# 62nd Annual Diagnostic Slide Session
# American Association of Neuropathologists

## Case 2021-3

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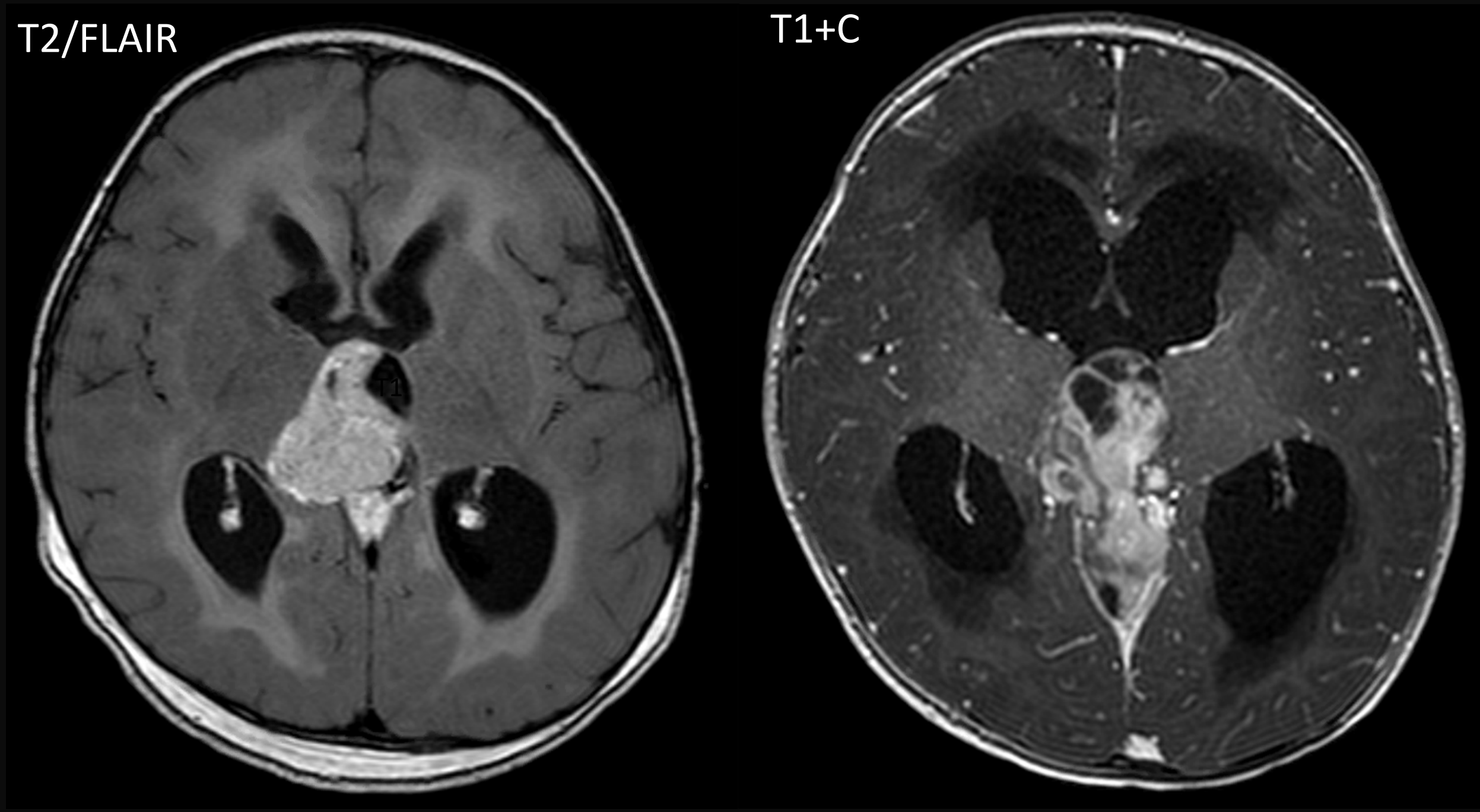
Toronto, ON, Canada

- No disclosures

# Clinical Summary

- **13-month-old boy presented with:**
- A week history of recurrent vomiting and motor regression.


T2/FLAIR
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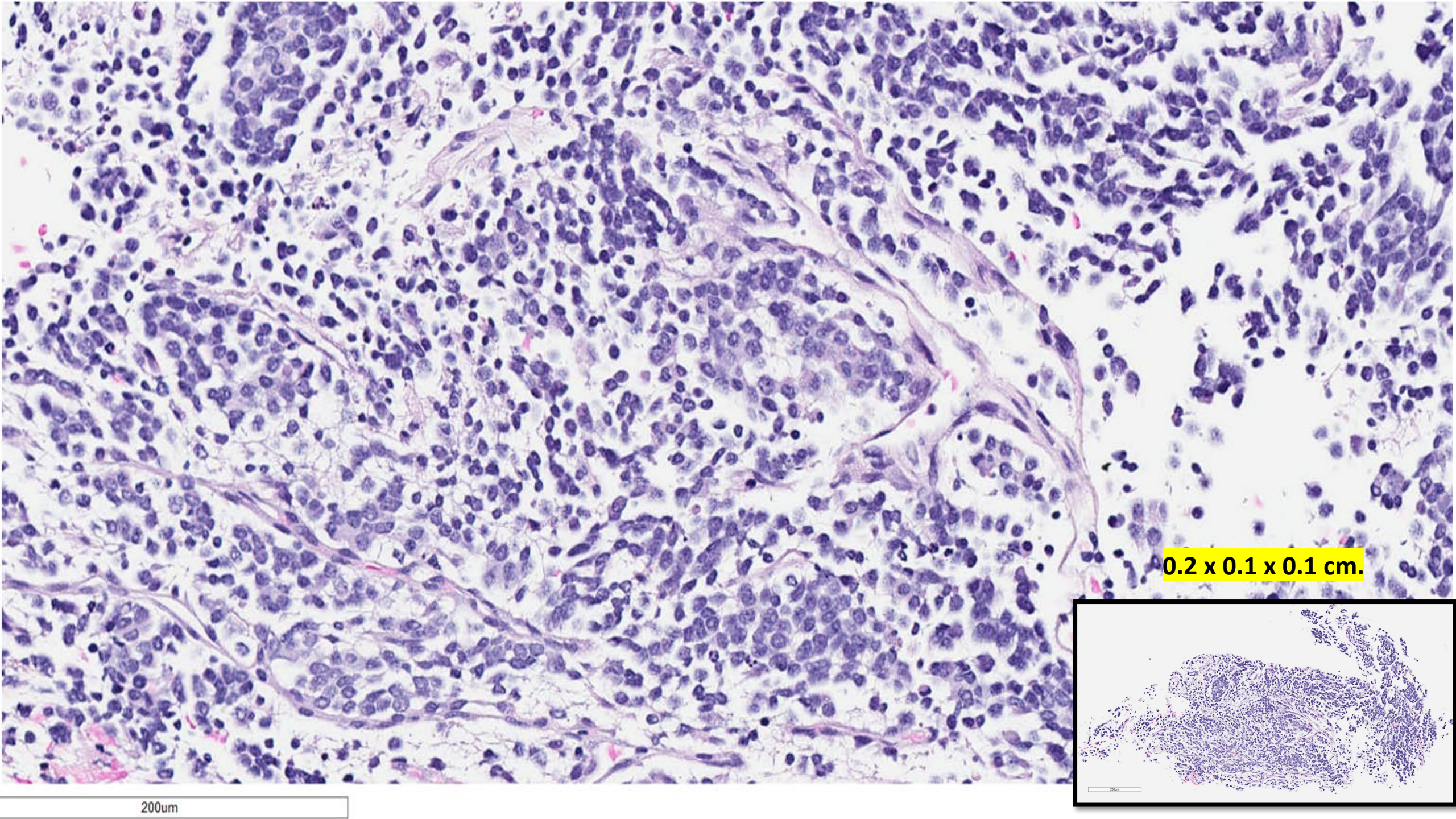
0.2 x 0.1 x 0.1 cm.
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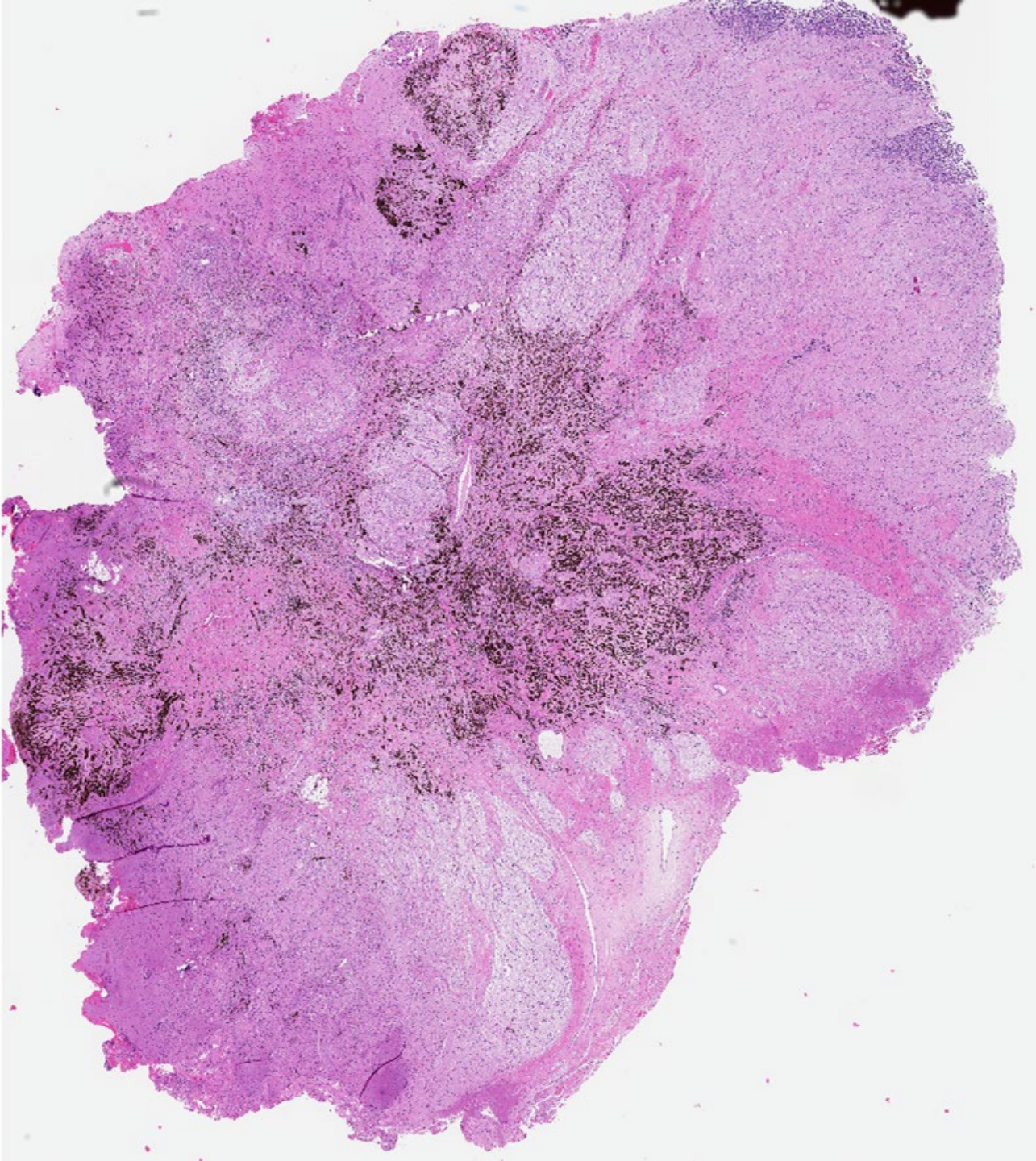

