

December 2016: Deciphering metabolic disease

Most horse owners are well aware that veterinarians love nothing more than reducing down complicated medical conditions into acronyms, which can be confusing! We find that this is especially true about metabolic conditions in the horse, and would like to take this opportunity to decipher these conditions and explain the importance of testing for metabolic diseases in geriatric horses.

What do PPID and EMS stand for?

PPID or Pituitary Pars Intermedia Dysfunction is commonly known as Cushing's disease. Vets prefer PPID to Cushing's disease as the disease in horses has a different origin and disease pathology than Cushing's in people and dogs. In horses, the intermediate section of the pituitary gland is responsible for increased output of cortisol that leads to a cascade of negative consequences in the body. PPID horses grow longer hair coats and stop shedding their coats appropriately, lose muscle mass and develop a pot-bellied appearance, show a dull attitude due to excess circulating endorphins, become more susceptible to infections due to immune system depression, are at increased risk of laminitis, may have increased thirst and urination, and may have depressed estrus cycles leading to infertility.

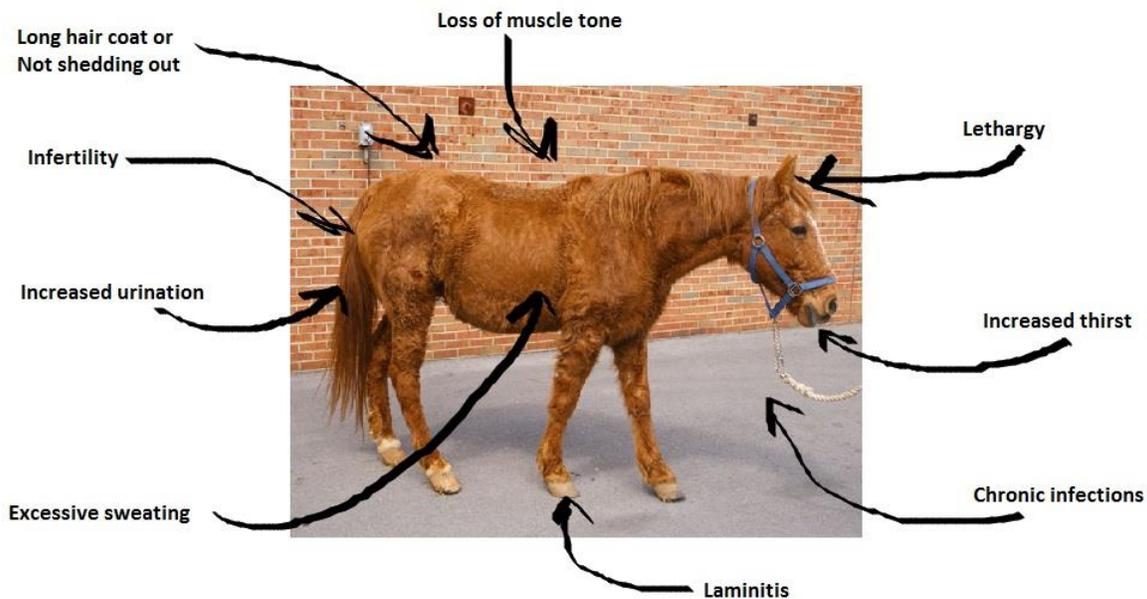


Image courtesy of Tufts Equine Endocrinology Group

EMS stands for equine metabolic syndrome which is caused by prolonged hyperinsulinemia, or increased insulin levels in the blood. Insulin is a hormone released in response to high circulating blood glucose levels, and its job is to cause absorption and storage of glucose as glycogen, a more structurally complex compound. Horses that are insulin resistant are less responsive to normal levels of insulin and consequently have high blood glucose levels much like type 2 diabetics. In response, the horses' body increases production of insulin to attempt to store the excess glucose. It makes sense then that insulin resistance generally goes hand in hand with EMS. There's a genetic component to EMS, and certain breeds are overrepresented. Horses with PPID and obese horses are also more likely to develop EMS.

