



# Latin Comparative Pathology Group

## The Latin Subdivision of the CL Davis Foundation

### Diagnostic Exercise

Case #: 57 Month: June Year: 2015

*Answer Sheet*

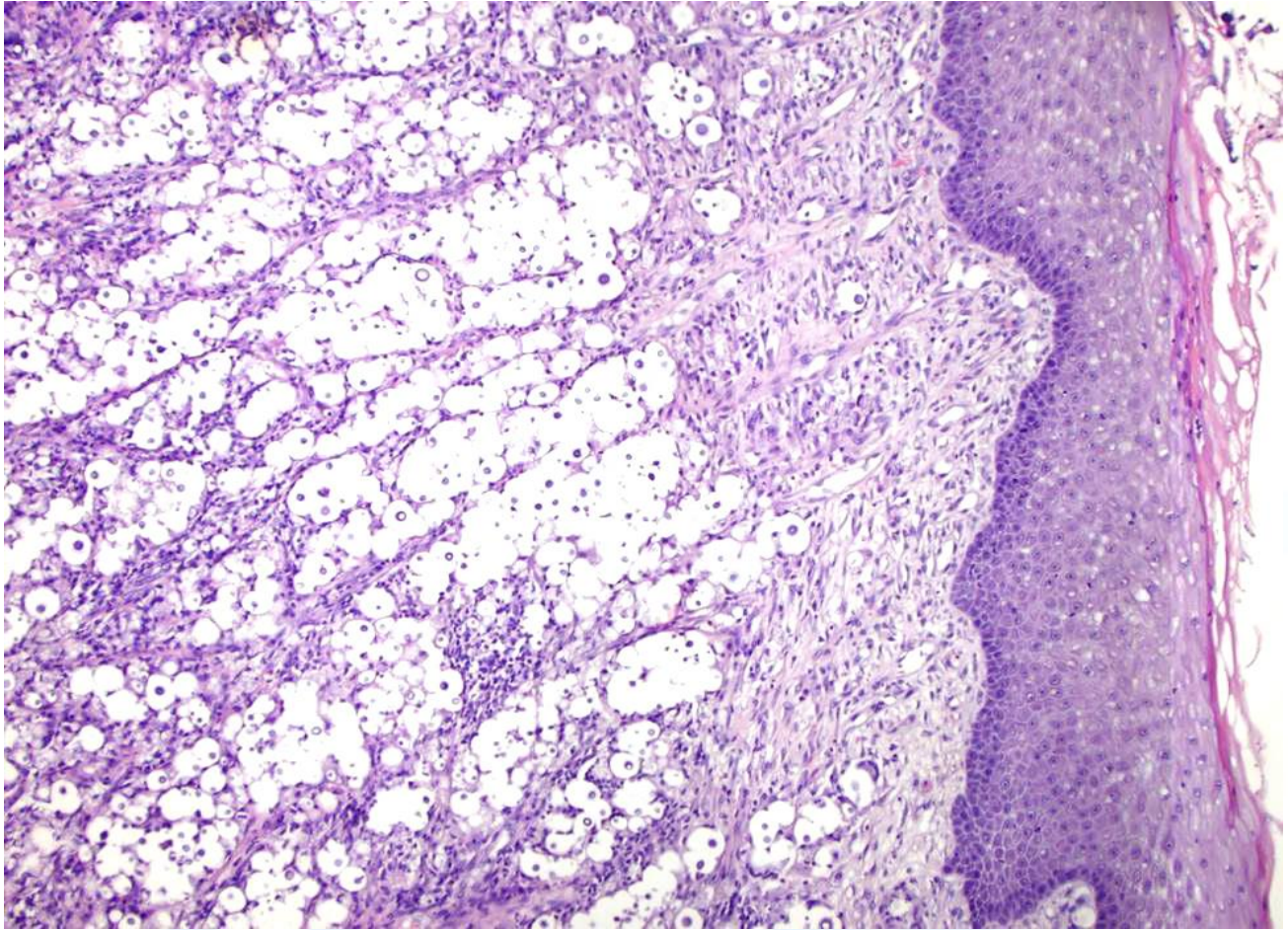
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**Clinical History:** An approximately 3-year-old, 4.5 kg, intact male, feral, domestic short hair cat (*Felis catus*) with a swelling in the nasal region.

