



## Equine Cushing's Disease & Metabolic Syndrome

Ever wondered why your little pony seems to gain weight on thin air alone, or why he or she keeps getting bouts of laminitis again and again even though you've tried so hard to prevent it? Well, your pony may in fact be suffering from Equine Cushing's disease and/or Equine Metabolic Syndrome. The following fact sheet will hopefully help you understand more about these relatively common but often misunderstood and confusing conditions.

### So what is Equine Cushing's disease?

Equine Cushing's disease, also known as Pars Pituitary Intermedia Dysfunction (PPID) is a disorder of the horse's endocrine system (organs that are involved in the release of hormones). Equine Cushing's most commonly affects pony breeds, but larger breeds can be affected and it is primarily seen in horses above the age of 15 years.

Equine Cushing's is usually caused by a benign tumour or simply a benign enlargement in the pars intermedia (middle section) of the pituitary gland. The pituitary gland is located at the base of the brain and is an important endocrine organ that produces a variety of different hormones. Dysfunction of the pars intermedia results in the increased release of several hormones, most notably ACTH (adrenocorticotropin hormone). ACTH travels through the horse's blood stream and causes the adrenal glands (located near the kidneys) to increase production of cortisol, which is a type of steroid. It is this over production of cortisol that affects the horse and can explain the majority of clinical signs seen in this condition. The location of the tumour can explain some of the rest.

### What does Equine Cushing's look like?

Recurrent and often unexplained bouts of laminitis along with an abnormal hair coat are two of the most common clinical signs of a horse with Cushing's. Other signs include a pot-bellied appearance, ravenous appetite, increased urination and drinking, lethargy and a decrease in the immune system seen as recurrent skin and respiratory infections as well as dental disease and an increased susceptibility to worms. Cushing's horses can also get an abnormal deposition of fat above their eye where normal horses would have a depression (this depression can often be seen moving when a horse chews) and can also show wasting of their skeletal muscles.

Abnormal hair coat can vary from mild changes in shedding pattern to the development of a long (up to 10cm) thick and wavy overgrown coat. This strange coat



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characteristic is known as hirsutism and is due to the enlarged pars intermedia of the pituitary gland compressing the hypothalamus, which is a section of the brain located next to the pituitary gland that regulates body temperature, appetite and seasonal cyclic shedding of hair.



The link between Equine Cushing's disease and Laminitis is still not fully understood by veterinary medicine but it is the focus of extensive research around the world. It is currently believed that the increased levels of circulating cortisol and cortisol-like hormones may play a major role in the development of laminitis, so too might a metabolic state known as insulin resistance.

### How do you diagnose Cushing's disease?

In classic cases (ie: old pony with hirsutism and recurrent laminitis) a diagnosis can be made on presentation alone, but not all Cushing's cases have obvious clinical signs - often they are very subtle. When investigating subtle signs or when a definitive diagnosis is wanted there are several tests that your vet can conduct.

The most common test performed to achieve a diagnosis of Equine Cushing's disease is the Low Dose Dexamethasone Suppression Test. This test involves taking a blood sample from the horse to get a base-line measure of circulating cortisol. After the blood is taken, a dose of dexamethasone is administered. Dexamethasone is a steroid that in normal horses will cause a suppression in circulation cortisol levels. In horses affected by Cushing's disease the body is unable to respond properly to the injection and cortisol levels remain elevated. A second blood sample is taken about 20hrs after the injection of dexamethasone. If the cortisol levels have not decreased then a diagnosis of Cushing's is made.



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Another common test is to measure resting ACTH. This is a simple one-off blood sample that gives fairly reliable results in regards to diagnosis as well as being used to monitor the progression of the condition once treatment has started. Other tests include insulin levels, thyrotropin releasing hormone response test, ACTH stimulation test and urine cortisol to creatinine ratio test.

### Treatment and Management of Equine Cushing's disease

Unfortunately there is no cure for Equine Cushing's but there are a couple of drugs on the market that can help reduce the effects of the disease and aid in managing the affected horse. Pergolide is probably the most commonly used Cushing's medication. It comes in tablet form that can be crushed up and fed in feed or hidden inside a treat and is given once per day. Pergolide is a dopamine agonist (dopamine inhibits the pars intermedia and hence helps to reduce its size and over-production of cortisol) and has been reported to be up to 80% successful in reducing the severity of signs seen in Cushingoid horses.

Trilostane is another drug often used in the medication of horses and ponies with Cushing's. This drug acts by inhibiting cortisol and is required to be given twice per day, morning and night.

Management is just as important as medicating Cushingoid horses. Frequently inspecting for wounds and the evidence of any kind of infection and ensuring prompt veterinary attention is very important as affected horse have reduced levels of immunity and often need more intensive and prolonged treatment than other horse. Regular farrier visits and dental checks along with routine vaccinations and a de-worming program involving frequent faecal egg counts are vital to ensure the health of Cushing's-affected horses. Simple things like clipping out excessive hair will also go a long way in ensuring the comfort of affected horses.

