

## Meningoencephalomyelitis of Unknown Etiology (MUE)

### What is Meningoencephalomyelitis of Unknown Etiology (MUE)?

MUE is considered an immune-mediated disorder that leads to inflammation in the brain or spinal cord. Inflammation occurring in the brain is referred to as encephalitis; inflammation in the spinal cord is termed myelitis; and inflammation affecting the membranes surrounding the spinal cord and brain is known as meningitis.

The immune system is typically designed to safeguard the body against infections; however, in dogs and cats suffering from MUE, it begins to target the brain and spinal cord instead.

### What Clinical Signs Occur with MUE?

Dogs diagnosed with MUE may exhibit a variety of clinical symptoms. Certain animals may experience solely back or neck discomfort. Others may present with seizures, alterations in behavior, circling, or vision impairment. Additionally, some animals may struggle with ambulation, have an uncoordinated walking pattern, or lose the capacity to walk or move their limbs, resulting in paralysis.

### Which Animals are Prone to Developing MUE?

MUE is most frequently observed in young to middle-aged dogs. Certain breeds, such as Maltese, Yorkshire Terriers, Pugs, Miniature Poodles, and Chihuahuas, are more prone to developing MUE than others. However, MUE can occur in dogs of any age, sex, or breed. MUE has rarely been described in cats.

### What Causes MUE?

The exact cause of MUE remains unidentified; however, various theories exist, such as genetic factors, a primary autoimmune disorder, and potential infectious triggers. Numerous studies have been conducted to identify a common infectious cause of MUE, yet studies have not succeeded in pinpointing a consistent infectious agent. The definitive cause of MUE is still unknown.

### How is MUE Diagnosed?

The first step typically involves conducting an MRI of the brain and/or spinal cord. Animals diagnosed with MUE often exhibit regions of inflammation in the brain and/or spinal cord, which can be detected through an MRI. However, it is also feasible for animals with MUE to present a normal MRI.

The second step involves conducting a spinal tap to obtain a sample of spinal fluid. In most cases, animals diagnosed with MUE exhibit an elevated white blood cell count and protein concentration in their spinal fluid. It is uncommon, however, for certain dogs with MUE to present with a normal spinal fluid analysis; this occurrence is most frequently observed in animals that are already undergoing treatment with steroid medications.

In specific instances, it may be crucial to eliminate potential infectious origins of the inflammation affecting the brain and/or spinal cord. Infectious origins of inflammation encompass viral, fungal, protozoal, tick-borne, and bacterial infections. The determination of whether to send samples for infectious disease analysis relies on the findings from the MRI and spinal tap.

### **How is MUE Treated?**

Since MUE is a disorder of the immune system, it is treated by using medications to help suppress the abnormal response of the immune system. Decreasing the abnormal immune response will help to decrease the inflammation within the brain and/or the spinal cord. The specific medications utilized may differ depending on what is most suitable for you and your pet; however, the most frequently used medications include Prednisone (or Prednisolone), Cyclosporine, Cytosar, Mycophenolate, Azathioprine, & Procarbazine.

**Prednisone** is a corticosteroid that aids in suppressing the immune system. The side effects associated with this medication may include heightened appetite, increased thirst, frequent urination, and panting. In some cases, Prednisone can lead to gastrointestinal ulcerations or bleeding. Typically, this medication is administered for the duration of your pet's life; however, we aim to gradually reduce the dosage of Prednisone to the minimum level that effectively manages clinical symptoms. This reduction in Prednisone dosage is generally performed very gradually (over several months).

**Cytosar** is a chemotherapy drug that specifically addresses inflammation in the brain and spinal cord. The side effects associated with this medication are relatively uncommon, and it is generally well tolerated. The primary side effect of concern is a reduction in the white blood cell count. A low white blood cell count may increase the risk of infections in your pet, such as urinary tract infections, pneumonia, or skin infections. While vomiting, diarrhea, or a reduced appetite can occur with Cytosar, most dogs do not experience any significant adverse effects.

Cytosar is typically administered via subcutaneous injection over a duration of one day. The medication is generally given every 3 to 4 weeks for a period of 6 months; however, following this initial treatment phase, the frequency of injections may occasionally be extended to once every five or six weeks.

### **What is the Prognosis for MUE?**

Generally, MUE is considered incurable, and the majority of pets will need ongoing treatment for their entire lives. MUE is life-threatening without treatment. The objective of this treatment is to help your pet resume as normal a life as possible, and there is a possibility that your pet may achieve a neurologically normal condition. It is important to note that the recurrence of neurological symptoms can happen even while treatment is ongoing. Should this happen, we will need to adjust the medications that your pet is currently taking.