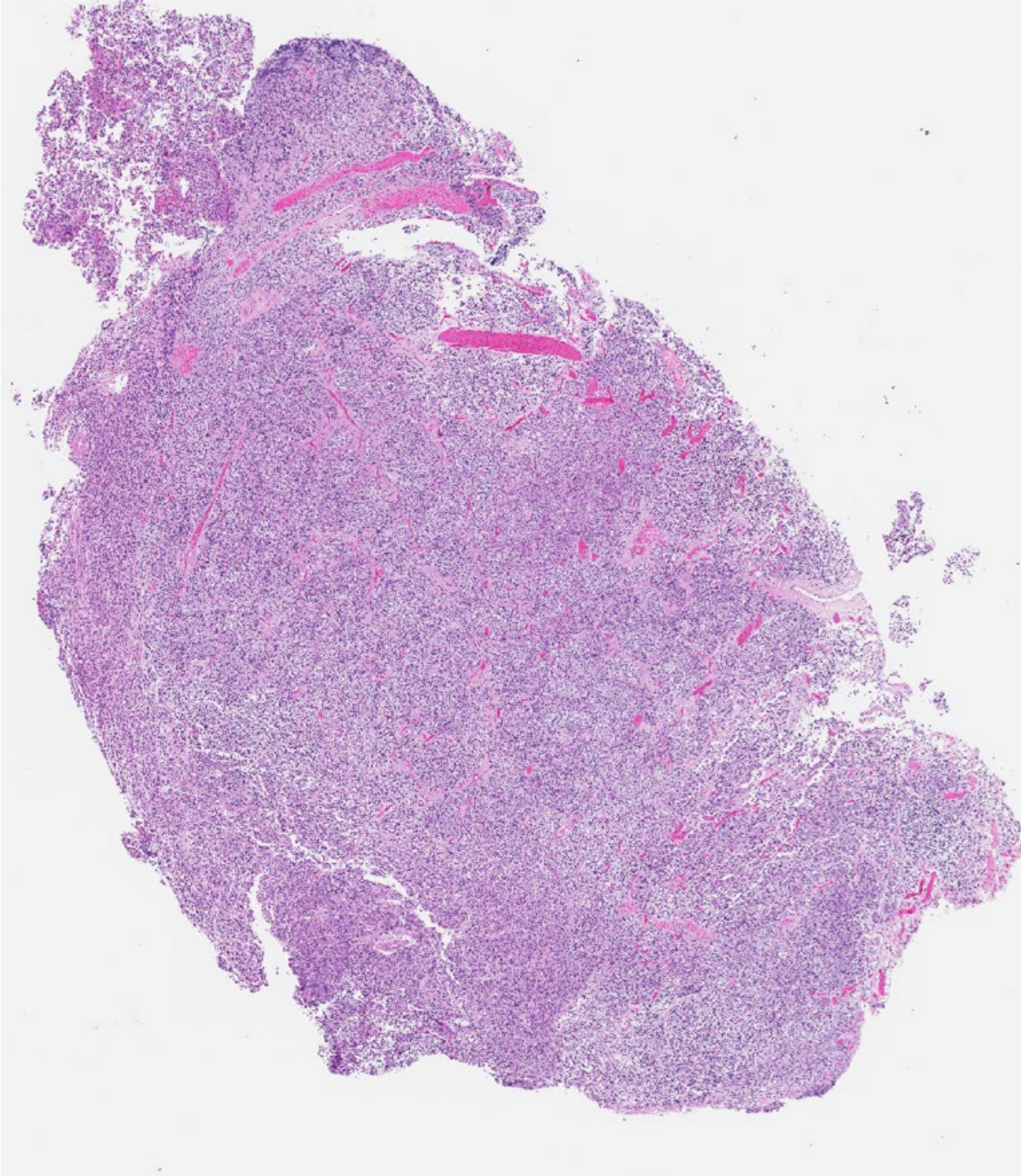

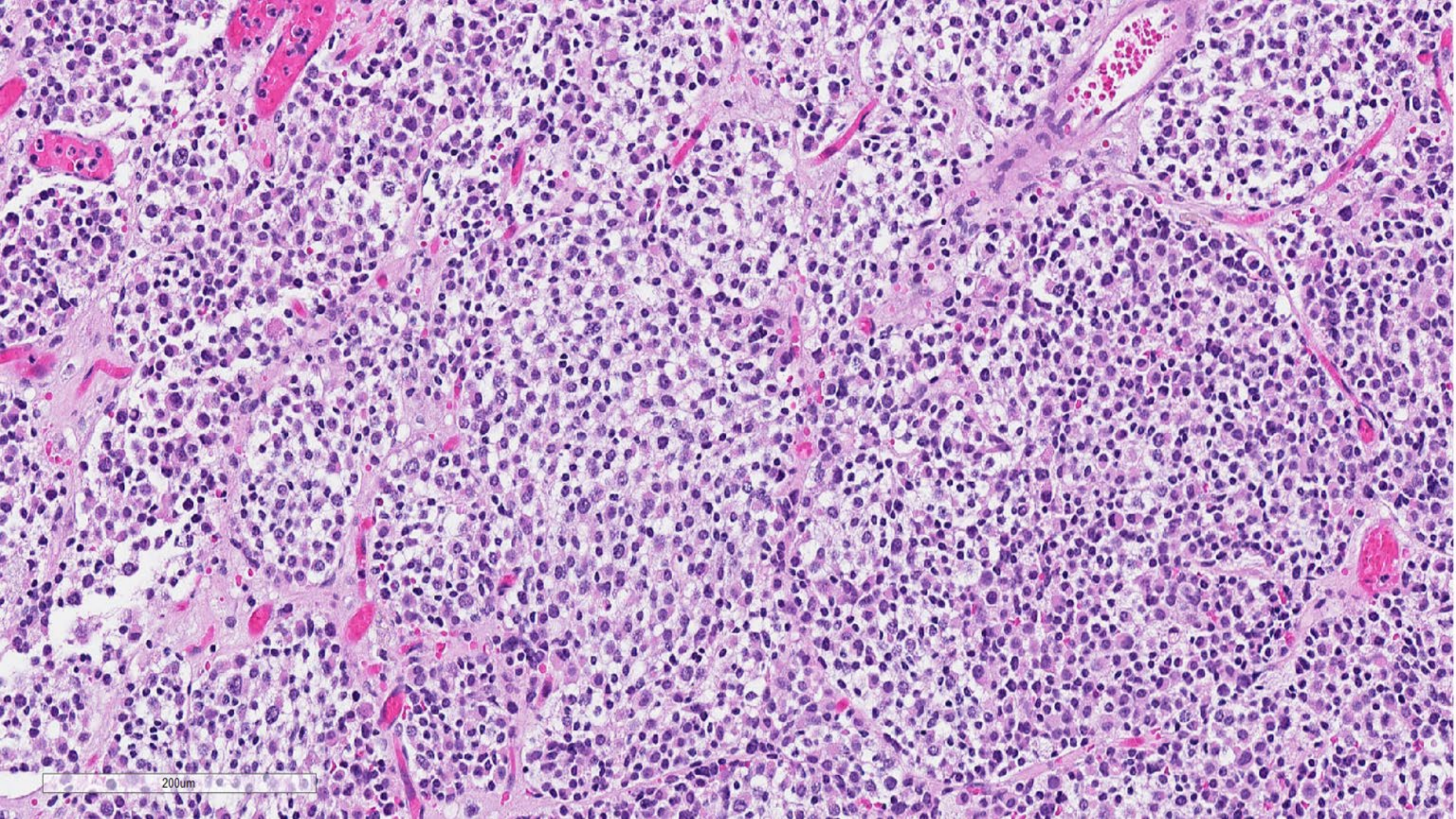
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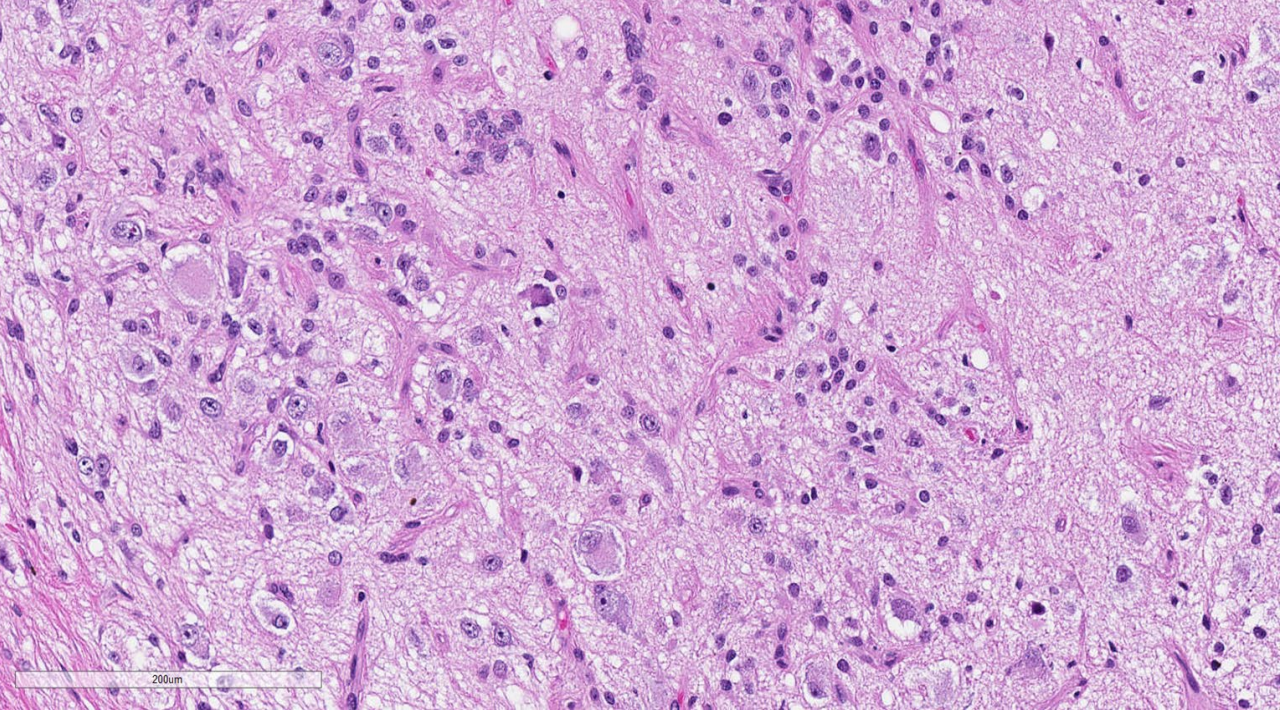
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