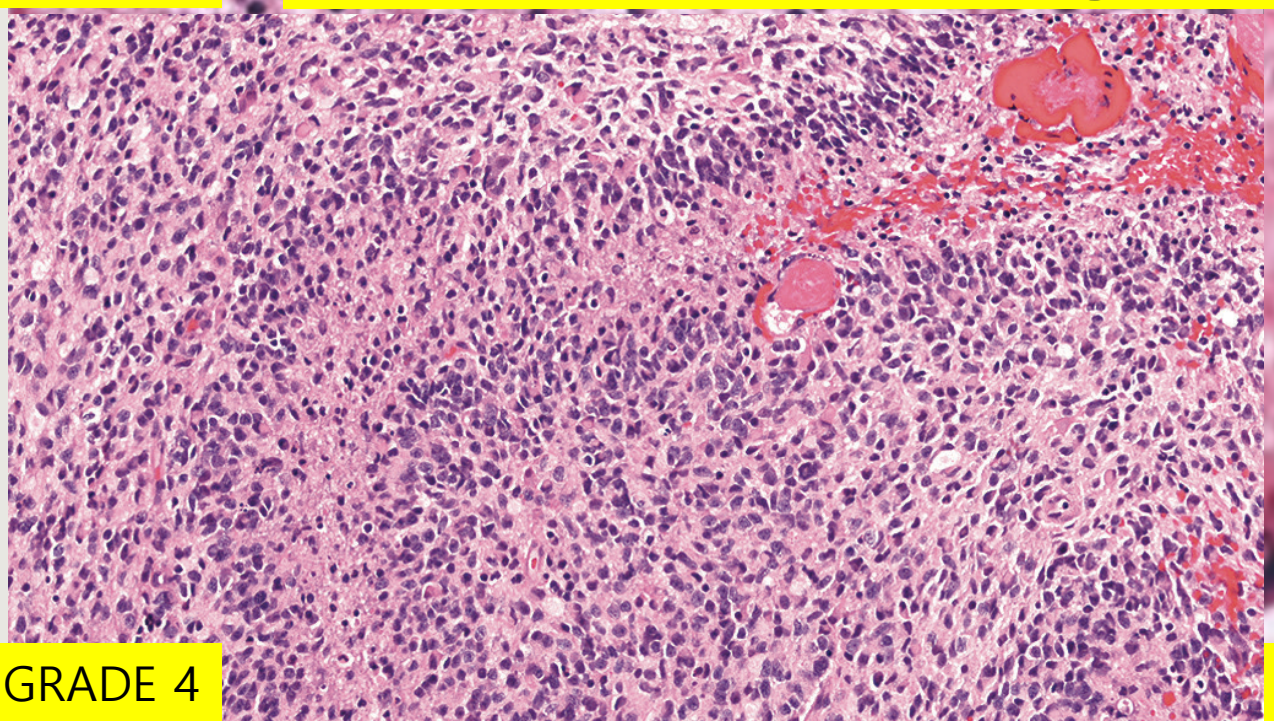
Diffuse (infiltrating) Astrocytoma, MORPHOLOGY:

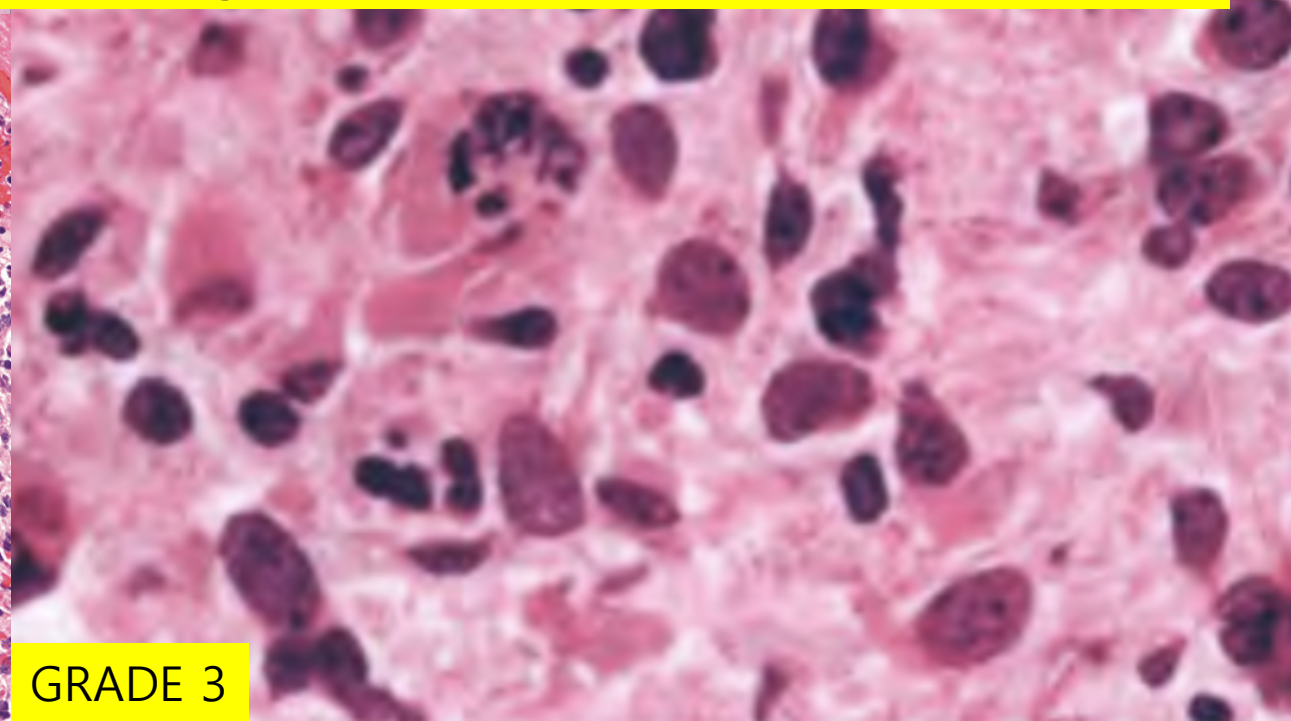


GRADE 2





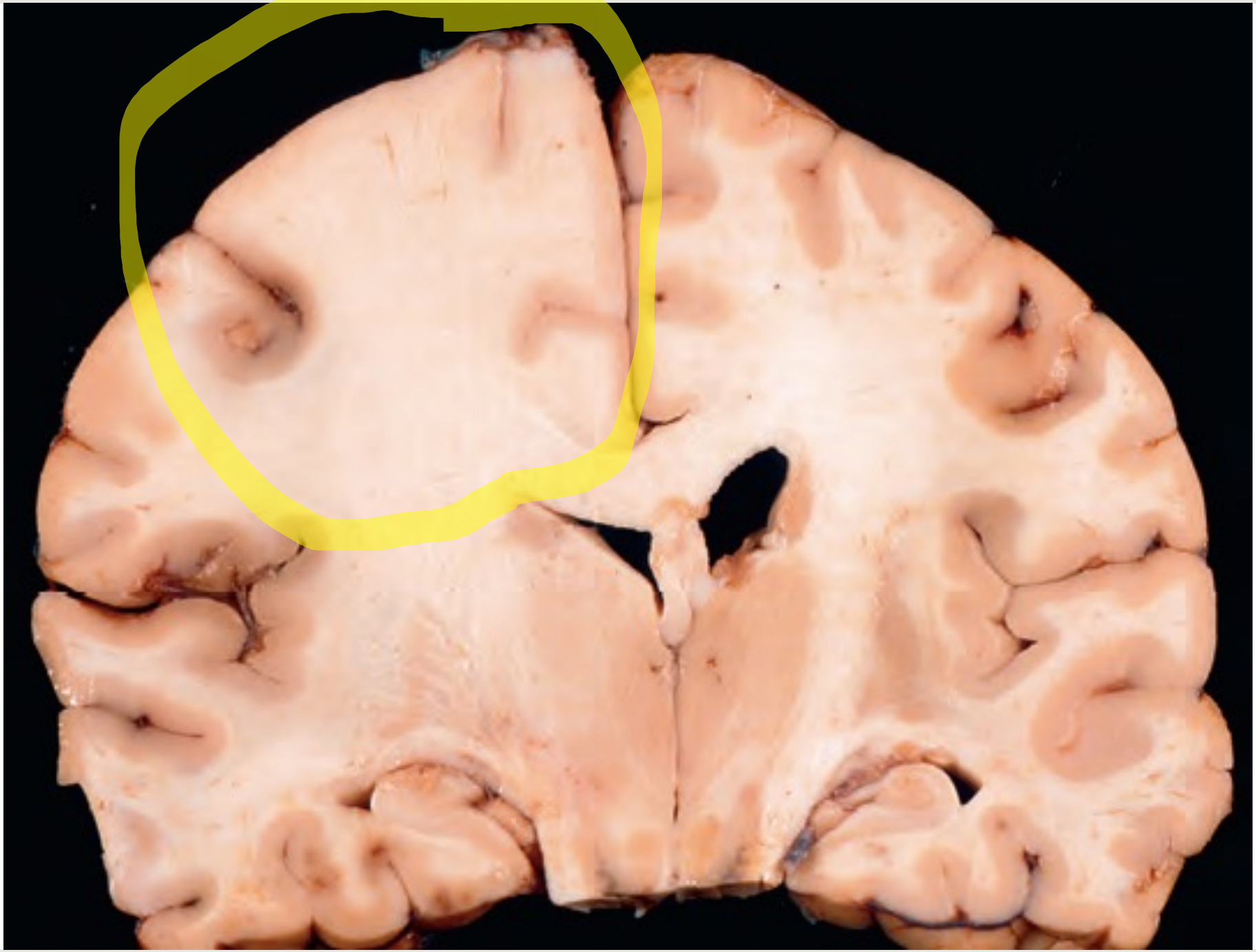
GRADE 4



GRADE 3

Diffuse astrocytoma, WHO grade 2 & 3, macroscopic:

- poorly defined, infiltrative tumors
- expand and distort the invaded brain
- NO discrete mass
- Infiltration beyond the grossly evident margins.
- +/- cystic degeneration



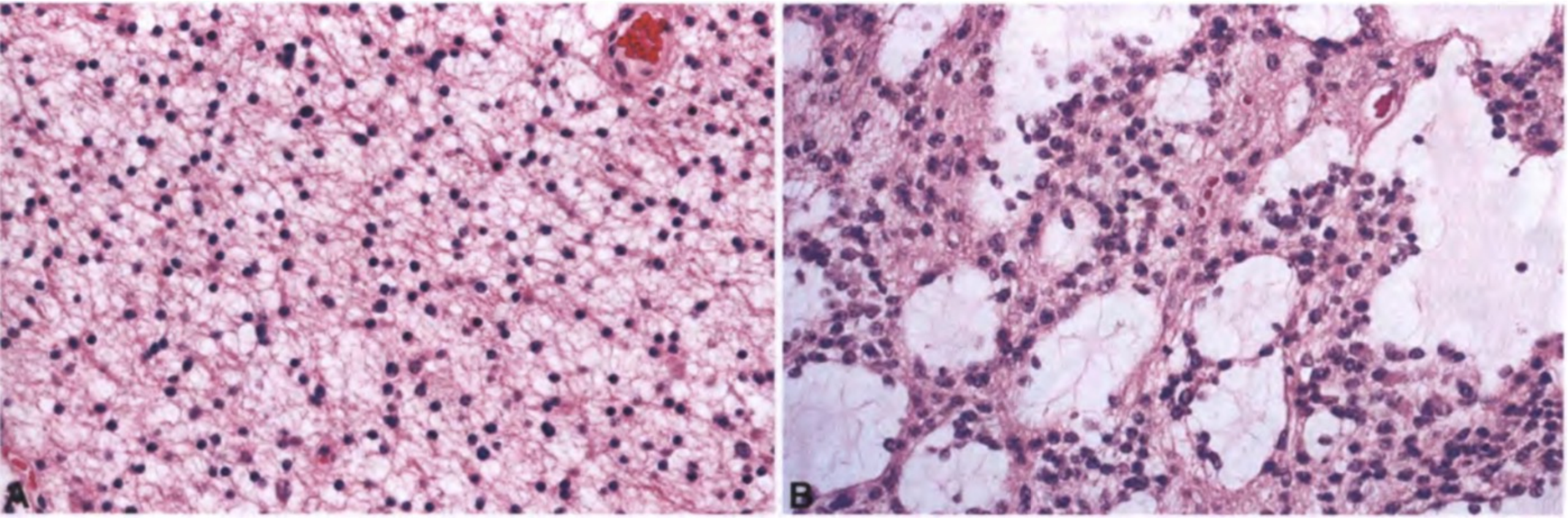
Diffuse astrocytoma, WHO grade 2, Microscopic:

- The transition between neoplastic and normal tissue is indistinct
- tumor cells infiltrate normal tissue many centimeters from the main lesion.

