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Case 1
Donation: Dr. Ravi Raghavan, Loma Linda University

History: 1 year old female with brain stem tumor.

Gross: Multiple brown-tan soft tissue fragments 0.1-0.3 cm.

CK	Negative
Vimentin	Positive
GFAP	Positive
NSE	Positive
EMA	Weakly positive
S-100	Weakly positive
NFP	Negative
AFP	Negative
PLAP	Negative
Ki-67	Markedly elevated (80%)
Chromogranin	Negative
Synaptophysin	Rare foci of reactivity
SMA	Positive
CD45	Negative

Loss of INI-1 protein expression.

Diagnosis: Atypical teratoid/rhabdoid tumor

Atypical teratoid/rhabdoid tumor: cytology and differential diagnosis in adults. Raisanen J; Hatanpaa KJ; Mickey BE; White CL. Diagn Cytopathol 2004 Jul;31(1): p60-3

Atypical teratoid/rhabdoid tumor of the central nervous system: report on workshop. Packer RJ; Biegel JA; Blaney S; Finlay J; Geyer JR; Heideman R; Hilden J; Janss AJ; Kun L; Vezina G; Rorke LB; Smith M. J Pediatr Hematol Oncol 2002 Jun-Jul;24(5): p337-42

Atypical teratoid/rhabdoid tumor of the brain: cytopathologic characteristics and differential diagnosis. Parwani AV; Stelow EB; Pambuccian SE; Burger PC; Ali SZ. Cancer 2005 Apr 25;105(2): p65-70

The WHO classification of tumors of the nervous system. Kleihues P; Louis DN; Scheithauer BW; Rorke LB; Reifenberger G; Burger PC; Cavenee WK. J Neuropathol Exp Neurol 2002 Mar;61(3): p215-25; discussion 226-9

Newly defined central nervous system neoplasms. Gyure KA. Am J Clin Pathol 2005 Jun;123 Suppl:S3-12

Atypical teratoid/rhabdoid tumor of the cerebellum: report of two infantile cases. Lee YK; Choi CG; Lee JH. AJNR Am J Neuroradiol 2004 Mar;25(3): p481-3

Case 2

Donation: Dr. Ravi Raghavan, Loma Linda University

History: 60 year old female with suprasellar mass.

Gross: One gram, 2.2 x 2.0 x 0.5 cm aggregate of brown-tan soft tissue fragments.

GFAP	Positive
Ki-67	Low labeling indices
S-100	Positive
EMA	Positive
Synaptophysin	Negative
HMB-45	Negative
CAM5.2	Negative
BCL-2	Positive
p53	Patchy reactivity

Diagnosis: Pituicytoma/infundibuloma

Pituicytoma. Kowalski RJ; Prayson RA; Mayberg MR. Ann Diagn Pathol 2004 Oct;8(5): p290-4.

Pituicytoma: report of two cases and clues regarding histogenesis. Ulm AJ; Yachnis AT; Brat DJ; Rhoton AL. Neurosurgery 2004 Mar;54(3): p753-7; discussion 757-8.

Pituicytomas, a mis-diagnosed benign tumor of the neurohypophysis: report of three cases. Figarella-Branger D; Dufour H; Fernandez C; Bouvier-Labit C; Grisoli F; Pellissier JF. Acta Neuropathol (Berl 2002 Sep;104(3): p313-9.

Distinctions between pituicytoma and ordinary pilocytic astrocytoma. Case report. Katsuta T; Inoue T; Nakagaki H; Takeshita M; Morimoto K; Iwaki T. J Neurosurg 2003 Feb;98(2): p404-6

Crush cytology of pituicytoma. Chen KT. Diagn Cytopathol 2005 Oct;33(4): p255-7.

Case 3

Donation: Dr. Ravi Raghavan, Loma Linda University

History: 59 year old male with a clival mass.

Gross: A 14.0 gram, 5.0 x 4.0 x 1.5 cm aggregate of multiple brown-tan soft tissue fragments.

CK	Positive
AE1/AE3	Positive
EMA	Positive
S-100	Positive

Diagnosis: Chordoma

Metastatic disease from spinal chordoma: a 10-year experience. McPherson CM; Suki D; McCutcheon IE; Gokaslan ZL; Rhines LD; Mendel E. J Neurosurg Spine 2006 Oct;5(4): p277-80.