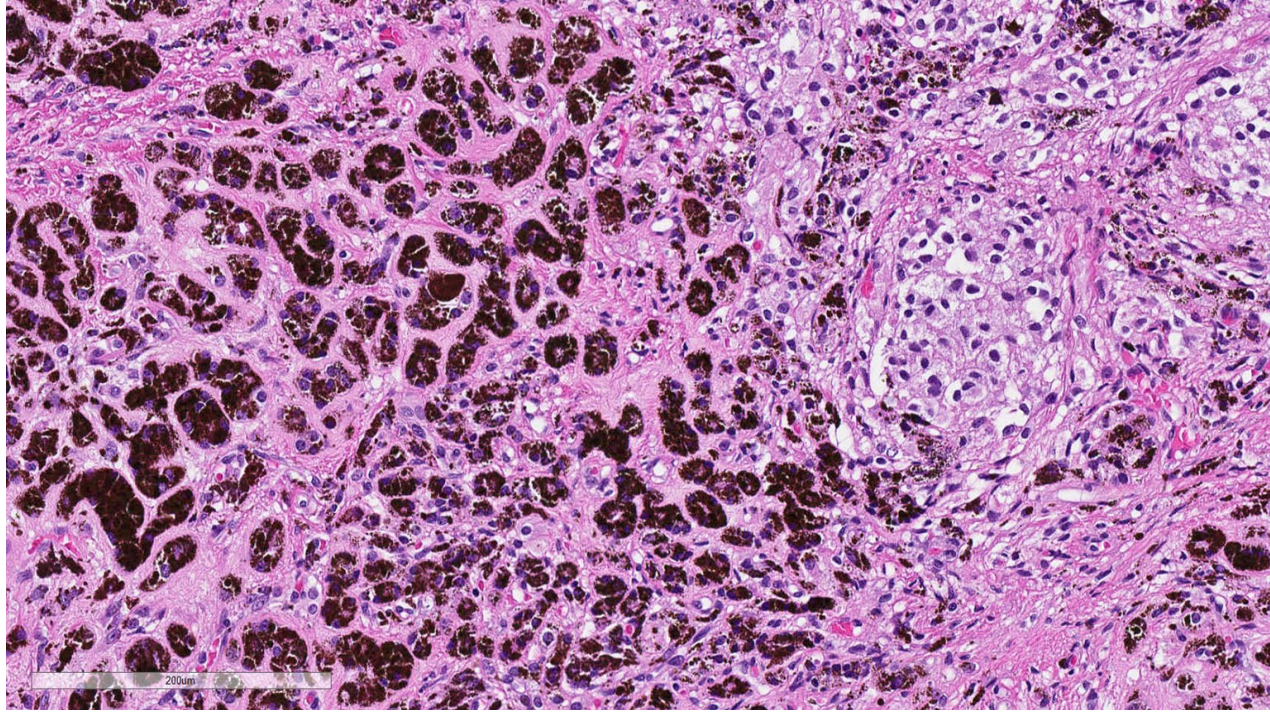
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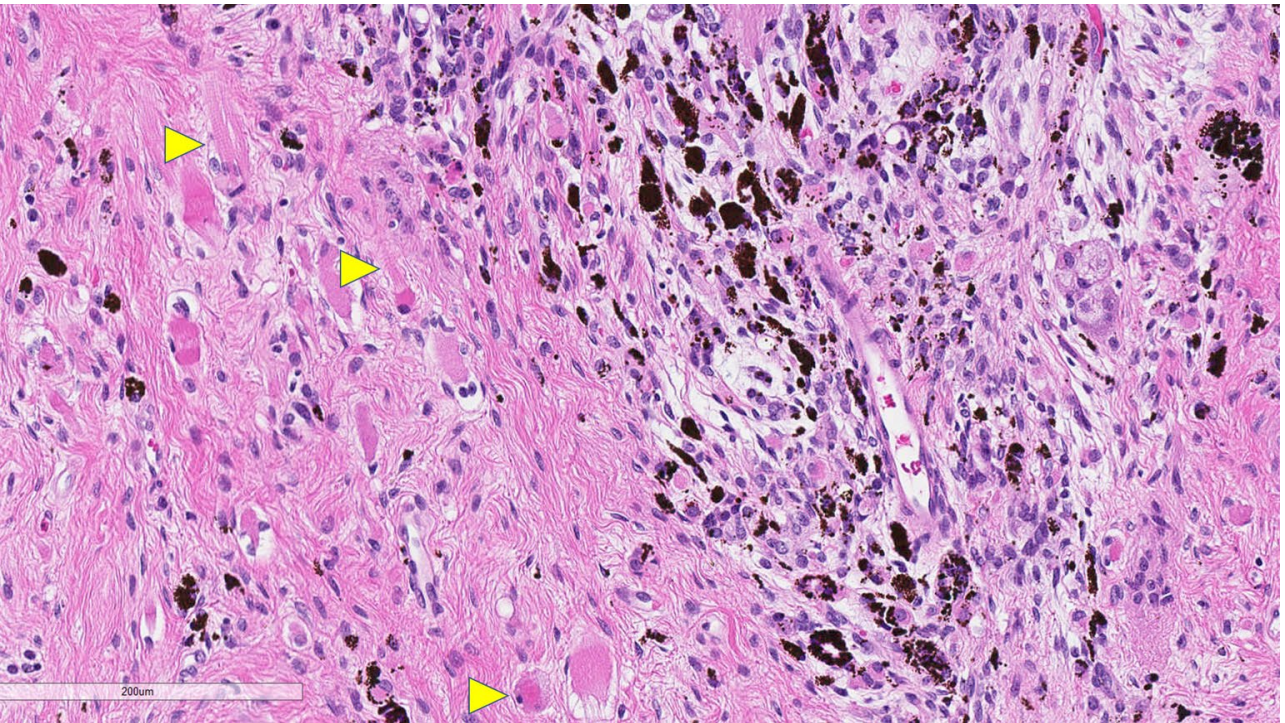
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