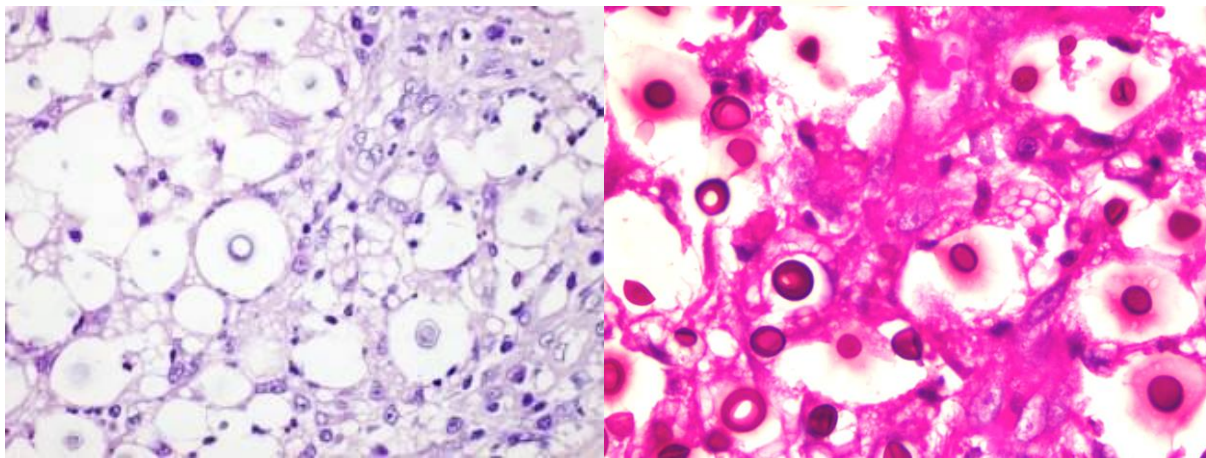
**Morphologic Diagnosis:** Nasal planum: Chronic, locally extensive, severe, granulomatous rhinitis with superficial focal dermal ulceration and hemorrhage with intralesional fungal organism compatible with *Cryptococcus* sp.

**Macroscopic findings:** The nasal planum had a bulging mass (5 cm in diameter) that expanded and misshaped the dorsal planum. A 3 cm diameter ulcer, covered by partially clotted blood mixed with necrotic debris, extended into the nasal cavity. The philtrum was intact. On cut section, the mass was solid and distorted the nasal cavity replacing the turbinates and sinuses.

**Microscopic Findings:** Skin from nasal area (from mucosa to haired skin): There was a locally extensive inflammatory area that extended to the deep limits of the examined sample. The submucosa was severely distorted and replaced by numerous round yeasts mixed with histiocytes, occasional multinucleated giant cells, and plasma cells. The yeast organisms were either round with a thick clear wall or oval and slightly pink transparent cells, varying from 5-25  $\mu\text{m}$  in diameter. The blastoconidia (asexual reproduction) were characterized by narrow based budding. The overlying epithelium was variably ulcerated with occasional acanthosis.



**Figure 3** - Chronic, locally extensive, severe, granulomatous inflammation with intralesional fungal organisms compatible in morphology with *Cryptococcus* sp.; H&E 20x.



**Figures 4 and 5** - Detail of characteristic encapsulated yeasts within sparse inflammatory reaction (Figure 4); H&E 60x. The yeasts are PAS positive; the capsule is clear and mostly unstained (Figure 5). 60x.

