Latin Comparative Pathology Group

The Latin Subdivision of the CL Davis Foundation

Diagnostic Exercise

Case #: 52 Month: January Year: 2015

Answer Sheet

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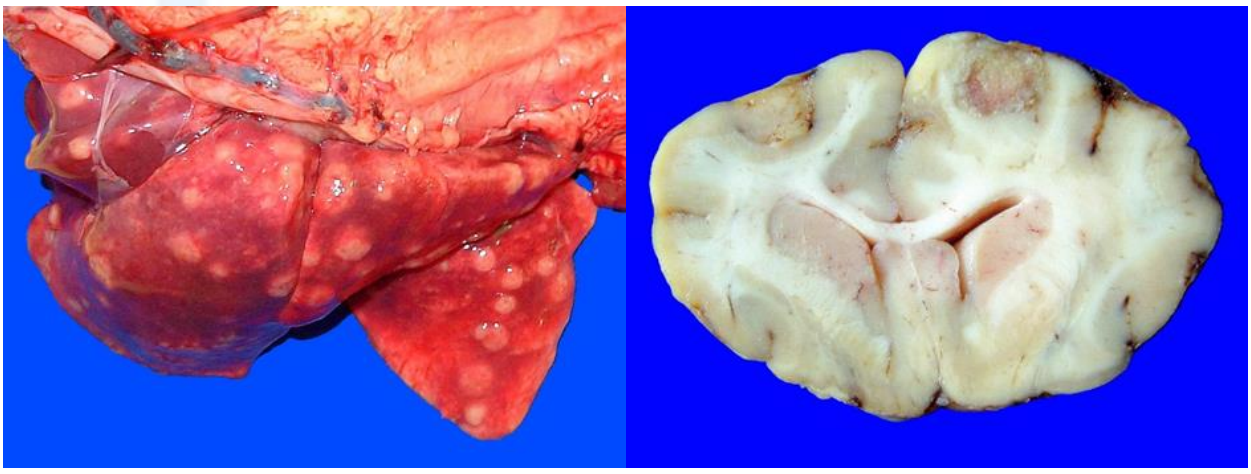
Clinical History: A seven-year-old male Yorkshire terrier presented with recurrent seizures and respiratory distress and died after surgical excision of a nodule detected by ultrasound examination. The nodule was determined to be the right renal lymph node. Four months prior to this event the dog had chronic dermatitis with alopecia and crusts on the chest, flank, neck and pelvic limbs. The animal had been treated for demodicosis, mycotic infection and flea-bite hypersensitivity dermatitis; lesions had since resolved.

Gross and/or microscopic image:



Follow-up questions: Gross description, morphologic diagnosis, differential diagnoses.

Diagnoses:

1) Gross description: At necropsy, multifocal whitish nodules, with a soft consistency, varying between 0.2 cm and 1.5 cm in diameter were observed in the lung. In the telencephalon, in the right parietal cortical region, there was a soft yellowish nodule of 1 cm in diameter.

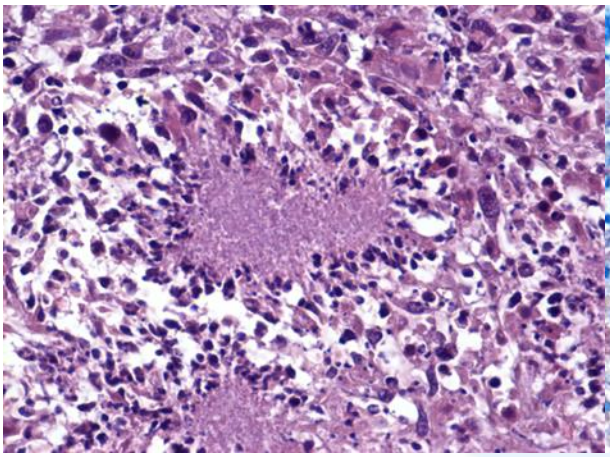
2) Morphologic diagnosis:

    Lungs: Pneumonia, chronic, marked, multifocal, and pyogranulomatous.

    Brain: Encephalitis, mild, chronic, focal, and pyogranulomatous.

3) Differential diagnoses: Disseminated neoplasia, granulomatous disease, abscesses (less likely based on cut surface image).

