



# Diagnostic Exercise

## From The Davis-Thompson Foundation\*

Case #: **245**; Month: **September**; Year: **2024**

*Answer sheet*

**Title:** Psammomatous meningioma

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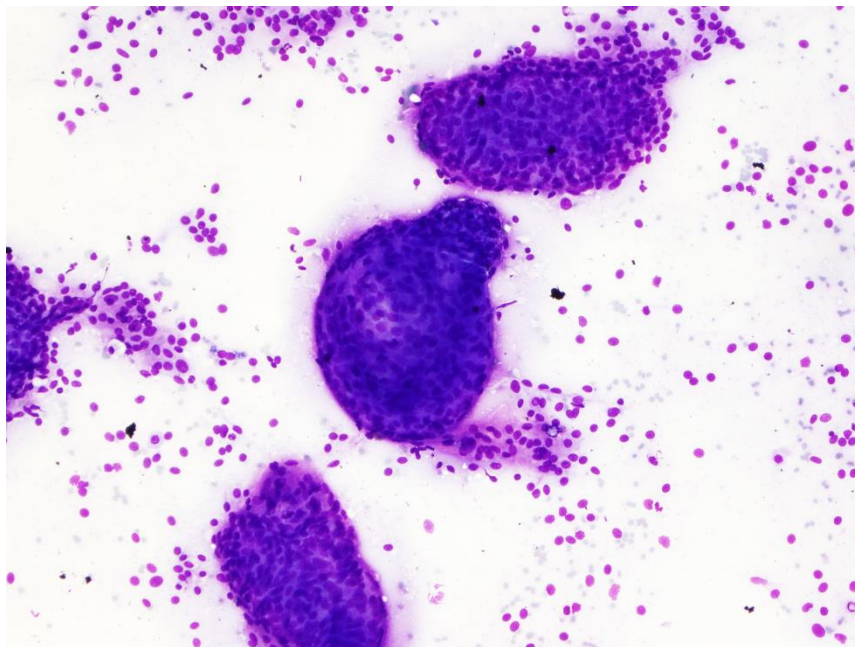
**Clinical History:** A 14-year-old male castrated domestic shorthair cat was presented to the Louisiana State University Veterinary Teaching Hospital for suspected seizures, incontinence, and poor body condition, and was deceased on arrival. The patient had been previously diagnosed two years earlier with severe concentric hypertrophy of the left ventricular parietal wall and interventricular septum secondary to hyperthyroidism or primary hypertrophic cardiomyopathy. Approximately 20 days prior to death, the cat presented hematuria, lethargy, increased respiratory rate and effort, and severe weight loss (approximately 2 kg). On the day of the death, the owner reported that the patient had a seizure-like episode of convulsing and falling over and became non-responsive. The owner consented to a post-mortem examination, and a necropsy was performed.

**Gross findings:** At necropsy, a 0.6 cm x 0.5 cm x 0.3 cm, pale tan, friable, irregular nodule was observed on the surface of the right hemisphere of the brain's frontal lobe (Figure 1).

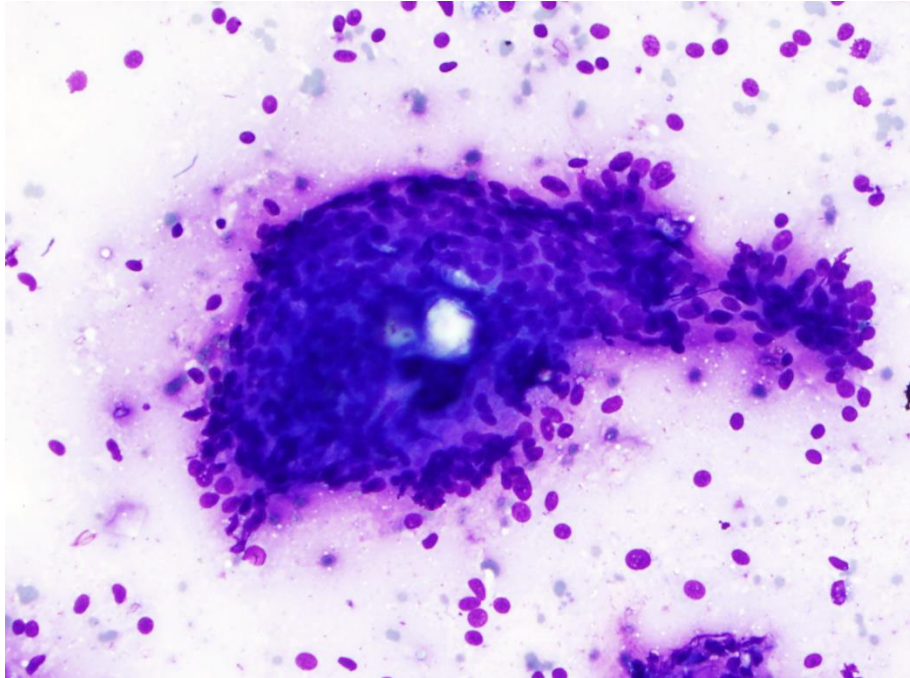
**Gross, Cytological and Histological Images:**