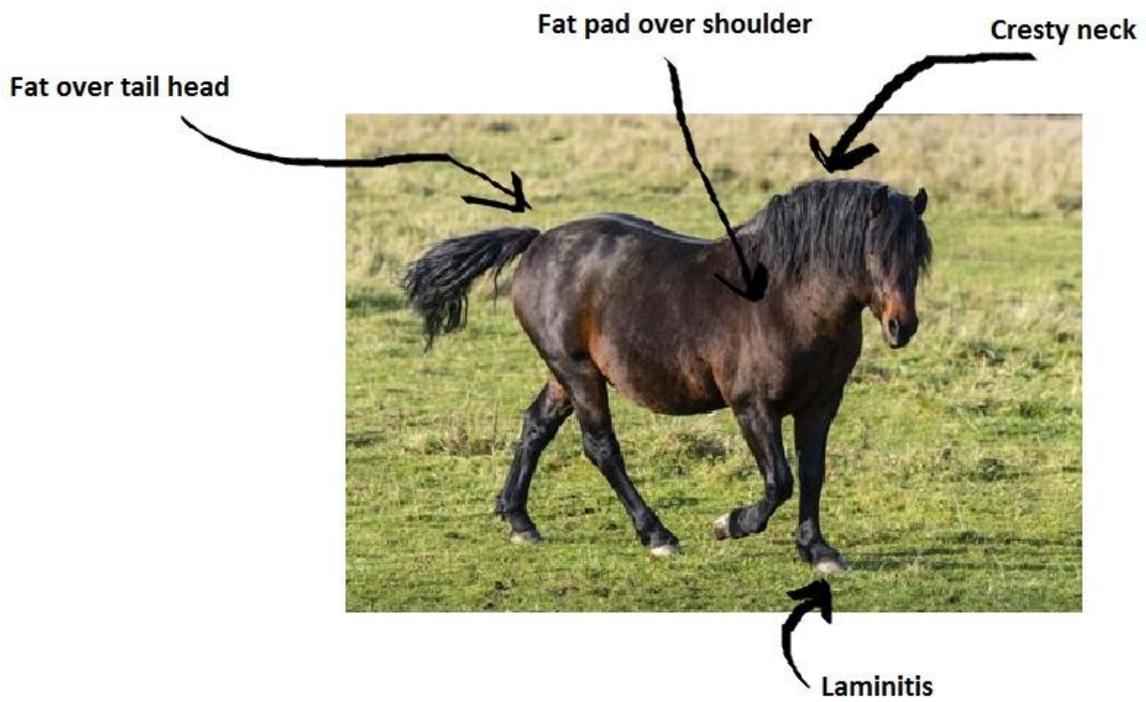
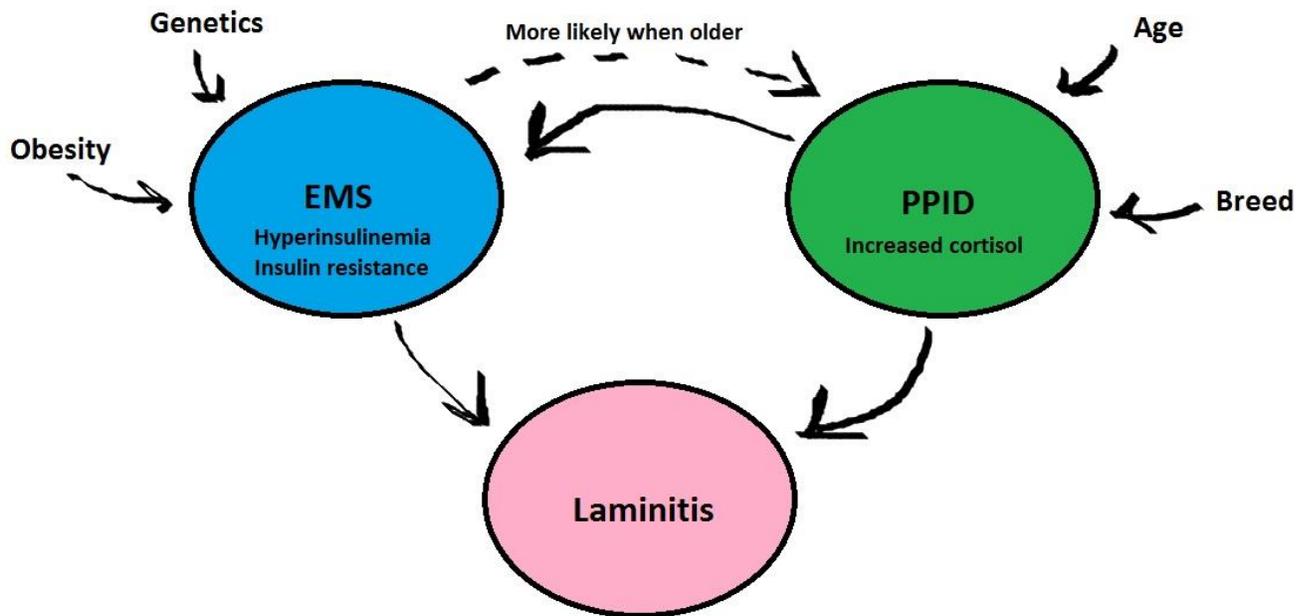


Image courtesy of thehorse.com

How are these conditions related to each other?



