What's Your Diagnosis?
Donna Hertzke, DVM, PhD

Match the diagnosis to the pictures

- Blastomycosis
- Canine distemper
- Cryptococcosis
- Helicobacteriosis
- Histoplasmosis
- Large granular leukemia/lymphoma
- Mast cell tumor
- Mycobacteriosis
- Toxoplasmosis

Photo #1 - Dog, peripheral blood

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BEYOND numbers

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Why are there new guidelines?

1. The current 4-way Leptospira vaccines induce antibodies which show cross-reactivity between the serogroups tested with the microscopic agglutination test (MAT). Cross reactivity is particularly evident with the non-vaccine serogroups Autumnalis and Bratislava. For example, sera from dogs vaccinated against Pomona and Grippotyphosa frequently develop titers to Autumnalis and these titers to Autumnalis are often the highest. False seropositivity to Bratislava has also been documented with dogs vaccinated against Grippotyphosa and Pomona.

2. Vaccine titers, although not typically very high, have been documented as high as 1:3200 within one month of vaccination. It is difficult to distinguish vaccine-induced titers from natural infection titers.

3. Extensive interlaboratory variation in MAT leptospira serology has been demonstrated in some studies. There is poor reliability in identifying the infecting serogroup.

4. Autumnalis MAT titers can develop in dogs that have diseases other than leptospirosis and in dogs exposed to the non-pathogenic *Leptospira biflexa*.

**Interpretation Guidelines**

**Acute titers:**

<1:800 is negative because some non-Leptospira organisms (i.e. *Borrelia burgdorferi*) cross react with the test.

>1:1600 and <1:6400 supports Leptospira infection in NON-vaccinated dogs. If a dog has been previously vaccinated, a convalescent titer is needed.

>1:6400 supports Leptospira infection in both vaccinated and non-vaccinated dogs.

**Convalescent titers:**

Collect sample at 7-10 or more days following acute titer sample. A 4-fold rise in titer is needed to support a diagnosis of leptospirosis. However, interpret convalescent titers differently in antibiotic-treated dogs. Antibiotic therapy ameliorates the antibody response. Convalescent titers in antibiotic-treated dogs may not reach a 4-fold increase or may even be lower than the acute titer in Leptospira infected dogs.

**Key Points**

1. The sole valid use of the MAT is to support a clinical diagnosis of canine leptospirosis.

2. The MAT test cannot be used to identify a specific infecting serogroup of Leptospira sp. The serogroup with the highest titer is not necessarily the infecting serogroup.

3. If only serogroup Autumnalis has a positive titer, the dog does not likely have a Leptospira infection.

4. The MAT cannot be used to assess protective immunity in a vaccinated dog.
References:

Schultz RD, Mukhtar E, Larson LJ, and Okwumabua O. Do the criteria used to interpret the microscopic agglutination test (MAT) for the diagnosis of canine leptospirosis need to be changed? 2010 Annual Conference Proceedings of the American Association of Laboratory Diagnosticians.


WELCOME NEW PATHOLOGISTS

Maxey L. Wellman, DVM, PhD

Maxey L. Wellman is a graduate of The Ohio State University College of Veterinary Medicine. She completed an internship in Small Animal Medicine and Surgery at Cornell University and a Master’s degree from the University of Illinois College of Veterinary Medicine. She completed a combined clinical pathology residency and PhD from The Ohio State University College of Veterinary Medicine and has been on the Ohio State University faculty since 1983 where she is currently a professor in the Department of Veterinary Biosciences. Dr. Wellman is past-President of the American Society for Veterinary Clinical Pathology. She is a Diplomate of the American College of Veterinary Pathologists in clinical pathology.