### If that was Cushing's, what's Equine Metabolic Syndrome?

Equine Metabolic Syndrome (EMS) is a veterinary term used to describe horses presenting with obesity and/or large regional fat deposits (regional adiposity), insulin resistance and recurrent laminitis. EMS usually affects young to middle aged horses and is especially seen in native pony-type breeds.

A metabolic syndrome horse is typically a "Good doer", obese and seems to gain weight on thin air. Large regional fat deposits can be seen around the shoulders,



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at the base of the tail, in and around the mammary glands in mares and in geldings a fat filled and enlarged sheath may be seen. A large, thick and "cresty" neck that becomes very firm and inflexible is also very commonly seen in EMS horses and ponies.

Like in Cushing's disease, the association between EMS and recurrent laminitis is still not fully understood but it is believed that there is a strong and plausible link between the occurrence of insulin resistance and the predisposition for laminitis to occur.

### So what is Insulin Resistance?

Insulin resistance is a reduction of the horse's ability to respond appropriately to the hormone Insulin. Insulin is involved in the uptake of glucose from the bloodstream and its storage into cells. As a result of insulin resistance this very important mechanism no longer functions properly. The body tries to counteract its own insensitivity to insulin by producing more and more insulin, and it is this elevated level of insulin that tells us that insulin resistance is occurring.

It is obesity as a direct result of excessive calorie intake that is the primary cause of insulin resistance in horses (so too in people). The main mechanism by which obesity causes insulin resistance is via the action of a variety of hormones known as adipokines which are produced by fat tissue (adipose tissue). These hormones down-regulate insulin, which is a normal body function, but when they are produced to excess by larger than normal deposits of fat, their down-regulatory action is too much for the body to cope with and insulin resistance occurs.

### Why are ponies so susceptible to EMS?

Ponies, especially native breeds, evolved to survive in harsh conditions and endure long periods with sparse amounts of grass. Their highly efficient metabolic systems would have previously allowed them to store large amounts of fat during the lush spring and summer months so they could draw on these reserves during the winter months to survive. Arriving into autumn and winter in a relatively obese state would create a situation where the pony is relatively insulin resistant (as we have previously learnt). This would create a higher than normal level of glucose in the blood (remember that insulin removes glucose from the blood and stores it in cells) which would allow the pony to preferentially use glucose for important organs like the brain and divert it away from structures of lesser importance. By the end of the harsh winter the pony would have used up its fat reserves and the relative insulin



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resistance would have disappeared along with the fat. The pony would once again be ready to eat fresh green spring grass full of carbohydrates and sugars without any issues.

It was during domestication when this all went wrong. Ponies now have access to far more calories than they were designed to cope with due to us feeding concentrates, haylage and even just from the improved pastures they now graze on. Domesticated ponies are usually overweight to begin with and now never truly experience harsh conditions so never have their insulin resistance down regulated by the loss of fat reserves.

### How is Equine Metabolic Disease diagnosed?

Clinical history alone is often highly suggestive in EMS cases but due to some of the clinical signs being quite subtle and easily confused with Equine Cushing's Disease it is important firstly to rule this out. After this, the next step is to try and confirm EMS, but this is often harder than it sounds. There is no one definitive test for Equine Metabolic Syndrome so your vet may use a variety of blood samples looking mainly for glucose and insulin concentrations.

### Equine Metabolic Disease treatment and management?

The key to treating and managing EMS is weight loss and exercise. Obese horses should be placed onto a diet solely composed of hay plus a vitamin and mineral supplement with absolutely no access to pasture. The hay needs to be mature grassy hay with a high stem to leaf ratio (i.e. old dry grassy hay with lots of stem). If the only hay available is still too rich, then it should be soaked in water for at least 30mins to leach out all the soluble sugars. If in doubt, it's better to soak than not to soak. Avoid haylage at all costs, it's just too rich. The amount of hay being fed should initially be 1.5% of current body weight (eg 3kgs dry weight for a 200kg pony) which should then be reduced to 1.5% of the ideal target weight (eg 2.2kg dry weight for the 200kg pony that should be 150kg) over 2wks. This amount of food should be continued until the ideal body weight is achieved. You can reduce this to 1% of ideal body weight if no weight loss has occurred after 30 days but never feed to less than 1% as severe calorie restriction can worsen insulin resistance or cause other severe conditions such as hyperlipaemia.

Exercise is the other crucial component in tackling EMS. It is recommended that as soon as laminitic feet are sound that the pony is started on a program of 2-3 sessions per week



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of light work. Intensity and duration should be gradually increased over time. Not only does exercise aid in weight loss but it has also been shown in humans to reduce insulin resistance directly.

## **Confused?**

Don't worry, Equine Metabolic Disease and Equine Cushing's are both very similar and very confusing diseases - lots of vets are still confused by them! The important thing to remember is that if you think your horse or pony has any clinical signs similar to what you've just read you should give your vet a call and talk about possibly investigating Cushing's or EMS - it's relatively easy and you may be able to make a real difference to your horse or pony's life.