Fine-needle aspiration of a chordoma and its recurrence 19 years after. Saiz A; de Agustin P; Barrios AP; Alberti N. Diagn Cytopathol 2006 Sep;34(9): p663-4.

Base of skull chordomas in children and adolescents: a clinicopathologic study of 73 cases. Hoch BL; Nielsen GP; Liebsch NJ; Rosenberg AE. Am J Surg Pathol 2006 Jul;30(7): p811-8.

Cadherins and catenins in clival chordomas: correlation of expression with tumor aggressiveness. Triana A; Sen C; Wolfe D; Hazan R. Am J Surg Pathol 2005 Nov;29(11): p1422-34.

Chromosome 7 abnormalities are common in chordomas. Brandal P; Bjerkehagen B; Danielsen H; Heim S. Cancer Genet Cytogenet 2005 Jul 1;160(1): p15-21.

Case 4

Donation: Dr. Boleslaw Liwnicz, Loma Linda University

History: 49 year old female with left temporal lobe tumor.

GFAP	Positive
S-100	Positive
CK	Weakly positive
CAM5.2	Negative
Synaptophysin	Negative
EMA	Negative
Thyroglobulin	Negative
p53	Positive

Diagnosis: Astroblastoma

'Low-grade' astroblastoma with rapid recurrence: a case report. Lau PP; Thomas TM; Lui PC; Khin AT. Pathology 2006 Feb;38(1): p78-80.

Cerebral astroblastoma. Caroli E; Salvati M; Esposito V; Orlando ER; Giangaspero F. Acta Neurochir (Wien 2004 Jun;146(6): p629-33.

Identification of phenotypic neural stem cells in a pediatric astroblastoma. Huhn SL; Yung Y; Cheshier S; Harsh G; Ailles L; Weissman I; Vogel H; Tse V. J Neurosurg 2005 Nov;103(5 Suppl): p446-50.

Astroblastoma: immunohistochemical and ultrastructural study of distinctive epithelial and probable tanycytic differentiation. Kubota T; Sato K; Arishima H; Takeuchi H; Kitai R; Nakagawa T. Neuropathology 2006 Feb;26(1): p72-81.

Case 5
Donation: Dr. Mia Perez, Loma Linda University

History: 79 y/o male with skull base neoplasm.

Gross: Less than 1 gram, 0.7 x 0.5 x 0.1 cm aggregate of pink-tan soft tissue fragments.

CK cocktail	Negative
AE1/AE3	Negative
EMA	Negative
S-100	Positive
Vimentin	Positive

Diagnosis: Low-grade chondrosarcoma

Chondrosarcoma of the skull base. Neff B; Sataloff RT; Storey L; Hawkshaw M; Spiegel JR. Laryngoscope 2002 Jan;112(1): p134-9.

Analysis of radiological features relative to histopathology in 42 skull-base chordomas and chondrosarcomas. Pamir MN; Ozduman K. Eur J Radiol 2006 Jun;58(3): p461-70.

Chondrosarcoma of the skull base. Baehring JM; Piepmeier J; Duncan C; Ogle E; Kim J; Liebsch N. J Neurooncol 2006 Jan;76(1): p49.

Evaluation of a new concept for the management of skull base chordomas and chondrosarcomas. Feigl GC; Bundschuh O; Gharabaghi A; Safavi-Abassi S; El Shawarby A; Samii M; Horstmann GA. J Neurosurg 2005 Jan;102 Suppl:165-70.

Chondrosarcomas of the temporal bone: presentation and management. Raghu M; Moumoulidis I; De R; Moffat D. J Laryngol Otol 2004 Jul;118(7): p551-5.

Case 6
Donation: Dr. Ravi Raghavan, Loma Linda University

History: 37 year old female with recurrent left temporal tumor with dural involvement.

Gross: A 10 gram specimen that consists of a 3.4 x 2.0 x 1.0 cm aggregate of firm red-tan tissue and a 4.8 x 4.0 x 0.2 cm piece of white-tan dura with areas of attached tissue.