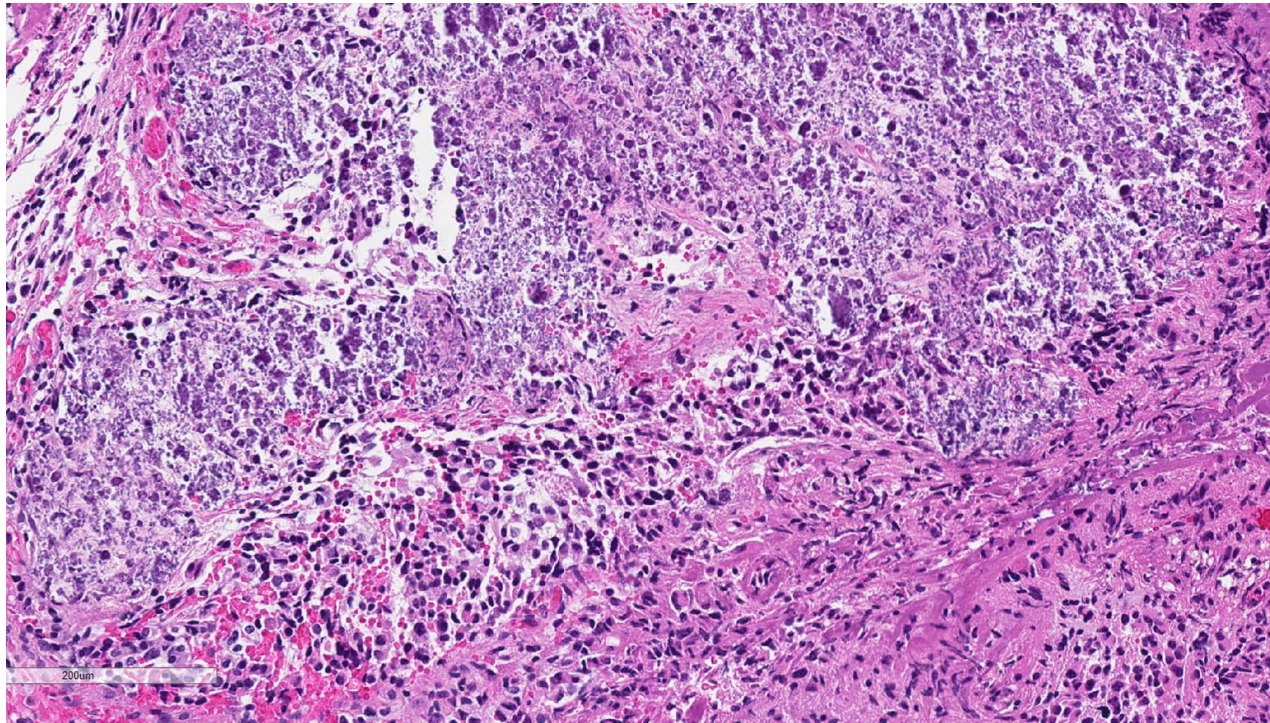
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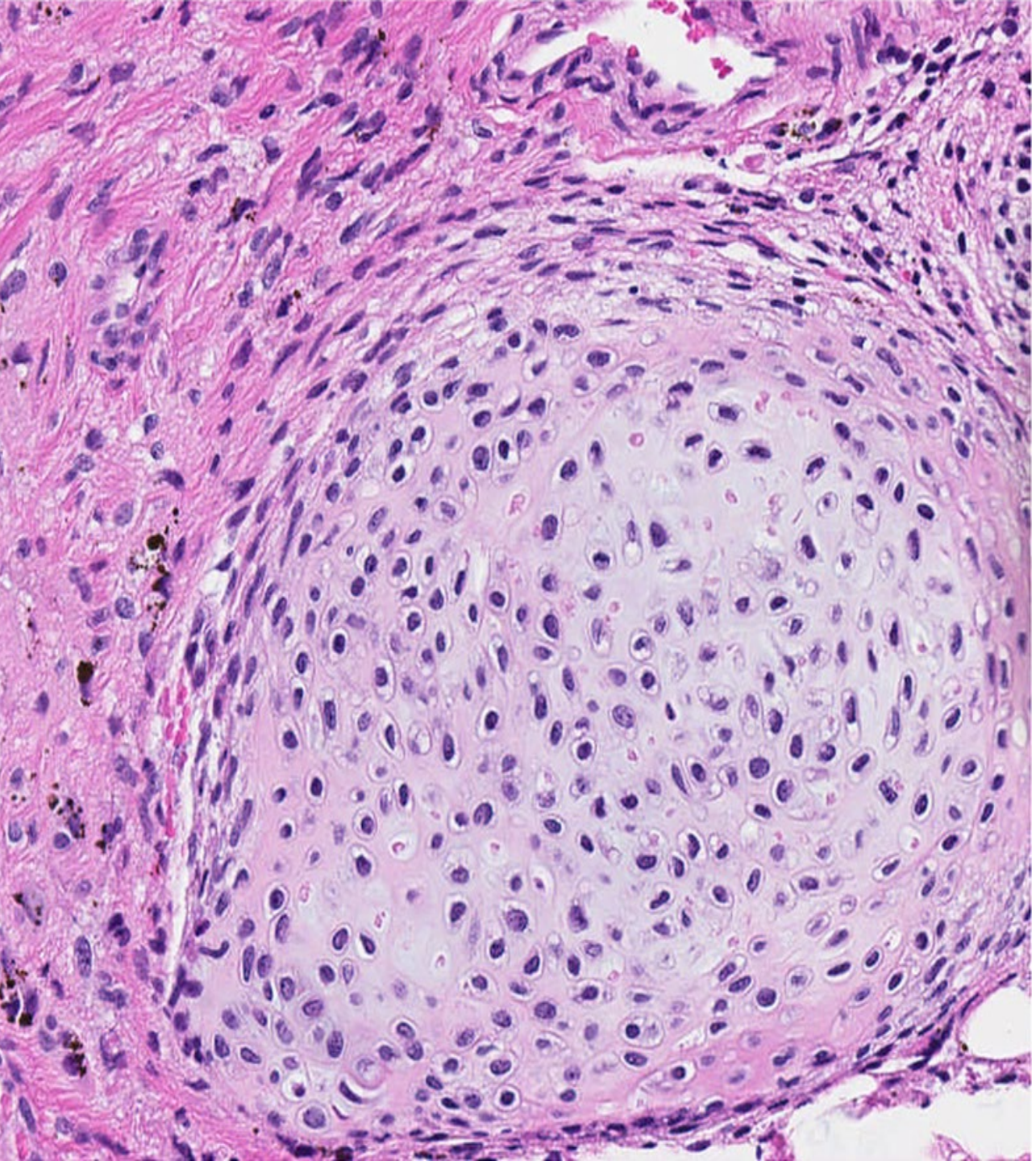
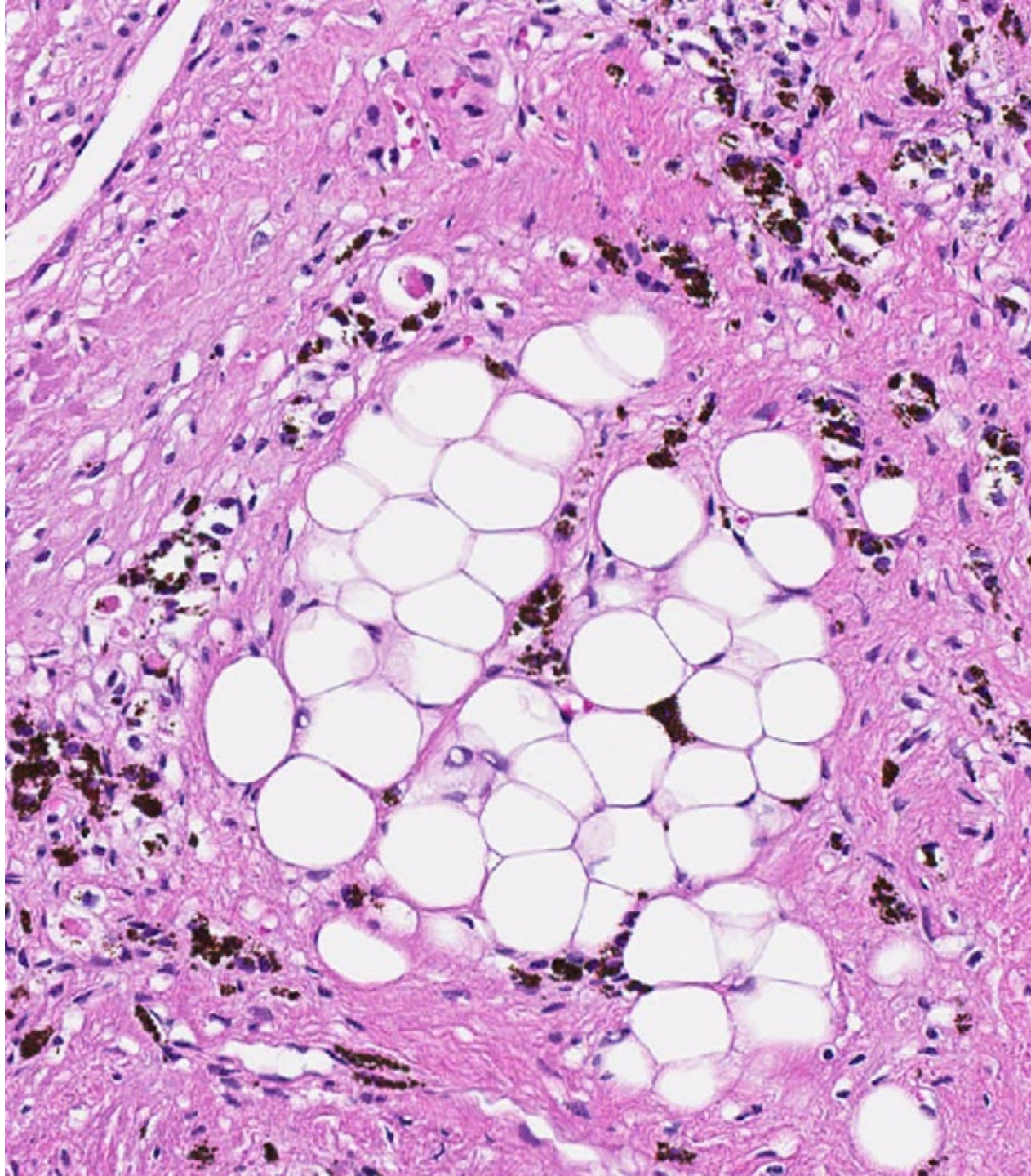
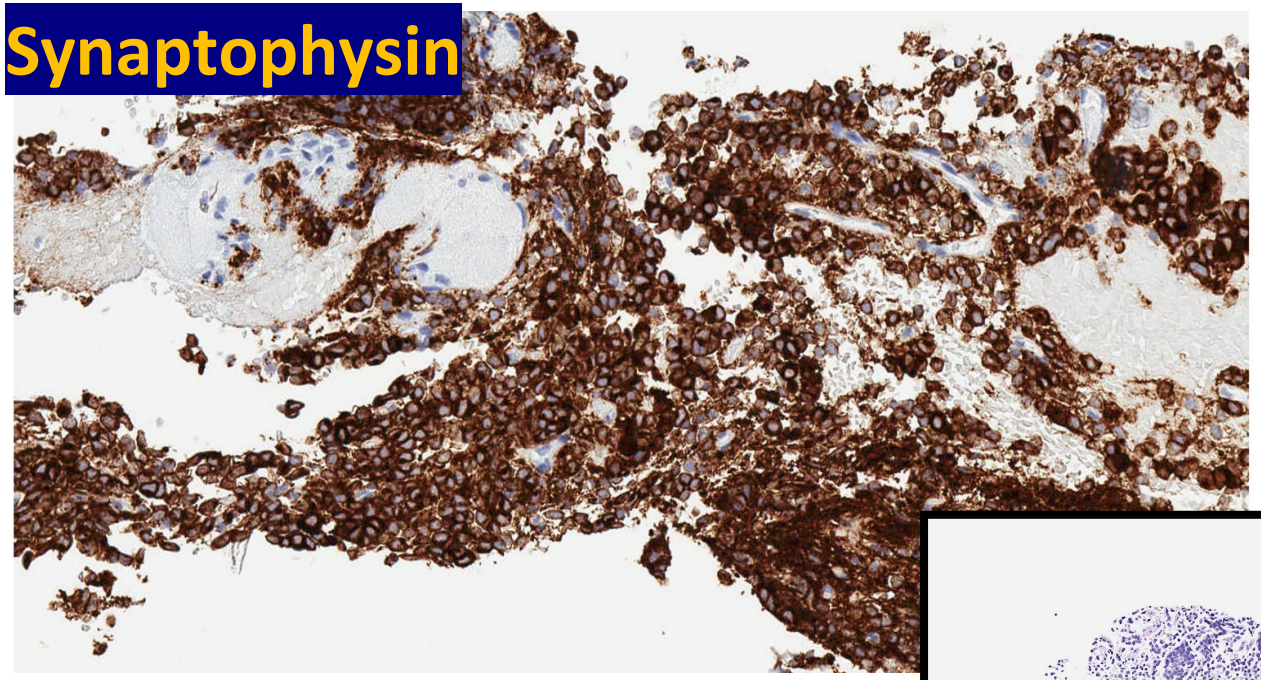