Microscopic findings: The right renal lymph node had diffuse moderate lymphoid hyperplasia associated with multifocal pyogranulomas. In the lung there was marked multifocal pyogranulomatous pneumonia (Figure A) characterized by areas with a necrotic center surrounded by large quantity of neutrophils, macrophages and occasional giant cells and lymphocytes. Additional findings in the lung included edema, thrombosis, and foci of suppurative bronchitis and bronchiolitis. In the cerebral cortex there was focal pyogranulomatous encephalitis, characterized by extensive central necrosis surrounded by neutrophils, macrophages and lymphocytes (Figure A). The liver had multifocal to coalescent inflammatory infiltrate, predominantly composed of lymphocytes and plasma cells, present in both the portal spaces and around the centrilobular veins, as well as multifocal pyogranulomas. In the kidney there were multifocal cortical pyogranulomas and membranous glomerulonephritis. The various pyogranulomas corresponded to the abnormal areas observed macroscopically in the liver, kidney, lung and brain. No microscopic lesions were observed in the skin. In the specially stained sections, large intralesional colonies of rod-like structures with filamentous growth were identified, which were positive by Gram Brown-Hopps (Gram positive), Ziehl-Nielsen, and Grocott's methenamine silver staining. These colonies were predominantly in the central areas of necrosis and, in the lung, also in the cytoplasm of the macrophages and giant cells (Figure B).



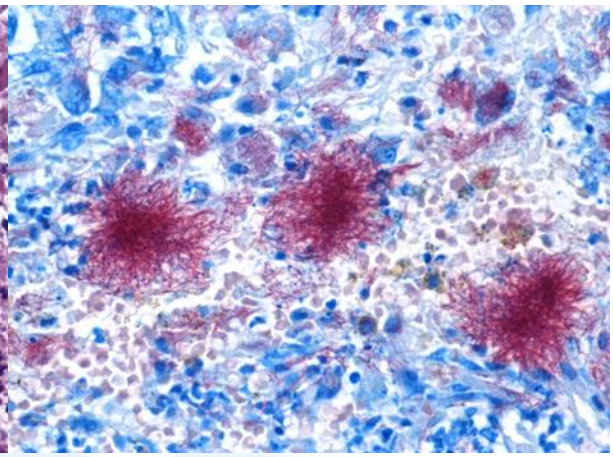


Figure A **Figure B**

Additional Laboratory Testing:

Nucleic acid sequence analyses showed the amplification product from the hsp65 gene sequence was most closely related (99% to 100% similarity) to nucleic acid sequences from multiple isolates of Propionibacterium acnes that have been deposited in GenBank. However, there also was a 99% similarity with Nocardia farcinica (AY766191). Nucleic acid sequence analyses were done on the amplification product from the recA gene to confirm that P. acnes, and not N. farcinica, was present in the tissues. The 96 base pair sequence from the recA gene was 100% similar with the recA gene from Propionibacterium acnes type I (reference strain NCTC 737) and 99% similar to the recA gene from Propionibacterium acnes type II (reference strain NCTC 10390).

Discussion:

Propionibacterium acnes is a Gram-positive, non-spore-forming, anaerobic, pleomorphic, rod bacterium, whose end products of fermentation include propionic acid. It belongs to the human cutaneous propionibacteria group. In humans P. acnes is a natural constituent of skin, nasopharynx, oral cavity, gastro-intestinal tract and genitourinary system, but it has also been associated with several types of infection, generally associated with invasive procedures and implants of surgical material. In dogs, P. acnes was isolated from multifocal skin areas in 7 out of 11 dogs, suggesting that it is part of the normal flora in this species as well. In animals, the isolation of the bacterium in association with diseases is less common than in humans, however.

In the case reported here, it was not possible to determine the portal of entry of the bacteria, although the previous dermatitis could have represented the primary site of infection. The histological morphology of the intralesional bacteria is in agreement with the characteristics of P. acnes, which can have a curled and branched appearance. However, these morphological characteristics also apply to other bacteria of the order Actinomycetales and therefore species belonging to the genera Actinomyces and Nocardia. The intralesional bacteria in this case were strongly alcohol-acid resistant. In animals with actinomycosis or nocardiosis, the main differential diagnoses in the present case, the intralesional bacteria are, respectively, non-acid fast or only partially acid-fast. Colonies of P. acnes have also been demonstrated through Grocott's methenamine silver staining, as noted in the present case.

Although few cases of infections associated with Propionibacteria in dogs have been reported, the present case indicates that P. acnes should be considered in the differential diagnosis of bacteria which are inducers of pyogranulomas, mainly in cases similar to actinomycosis and nocardiosis.

References and Recommended literature:

Brook I, Frazier EH (1991) Infections caused by Propionibacterium species. Reviews of Infectious Diseases, 13, 819-822.

Harvey RG, Noble WC, Lloyd DH (1993) Distribution of propionibacteria on dogs: a preliminary report of the findings on 11 dogs. Journal of Small Animal Practice, 34, 80-84.

Park HJ, Na S, Park SY, Moon SM, Cho O-H et al. (2011) Clinical significance of Propionibacterium acnes recovered from blood culture: analysis of 524 episodes. Journal of Clinical Microbiology, 49, 1598-1601.

Perry AL, Lambert PA (2006) Propionibacterium acnes. Letters in Applied Microbiology, 42, 185-188.

Schaal KP, Schofield GM, Pulverer G (1980) Taxonomy and clinical significance of Actinomycetaceae and Propionibacteriaceae. Infection, 8, S122-S130.

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