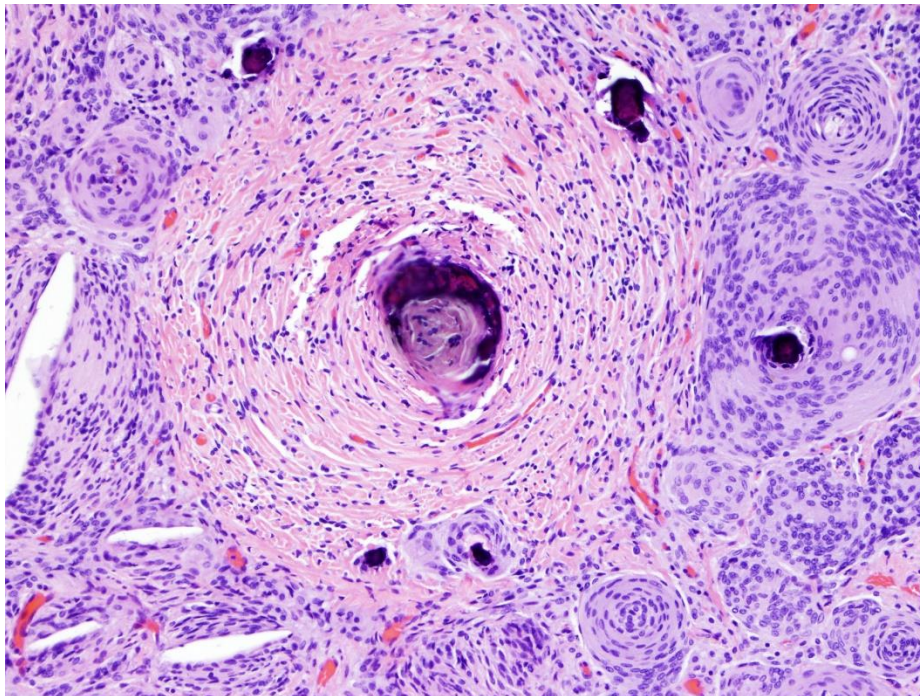
**Figure 1.** Brain, feline, gross photography. A pale tan, friable, irregular nodule was observed on the surface of the right hemisphere of the brain's frontal lobe.



**Figure 2.** Brain, feline, Romanowsky stain, 200X. The smear preparations were highly cellular with aggregates of cells forming whorls.



**Figure 3.** Brain, feline, Romanowsky stain, 400X. Distinctive whorls composed of spindle to polygonal cells with dense material in the center.



**Figure 4.** Brain, feline, Hematoxylin and eosin (HE), 200x. Cells are arranged in bundles and whorls with aggregates of basophilic mineral at the center.

**Follow-up questions:**

**Cytological Description:** Brain: The smear preparations were highly cellular and presented two distinct cell arrangements. The first is characterized by variably sized cohesive aggregates, forming distinctive whorls composed of spindle to polygonal cells with psammoma bodies in the center. The second arrangement has individual cells with a round to elongated appearance. The neoplastic cells present a wispy cytoplasm and poorly defined cell borders. Nuclei were round to oval, with finely stippled chromatin, and single, small prominent irregular nucleoli. Mild to moderate anisocytosis and anisokaryosis were observed. A moderate number of cholesterol crystals was observed.

**Histological Description:** Brain: Histopathology revealed a densely cellular, well-demarcated, and non-encapsulated mass, composed of meningotheial cells. Cells were arranged in bundles and whorls with moderate collagenous stroma and aggregates of basophilic mineral at the centers of several whorls (psammoma bodies). The cytoplasm of the neoplastic cells was indistinct, granular, and eosinophilic, the nuclei were round, with finely stippled chromatin, and single nucleoli with. Mild anisocytosis and anisokaryosis. Between the neoplastic cells, numerous cholesterol clefts were observed.

**Morphologic diagnosis:**

Brain: Psammomatous meningioma

**Comments:**

Meningiomas are extra-axial central nervous system (CNS) tumors arising within the dura mater but outside the brain and spinal cord parenchyma. The neoplastic cells arise from the cap cells covering the arachnoid granulations, particularly at the point where they project into the venous sinuses (1). They are the most common type of intracranial tumor in the cat, usually affecting older cats (over 9 years of age) (1,2). In cats, common locations include the supratentorial meninges, the tela choroidea of the third ventricle, and occasionally, the cerebellar meninges (2,3). In approximately 17% of feline meningioma cases, multiple tumors were described, including concurrent benign and malignant meningiomas (2,3). Meningiomas exhibit highly variable morphological and immunophenotypic patterns, and benign slow-growing meningiomas present eight different subtypes including the most described transitional, meningotheiomatous, and psammomatous subtypes (4). Although in human medicine subtypes and grading assist in determining prognostics, in cats, no grading system is applied (4). Psammomatous meningiomas have cells arranged in whorls, and in the center of the whorl, lamellar hyaline tissue forms, derived possibly from cells, stroma, or a blood vessel. As the hyaline focus expands, it tends to be impregnated with calcium and iron salts to form psammoma bodies (1). Several different clinical signs are described in animals affected by meningiomas, likely to be related to the neuroanatomical distribution of the tumor, including altered consciousness, seizures, visual impairment, and vestibular dysfunction (2,4). Seizures reportedly occur in 14–25% of cats with meningiomas (2). In our case, the owner reported seizures minutes before the cat passed. To the best of our knowledge, this is the first report presenting a detailed description of the cytology of a psammomatous meningioma in a cat. The cytologic features described in our case can be easily compared to normal histological features of this meningioma subtype,

with distinguishable psammoma bodies. Other meningioma features included abundant cholesterol clefts and spindle-shaped cells. Confirming our findings, studies have demonstrated that cytologic examination provides an accurate diagnostic method that is useful for the intraoperative diagnosis of intracranial lesions (5).

### **References:**

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\*The Diagnostic Exercises are an initiative of the Latin Comparative Pathology Group (LCPG), the Latin American subdivision of The Davis-Thompson Foundation. These exercises are contributed by members and non-members from any country of residence. - Consider submitting an exercise! - A final document containing this material with answers and a brief discussion will be posted on the CL Davis website ([http://www.cldavis.org/diagnostic\\_exercises.html](http://www.cldavis.org/diagnostic_exercises.html)).

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