# Discussion and Diagnosis??

# Differential Diagnosis

| DDX | Morphologic characterization |
|---|---|
| **Teratoma** | Compromised of neuroectodermal, mesenchymal and endodermal differentiated components. |
| **Medulloblastomas with myogenic differentiation and/or melanotic differentiation** | Variant of medulloblastoma that exhibits muscle differentiation or/and melanotic cells and occurs in the cerebellum only. |
| **Melanotic neuroectodermal tumour of infancy (MNTI)** | Small round blue cell neuroblast-like component and larger, melanin producing epithelioid cells in fibrotic background |
| **Ectomesenchymoma** | Considered to be a rhabdomyosarcoma with neural/ganglioneuroma-like differentiation and pigmented epithelium. |
| **Pineal anlage tumour** | Contains pigmented epithelium, ganglion cells, neuroblast, glia, cartilage, and striated muscle, but **no endoderm-derived elements**. |

S. Berns, G. Pearl, Review of pineal anlage tumor with divergent histology, Arch. Pathol. Lab. Med. 130 (8) (2006) 1233–1235.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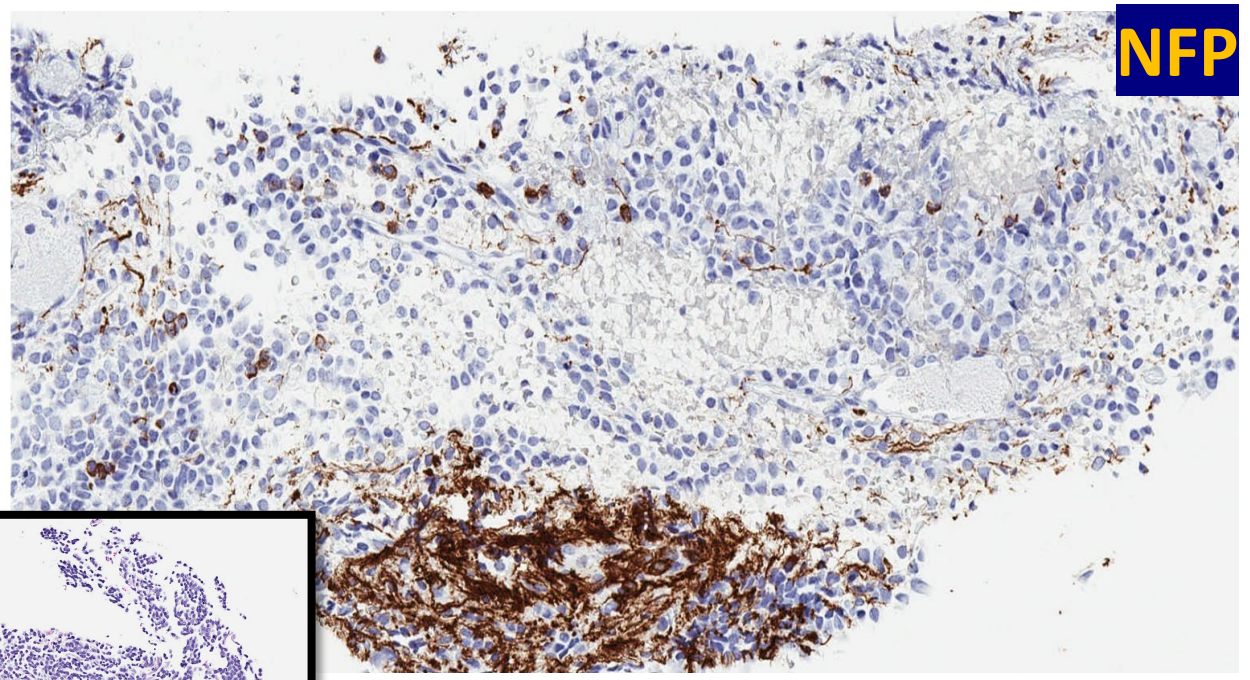
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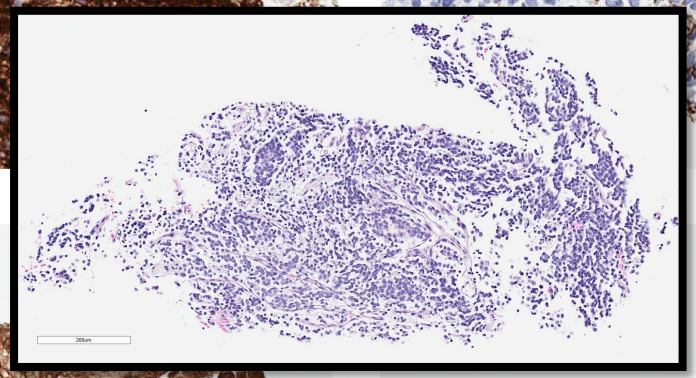

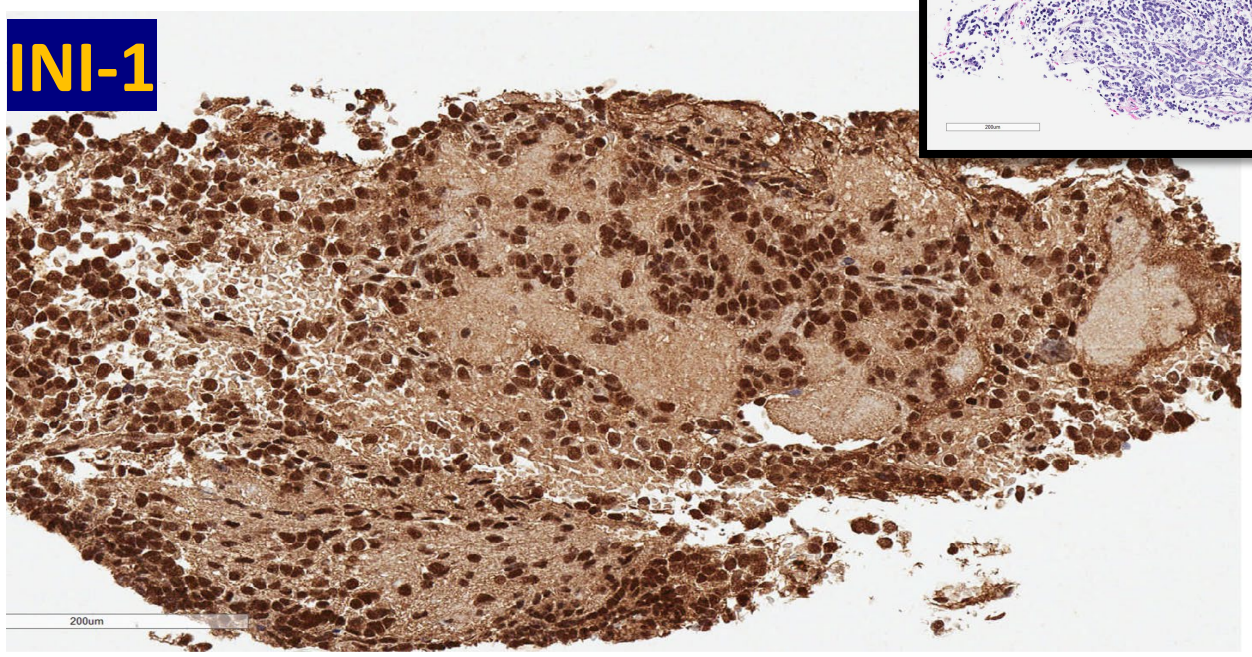
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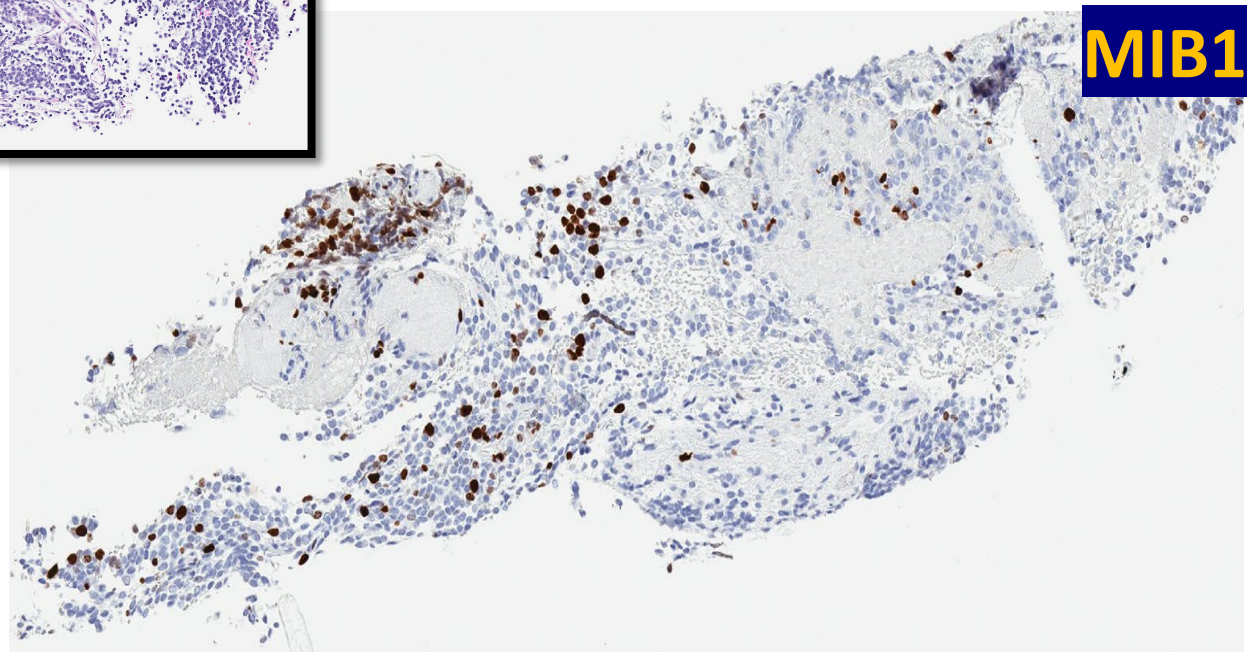
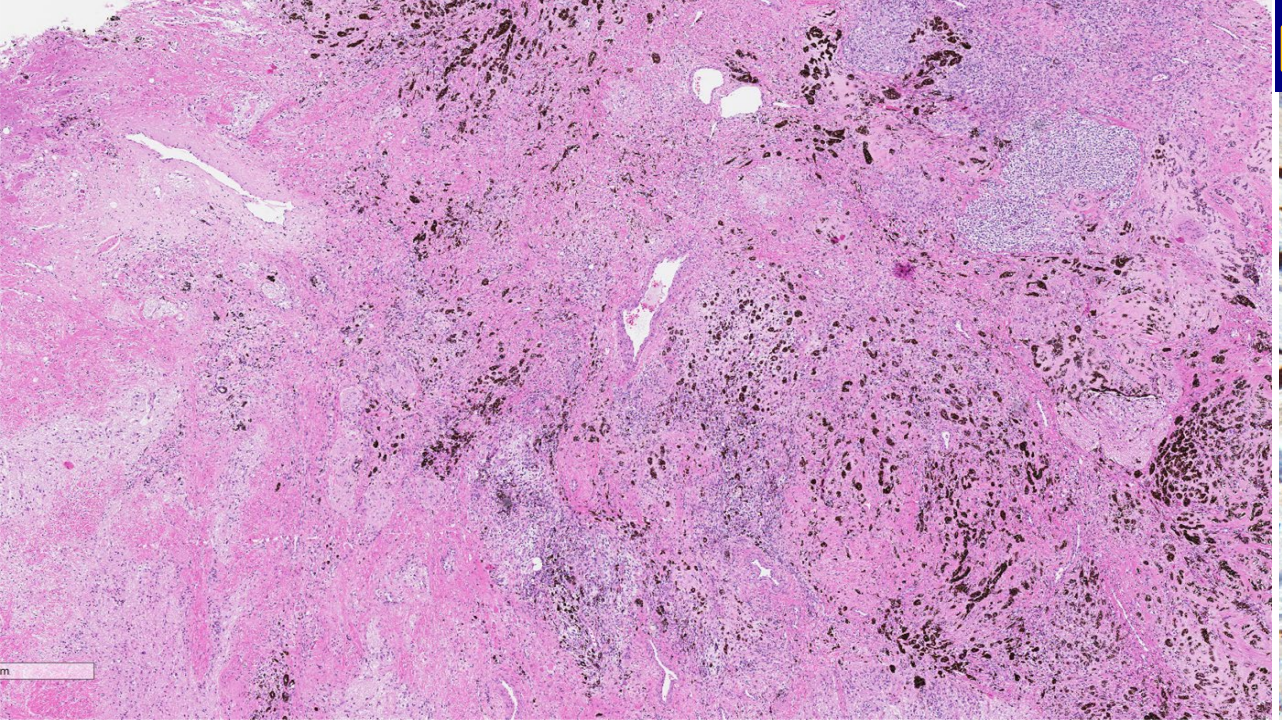
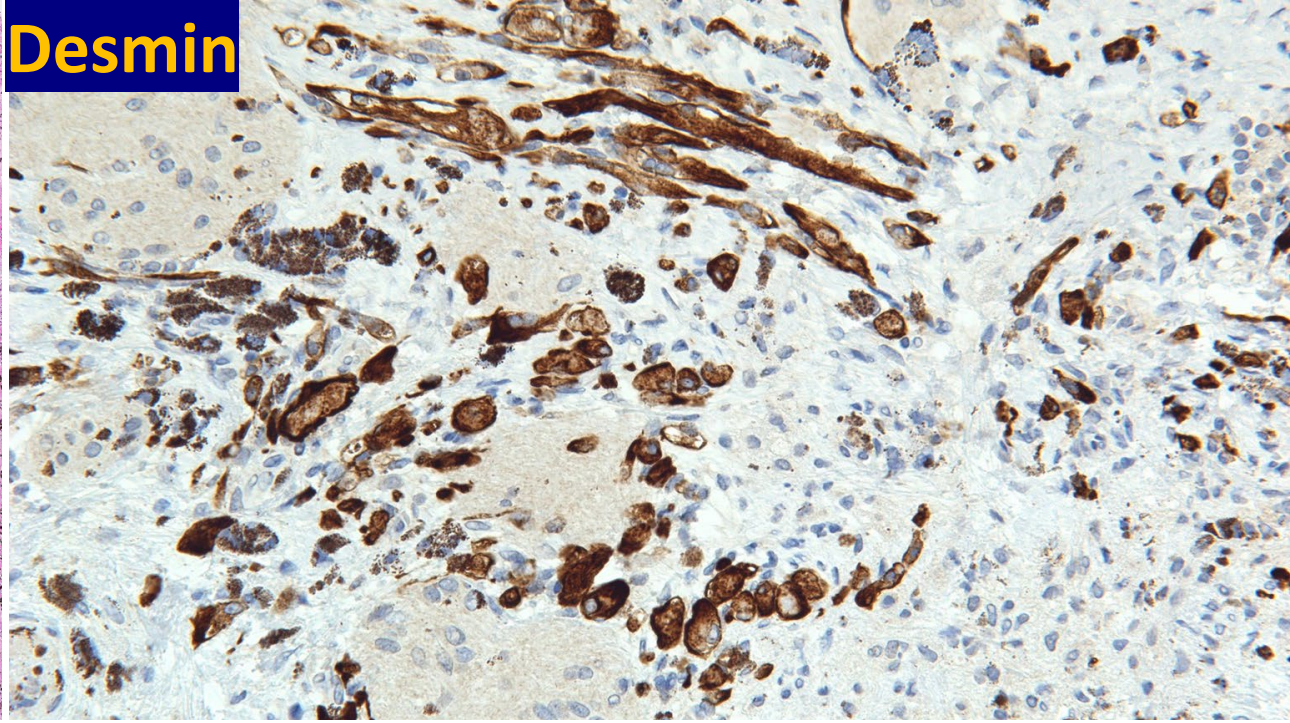