- **Hypercellular** (compared to normal white matter): **mild to moderate** increase in the number of glial cells.
- **Cytologic atypia**:
  - mild
  - enlarged, elongated or irregular hyperchromatic nuclei
  - No prominent atypia

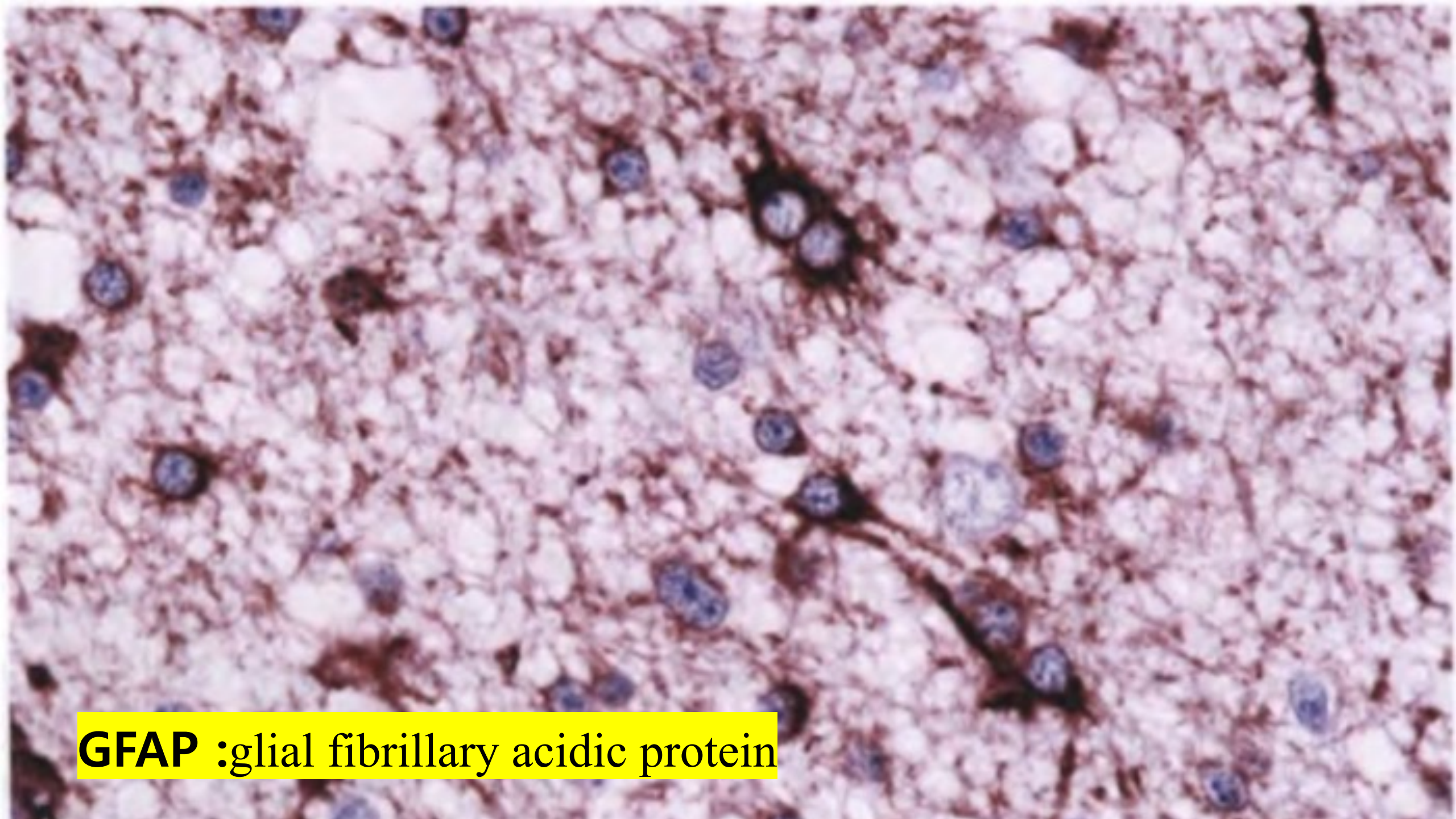
+ **fibrillary background** made of fine astrocytic cell processes

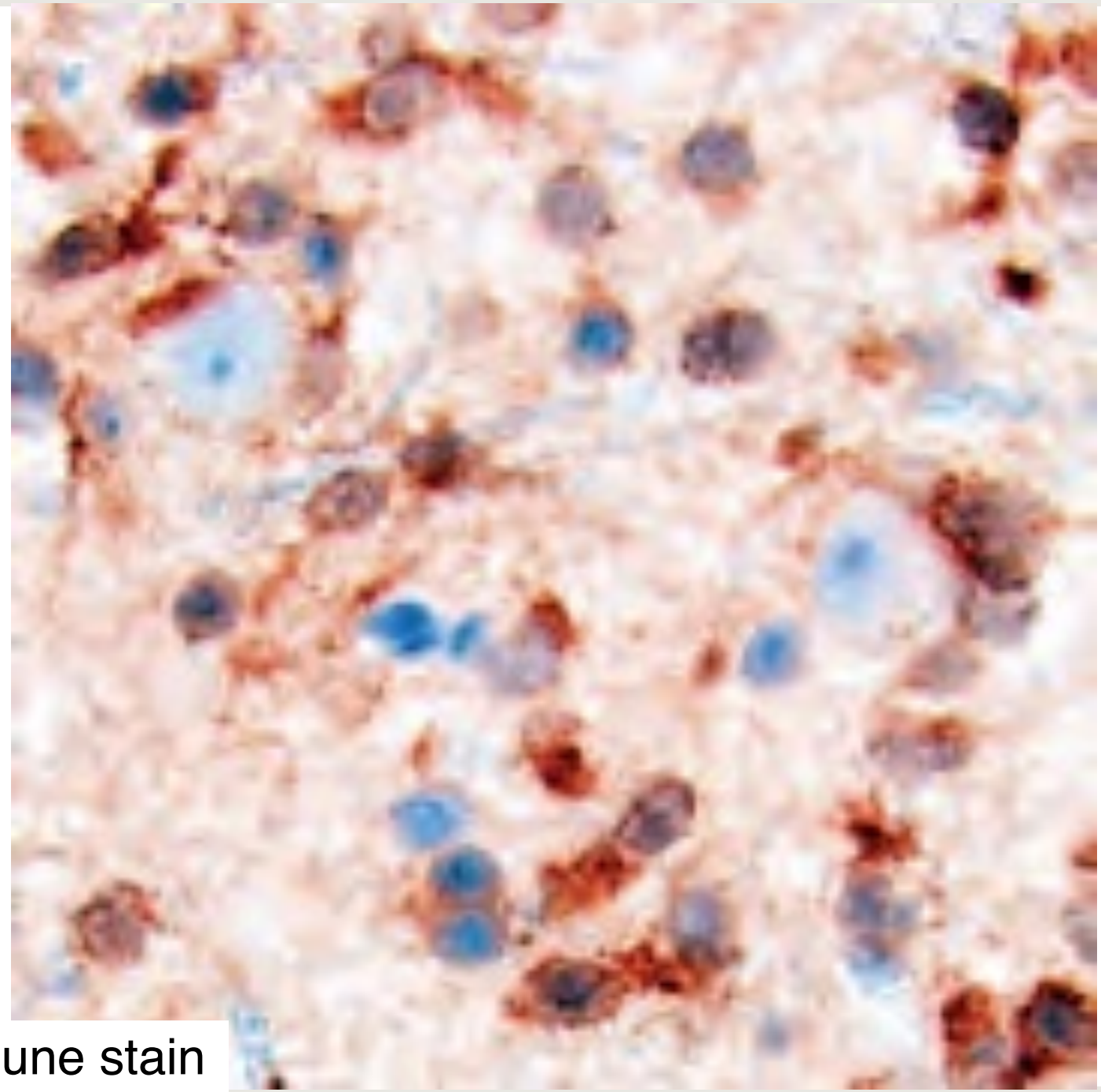
- **NO or rare** Mitotic activity
- **NO** necrosis
- **NO** microvascular proliferation