**Discussion:** *Cryptococcus* is a dimorphic, basidiomycetous encapsulated fungal organism causing disease in humans and animals,<sup>1,2</sup> with cats being the most susceptible species.<sup>3</sup> This encapsulated fungus replicates by narrow based budding (blastoconidia - asexual reproduction, also called vegetative stage). The organism has also a sexual stage of reproduction called basidiopores rarely found in cases of natural infection. The infection occurs by environmental exposure and is not thought to be transmissible from one infected animal to another. The main environmental source are bird excreta, mainly of pigeons.<sup>1,2,3</sup>

*Cryptococcus* is aerobic, is non-fermentative, and forms mucoid colonies in a variety of media. Virulence factors utilized by the yeast include its polysaccharide capsule, melanin, mannitol, and enzymes such as phospholipase, laccase and superoxide dismutase. Phospholipase and laccase are unique to *C. neoformans* and *C. gatti* and are thought to increase pathogenicity by interfering with the host immune response. The severity of the disease is the result of the combination of the virulence factors coupled with the immune status of the patient.<sup>2,3,8</sup>

The thick polysaccharide capsule interferes with the protective immune reaction against the yeast preventing successful phagocytosis. There is some evidence to correlate the immune status of the patient to the inflammatory response against the organism. The most susceptible patients have T-cell deficiencies. In cats there is no breed or gender predisposition. Cats younger than 6 years appear to be at higher risk. Retroviral infection in cats is not considered a risk factor. The most common presentations in cats include upper respiratory (like in this case), cutaneous, or central nervous system.<sup>1,2,5,6,8</sup>

#### **References and Recommended literature:**

- 1.- Guarner, J., & Brandt, M. E. (2011). Histopathologic diagnosis of fungal infections in the 21st century. *Clinical microbiology reviews*, 24(2), 247-280.
- 2.- Chandler FW and Watts JC. Pathologic Diagnosis of Fungal Infections. ASCP Press Chicago USA 1987 p161-175.
- 3.- Trivedi, Sameer R., Richard Malik, Wieland Meyer, and Jane E. Sykes. "Feline cryptococcosis: impact of current research on clinical management." *Journal of Feline Medicine & Surgery* 13, no. 3 (2011): 163-172.
- 4.- Sidrim, J. J. C., Costa, A. K. F., Cordeiro, R. A., Brillhante, R. S. N., Moura, F. E. A., Castelo-Branco, D. S. C. M. & Rocha, M. F. G. (2010). Molecular methods for the diagnosis and characterization of *Cryptococcus*: a review. *Canadian journal of microbiology*, 56(6), 445-458.

5. Sykes, J. E., B. K. Sturges, M. S. Cannon, B. Gericota, R. J. Higgins, S. R. Trivedi, P. J. Dickinson, K. M. Vernau, W. Meyer, and E. R. Wisner. "Clinical signs, imaging features, neuropathology, and outcome in cats and dogs with central nervous system cryptococcosis from California." *Journal of Veterinary Internal Medicine* 24, no. 6 (2010): 1427-1438.

6.- Lamm, Catherine G., Sterrett C. Grune, Marko M. Estrada, Mary B. McIlwain, and Christian M. Leutenegger. "Granulomatous rhinitis due to *Candida parapsilosis* in a cat." *Journal of Veterinary Diagnostic Investigation* (2013).

7.- Buchanan, K. L., & Murphy, J. W. (1998). What makes *Cryptococcus neoformans* a pathogen?. *Emerging infectious diseases*, 4(1), 71.

8.- Castrodale L. *Cryptococcus gattii*: an emerging infectious disease of the Pacific Northwest. *State of Alaska Epidemiology Bulletin*. September 1, 2010, no. 27.

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A final document containing this material with answers and a brief discussion will be posted on the C. L. Davis website by the end of the current month ([http://www.cldavis.org/lcpg\\_english.html](http://www.cldavis.org/lcpg_english.html)).