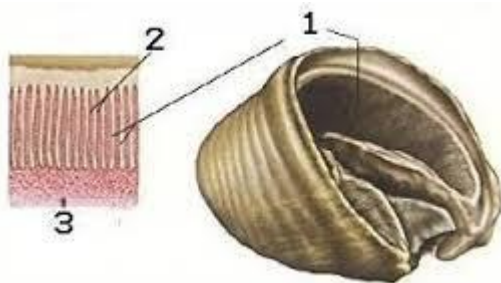


LAMINITIS

What is it?

Any word ending in -itis means inflammation. Laminitis is inflammation of the laminae in the horse's hooves. The laminae are lots of tiny finger-like projections which hold the pedal bone to the hoof capsule. The pedal bone is not a triangle shape like it appears to be in x-rays, it is actually the same shape as the hoof. All over its surface these laminae stick out. The hoof wall also has laminae that project inwards. These laminae grip each other thus fixing the bone to the hoof wall. You can see these laminae every time you look at



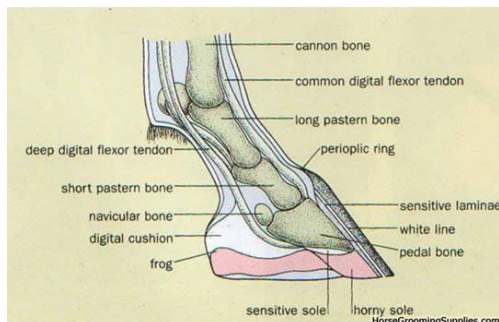
the horse's hoof. It is roughly what we call the white line. In laminitis these laminae swell. However the horse's hoof is solid, it cannot expand to allow for this swelling. This means the pressure in the hoof is immense and the horse's feet become extremely painful.

What are the symptoms of laminitis?

The typical appearance of laminitis is a horse or pony leaning back on their heels, trying to put all their weight on the back feet and taking weight off the front. In cases where all four feet are affected, the horse may just weight shift without leaning back. The horse tries to rest its feet. This can present as a horse constantly swapping their weight from one foot to the other (weight shifting). It is normal for a horse to rest a back leg and occasionally swap to the other, but in laminitis they try to rest their front feet too and the weight shifting is much more frequent. Often these horses will lie down a lot, sometimes lying flat out and groaning in pain. This can sometimes be confused with colic. Laminitis usually affects either both front feet, or all four feet. It is rare for only



one foot to be affected. If the horse is pointing only one hoof, an abscess is more likely than laminitis.



In milder cases the signs may be more subtle. Sometimes they will only look short or 'careful' on hard ground and be sound when on soft ground e.g. the field or in a school. These cases can progress to severe laminitis if not treated promptly.



When diagnosing laminitis, the vet or farrier will first feel for a digital pulse. This is felt either side and towards the back of the fetlock. When the fingers are rested lightly over these blood vessels, a throbbing or 'bounding' pulse is felt. In a normal horse, the digital pulse is very difficult, if not impossible to feel. Often the hooves are hot to touch, especially around the coronary band. Next the vet or farrier will use hoof testers to squeeze the hoof. Laminitics tend to react with pain when squeezed around the toe area. In really severe cases, they will react just by thumb pressure over the sole at the toe.

What causes laminitis?

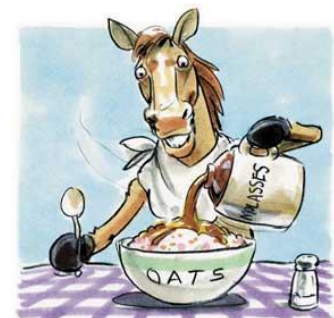
This is a very good question. In a very basic sense, there are 3 broad causes of laminitis. The first is concussion. Concussive laminitis is due to shock forces damaging the laminae and causing inflammation. Possible triggers are fast work on hard ground, or one part of the foot landing heavily when the hoof is not level. We call this mediolateral imbalance. This is most commonly when a horse is toe in or toe out, if not trimmed regularly and carefully, one side of the hoof can outgrow the other side. The long side hits the ground first sending these shock waves up the hoof. Sometimes the shorter side doesn't grow fast enough for the hoof to be trimmed level and so farriers have to use special shoeing techniques to make sure the shoe levels out the hoof.



Another cause of laminitis is endotoxaemia. This is when there are a lot of toxins travelling around the bloodstream. This is a big risk after torsion colic (twisted gut) and with colitis. Both of these conditions make the horse's intestines permeable. This means the toxins that are usually kept out of the blood stream by the barriers of the gut, suddenly get into the bloodstream. This can cause toxic shock and laminitis. Every effort is made by the vets treating the horse to reduce this happening but unfortunately it is a known side effect.