Laura Snyder, DVM

Dr. Snyder is a graduate of Tufts University Cummings School of Veterinary Medicine. She completed a small animal medicine and surgery internship at Virginia-Maryland Regional College of Veterinary Medicine. She practiced small animal medicine in a private practice in Massachusetts prior to completing a residency in clinical pathology at North Carolina State University College of Veterinary Medicine. She was an instructor in clinical pathology at North Carolina State University. She formerly was assistant clinical professor of clinical pathology at University of Minnesota College of Veterinary Medicine and was assistant laboratory director of the clinical pathology laboratory at the University of Minnesota Veterinary Medical Center. She was staff pathologist at Antech Diagnostics in Minneapolis, MN. Dr. Snyder is a diplomate of the American College of Veterinary Pathologists in clinical pathology.
What’s Your Diagnosis Answers

1. **Canine distemper**: Viral inclusions are variable in size, predominately cytoplasmic and usually pink although they may appear grey-blue in Wright’s stains. They may occur in a variety of cell types including lymphocytes, monocytes/macrophages, neutrophils, red cells, platelets and epithelial cells.

2. **Toxoplasmosis**: Tachyzoites of *Toxoplasma gondii* are typically banana shaped, basophilic and have a central nucleus. They may be found free and within macrophages in tracheal/bronchial washes and direct pulmonary aspirates accompanied by mixed, suppurrative inflammation. Tachyzoites of *Neospora caninum* are similar.

3. **Mycobacteriosis**: Macrophages with long, thin, negative images are typical of mycobacterial infection. Acid fast staining (see photo #10) helps visualize the organisms. Macrophages predominate in cytological preparations, but may be accompanied by neutrophils, lymphocytes and plasma cells.

4. **Helicobacteriosis**: *Helicobacter* species are large, spiral bacteria typically seen in the stomach of dogs and cats. Their significance is controversial, but they may be associated with gastritis. They are often found along the mucosal surface and may be seen in endoscopic brushings with or without inflammation.

5. **Agranular mast cell tumor**: Mast cell tumors involving the intestines in cats typically lack distinctly staining granules and have moderately abundant, finely vacuolated cytoplasm. In addition to the intestinal tract, they commonly involve lymph nodes, liver and spleen (see photo #11).

6. **Cryptococcosis**: *Cryptococcus neoformans* has a wide geographical distribution. Organisms are 4-10 u.m round to oval yeast with or without a thick, non-staining, clear capsule. Division is by narrow-based budding in contrast to *Blastomyces* sp that have broad-based budding. Macrophages predominate and may be multinucleated. Minimal inflammation is seen in immunocompromized animals or with organisms with thick capsule. *Cryptococcus gatti* has recently been recognized in the US and appears similar.

7. **Blastomycosis**: *Blastomyces dermatitidis* is endemic in the Mississippi and Ohio River basins. Organisms are 7-15 u.m, round with a refractile, double contoured cell wall. Division is by broad-based budding. Organisms may be free or phagocytized. The tissue reaction is typically pyogranulomatous to granulomatous.

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8. **Large granular leukemia/lymphoma:** The neoplastic cells in this condition are large lymphoblasts with scant to moderate light blue cytoplasm and variable numbers of 1-3 μm pink-purple granules. In cats, large granular lymphoma most commonly involves the small intestine and mesenteric lymph nodes. Neoplastic LGL cells are present in the blood in less than half the cases. LGL cells are thought to be derived from NK cells.

9. **Histoplasmosis:** *Histoplasma capsulatum* has a similar, but more widespread geographic distribution than Blastomycosis. Many infections are latent. When clinically apparent, the organisms are widely disseminated throughout the body in the monocyte-phagocytic system and can be found in aspirates of liver, spleen, lymph nodes, bone marrow, skin and occasionally colonic scrapings. They are rarely seen in the peripheral blood. Organisms are intracellular, 2-4 μm, oval with a clear capsular halo. In cats, LGL cells are occasionally misdiagnosed as histoplasmosis. Histoplasma organisms are found in monocytes/macrophages (not lymphoblasts), have a clear capsule and exhibit narrow-based budding (see photo #12).