MIB1

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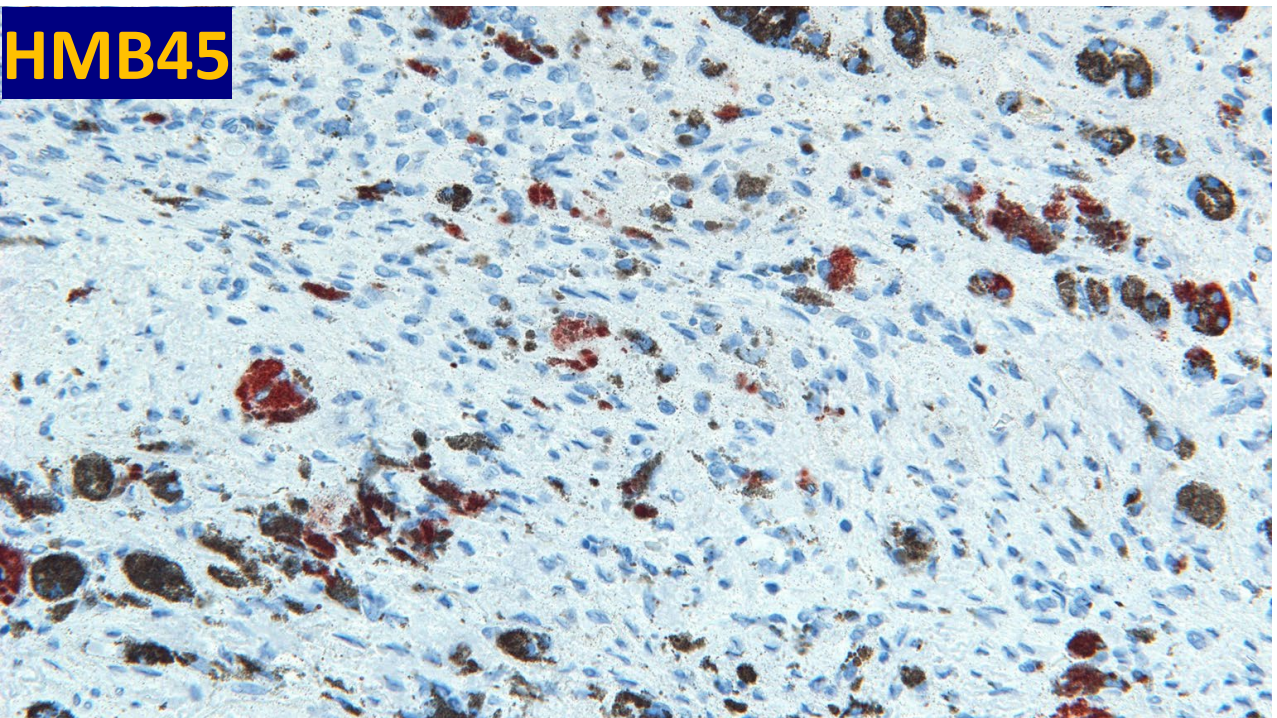
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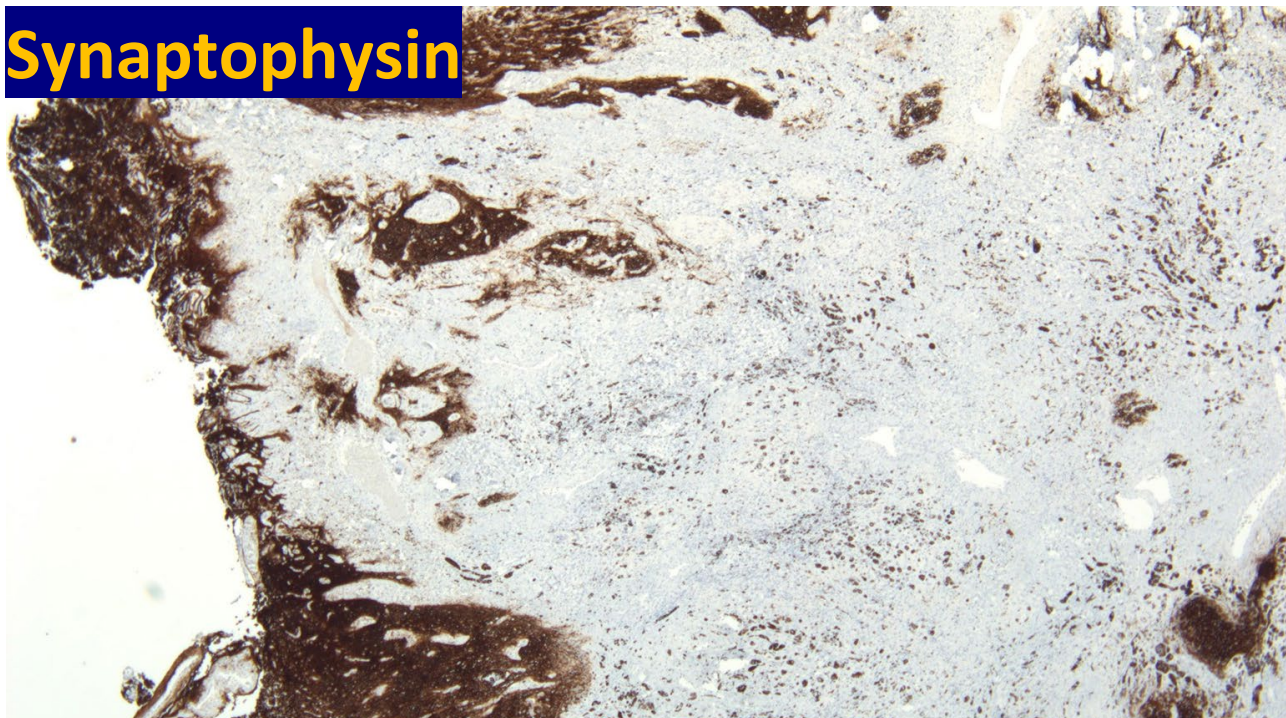
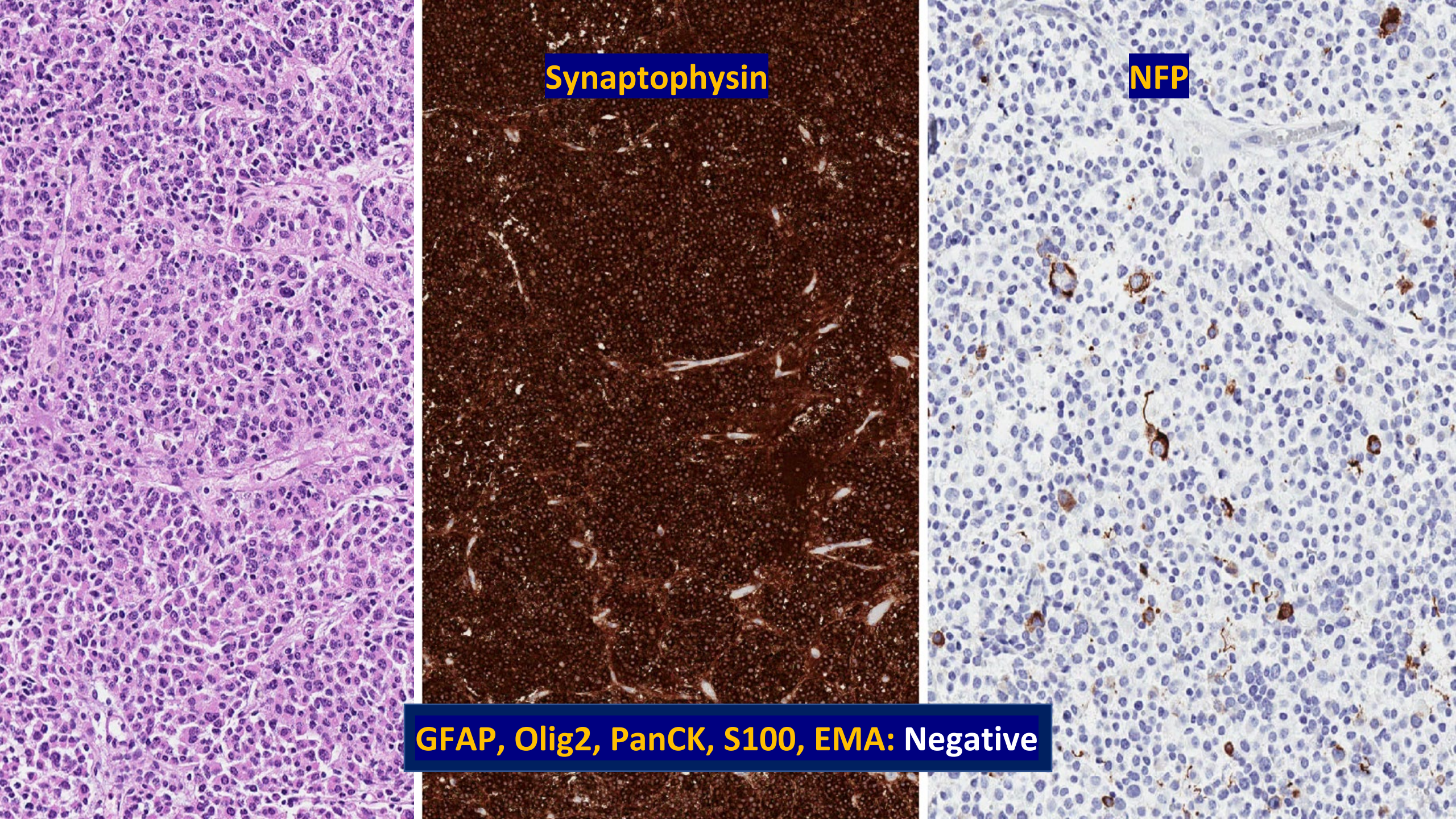
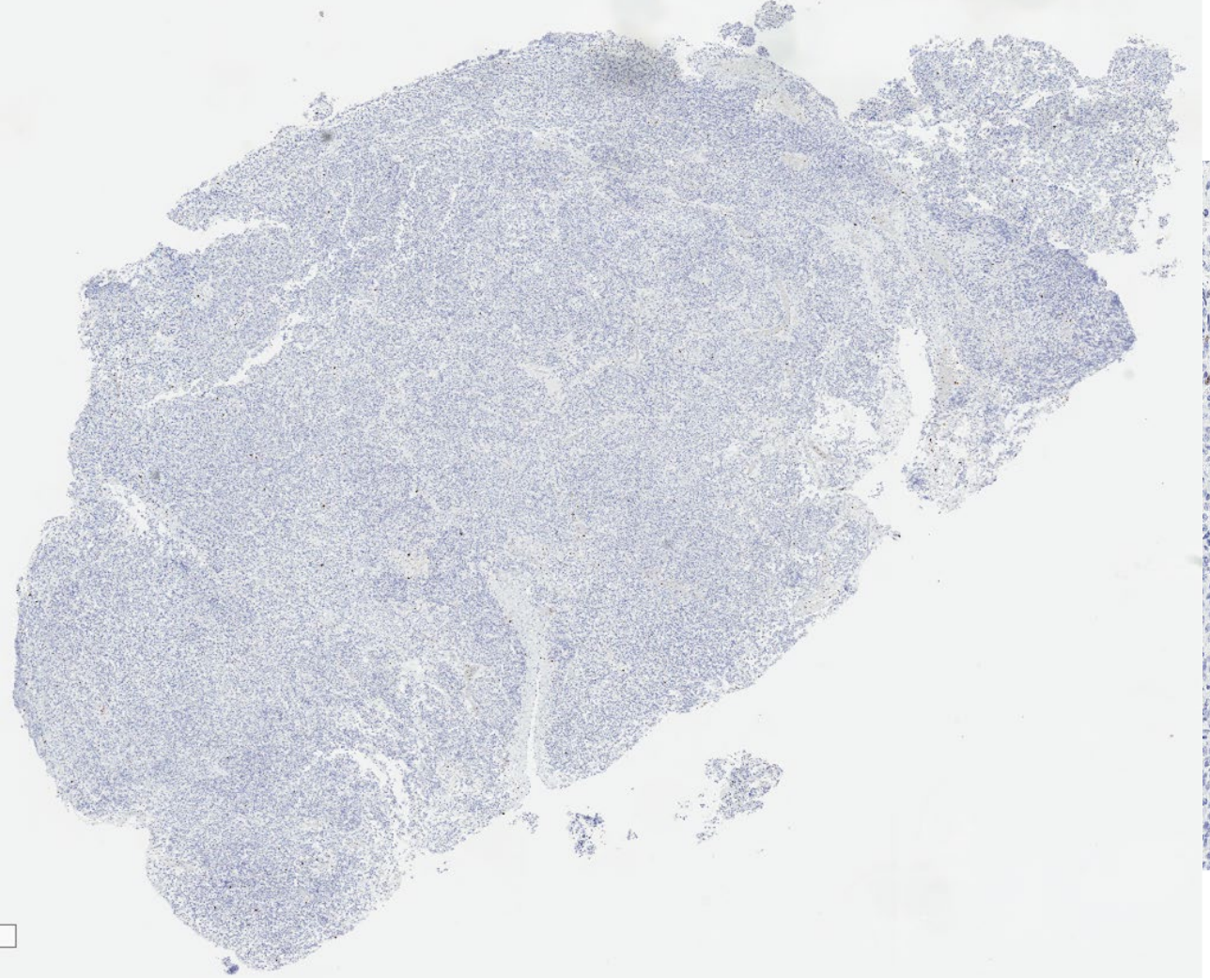