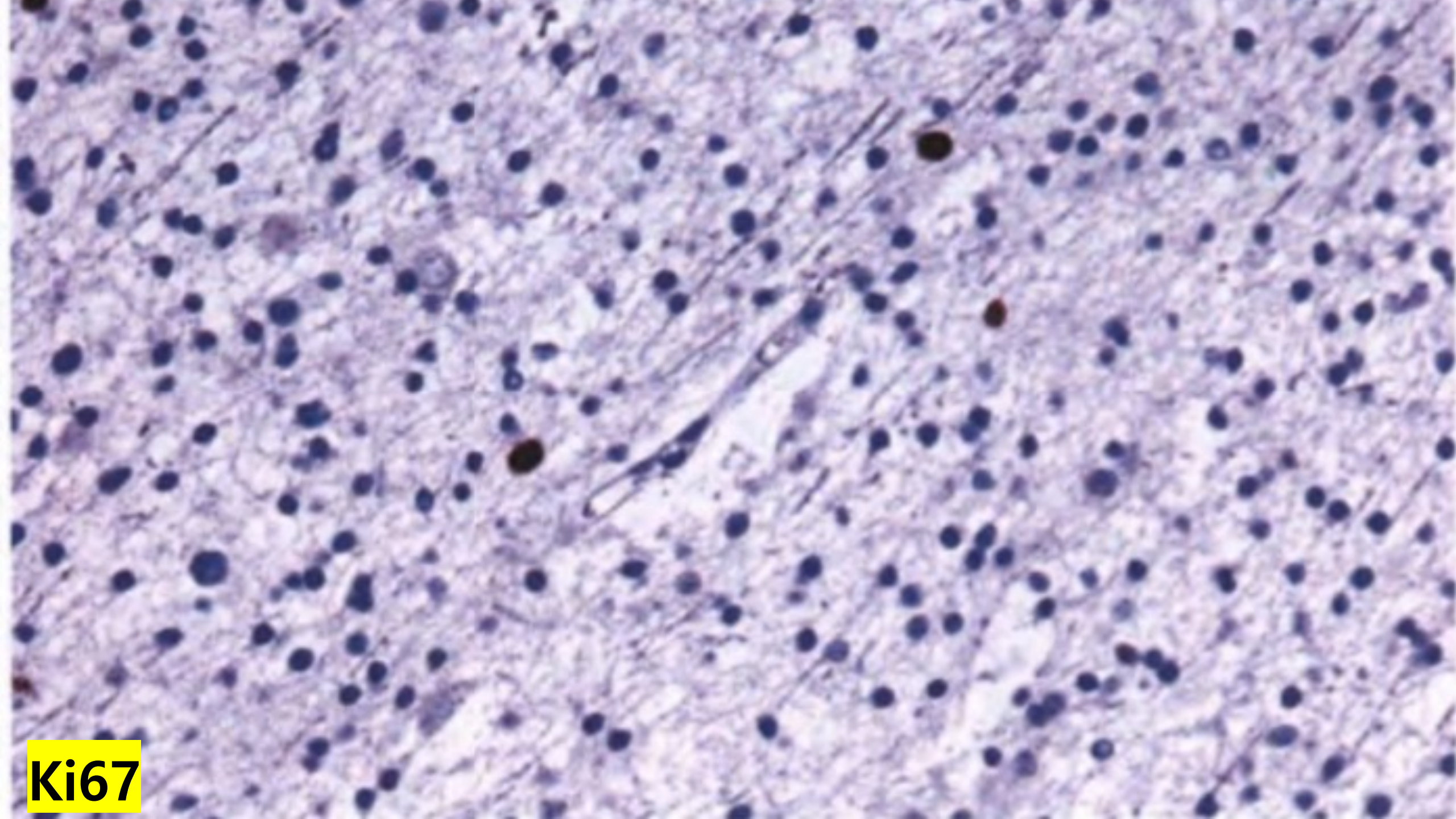
WHO classification of tumors of the central nervous system revised 4th edition,2016,