NFP	Negative
S-100	Negative
Ki-67	Moderate to high labeling indices
p53	Positive
GFAP	Negative
Synaptophysin	Positive
Chromogranin	Positive

Diagnosis: Olfactory neuroblastoma/esthesioneuroblastoma

Olfactory neuroblastoma: past, present, and future? Lund VJ; Howard D; Wei W; Spittle M. Laryngoscope 2003 Mar;113(3): p502-7.

Cytopathologic features of olfactory neuroblastoma. Mahooti S; Wakely PE. Cancer 2006 Apr 25;108(2): p86-92.

Misdiagnosis of olfactory neuroblastoma. Cohen ZR; Marmor E; Fuller GN; De Monte F. Neurosurg Focus 2002 May 15;12(5): pe3.

Esthesioneuroblastoma of the pituitary gland: a clinicopathological entity? Case report and review of the literature. Mariani L; Schaller B; Weis J; Ozdoba C; Seiler RW. J Neurosurg 2004 Dec;101(6): p1049-52.

Esthesioneuroblastoma in children. Kumar M; Fallon RJ; Hill JS; Davis MM. J Pediatr Hematol Oncol 2002 Aug-Sep;24(6): p482-7.

Case 7

Donation: Dr. Evelyn Choo, Loma Linda University

History: Left frontal brain tumor.

Gross: A one gram, 2.2 x 1.4 x 0.3 cm aggregate of gelatinous white-tan soft tissue fragments ranging from 0.1 to 0.8 cm in greatest diameter.

GFAP Positive
Ki-67 Low labeling indices

Diagnosis: Oligodendroglioma

Oligodendroglioma of the pineal region. Case report. Das S; Chandler JP; Pollack A; Biggio EH; Diaz L; Raizer JJ; Batjer HH. J Neurosurg 2006 Sep;105(3): p461-4.

Recent advances in the treatment of oligodendrogliomas. Agulnik M; Mason WP. Curr Neurol Neurosci Rep 2006 May;6(3): p212-7.

The impact of genotype on outcome in oligodendroglioma: validation of the loss of chromosome arm 1p as an important factor in clinical decision making. Kanner AA; Staugaitis SM; Castilla EA; Chernova O; Prayson RA; Vogelbaum. J Neurosurg 2006 Apr;104(4): p542-50.

Small cell astrocytoma: an aggressive variant that is clinicopathologically and genetically distinct from anaplastic oligodendroglioma. Perry A; Aldape KD; George DH; Burger PC. Cancer 2004 Nov 15;101(10): p2318-26.

Diagnosis and management of oligodendroglioma. van den Bent MJ. Semin Oncol 2004 Oct;31(5): p645-52.

Case 8

Donation: Dr. Ravi Raghavan, MD, Loma Linda University

History: Peri-ventricular tumor.

Gross: A 2.4 x 1.8 x 0.6 cm aggregate of pink-tan soft tissue fragments.

Ki-67 Low labeling indices
GFAP Negative

Diagnosis: Choroid plexus papilloma

Psammomatous choroid plexus papilloma: three cases with atypical characteristics. Tena-Suck ML; Lopez-Gomez M; Salinas-Lara C; Arce-Arellano RI; Biol AS; Renbao-Bojorquez D. Surg Neurol 2006 Jun;65(6): p604-10.

Identification of novel diagnostic markers for choroid plexus tumors: a microarray-based approach. Hasselblatt M; Bohm C; Tatenhorst L; Dinh V; Newrzella D; Keyvani K; Jeibmann A; Buerger H; Rickert CH; Paulus W. Am J Surg Pathol 2006 Jan;30(1): p66-74.

Prognostic implications of atypical histologic features in choroid plexus papilloma. Jeibmann A; Hasselblatt M; Gerss J; Wrede B; Egensperger R; Beschorner R; Hans VH; Rickert CH; Wolff JE; Paulus W. J Neuropathol Exp Neurol 2006 Nov;65(11): p1069-73.

