

Diagnosing Aleutian Disease in Companion Ferrets

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Abstract: This article highlights research developments made at the University of Georgia in diagnosing Aleutian Disease Virus in domestic ferrets (*Mustela putorius furo*). The tests developed at UGA have resulted from the cumulative hard efforts of numerous individuals including Dr. M.A. Stevenson, Kate Pennick, Dr. Chris Gregory, Dr. Ken Latimer, myself, and Dr. Branson Ritchie.

INTRODUCTION TO ADV

ADV is Aleutian Disease Virus. The virus was named after the Aleutian strain of mink in which Aleutians Disease (AD) was first discovered in the 1940s. Although mink with sable or other coat colors can be affected with AD, it is the Aleutian strain of mink, which have the gunmetal gray coat color, that are most severely affected. The virus that causes the disease is a parvovirus that was first reported in the 1950s. Infection with ADV causes an over-stimulation of the immune system (resulting in a hypergammaglobulinemia) that is nonetheless insufficient to defeat the virus. In infected animals that develop disease, the antibodies produced by the animal's immune system combine with the virus particles to form antigen/antibody complexes. These large complexes are then deposited in multiple organs, such as kidney, liver, spinal cord, GI tract, and blood vessels, causing severe inflammation. The disease affects mink, ferrets, and related mustelids, such as skunks. In most ferrets, it is usually subclinical. If clinical signs are manifested, they may include posterior paresis, wasting, respiratory disease, depression, dark, tarry stools, and incontinence.

TRANSMISSION

Transmission of the virus in ferrets is thought to be similar to what has been shown to occur in mink. In mink, the virus may be transmitted through direct contact with urine, saliva, blood, or feces, or through the air in respiratory secretions. It may also be transmitted from contact with contaminated fomites, such as cages or bowls. Vertical transmission (i.e., transmission from dams to kits) is suspected in ferrets, since it has been shown to occur in mink, but has not been proven.

DIAGNOSIS

Diagnosis cannot be made on the basis of clinical signs, as there are many other diseases that may present with symptoms similar to that of AD. Generally, a thorough physical examination and routine bloodwork should be performed on any "sick" ferret. A serum electrophoresis to look for increased total protein and gamma globulins (may be up to 20 percent of TP value) is also helpful. Serum antibody titers (using counterimmunoelectrophoresis, or CIEP) and polymerase chain reaction (PCR or DNA probe) assays on whole blood and urine will soon be available through the University of Georgia's Infectious Disease Lab. These tests have been used on a research basis for several years and have been shown to provide clinically relevant information. DNA probes actually detect the presence of the virus itself and are much more specific and sensitive tests than any previously developed for diagnosing ADV. Additionally, the ability to run this assay on urine helps to identify animals that are shedding viral genetic material (DNA).

Currently, there are ongoing efforts to develop an ELISA assay that would be less labor-intensive than the CIEP assay. It would also be more specific for the type of antibody produced and this could better define the course of disease in companion ferrets. Veterinarians interested in submitting samples for these tests may contact the lab at 706-542-8092.

Another commercially available test is the CIEP test through United Vaccines. This has been an effective tool in diagnosing affected mink, which might be euthanized should the test come back as positive. However, a single positive antibody titer does not necessarily indicate an active infection. In mink, it has been shown that some animals are capable of clearing the virus from the body. So there are some limitations in using this test to diagnose disease in companion ferrets, as an antibody titer is not given and it cannot differentiate between previous and active infection. A ferret that has been previously infected but has defeated the virus is actually the safest ferret to have in a group, as it has essentially been self-vaccinated. Further research into the course of ADV infection in ferrets is needed. However, animals that test positive but are displaying no clinical signs should not be euthanized!

A definitive diagnosis of Aleutian disease requires microscopic examination of tissues collected by biopsy or after death at necropsy. Histopathology (examination of tissues under the microscope) usually demonstrates lymphoplasmacytic (inflammatory) infiltrates in several tissues and glomerulonephritis (in-

flammation in the kidneys). Affected organs frequently include liver, kidney, intestines, and spinal cord.

INCIDENCE OF ALEUTIANS DISEASE

Historically, the prevalence of the virus has been moderate to high, but incidence of the disease has been low in ferrets. For example, in a survey that Dr. Susan Brown did in over 500 ferret shelters in Illinois during the 1980s of 700 ferrets, 10 percent (70) were positive on CIEP, but over time, only 2 developed clinical disease. It is important to remember that, historically, ADV has really not been a problem for ferrets. However, there have been several outbreaks recently reported with high morbidity (illness) and mortality (death). Remember that the onset of clinical signs can be extremely variable. There is no accurate way to determine if or when a ferret that has been exposed to ADV will develop disease. Even if a ferret tests positive, it may never die of AD.

INCUBATION PERIOD

The viral incubation period seems to be pretty short (mink take about six days after infection to start making antibodies). Ferrets that are exposed and subsequently infected seem to seroconvert and become antibody positive very quickly. If serum antibody titers are taken several weeks apart and are rising, then there is probably a recent infection occurring (it is rare to document this). If the antibody titers are falling, or have gone from positive to negative, then the ferret may have defeated the viral infection and should be fine. In our experience, ferrets can

be persistently infected for a prolonged periods (perhaps even for years) and maintain high antibody titers for that length of time and also be shedding the virus all that time.

DIFFERENTIAL DIAGNOSES

Clinical signs of AD can be variable depending on the virulence of the virus strain (several different strains of this parvovirus have been identified), the level of exposure, and the immune status of the host. It is important to realize there are a number of diseases that are very common in ferrets that may present with clinical signs similar to that of Aleutians Disease. These may include insulinoma or other neoplasias, heart disease, anemia, viral or bacterial infections, toxins, or trauma. Furthermore, it is entirely possible that a ferret may have one or more of these diseases concurrently.

TREATMENT/PREVENTION

As with viral infections in most species, there is no definitive treatment for ADV beyond supportive care. Anti-inflammatory or immunosuppressive drugs may be of some palliative use. Given sufficient funding, the Emerging Diseases Research Group at the University of Georgia would work on a vaccine to prevent infection in ferrets. Because of new technology in vaccine production, there is promise that a safe and effective vaccine could be produced.

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PATTY ASHEUER

The only way to protect your ferret from ADV is to first have it tested, then quarantine and test any new arrivals.

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Donations may be made to the UGA Foundation with "ferret research" on the memo line. Contact the author at 706-542-3221 or Kathy Bangle at 706-583-0154, or e-mail gifts@vet.uga.edu.

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