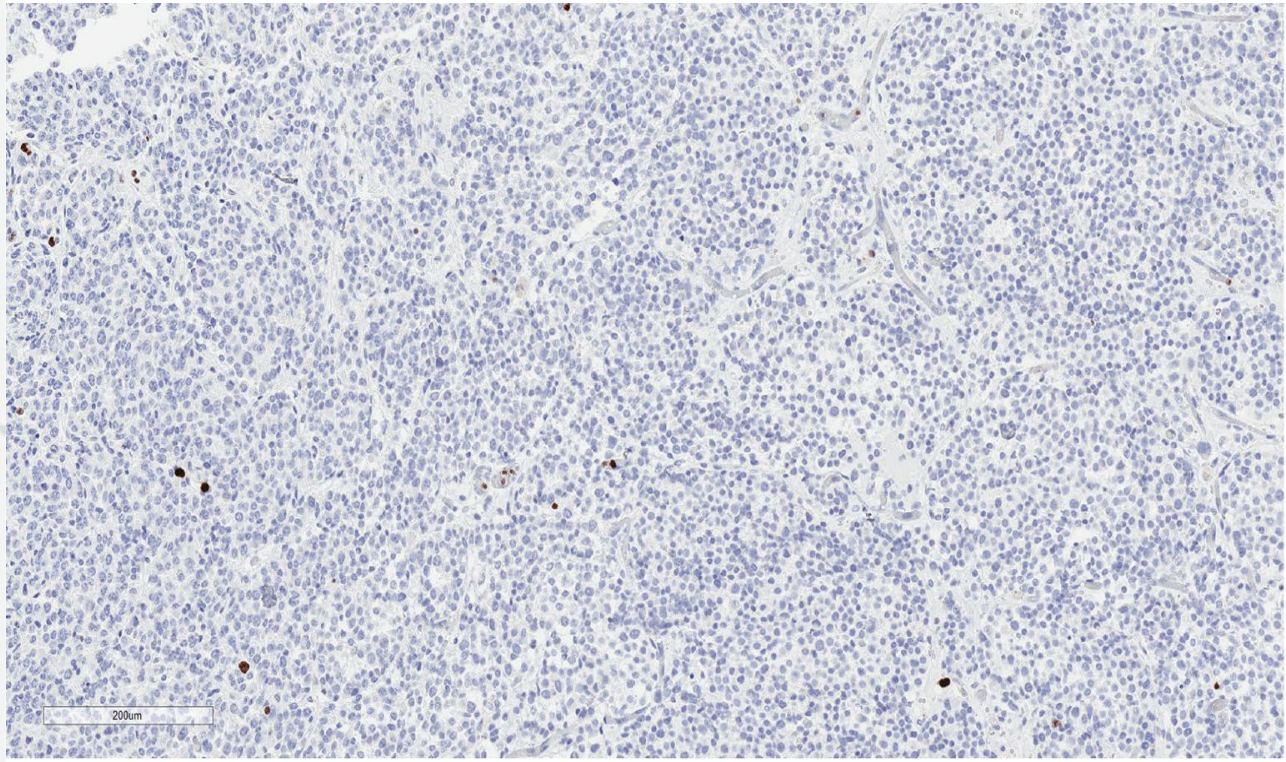

Synaptophysin


Synaptophysin
NFP
GFAP, Olig2, PanCK, S100, EMA: Negative






**Ki-67 proliferation index is low**

# Molecular Test

- **TruSight RNA Pan-Cancer seq panel :**

- No evidence of ***DICER1*** mutation has been detected.