Where does laminitis come in the equation?

Researchers are still ironing out the details on how imbalanced hormone levels cause weakening of the laminae and consequently laminitis. The current thought is that insulin activates hormone receptors (specifically insulin-like growth factor 1 receptors) in the lamellae which affects normal lamellar cell division and leads to structurally unsound lamellae. High insulin levels may also negatively affect blood vessel tone and consequently the blood supply to the hoof.

Technically not all horses with PPID are susceptible to laminitis. Only those that have high blood insulin levels (i.e. those with EMS) are at risk of developing laminitis, which makes it important to test suspected metabolic disease horses for both PPID and EMS.

Should my horse be tested?

Consider testing for PPID if your horse is over 15 years old, does not shed out its hair coat during the summer months, and/or suffers from chronic laminitic episodes (which can manifest as foot pain or hoof wall growth rings). You should suspect EMS if your horse has fat deposits in the crest, shoulder, and tail head. Your horse may be predisposed to metabolic conditions if it is a pony, Morgan, Spanish breed, or has a “cob” type body shape.

Initial testing involves a blood test that looks for the levels of resting ACTH (hormone that breaks down into cortisol), cortisol (the stress hormone), insulin (glucose storage signalling hormone), and glucose (blood sugar). Testing for PPID is best done in the fall when the shortening day length triggers higher levels of ACTH production, which makes it easier to catch horses earlier on before they develop later stage symptoms like laminitis. Further testing for EMS in the form of an oral sugar challenge test can be performed, which measures the levels of glucose and insulin 60-90 minutes after feeding corn syrup to a horse on an empty stomach. Some horses with normal “resting” insulin levels will spike abnormally high insulin levels after being fed a sugary syrup.

What are the treatment options?

The treatment for PPID is fairly straight forward. The only effective medication is pergolide, a once daily tablet that blocks production of ACTH by stimulating dopamine receptors. In the normal horse, dopamine is a hormone that regulates ACTH production in the pars pituitary. PPID horses don't produce enough of this regulatory hormone therefore treatment focuses on replacing dopamine's normal action on the pars intermedia. Pergolide is available in Canada as “Prascend”.

Treatment for EMS can be more challenging. The focus is on weight loss to improve insulin sensitivity, however, there are some horses and ponies that suffer from high insulin levels despite having completely normal body conditions. For overweight horses, changing feeds to hays with lower glycemic indexes (i.e. hay with lower non-structural sugar content) is the most important step. Hay should be soaked for 12 hours prior to feeding. It's vital to drain the water before feeding as the water will contain dissolved sugars from the hay. Grains and concentrates that have not been formulated for EMS horses should also be removed from the diet. Your veterinarian may also recommend short term medication with levothyroxine to assist in weight loss. Levothyroxine acts similarly to the naturally produced thyroid hormone, thyroxine, and stimulates the breakdown of fat from the body stores.

For normal body condition horses, feed hay and concentrate supplements with low glycemic indexes. There are several concentrate feed products on the market created specifically for metabolic horses. Fat in the form of oil is also a good alternative to high sugar content supplements. If dietary changes aren't

enough, there is some evidence for medical treatment with metformin, a drug designed to improve insulin sensitivity in type 2 diabetics. Oral metformin tablets are poorly absorbed from the equine stomach, making it a less effective drug in horses compared to humans.

Looking for more detailed answers?

Here are links to a few trusted resources. We highly recommend the animated video on the Talk About Laminitis website if you're looking for an in-depth understanding of PPID.

<http://www.aaep.org/info/horse-health?publication=747>

<http://www.thehorse.com/articles/32113/understanding-the-differences-between-ems-and-ppid>

<https://www.talkaboutlaminitis.co.uk/ppid>

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