microcyst formation

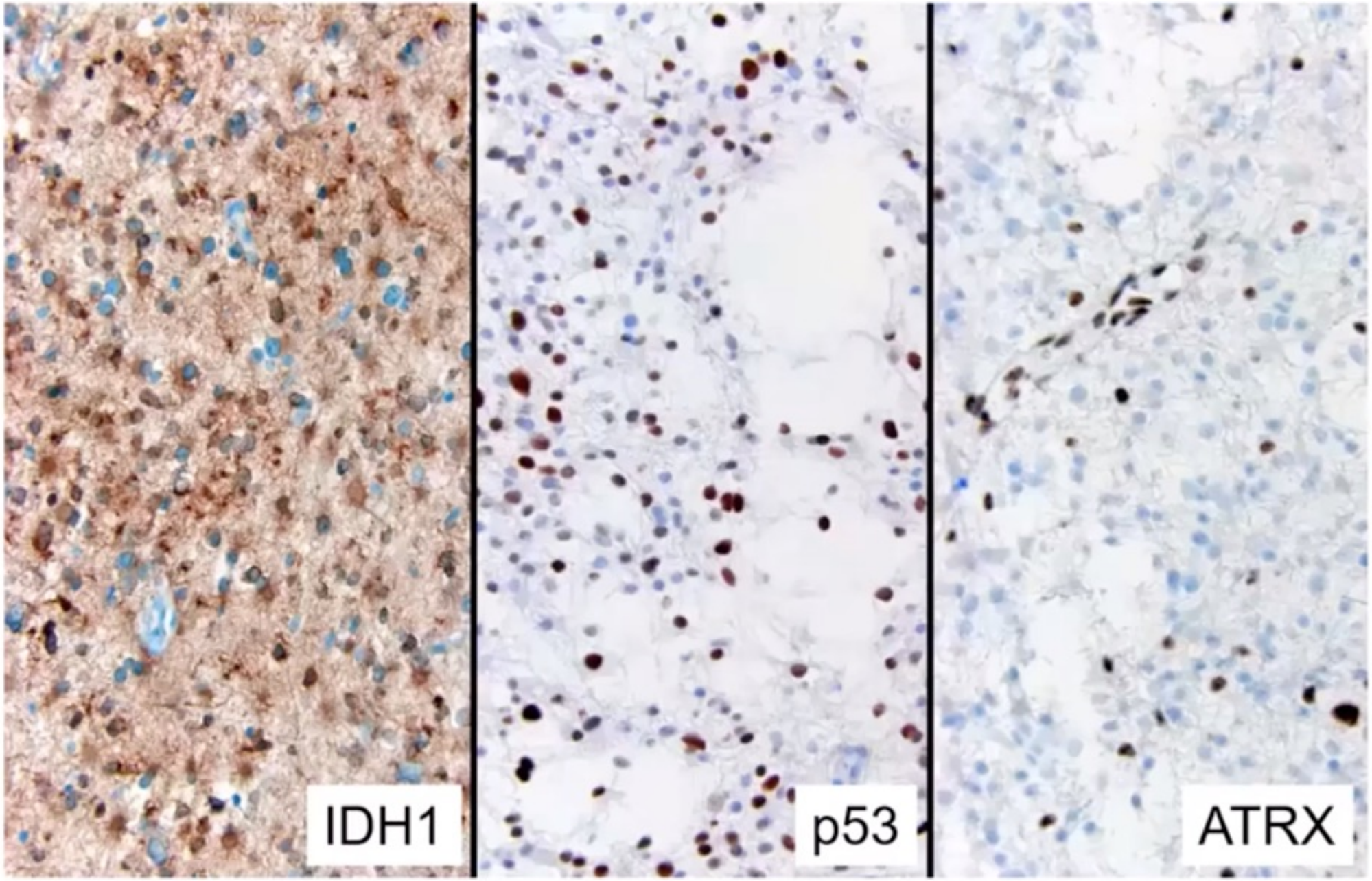

GFAP :glial fibrillary acidic protein

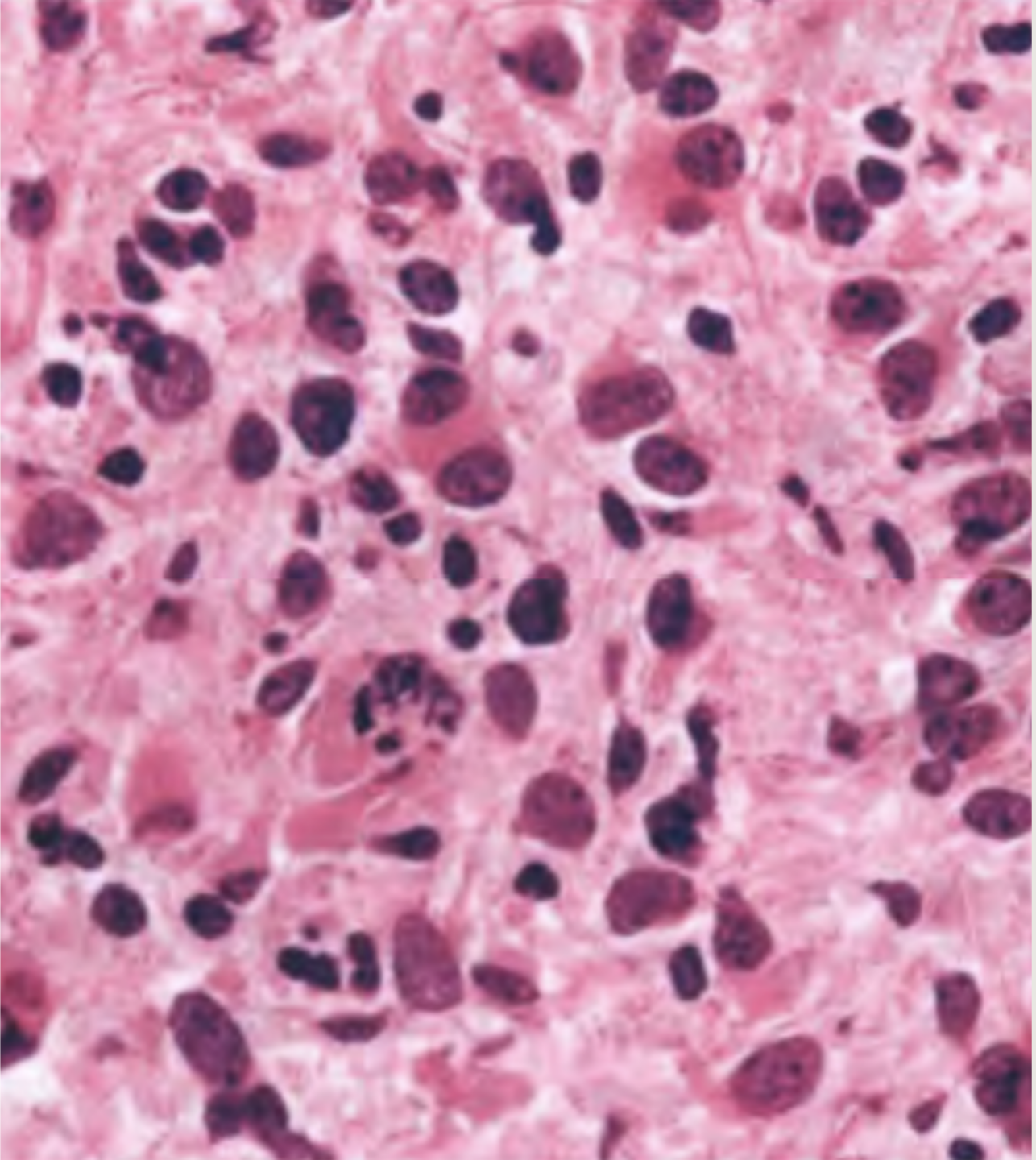


IDH1 R132H immune stain


Ki67

Astrocytoma, IDH-mutant, CNS WHO grades 2-4

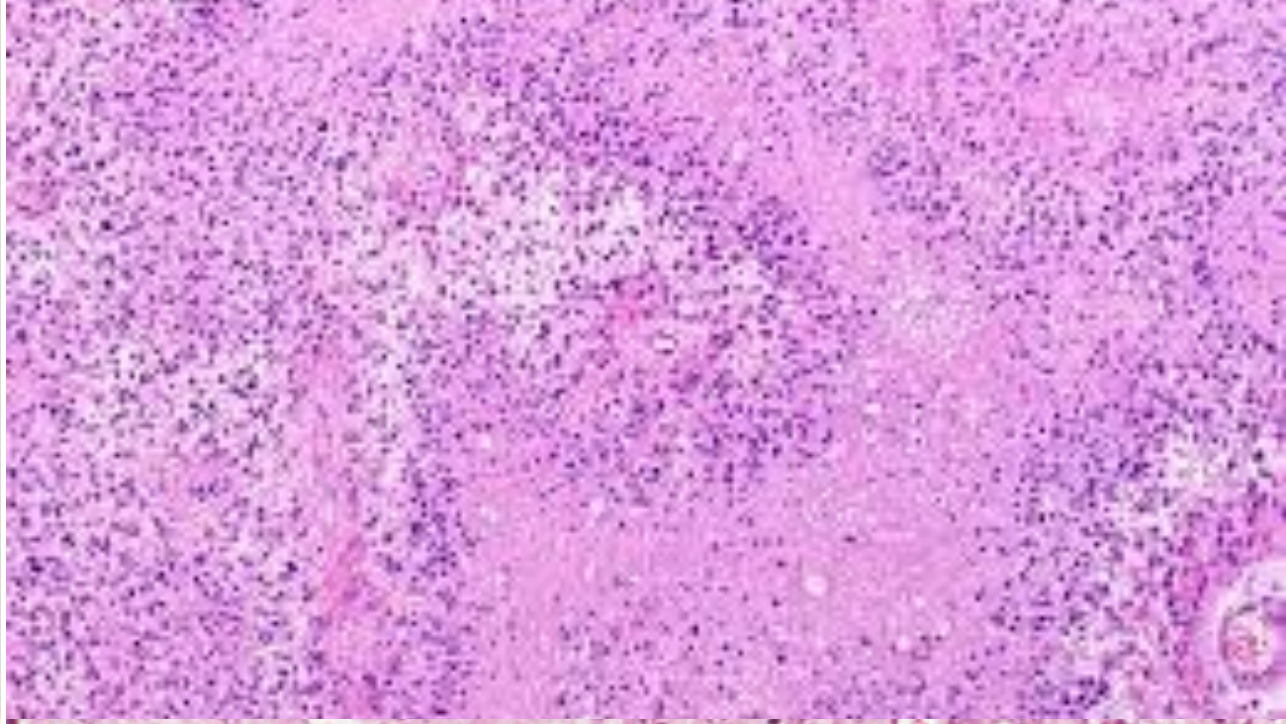


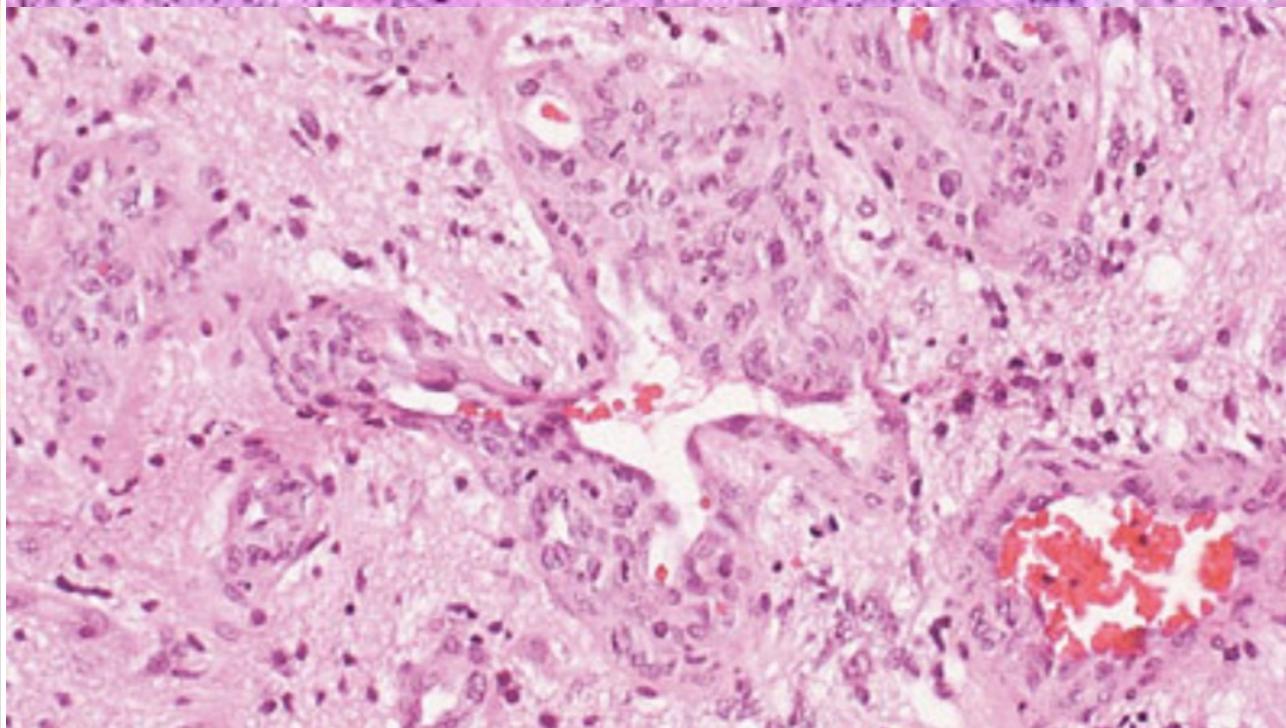


Anaplastic astrocytoma, grade 3:

- cellular
- nuclear pleomorphism
- mitotic figures are **present**
- **NO** necrosis
- **NO** microvascular proliferation

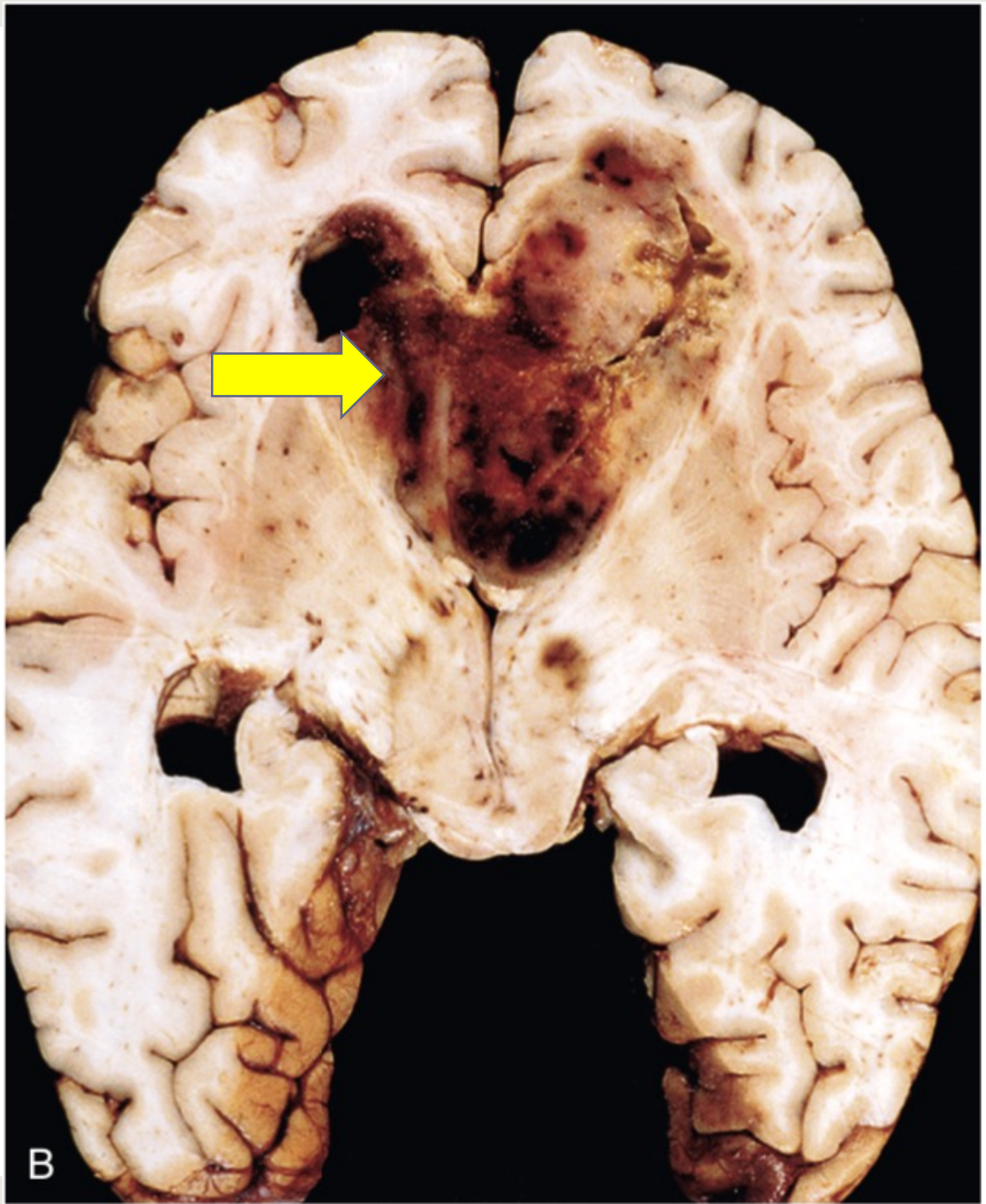
Glioblastomas, grade 4:





Macroscopic:

- variation in the gross appearance of the tumor from region to region is characteristic (was called **glioblastoma multiforme**).
- Some areas are firm and white, others are soft and yellow (due to tissue necrosis), others show regions of cystic degeneration and hemorrhage.



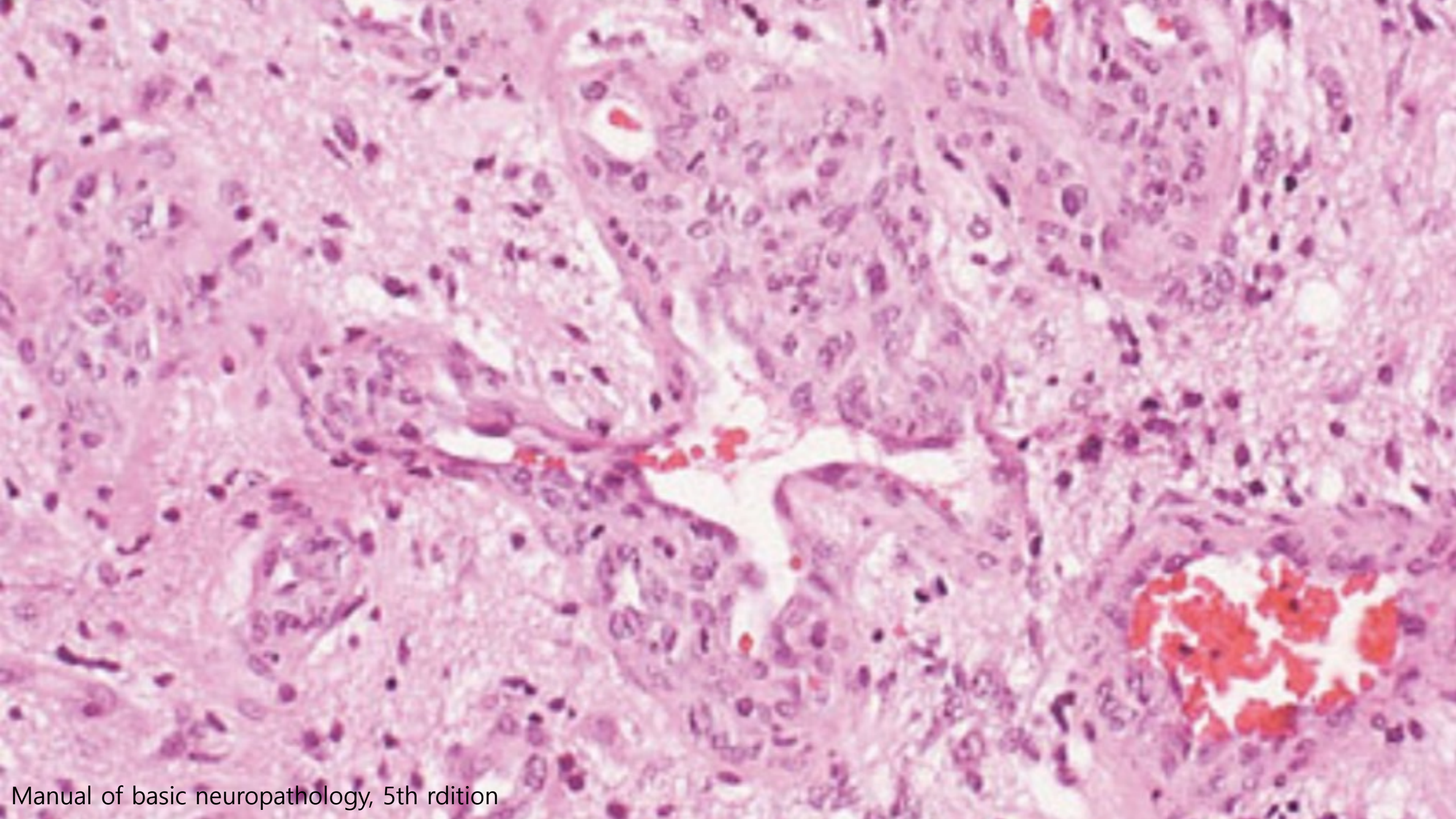
- **Microscopic:**
  - anaplastic astrocytoma features + either:

Necrosis: irregular zones of necrosis surrounded by dense accumulations of tumor cells (**palisading necrosis)**

or

microvascular proliferation:

the presence of abnormal vessels with walls composed **2** ≥ layers of vascular wall cells.