The final broad cause of laminitis is a little more complex. The simplest description is having too much of certain sugars in the blood stream. No one knows for certain why these sugars cause laminitis; only that they do. There are many triggers and we probably don't know them all. We can split these down into dietary and endocrinological (the hormones that are in the horse's blood stream control how the body works).

First dietary, when a horse has too lush grass, rich haylage and high sugar feeds, these sugars move into the blood stream and cause laminitis. The horse doesn't have to be overweight for these foods to cause laminitis. Although overweight horses cannot cope with the sugars as well as slim horses for reasons we will describe later.



Endocrinological causes usually boil down to stress, steroid medication, Cushings (PPID) or Equine Metabolic Syndrome (EMS).

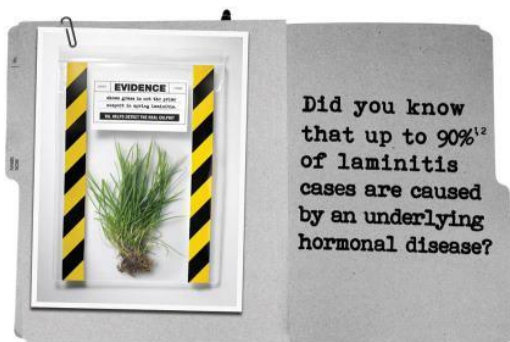


Any animal or human in a highly stressful environment release a natural steroid called Cortisol. This natural steroid increases the horse's blood sugar and decreases the action of insulin, which is supposed to reduce the sugars in the blood stream. When stress is prolonged for a period of time, this can lead to laminitis.

Steroid medication works along the same principle. When steroid is given either by injection or orally, it interferes with this mechanism and acts as the natural steroid does, increasing blood sugars. A short course or single injection of steroid is usually of minimal risk. The longer a horse requires the drugs for, the greater the risk becomes. Vets will always avoid giving steroid to a horse or pony that they consider at risk of laminitis, for fear of tipping them over the edge. However, in life or death situations, it may be unavoidable e.g. horses with COPD (RAO) that can't breathe. In these situations, precautions should be taken with the horse's diet to try and minimise the sugars they are getting.



Cushings (or correctly termed PPID) usually affects older horses but we have seen it in

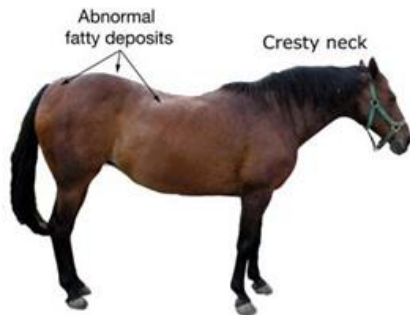


horses as young as 5-6 years old. Again no one knows what causes this condition, but we do know what it does and how it does it. The pituitary is a section of the brain that releases hormones to regulate the body. PPID is when the pituitary becomes over active and releases too much of these hormones. The one we measure when diagnosing PPID is called ACTH. The excess ACTH causes an excess of the natural steroid

cortisol. The mechanism by which this causes laminitis is the same as previously described. The excess ACTH also controls many other functions of the body and causes the excessive coat, which can become curly (hirsutism) as well as fat deposits over the body, often along the crest, behind the saddle, over the tail head and above the eyes. Other symptoms of PPID are excessive drinking and urinating, lethargy (feeling very tired) and muscle wastage over the top line.



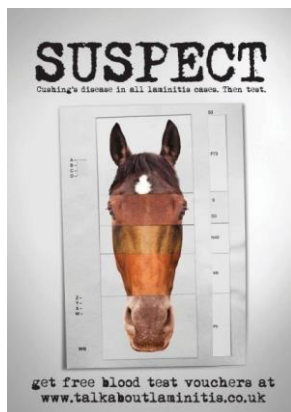
Equine Metabolic Syndrome (EMS) is also known as Insulin Resistance (IR). EMS is most comparable to Diabetes type II in humans. It is usually seen in obese horses, especially horses that have been excessively obese as a youngster. The job of insulin is to remove the sugars from the blood stream and make the body store them for later. When blood sugars are consistently high (usually due to obesity and diet), the insulin receptors become 'tired' and less responsive to the insulin in the horses blood stream, because the insulin levels are always so high trying to deal with the blood sugar. This becomes a cycle. The less responsive the body is to insulin, the more sugars circulate the blood steam so more insulin is produced, which makes the body even less sensitive. This is seen in horses of any age but usually comes to light in young-middle aged horses. Other signs of EMS are fatty deposits and excess drinking and urinating.