Comparative genomic hybridization detects specific cytogenetic abnormalities in pediatric ependymomas and choroid plexus papillomas. Grill J; Avet-Loiseau H; Lellouch-Tubiana A; Sevenet N; Terrier-Lacombe MJ; Venuat AM; Doz F; Sainte-Rose C; Kalifa C; Vassal G. Cancer Genet Cytogenet 2002 Jul 15;136(2): p121-5.

Choroid plexus tumors in children. Gupta N. Neurosurg Clin N Am 2003 Oct;14(4): p621-31.

Case 9

Donation: Dr. Ravi Raghavan, MD, Loma Linda University

History: Thoracic spinal tumor.

Gross: A one gram, 2.0 x 0.8 x 0.5 cm aggregate of brown-tan soft tissue fragments, ranging from 0.1 to 0.5 cm in greatest dimension.

GFAP	Positive
CD99	Positive
EMA	Focal perinuclear dot-positivity
Ki-67	Low labeling indices

Diagnosis: Ependymoma

Identification of tumor-specific molecular signatures in intracranial ependymoma and association with clinical characteristics. Modena P; Lualdi E; Facchinetti F; Veltman J; Reid JF; Minardi S; Janssen I; Giangaspero F; Forni M; Finocchiaro G; Genitori L; Giordano F; Riccardi R; Schoenmakers EF; Massimino M; Sozzi G. J Clin Oncol 2006 Nov 20;24(33): p5223-33.

Ependymoma of the pituitary fossa. Case report and review of the literature. Mukhida K; Asa S; Gentili F; Shannon P. J Neurosurg 2006 Oct;105(4): p616-20.

Myxopapillary ependymoma of the posterior mediastinum. Estrozi B; Queiroga E; Bacchi CE; Faria Soares de Almeida V; Lucas de Carvalho J; Lageman GM; Rosado-de-Christenson M; Suster S. Ann Diagn Pathol 2006 Oct;10(5): p283-7.

Identification of relevant prognostic histopathologic features in 69 intracranial ependymomas, excluding myxopapillary ependymomas and subependymomas. Kurt E; Zheng PP; Hop WC; van der Weiden M; Bol M; van den Bent MJ. Cancer 2006 Jan 15;106(2): p388-95.

CSF cytology has limited value in the evaluation of patients with ependymoma who have MRI evidence of metastasis. Poltinnikov IM; Merchant TE. Pediatr Blood Cancer 2006 Aug;47(2): p169-73.

Case 10

Donation: Dr. Ravi Raghavan, MD, Loma Linda University

History: Posterior fossa mass.

Gross: A less than 1 gram, 1.1 x 1.1 x 0.5 cm aggregate of red-tan soft tissue fragments.

Ki-67	Low labeling indices
EMA	Negative
CK	Negative
NSE	Positive

Diagnosis: Hemangioblastoma

Cellular and reticular variants of hemangioblastoma differ in their cytogenetic profiles. Rickert CH; Hasselblatt M; Jeibmann A; Paulus W. Hum Pathol 2006 Nov;37(11): p1452-7.

Cystic tumor of the cerebellum with megaloblastic erythropoiesis. Hemangioblastoma with megaloblastic hematopoiesis. Svensson AM; Pang Y; Moore NJ; Tindle BH. Arch Pathol Lab Med 2006 Jun;130(6): p886-9.

Supratentorial hemangioblastoma: a case report and review of the literature. Acikalin MF; Oner U; Tel N; Pasaoglu O; Altinel F. Arch Pathol Lab Med 2003 Sep;127(9): pe382-4.

Inhibin alpha distinguishes hemangioblastoma from clear cell renal cell carcinoma. Hoang MP; Amirkhan RH. Am J Surg Pathol 2003 Aug;27(8): p1152-6.

The natural history of hemangioblastomas of the central nervous system in patients with von Hippel-Lindau disease. Wanebo JE; Lonser RR; Glenn GM; Oldfield EH. J Neurosurg 2003 Jan;98(1): p82-94

Case 2. Hemangioblastomas: diagnosis of von Hippel-Lindau disease and antiangiogenic treatment with SU5416. Schuch G; de Wit M; Holtje J; Laack E;

Schilling G; Hossfeld DK; Fiedler W; Scigalla P; Jacobs MS. J Clin Oncol 2005 May 20;23(15): p3624-6.