Manual of basic neuropathology, 5th rdition

Circumscribed astrocytic gliomas

Pilocytic Astrocytoma, WHO grade 1

- **Age at presentation:** children and young adults.
- **Location:**
  - cerebellum (especially in children)
  - Optic nerve
  - Midline locations: Brainstem, optic chiasm/ hypothalamus, basal ganglia
  - Spinal cord
  - Cerebral hemispheres: Rare in children but happens in adults

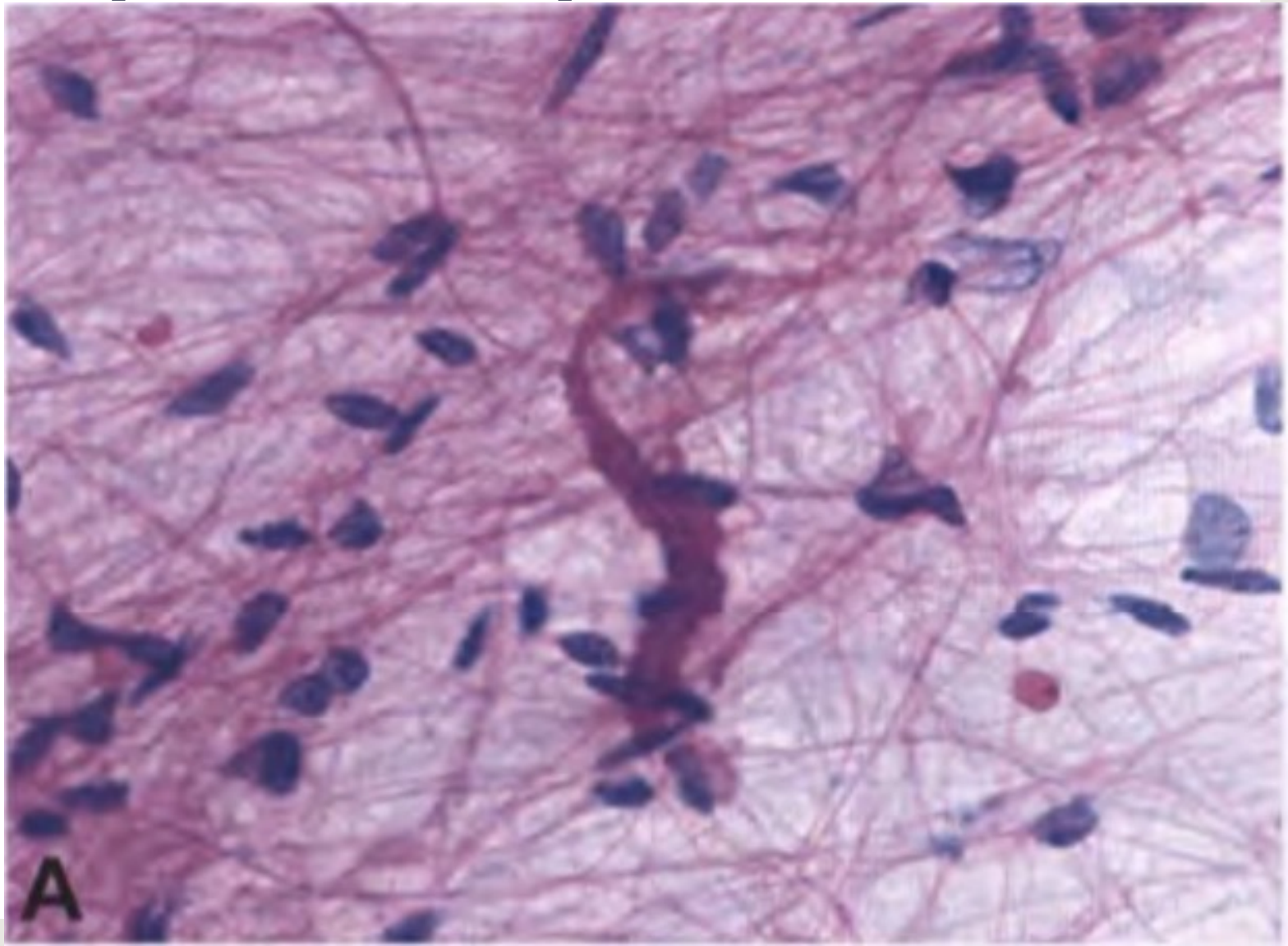
- **Molecular profile:**
  - activating mutations or translocations involving the gene encoding the BRAF→ resulting in activation of the MAPK signaling pathway.

- **do not have mutations in IDH1 and IDH2,** supporting their distinction from the low-grade diffuse gliomas.

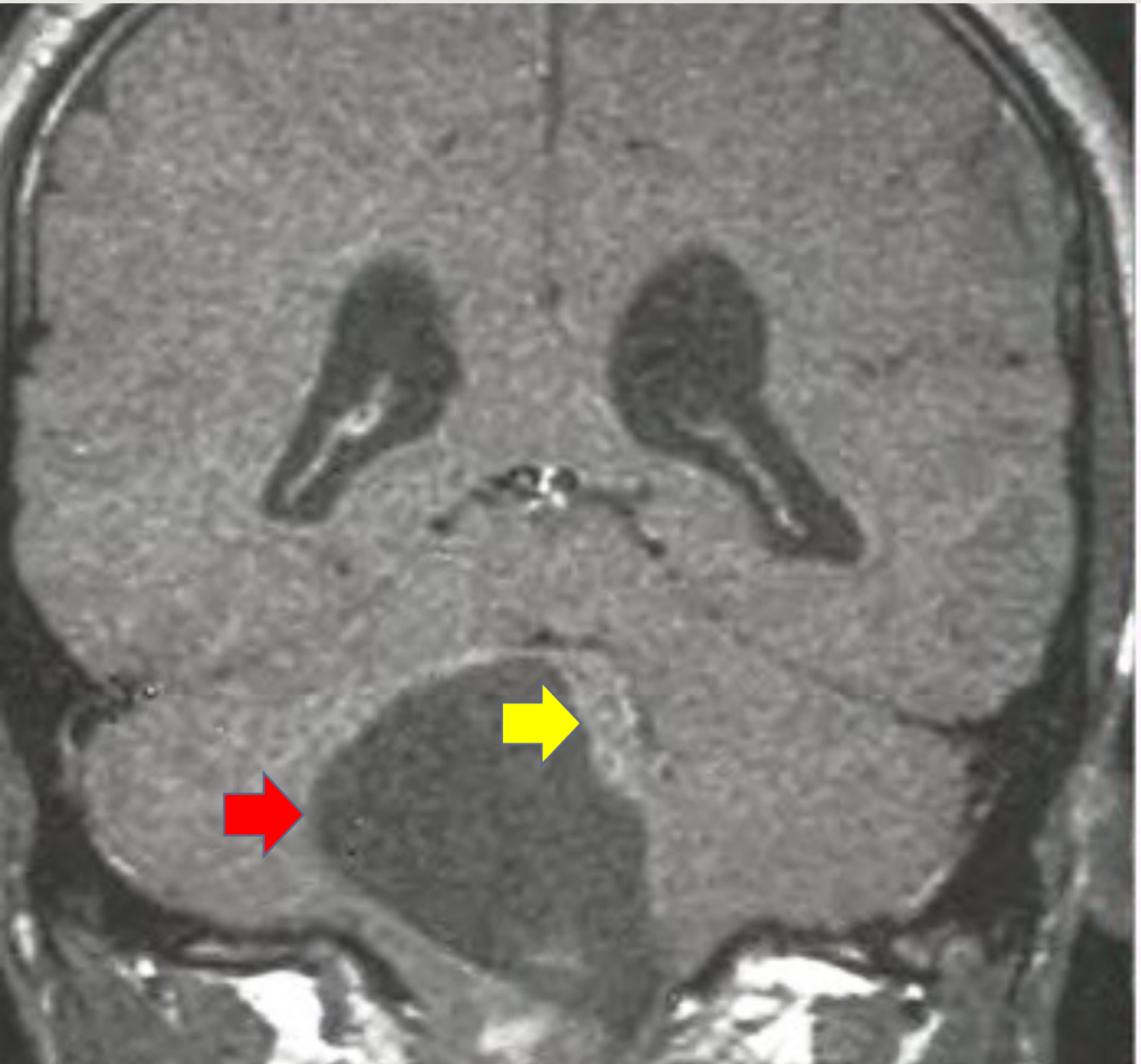
- **Macroscopic:**
  - well circumscribed (discrete) Cystic tumor +/- calcifications