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How do we work out what has caused the laminitis?

Firstly we look at the history, which is basically everything the horse has been doing recently. Sometimes it is obvious e.g. just been turned out on spring grass, just been put on rich haylage (either from hay or a change from last years to this year which will be much richer) or the horse has been on box rest for another reason without having their feed cut back. Sometimes the appearance of the horse will lead us to suspect EMS or PPID. Sometimes, unfortunately, it is difficult to find a cause and we have to test for everything we have the ability to.



As previously described, when we are testing for PPID, we measure the ACTH levels in the blood stream. This is a matter of simply taking a blood sample. This blood sample has to be carefully handled and processed speedily for the result to be accurate. ACTH levels naturally increase during autumn in order to prepare the horses body for winter. Horses with PPID typically get laminitis in autumn rather than spring, which is more typically due to lush grass. Vets will usually test for PPID in any older horse with laminitis, horses with laminitis in autumn and laminitic cases that don't seem to be responding to other treatment regardless of their age.

EMS can be difficult to test for. When trying to diagnose EMS, we are looking at not only the insulin levels but also the glucose levels, triglyceride levels and more recently adiponectin. The horse must be fasted (have nothing to eat at all, but can have water) for at least 4-6 hours before blood is taken. This test is not very sensitive, which means it will not come back positive for all EMS cases. If EMS is still suspected despite a negative result, we can do a glucose tolerance test to see how the horse's body copes with sugars. The horse is fasted for 12



hours and then fed glucose (sugars) in a feed. The insulin levels are then measured 2 hours later. A horse with EMS will have a much larger amount of insulin released than a horse without EMS. This test does present a risk, in that we are feeding sugars to a horse with laminitis.

How is laminitis treated?

In the initial stages the horse requires pain relief by way of anti-inflammatories e.g. bute or Danilon. Then the horse's hooves need supporting. This can be provided by a deep shavings bed or by putting pads on. The horse's diet needs



addressing to minimise the sugar content. Regardless of the cause, whether it be concussive, PPID, EMS or steroid related, the diet must be altered to reduce the sugars. Ideally the horse will be put on hay that is not rich and has been soaked for over 4 hours. The horse will require a bucket feed in order to give the pain killers. But this feed must be sugar/molasses free and only enough to get the horse to eat the pain killers. It is sensible to give

the horse a powdered multi vitamin to make sure they are still getting what they need from the restricted diet. The horse will need a minimum of 2 weeks complete box rest for the inflammation to settle down. Often standing the horse in ice buckets provides a lot of relief and can reduce the inflammation quicker than just pain killers alone.

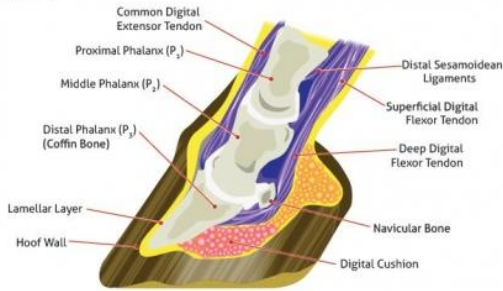
Next we try to find the cause of the laminitis and treat for that too. In the case of PPID, a drug called pergolide (Prascend) is given. This drug is not a cure, but manages the condition. The horse will need to be on pergolide for the rest of their lives. It is sensible to test regularly to make sure the horse is on the correct dosage. Over time, some horses will need their dose increasing to keep the PPID under control.



For EMS, dietary control (no sugar diet as described previously) is the most important treatment. This dietary control will need to be continued for the rest of the horse's life. If this is not enough to control the condition, we use a human drug called metformin, which sensitises the body to insulin. The horse can become resistant to metformin over time, so it is important to get the horse down to a suitable weight and on an appropriate diet long term.

Often if it is the horse's first laminitis attack, they will recover uneventfully after these initial 2 weeks. However their hooves will be weakened so any further attacks could result in much worse consequences.

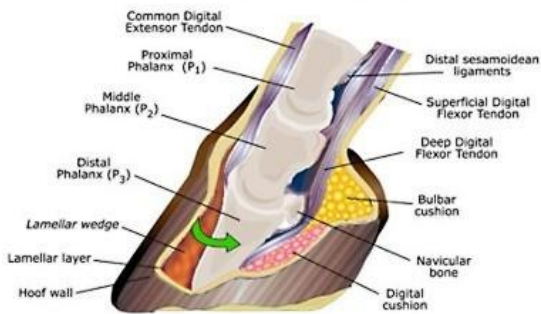
Healthy Hoof



When the inflammation is severe enough, the laminae that form the finger like projections between the hoof wall and pedal bone, become so swollen that they cannot keep hold of each other anymore. The pedal bone then become 'loose' and can move. There are two main ways in which the pedal bone can move. By rotating or by dropping (founder).

