Haemotropic *Mycoplasmosis*

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Tests available at VBDDL: PCR (serology not available as organism has not yet been isolated.)

Haemotropic mycoplasmosis in dogs is associated with *Mycoplasma haemocanis* and *Candidatus* Mycoplasma haematoparvum whereas haemotropic mycoplasmosis in cats is associated with *Mycoplasma haemofelis* (also referred to as Ohio or large form), *Mycoplasma haeomominutum* (also referred to as California or small form) or Candidatus Mycoplasma turicensis. Collectively, these organisms were formerly known as *Haemobartonella canis* and *Haemobartonella felis* based upon visualization of organisms in dogs and cats, respectively. Haemotropic *Mycoplasma* species are cell-wall deficient, uncultivable bacteria that infect a wide range of vertebrate hosts, including humans targeting the red blood cells, where the organisms can at times be visualized on stained blood smears adhered to the erythrocyte surface. They are thought to be tick-transmitted to dogs and flea-transmitted to cats. As these bacteria have not been cultured in the laboratory, serological testing and isolation cannot be used to confirm a diagnosis. PCR amplification of organism-specific gene targets provides the most sensitive and specific approach to diagnosis.

Risk factors

- History of tick or flea exposure
- Splenectomized animals develop disease manifestations in association with concurrent infections or after therapeutic immunosuppression.
- Pregnancy. In the cat, haemotropic mycoplasmas can be transmitted from the queen to her kittens, although the exact mode of transmission has not been established. There is also clinical evidence supporting perinatal transmission of haemotropic mycoplasma to puppies, however, this has not been proven.

Disease (one or more of the following are good reasons to test)

Acute disease:

- Hemolytic anemia
- Depression
- loss of appetite
- weight loss
- fever
- Death (most such cases probably co-infected or incubating a non-infectious disease process)

Chronic, sub-clinical disease:

- weakness
- increase in appetite
- *pica*

Testing: PCR (2mls of EDTA whole blood) (Sending 2mls of serum as well is recommended.)

- The **PCR** assay used by the NCSU-CVM-VBDDL was designed to detect all known Mycoplasma species that infect cats and dogs, including *Mycoplasma haemofelis, Mycoplasma haeomominutum,* Candidatus *Mycoplasma turicensis, Mycoplasma haemocanis* and *Candidatus* Mycoplasma haemotaparvum.
- The **VBDDL Comprehensive Feline or Canine Panel** (requires 2mls of serum and 2mls of EDTA whole blood) although it does not include IFA specific to Mycoplasma, is

ideally suited to clarify the exposure history (serology) and to provide evidence of active co-infection(s) (PCR) for each patient. Since one tick could be infected with and transmit more than one pathogen (e.g., Babesiosis, Bartonellosis, Ehrlichiosis, Mycoplasmosis), it is not all that uncommon for cats and dogs to be infected with more than one of these disease-causing pathogens when presented to the veterinarian.

Treatment See ACVIM 2005 Blood Donor Consensus Statement: Blood Donor Screening

- In dogs, overt disease manifestations are generally not apparent, unless the dog has been previously splenectomized, has a suppressed *immune system* (e.g., during cancer chemotherapy), or is infected with other organisms such as *Bartonella* or *Ehrlichia* species.

- Feline haemplasmosis can be a severe disease, resulting in death. Although these bacteria typically induce persistent infections, most haemotropic *Mycoplasma* species are considered to be of low virulence.

Prevention: As with other diseases transmitted by fleas or ticks, flea and tick control through the year-round routine use of safe and effective acaracide products form the foundation for prevention of these vector borne diseases. Products which repel and kill ticks and kill immature and adult fleas are good choices. Owners should consult their veterinarian to determine the most appropriate preventative strategy for their pet.

Insights gained from VBDDL associated research

Among a study population of 506 dogs, *M.haemocanis* and *Candidatus* M.haemoparvum prevalences of 0.6% and 0.8%, respectively were found with a low overall *Mycoplasma* prevalence of 1.3% (7 out of 506). Evidence of co-infection with *Bartonella* was also found. It is possible that *Bartonella* and haemotropic *Mycoplasma* sp. are co-factors in some patients or alternatively, detection of organisms that induce persistent intravascular infections in dogs is facilitated by a serious systemic illness that suppresses the immune system and increases *Bartonella* and *Mycoplasma* sp. numbers and thereby diagnostic detection by PCR in patient samples. Published article: Compton SM, et al. Candidatus Mycoplasma haematoparvum and *Mycoplasma haemocanis* infections in dogs from the United States. Comp Immunol Microbiol Infect Dis (2012), http://dx.doi.org/10.1016/j.cimid.2012.06.004

Further reading:

Foley JE and Pedersen NC. '*Candidatus* Mycoplasma haemominutum', a low-virulence epierythrocytic parasite of cats. International Journal of Systematic and Evolutionary Microbiology 2001; 51: 815–817.

Belle Marie D. Nibblett, Cheryl Waldner, Susan M. Taylor, Marion L. Jackson, Laina M. Knorr, Elisabeth C. Snead. Hemotropic mycoplasma prevalence in shelter and client-owned cats in Saskatchewan and a comparison of polymerase chain reaction (PCR) — Results from two independent laboratories. The Canadian Journal of Veterinary Research 2010;74:91–96.

Maggi RG, Compton SM, Trull CL, Mascarelli PE, Mozayeni BR, Breitschwerdt EB. Infection with Hemotropic *Mycoplasma* Species in Patients with or without Extensive Arthropod or Animal Contact. JCM 2013;51:3237-3241.