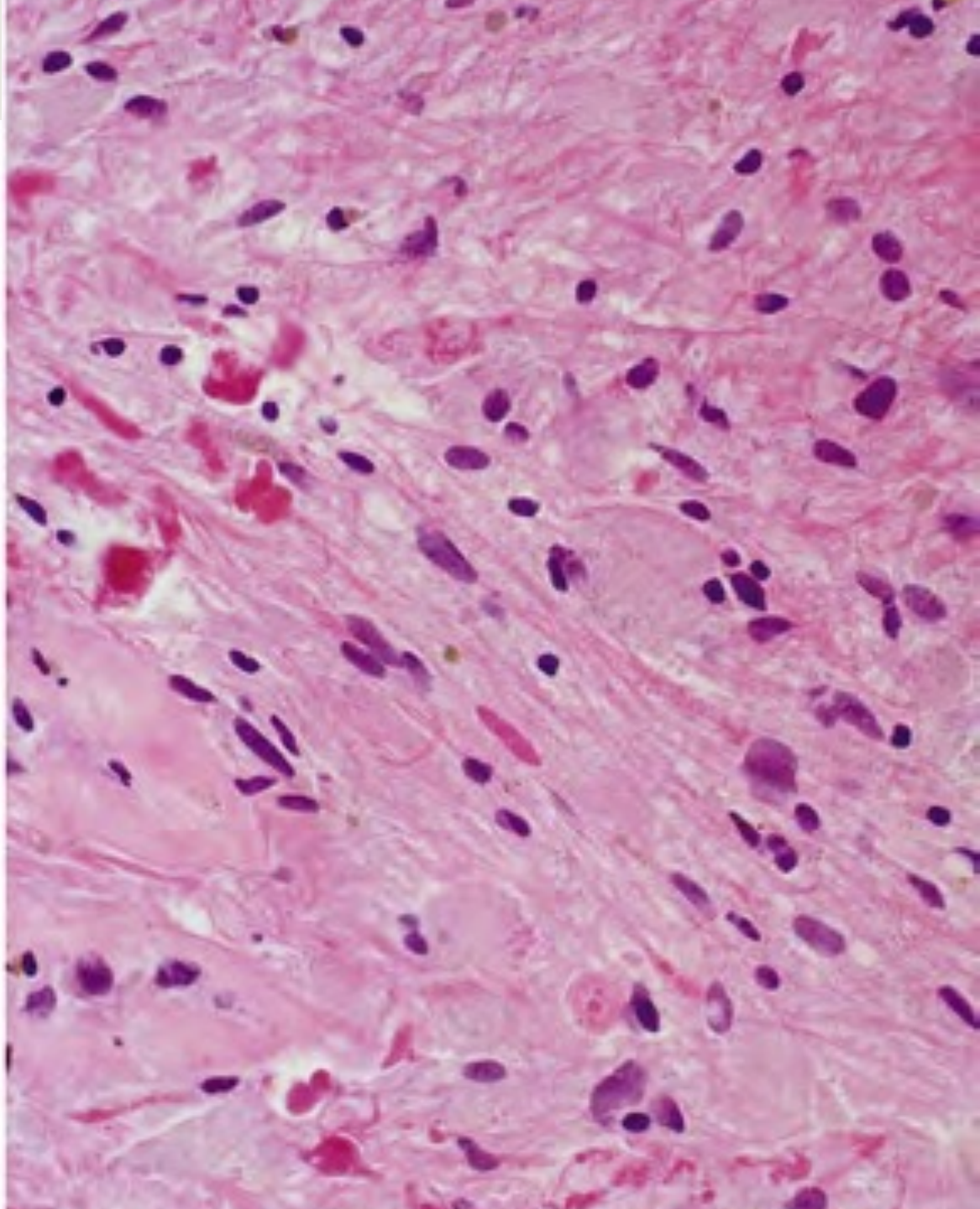
Morphology, microscopic:

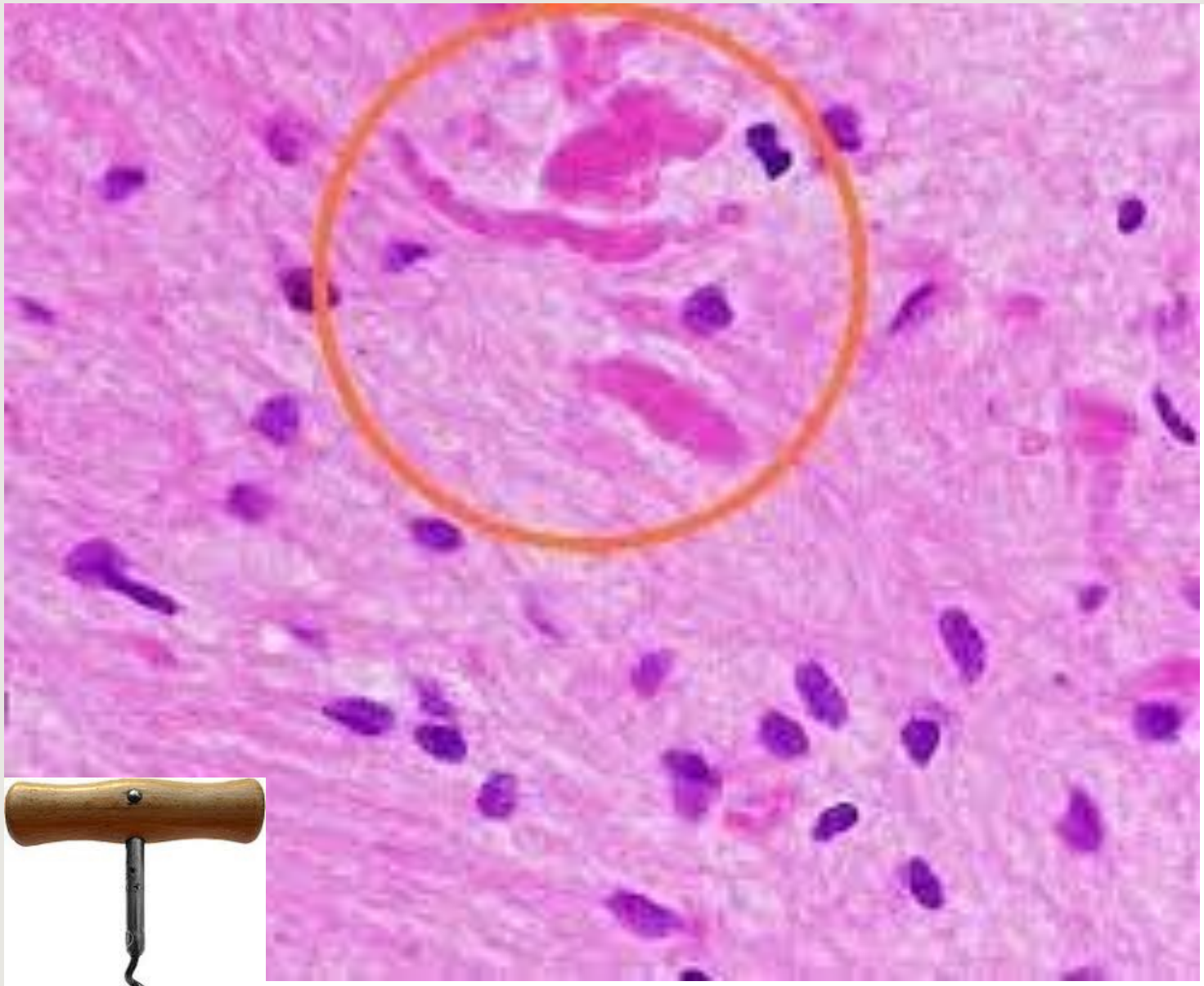
- bipolar cells with long, thin GFAP positive “hairlike” processes
- Rosenthal fibers
- eosinophilic granular bodies
- microcysts are often present
- necrosis and mitoses are rare.