Rotation

Detached distal phalanx rotates and disrupts weight distribution



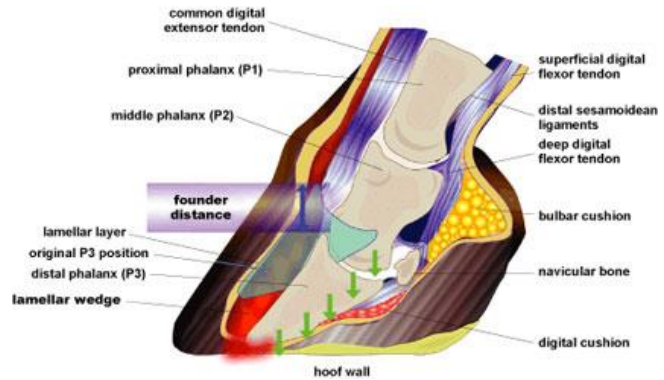
Rotation can occur front to back or side to side. It is most common for the pedal bone to rotate toe downward in a front to back motion. It is widely believed that this is due to only some of the laminae 'letting go' and the pull of the Deep Digital Flexor Tendon (DDFT), which inserts near the tip of the pedal bone and helps to pull the leg backwards. When the pedal bone has rotated, the horse's body tries to fix it by growing the new hoof down the new angle of

the pedal bone. This can create a large step in the hoof wall. The horse's farrier will attempt (using x-rays to guide them) to help the horse by aligning the current hoof to the new pedal bone angle whilst a new hoof is grown down. They do this by reducing the heel and pulling the toe back. Over time, and with the use of a heart bar shoe to try and support the pedal bone to stop it moving any further, the new hoof will end up realigned and the horse should no longer be in pain. It can take 6-12 months for this process, depending on the rate the individual horse grows hoof horn and the degree of movement that the pedal bone has undergone. Again the hoof will always be weaker than before the laminitis so care must be taken to avoid any further bouts of laminitis. Sometimes, the rotations continues as fast as the farrier can try to correct it. In these situations, more radical



treatment is necessary. Such as a DDFT tenotomy, which is where the DDFT is cut at the mid cannon level. This releases its pull and the pedal bone can be reset into a correct position. Horses that have undergone this procedure do not usually return to work as they have lost the tendon, but they can be pain free as pasture pets.

Founder is much more difficult to treat. In this situation, all of the laminae either 'let go' or stretch almost to breaking point and the pedal bone drops under the weight of the horse. The heavier the horse, the poorer the prognosis for founder. Sometimes you can see evidence of founder by looking and feeling the hoof. There is usually a



depression at the coronary band where the bone has left a space, and sometimes the sole of the hoof will bulge outwards instead of being concave like a normal horse. Heart bars are used again to try and support the pedal bone and stop it dropping further. If the laminae are just stretched, over time the pedal bone can move back up to a more normal position. Although again, the hoof is always weaker and any subsequent bouts of laminitis will make it unlikely the horse will get better. Studies have indicated a cut-off point of 1.5cm when measuring the founder distance offers a grave prognosis. This means once the pedal bone has dropped more than 1.5cm from the normal position, the chances of that horse getting better are very slim, even to become sound enough to be a pasture pet.

Foot abscesses are very common in laminitics. Where the laminae have become swollen and separated, small particles of dirt can find their way up the hoof wall and then set up an abscess. These need to be opened up by a vet or farrier to allow drainage.



Sometimes the pressure from the inflammation and/or multiple abscesses require a procedure called a Dorsal Hoof Wall Resection to be performed. This is when the front of the hoof wall is removed to expose the white line/laminae. This can relieve pain from inflammation and can offer drainage for

abscesses without having to remove their heart bars. Once the hoof wall resection has grown back, the procedure should not need to be repeated. It does not hurt the horse to have this procedure done. Usually they will not need local anesthetic, and in the case of quiet horses, they may not even need sedating.

Remember, it is much easier to prevent laminitis than try to treat it. This can be a fatal condition, so every care should be taken to avoid allowing horses to become obese and watch for signs of PPID so treatment can be given before the horse gets laminitis.