Diagnosing the cause of anemia in feline patients can be frustrating and difficult at best. It is not uncommon to rule out obvious causes such as bleeding and renal failure and be left with a list of differential diagnoses that can be a challenge to work through. Often, feline hemotropic mycoplasmosis (FHM), formerly known as hemobartonellosis or feline infectious anemia, remains a possibility. Traditionally, diagnosis of this infection has relied on microscopically identifying the organism on the patient’s blood smear, which is an insensitive method and can result in misidentification. Response to treatment is a common means of trying to confirm this diagnosis. A positive response does not actually confirm the diagnosis, and if the cat does not respond, precious time is lost trying to identify the true cause of anemia.

IDEXX’s new Molecular Diagnostics Laboratory, directed by Christian Leutenegger, DrVetMed, PhD, FVH, now offers real-time PCR (polymerase chain reaction) testing to accurately determine the presence or absence of feline hemotropic mycoplasmas—providing you with convenient and affordable access to the accuracy of PCR as part of your routine test menu. With IDEXX RealPCR tests, you can count on:

- **The latest innovation in PCR technology.** Real-time PCR is a closed-tube system that delivers short assay run times that virtually eliminate false positive results.
- **Surprising cost savings.** IDEXX RealPCR tests and panels cost about the same as our other laboratory tests and are much more affordable than send-out PCR tests.

**Feline Hemotropic Mycoplasmosis**

Feline hemotropic mycoplasmas are parasites that attach to the outside of erythrocytes and result in anemia. This organism was formerly known as Haemobartonella but has been reclassified as a mycoplasma based on recent RNA sequence analysis. Feline hemotropic mycoplasmas are small (0.3–0.8 μm) gram-negative bacteria that lack a cell wall and infect a variety of mammalian species, including people. Damage caused by parasite attachment and immune response by the host results in increased red blood cell (RBC) destruction and anemia. There are three hemotropic mycoplasmas that have been identified in cats: Mycoplasma haemofelis, Candidatus Mycoplasma haemominutum and most recently Candidatus Mycoplasma turicensis. (Candidatus designation is given to incompletely characterized species.)

Recent studies revealed that 12.7% of healthy blood donor cats, 14.5% of healthy client-owned cats having routine blood work performed, and 28% of sick cats where FHM was suspected were positive for infection. Risk factors associated with hemotropic mycoplasma infection include:

- access to outdoors, flea, male gender, age of less than 4 to 6 years, presentation during summer months, positive FeLV status, history of cat bite abscesses and absence of current vaccination.

Transmission can occur through fleas and possibly ticks and lice. Kittens can be infected from the queen. Biting and aggressive behavior have been associated with transmission. Blood transfusion with infected blood can result in infection of the blood recipient.

Cats with FHM present with depression, lethargy, anorexia or inappetence, weakness, weight loss and dehydration. On physical examination, mucous membranes are pale and sometimes icteric. Tachypnea, tachycardia and a heart murmur may be present. Fever and splenomegaly are not uncommon. Subclinical carriers of feline hemotropic mycoplasmas show no clinical sign of the disease.

The CBC in cats presenting with clinical signs of illness reveals a hematocrit that is often 50% of normal. The anemia is usually very regenerative, but may be nonregenerative if there is concurrent illness or infection with FeLV. In cats with subclinical infections, the CBC may be normal or reveal only a mild anemia. A biochemical profile is usually normal, but increases in ALT from hypoxia and hyperbilirubinemia from hemolysis may be present.

Once a diagnosis of FHM has been made, treatment with doxycycline or enrofloxacin can be initiated. Because the immune system contributes to the destruction of erythrocytes, glucocorticoids are often given to severely anemic patients.

Blood transfusions may be necessary in cats with significant anemia for immediate stabilization. Flea control is important to protect against additional infections.

Prognosis with appropriate treatment is good. Because early diagnosis and appropriate therapy are key to a good outcome, having an accurate, reliable, cost-effective and fast diagnostic test for feline hemotropic mycoplasmosis can help you save your patients’ lives by taking the guesswork out of diagnosing this disease.

**Diagnosing Feline Hemotropic Mycoplasmosis**

Traditionally, FHM is diagnosed by cytologic evaluation of the red blood cells. At IDEXX, every CBC is scanned by a trained technician, and for every anemic cat a comment is made about whether feline hemotropic mycoplasmas are seen. However, the number of infected cells fluctuates quickly (in some cases declining from 90% to less than 1% in under 3 hours) and infection can easily be missed. False positive results are also possible because feline hemotropic mycoplasmas can be difficult to differentiate from precipitated stain, other drying or
fixation artifacts, poorly staining Howell-Jolly bodies, basophilic stippling, iron-positive inclusions, Cytauxzoon felis organisms and small Babesia organisms.

The IDEXX RealPCR FHM Test uses a fluorescent probe that matches a unique segment of the organism's DNA, making the test highly specific for the pathogen. The test can detect very small numbers of organisms, at a level not detectable by microscopic examination. Because the test detects only DNA, it cannot detect other non-DNA substances that could be visually mistaken for feline hemotropic mycoplasmas in a cytological examination. The specificity, sensitivity and speed of real-time PCR make this technology far more accurate and reliable for diagnosing FHM than microscopic identification.

An internal study performed at IDEXX Reference Laboratories evaluated whole blood samples from cats with a hematocrit less than 25% for the presence of feline hemotropic mycoplasmas. These samples were also screened microscopically for the presence or absence of these organisms. Out of 303 samples evaluated, feline hemotropic mycoplasmas were detected in 10 samples by routine microscopic examination. All 10 of these samples were positive for M. haemofelis by IDEXX RealPCR. In addition, 29 additional samples, for a total of 39 samples or 13%, were positive for M. haemofelis by IDEXX RealPCR. Feline hemoplasmas were detected in a total of 88 samples (or 29%); 13 samples had coinfections with two strains, and seven samples had coinfections with all three strains. Results confirm previous studies—PCR is up to 10 times more sensitive than microscopic evaluation and will have a significant impact on the diagnosis of feline hemotrophic mycoplasmosis.

Limitations: As with any PCR procedure, new and emerging isolates may not be detected and may lead to false negative results. Because healthy cats can be infected with feline hemotropic mycoplasmas, PCR analysis should be restricted to anemic cats presenting with clinical signs and to blood donor cats. The pathogenicity of the three strains of feline hemotropic mycoplasmas is different. M. haemofelis has the greatest pathogenicity and has been associated with severe hemolytic anemia in immunocompetent cats. In contrast, Candidatus M. haemominutum is not believed to cause anemia in immunocompetent cats. It may be a contributing factor to anemia in ill cats, but investigation of additional causes of anemia including additional infectious agents (e.g. FeLV, FIV, Cytauxzoon felis and Ehrlichia infections), concurrent illness (e.g. renal disease, neoplasia), or coagulopathies is recommended. The most recently identified hemotropic mycoplasma, Candidatus M. turicensis, is believed to have moderate pathogenicity.

Contacting IDEXX
For more information about IDEXX RealPCR, call our Internal Medicine Team at IDEXX Reference Laboratories, 1300 44 33 99. If you are not currently an IDEXX Reference Laboratories customer and would like to try IDEXX RealPCR, ask to speak with your sales representative.

References

The information contained herein is intended to provide general guidance only. As with any diagnosis or treatment, you should use clinical discretion with each patient based on a complete evaluation of the patient, including history, physical presentation and complete laboratory data. With respect to any drug therapy or monitoring program, you should refer to product inserts for a complete description of dosages, indications, interactions and cautions.