

## **Myxomatosis: A Brief Review**

### **Introduction:**

The term "myxo" in myxomatosis refers to the mucinous fluid present in tumor-like lesions (myxomas) that are present in some species of rabbits when infected with the myxoma virus. These lesions develop in the chronic form of the disease with some strains of virus. Excessive mucus production is also present in the early (acute) stage of the disease when blood vessels and mucous membranes become infected.

### **The infectious agent:**

The infectious agent is a member of the Poxvirus Family and morphologically is similar to other members of this virus group. Poxviruses are noted for their resistance to inactivation under most environmental conditions and are not easily destroyed by disinfectants. Poxviruses also are not easily eliminated within an infected animal. A cell-mediated immune response is needed to rid the animal of infected cells. Cellular immunity usually requires 28 days to fully develop; this is an important concept in establishing a quarantine period of an infected animal that recovers from the disease.

### **History and prevalence of the virus in enzootic areas:**

The disease in rabbits was first described in Uruguay in 1898. From this location it spread naturally to other countries in South America including Mexico. From Mexico, it was introduced into California by an infected domestic rabbit. The agent remains enzootic in California, especially along coastal areas. Myxomatosis is occasionally seen in Oregon with both major and minor epizootics occurring at periodic intervals. The virus that is present in the Western USA is referred to as the California strain of myxoma virus and possesses characteristics that differ slightly from other strains.

The myxoma virus generally appears to be subject to variation due to natural mutation. There is a great deal of variation among different recognized strains of the virus throughout the world. The purposeful introduction of the virus has been used in an attempt to rid areas of wild rabbits that were designated as agricultural pests. This was undertaken in Australia in 1950 and Belgium in 1953 and resulted in a high mortality rate among susceptible rabbits. However, due to both genetic changes of the virus and adaptation of surviving rabbits, the virus became less pathogenic and rabbits developed increased resistance to disease. In Australia, within seven-year period, the mortality rate dropped to approximately 25% compared to >90% when the virus was first introduced.

### **Susceptible species of rabbits:**

Wild rabbits are generally more resistant to the effects of the virus. While they may become infected and serve to spread the disease, they may not suffer from a high mortality rate. The so-called **brush rabbit** appears to be the natural host for the virus on the West Coast of the USA (California and Oregon). The role of the cottontail and jackrabbit is not clearly defined. These species can become infected and die from the disease but appear to be relatively resistant compared to domesticated rabbits. It is not known if they are important reservoir hosts for the virus.

There are a number of different species of rabbits and hares throughout the world that vary in their susceptibility to the virus. Generally, all species of domestic rabbits in the United States are very susceptible to infection and show severe signs of disease. No other species of animals become infected. Likewise, humans are not susceptible to infection.

#### **Natural spread of the virus:**

In nature, insects that bite an infected reservoir host (brush rabbit) serve as the main method of transmission. Mosquitoes appear to be the major vector but fleas, mites and biting flies may also be involved. The virus does not grow in the vector so transmission is strictly mechanical from the contaminated mouthparts of the insect. Several species of mosquitoes may acquire a blood meal from the reservoir rabbit so spread of the virus in nature is not limited to the niche of a specific species of mosquito.

Periodic epizootics occur due to a complex interrelationship between the susceptible reservoir i.e., immunity within the brush rabbit population, mosquito prevalence, and other complex environmental factors. Epizootics usually occur during the peak mosquito season, which in Western Oregon is July through October. However, cases may be detected after this time due to transmission by other insects such as fleas.

The virus can also be transmitted via aerosol from an infected rabbit. The importance of this method of transmission is not clear as some information indicates that virus does not spread but a few feet. Other researchers feel the wind may carry the virus for miles.

Mechanical transmission by handling an infected animal may be an important method of transmission with domestic rabbits. In a rabbit colony that contains an infected animal, the caretaker may spread the virus. Likewise, animals that are congregated at rabbit shows or fairs may become infected if one of the rabbits has the disease and is shedding the virus. Transmission of the virus may be by the supervisor that checks animals into the show, by the judge, or by the exhibitor during a showmanship contest. Rabbits that do not die may shed the virus for up to 30 days.

#### **Signs of disease (domestic rabbits):**

**Peracute** (extremely acute or brief course of the disease) signs of disease include a high fever ( $> 104$ ), lack of appetite, depression and death. Incubation period in experimentally inoculated animals is 7 to 10 days. Once clinical signs become apparent, the animal may die within 48 hours. Pathological signs are not specific at this stage of the disease and the animal may appear to succumb from any number of different causes. The virus replicates in lymphocytes and there is a profound immune suppression. Inclusion bodies (see below) may not be apparent in this peracute form of the disease.

If the animal survives 3 to 4 days, it is classified as being in the **acute** form of the disease. Outstanding signs of disease include localized or generalized swelling of mucous membranes and other tissue. This is most apparent at sites such as the conjunctiva, nose, muzzle, vulva, scrotum and around the anus. Occasionally, the entire face will be dramatically swollen. The ears may also be edematous and droop. These signs are more specific for the disease and aid in diagnosis. The animal continues to maintain a fever and

is extremely depressed. In a susceptible population, over 90% of rabbits may die by this stage of disease. Different rabbit species may vary in their ability to survive infection. In making a diagnosis, pathologists frequently take a sample from the mucous membranes of the conjunctiva and examine tissue with a microscope for the presence of intracytoplasmic inclusion bodies in infected cells. The presence of these inclusion bodies, along with clinical signs as indicated above, is used to make the diagnosis.

The literature and some web sites dealing with the disease report that the **chronic** disease is characterized by the presence of nodules (myxomas). Myxomas appear within 5 to 7 days in animals that survive the acute form of disease. These lesions are detected in some species of wild and domestic rabbits and with some strains of virus. Nodules appear at the site of insect bites, usually around the ears and legs. It should be noted that, with infection by the California strain of virus in domestic rabbits, myxomas are seldom present in infected animals.

### **Prevention**

The best preventative measure is mosquito control. If an animal is suspected of developing disease, it should be isolated and mosquito netting placed over the cage. Extreme care should be taken to prevent mechanical transmission. Care should be taken not to allow the animal to become overheated as mosquito netting may diminish natural airflow that tends to cool the animal.

If a rabbit is exposed to an infected animal, it should be quarantined for a period of 14 days. It should be regarded as infected and cared for as indicated above. After 14 days, if it does not become sick or develop a fever greater than 102.5 F, it should be assumed to be free of infection.

During epizootic periods, rabbits should not be taken to fairs, rabbit shows or anywhere these animals are congregated.

A vaccine has been developed (an attenuated modified-live virus). Twenty-eight days are required after administration of the vaccine before a good immunity develops. The vaccine may not be readily available in the United States.

Further questions concerning diagnosing this disease should be directed to your local veterinarian or the OSU Veterinary Diagnostic Laboratory (541) 737-3261.

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