# Equine Myopathy (PSSM2)

*Are you treating a horse with suspected degenerative muscle disease?*

*The cause could be PSSM2.*

| Test | # H108 |
|---|---|
| Sample | Hair or Blood |
| Price | 200 € (net) |
| Time required | 10 - 14 days |

PSSM2 stands for "Polysaccharide Storage Myopathy Type 2" and is an umbrella term for multiple muscle diseases with similar symptoms.

The name was given because PSSM Type 1 has similar symptoms, and it can be difficult to distinguish between the types of disorders.

PSSM2 is actually not a defect of muscle polysaccharide storage. We now know that the symptoms of PSSM2 result from defects in muscle fibers themselves.

Until recently, PSSM2 was diagnosed by ruling out all other possibilities. If a genetic test for PSSM1 was negative, but a biopsy showed disrupted muscle formation, the horse was diagnosed with PSSM2. Four genetic variants associated with PSSM2 have now been identified. The test for these four variants is exclusively available in Europe from CAG.

## Genetic Tests and Inheritance

PSSM2 is a group of disorders with similar symptoms which test negative for the *GYS1*-R309H mutation which causes PSSM1.

Four mutations associated with PSSM2 have been identified and can be tested by CAG.

**Known PSSM2 Variants:**

| Myopathy Panel | Variant | Affected Gene | Defective Protein | Normal Function |
|---|---|---|---|---|
| #H108 | P2 | *MYOT* | Myotilin | Actin-binding protein which makes up part of the Sarcomere Z-disc. |
| | P3 | *FLNC* | Filamin C | Actin-binding protein which makes up part of the Sarcomere Z-disc. |
| | P4 | *MYOZ3* | Myozenin 3 | Protein in the Z-disc which binds to other Z-disc binding proteins in the Sarcomere |
| | Px | *CACNA2D3* | $Ca^{2+}$ Ion Channel | Regulation of $Ca^{2+}$-concentration in muscle |

All four variants have a semidominant mode of inheritance. This means that one copy of the variant is sufficient to increase the risk of a horse developing PSSM2. If a horse has two copies of a variant, it will develop symptoms at a younger age, and will have a more severe disease process. Because the mutations are in different genes, it is possible for a horse to have a combination of variants.

# Equine Myopathy (PSSM2)

## Typical Symptoms for Equine Myopathies P2, P3 and P4 (Myofibrillar Myopathy (MFM))

The first symptoms of PSSM2 are most often seen between 7-10 years of age.

- Changes in behaviour (likely related to pain)
- Shifting lameness (especially in the stifles)
- Severe muscle wasting (especially in the hindquarters and topline / shoulder girdle)
- Localized muscle wasting causing small divots, often resembling kick marks
- Coordination problems /.Ataxia
- Muscle tension / cramping / tying up
    - Stiff hindquarters
    - Muscle tremors
- Gait changes (reduced stride length, lack of drive from hindquarters, bunny hopping, rope walking, etc.)
- Although there is severe muscle atrophy, the creatinine kinase (CK) and aspartate aminotransferase (AST) usually remain within normal parameters.

## Typical Symptoms of Equine Myopathy Px (Recurrent Exertional Rhabdomyolysis (RER))

- Most common in Arabians and Thoroughbreds
- Symptoms most obvious during/after exercise
- Pain-related reluctance to move
- Muscle tension / tremors
- Severe sweating
- Horse may be described as nervous or easily upset
- Darkly pigmented urine (Pigmenturia)
- High Creatinine kinase (CK) and aspartate aminotransferase (AST) levels

## When should a horse be tested?

Horses should be tested if they have shifting lameness and/or severe muscle wasting, along with reluctance to move without a clear cause.

As opposed to a stressful, invasive muscle biopsy, genetic testing requires only a sample of hair from the mane or tail (with roots). The genetic test can differentiate between the different forms of myopathy so that you can help your patient as soon as possible.

The genetic test can be performed on a horse of any age, even before symptoms are ever seen. Testing prior to breeding or purchasing a horse is a good idea.

## Caring for a horse with PSSM2

Hereditary muscle diseases are not curable. Most PSSM2 affected horses benefit from diets with high fat and protein, and/or supplementation of the amino acids Lysine, Threonine, and Methionine, along with regular exercise.

EQUISEQ

CAG holds the exclusive license to offer the EquiSeq Equine Myopathy Panel in Europe. Other forms of equine myopathies are still being researched. Genetic tests for new variants will also be available at CAG.