well circumscribed, cystic with a mural nodule in the wall of the cyst or solid

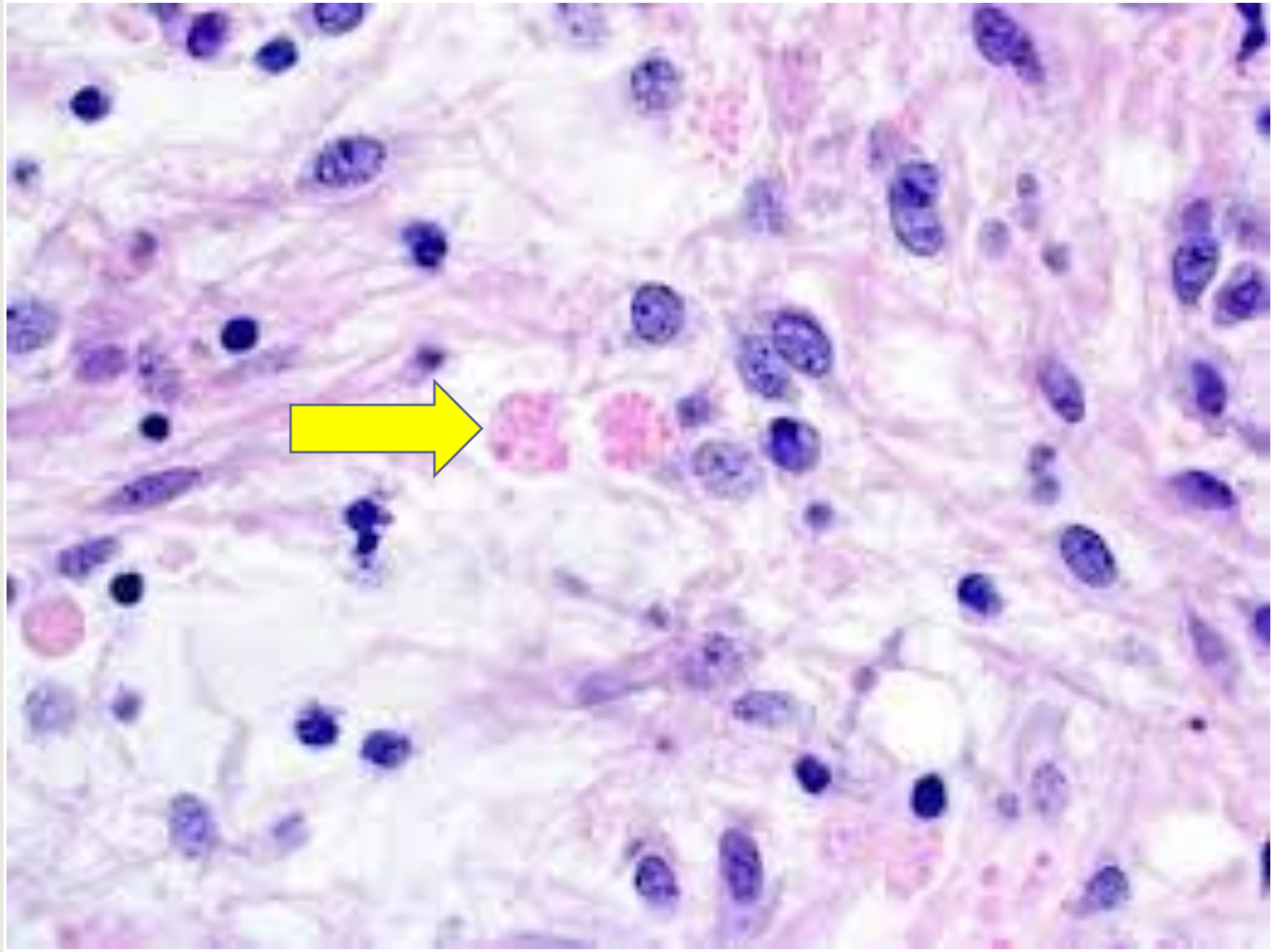






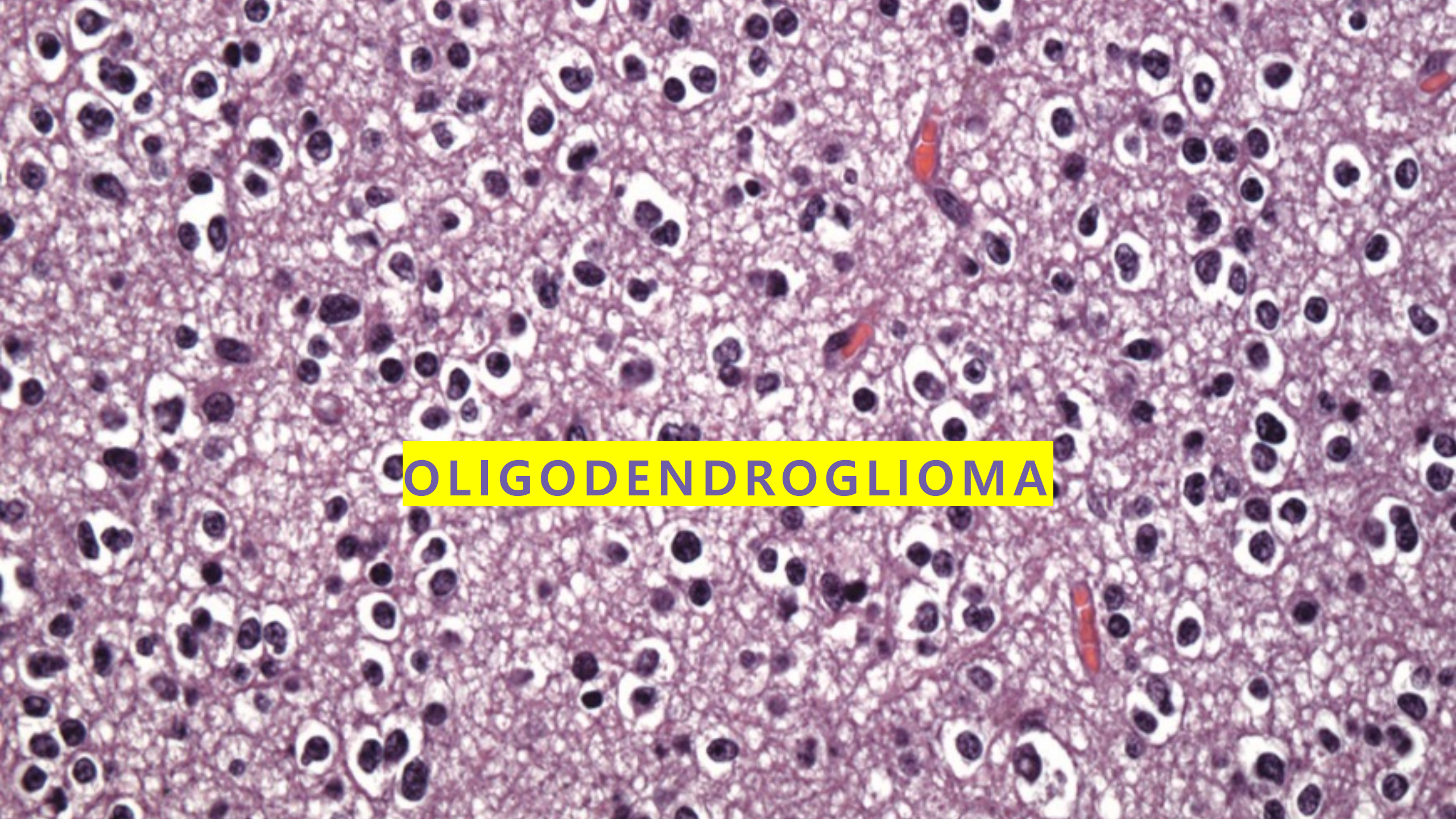
Rosenthal fibers

- brightly eosinophilic corkscrew shaped structures within the astrocytic processes
- made of Can be physiologic (gliosis) or pathologic (PA) and Alexander disease



Eosinophilic granular bodies:

rounded hyaline droplets in cytoplasm of astrocytes seen in PA and ganglion-cell tumors.


OLIGODENDROGLIOMA

- Defined as:

A <u>diffusely infiltrating</u>, slow-growing glioma with IDH1 or IDH2 mutation and codeletion of chromosomal arms 1p and 19q.

- Accounts for 5-15% of gliomas

- **Age at diagnosis:** 40-50.

- **Location:** mostly in the cerebral hemispheres, mainly in the frontal or temporal lobes, white matter.

- The combination of surgery, chemotherapy, and radiotherapy yields an average survival of:
- 10-20 years for WHO grade 2.
- 5-10 years for WHO grade 3.

- **Grade 3 is more aggressive than grade 2 oligodendroglioma**

- **Better prognosis than astrocytoma of the same grade!**

- **NO grade 1 OR 4 oligodendroglioma**

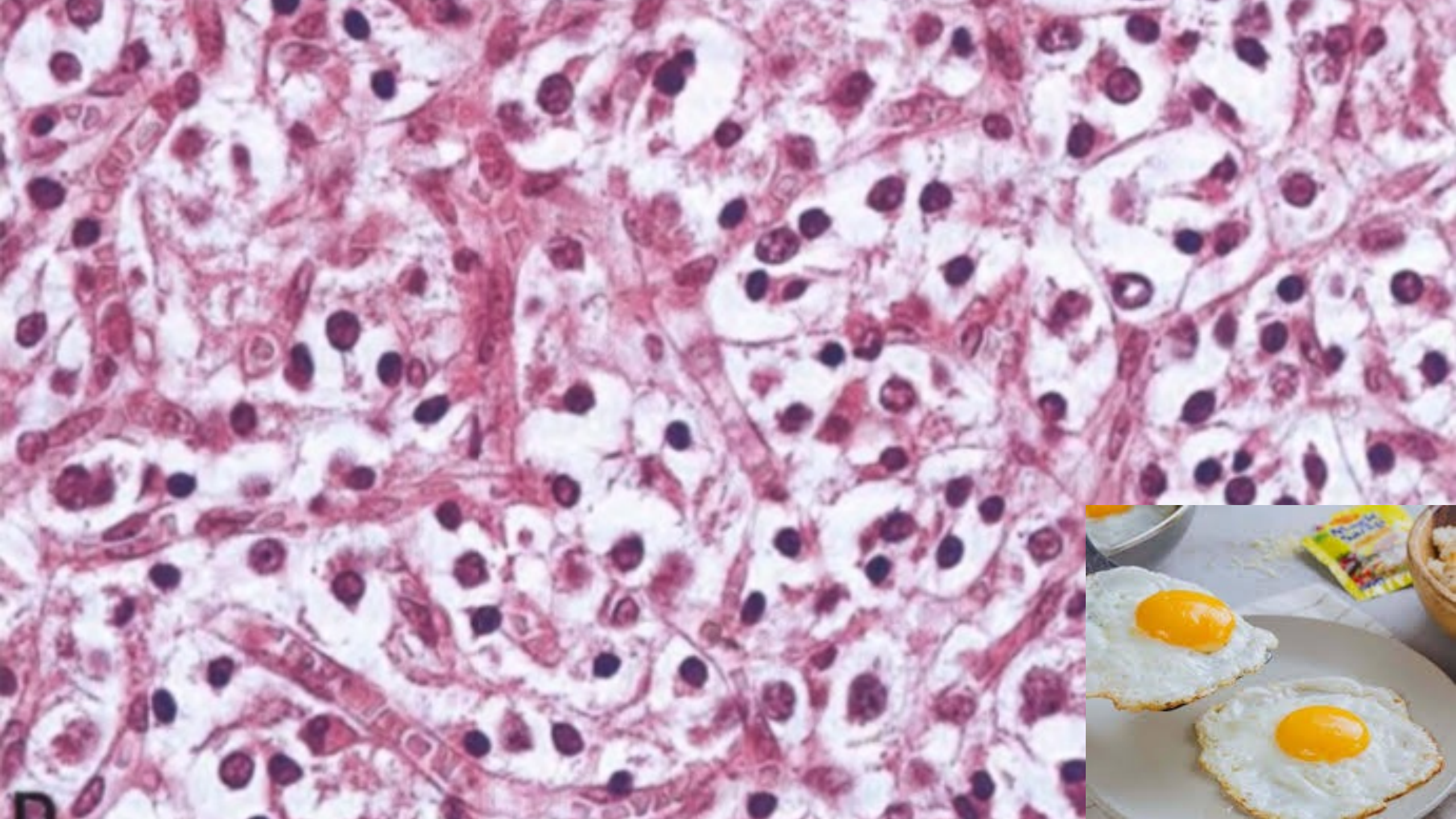
Oligodendroglioma ,WHO grade 2:

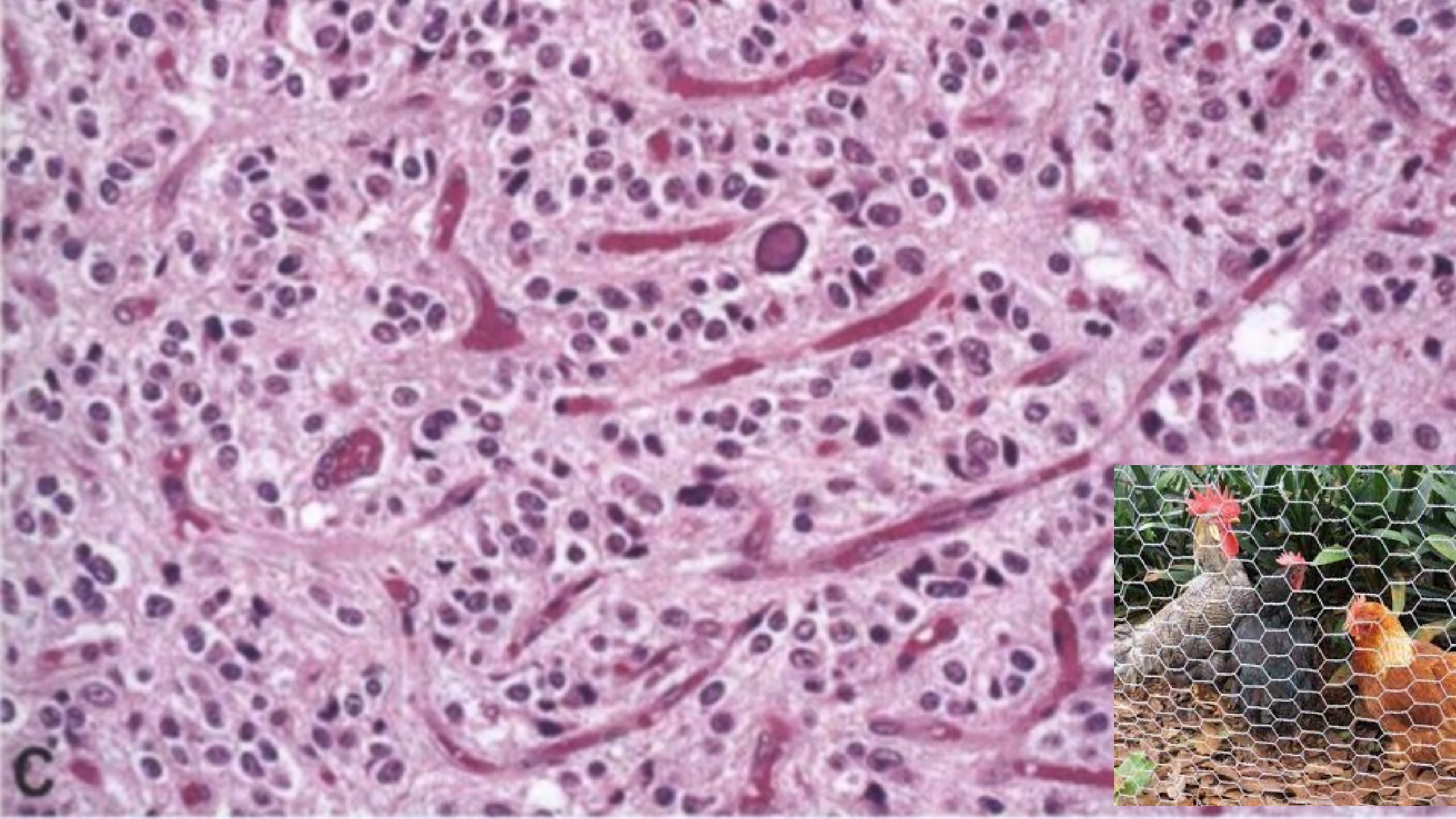
Marcoscopic:

- infiltrative tumors with blurring of grey matter-white matter boundary.
- +/- cystic degeneration, focal hemorrhage, and calcification.