# Final Diagnosis

## Pineal Anlage Tumour

# Pineal Anlage Tumour

- Pineal gland tumors are rare intracranial neoplasms representing 0.2%–2% of all brain tumors.
- Pineal anlage tumor (PAT) is an extremely rare tumor in the pediatric population.
- PAT is considered a variant of pineoblastoma (PB) with neuroepithelial and ectomesenchymal/ rhabdomyoblastic differentiation without endodermal differentiation.

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WHO Classification of Tumours of he Central Nervous System, Revised 4th Edition, 2016

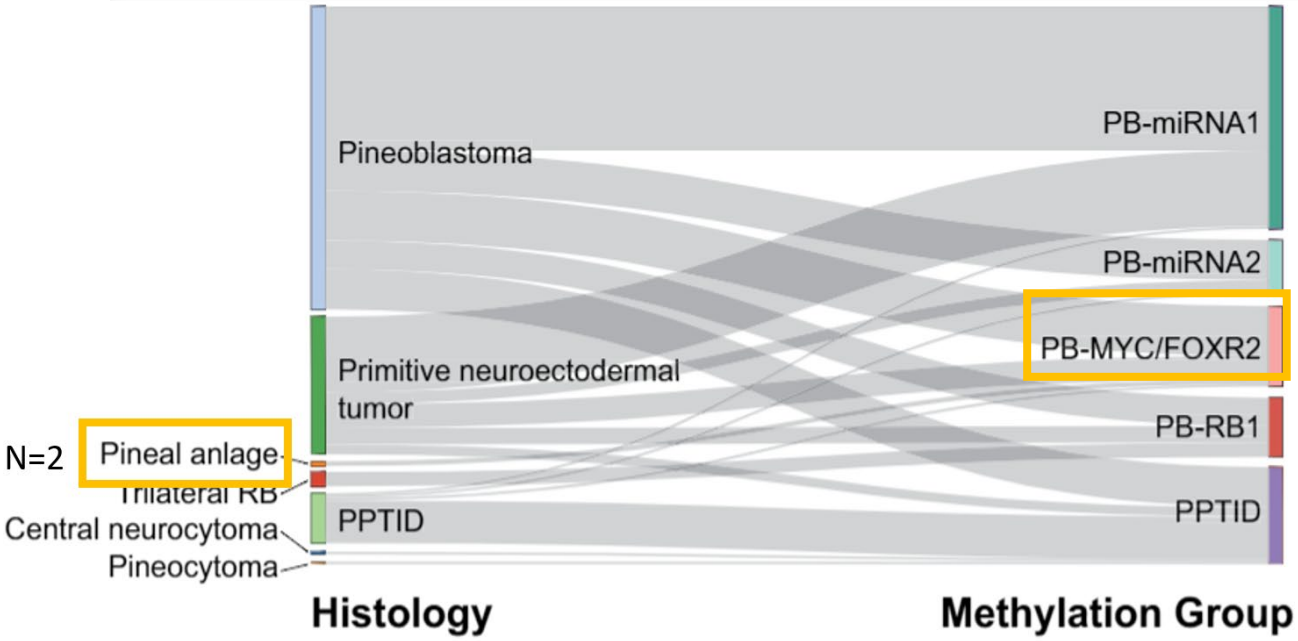
| Case no. | Age/sex | Treatment | Clinical outcome/Prognosis | Reference |
|---|---|---|---|---|
| 1 | 9 years/F | Not known | Died after 5 months of increased intracranial pressure with occlusive hydrocephalus. | Schmidbauer et al (1989) |
| 2 | 1 year/M | No data | No data | J. Raisanen et al. (1990) |
| 3 | 9 months/M | Cranial chemotherapy and radiation therapy. | Progressive paraplegia due to multiple metastasis in the spinal cord developed. Died after 9 months | G. Mc Grogan et al. (1992) |
| 4 | 10 months/M | Surgery | No data | I. Gudinaviciene et al. (2005) |
| 5 | 9 months/M | Surgery only | No data | B. Stephen et al. (2006) |
| 6 | 5 months/M | Surgery and adjuvant chemotherapy (5 cycles) | Alive after 1-year follow up, the patient remained with significant developmental delay and no evidence of tumour recurrence. | Joffre E. Olaya et al. (2010) |
| 7 | 4 months/M | Surgery and chemotherapy. | Doing well after 6 months | Ahuja et al. (2011) |
| 8 | 1 year/M | No data | No data | Zhang et al. (2012) |
| 9 | 11 months/F | Chemotherapy and autologous stem cell transplantation | Alive without evidence of residual/recurrent disease at 6 months | Olaide Ajayi et al. (2014) |
| 10 | 9 months/M | Surgery | Died due to septicaemia (MiB1 labelling index was <1% throughout the tumour) | Raghvendra Ramdasi et al. (2015) |
| 11 | 2 years/M | No data | Spinal dissemination at presentation | Verma et al. (2019) |
| 12 | 13 months/M (present case) | Surgery, chemotherapy and autologous stem cell transplantation | Alive at 10 months follow-up and no tumor recurrence | 2020-2021 |

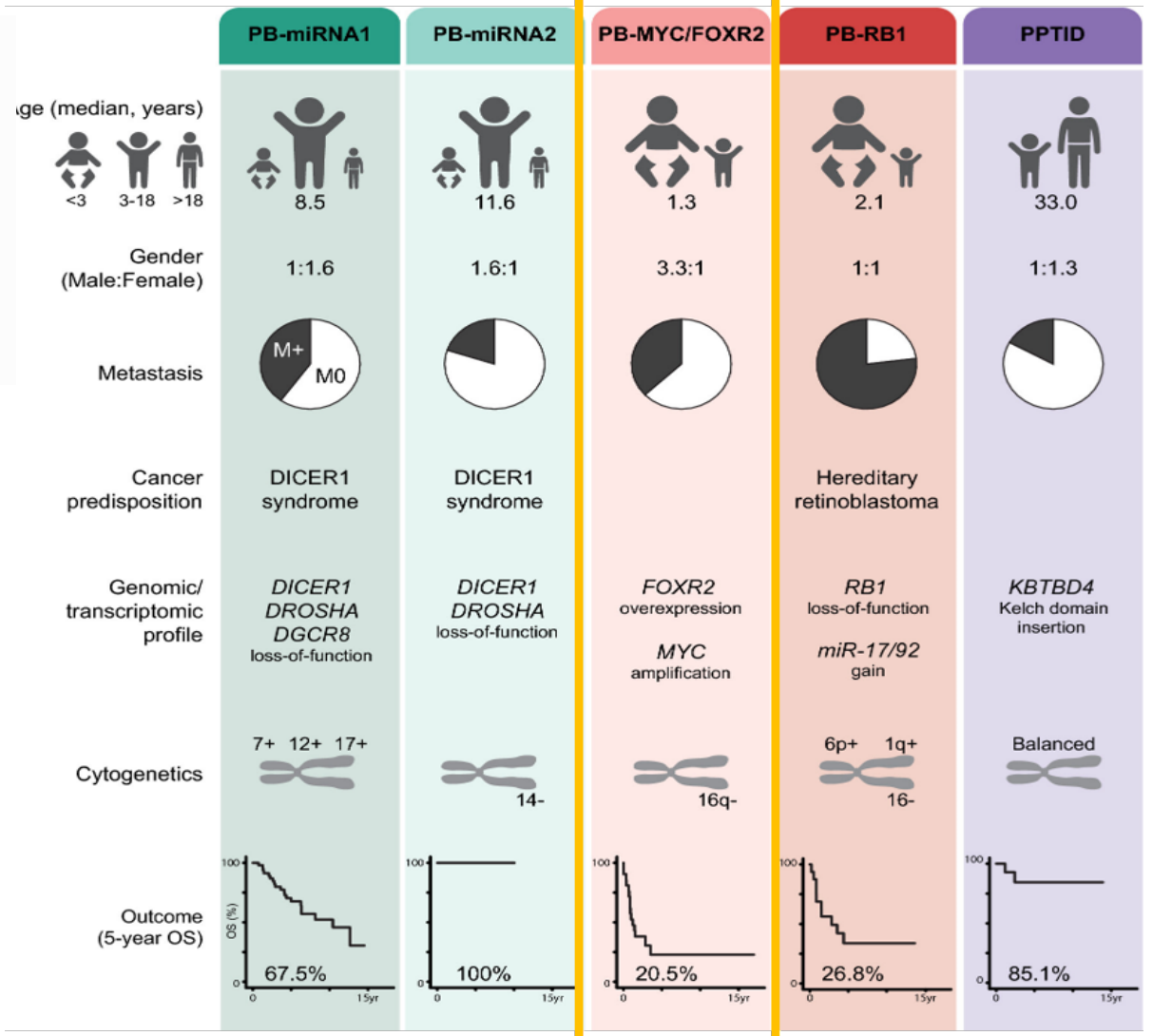
Original Paper | Published: 22 February 2021

# Clinical and molecular heterogeneity of pineal parenchymal tumors: a consensus study

Anthony P. Y. Liu, Bryan K. Li, [...]Annie Huang

*Acta Neuropathologica* **141**, 771–785 (2021) | Cite this article




**DNA methylation profile of our case: FOXR2-activated pineoblastoma.**

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# Treatment and Prognosis

- As per recent methylation and molecular classification, PAT requires intensive multimodality treatment with craniospinal irradiation and chemotherapy mirrors that seen in many pineoblastomas.
- The prognosis is not well characterized.

**Follow up of our patient (August 2020-June 2021):**

- Recent neuroimaging (MRI) reveals no evidence of recurrence after surgery and chemotherapy.

# Conclusion

- PAT is an extremely rare neoplasm of pineal origin with distinct histologic findings.
- In our case, we have noticed a discrepancy between the tumor morphologic features and its molecular profile.
- It is still ambiguous if PAT harbors an aggressive behavior and needs extensive treatment in the absence of high-grade components (PB).
- Further cases are needed with more clinical follow-up and integration of methylation profiling and targeted sequencing to determine prognosis and treatment guidelines.

# Thank you


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