Oligodendroglioma ,WHO grade 2, microscopic:

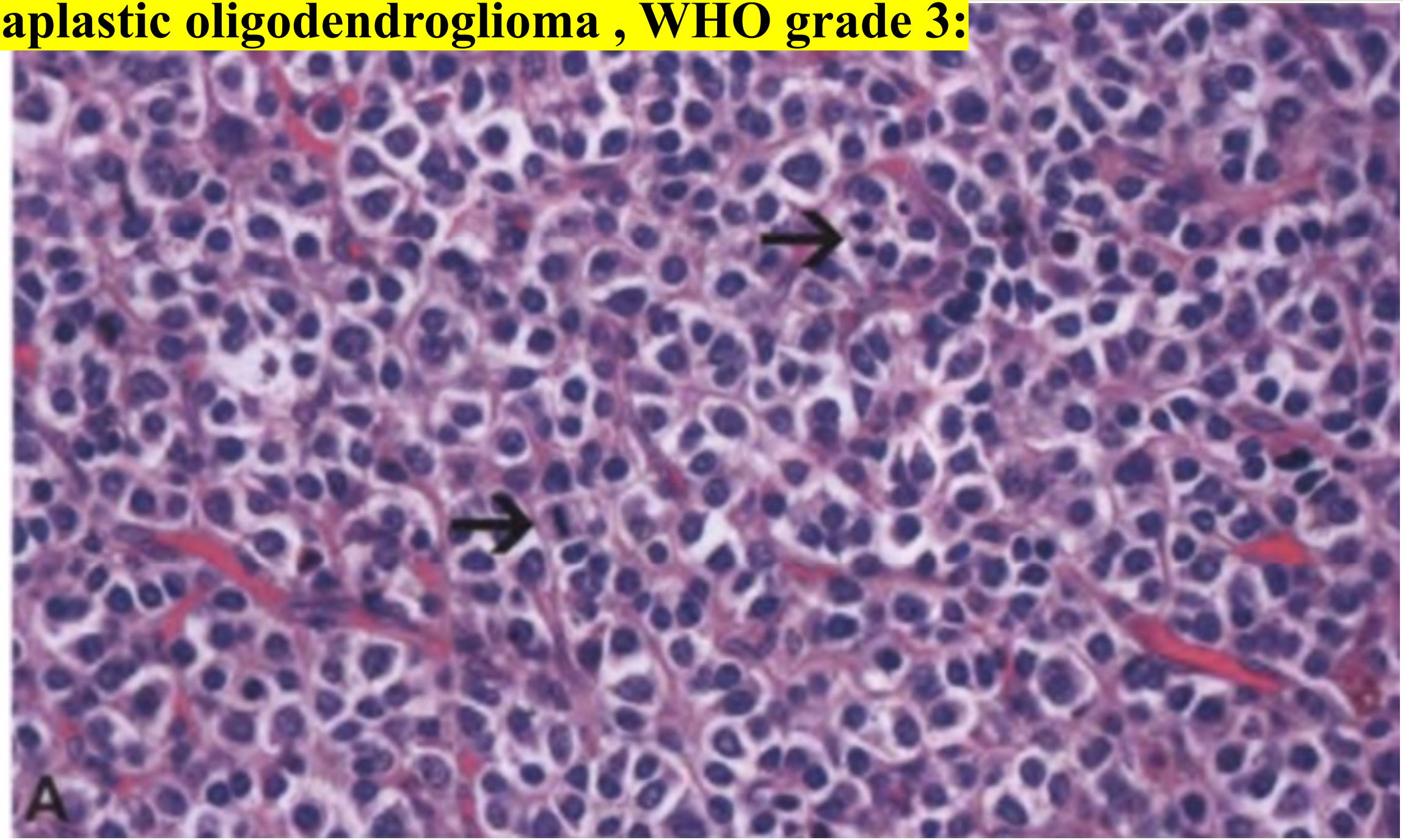
- sheets of regular uniform cells resembling oligodendrocytes
- round nuclei containing finely granular chromatin **(salt and pepper)**
- The nuclei are surrounded by a clear halo of cytoplasm → **fried-egg appearance**.
- delicate network of anastomosing capillaries **"chicken-wire"**





- Calcification in 90% of tumors.
- Mitotic activity usually is **absent or low (Ki67<5%)**
- **No** spontaneous necrosis
- **No** microvascular proliferation

Anaplastic oligodendroglioma , WHO grade 3:



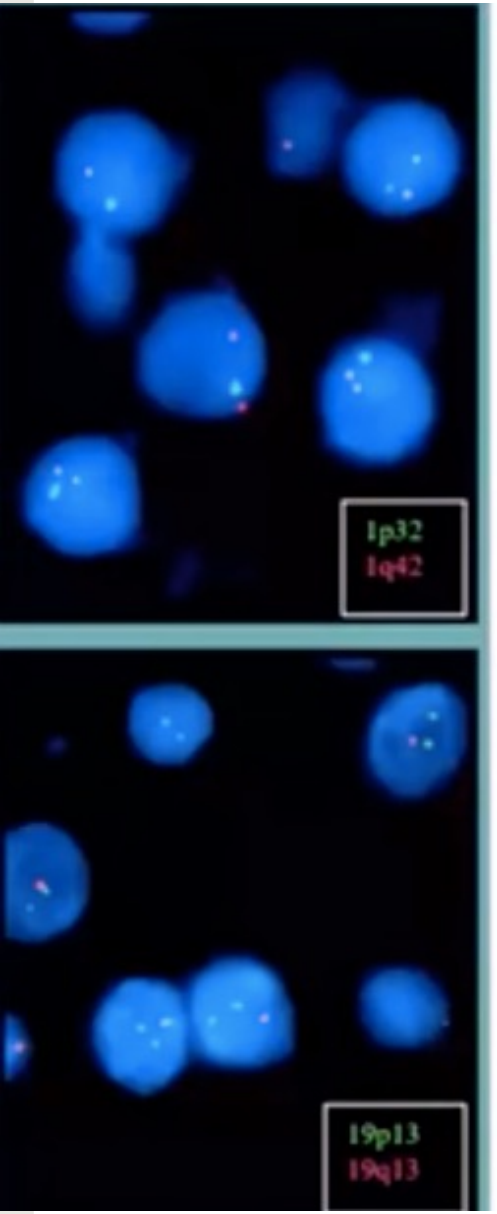
Anaplastic oligodendroglioma , WHO grade 3:

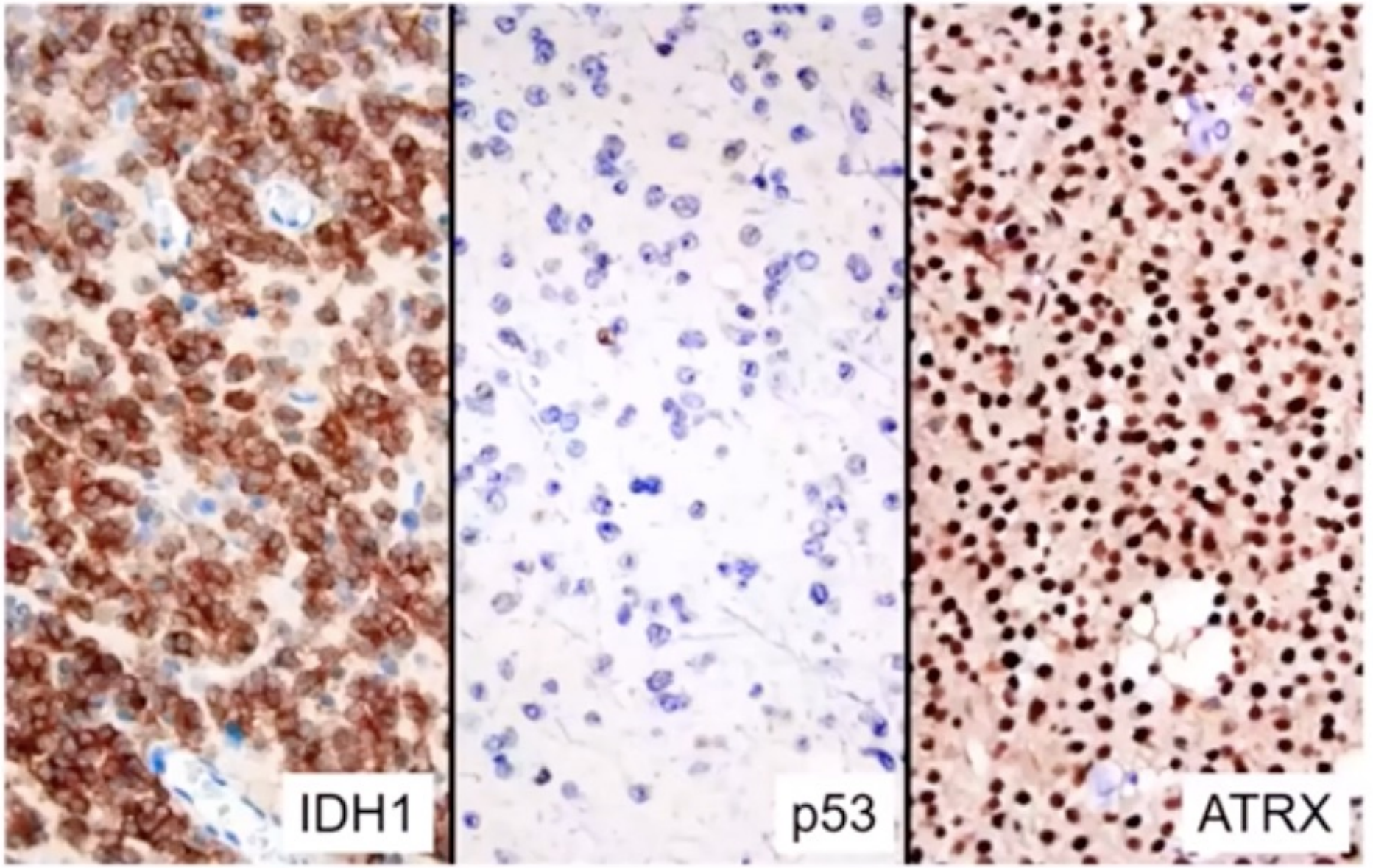
- Defined as: An IDH-mutant and 1p/19q-codeleted oligodendroglioma with focal or diffuse histological features of anaplasia (in particular, **pathological microvascular proliferation and/or brisk mitotic activity with or without necrosis**).

IDHm 1p/19q-codel Oligodendrogliomas, grades 2-3

Essential diagnostic criteria for **oligodendroglioma, IDH-mutant and 1p/19q-codeleted, WHO grade 2**
A diffuse glioma
WITH
an IDH1 codon 132 or IDH2 codon 172 missense mutation*
AND
combined whole arm deletions of 1p and 19q
AND
absence of histological features of anaplasia

Essential diagnostic criteria for **oligodendroglioma, IDH-mutant and 1p/19q-codeleted, WHO grade 3**
A diffuse glioma
WITH
an IDH1 codon 132 or IDH2 codon 172 missense mutation*
AND
combined whole arm deletions of 1p and 19q
AND
histological features of anaplasia, including brisk mitotic activity and/or pathological microvascular proliferation with or without necrosis AND/OR homozygous *CDKN2A* deletion**





UPDATE


thank you