Countless horses, many of them in their prime, are euthanized every year because of Navicular disease. The progression is usually gradual, with the horse starting to be “off” during hard work, and ending with the horse unusable and in chronic pain. Usually, he is treated with a set up of pads and wedges, possibly under eggbar shoes, which seem to work for a while but eventually lose their effectiveness. The wedges become more and more extreme, until they seem to have no effect at all. Sometimes the horse is “nerved” at this point, so he can no longer feel his feet. In many cases, he is eventually put to sleep.

Causes of Navicular Disease

Many veterinarians think that Navicular disease is due to an interruption in blood supply to the navicular bone. The popular theory supposes that this interruption to the blood supply of the bone causes reshaping to occur, and the irregularities in the bone damage the deep flexor tendon, making the horse lame. The precise definition of Navicular disease and the process by which it is diagnosed are both controversial. Although there is general agreement that the characteristic symptom of Navicular disease is heel pain, finding answers on what causes it and how to remedy it can be elusive for horse owners.

This paucity of knowledge about Navicular disease is both unfortunate and unnecessary. Over 30 years ago, Dr. James Rooney, a British research veterinarian and author of The Lame Horse, began to do extensive cadaver studies of horses that had been euthanized for navicular. He expected to find (given the assumption that navicular bone remodeling causes tendon damage) that there would always be bone changes present, independent of tendon damage. In fact, he found the opposite was true: THERE WAS ALWAYS DAMAGE TO THE DEEP FLEXOR TENDON, WHETHER OR NOT THERE WAS DAMAGE TO THE NAVICULAR BONE. Obviously, something damages the tendon, but it could not be the navicular bone itself, as bone lesions were not always present.

Looking for more answers, Dr. Rooney began to examine other factors that could damage the tendon, and cause the pain in the back of the foot. He experimented with different movement patterns in cadaver limbs to see if he could recreate the damage to the deep flexor tendon. He discovered when he simulated a toe first landing, after a short time the tendons began to experience heat and friction damage. When the toe first landing continued over an extended time, more and more damage would occur in the tendon which in turn would damage the navicular bone. The cadaver limbs simulating a heel first landing could literally be pounded step after step until the hoof wore away, but no damage ever occurred to the deep flexor or navicular bone.

The reason the pattern of toe landing is so damaging to the hoof can be hard to visualize at first, but is relatively simple. Essentially, when the horse lands heel first, the deep flexor tendon is tightened by the dropping of the fetlock joint, then loosened by the rotating of the coffin bone. This results in a system of equilibrium, where the deep flexor
is never overstretched. When the hoof lands toe first, the deep flexor tendon is tightened by the dropping fetlock, and then further tightened by the coffin bone rotating the wrong way. This snapping downward motion of the heel not only damages the deep flexor tendon, but can also damage the impar ligament, which holds the navicular bone to the coffin bone, and contains the majority of the blood vessels feeding the navicular bone.

Fig 1. A schematic of a healthy heel first landing. To the far left, the skeleton of the lower leg and deep flexor tendon at rest. Center, the dropping of the fetlock joint stretches the tendon. Right, the rotating of the coffin bone loosens the tendon, causing it not to be stressed. The action of the fetlock and coffin bone occur simultaneously, but are shown separately to illustrate the effect that each movement has on the deep flexor tendon.

Fig. 2- Schematic of toe first landing. Left, the fetlock drops and tightens the deep flexor tendon. Right, the coffin bone rotates the wrong way, further stretching the deep flexor. As the rear of the coffin bone drops suddenly, note the stretching of the impar ligament (green).

Prevention and Rehabilitation
Although Dr. Rooney discovered the mechanism of damage in Navicular disease (and therefore how to prevent and remedy it), his findings have gone largely unnoticed by the veterinary community. Even so, his contributions have given us the answer to prevention and “cure”. Once lesions to the tendon and bone have occurred, there is no firm evidence they can be reversed; what has been demonstrated however, is that once a healthy movement pattern is restored, the horse can become usably sound again. Therefore the term “cure” is not really accurate, however, if the horse can be made usably sound again, it is usually good enough for the owner and the animal!

The answer to both preventing and rehabilitating a horse with navicular disease is to establish healthy heel first movement. This is a natural movement pattern for a horse; we do not need fancy “tricks” of farriery to get a horse to move like this. We simply need to remove the obstacles to natural healthy movement, and the horse will do the rest. The obstacles to achieving heel first landing fall under two categories: mechanical and pain.

Obstacles to Heel First Landing

A horse will be mechanically prevented from landing heel first if the coffin bone is brought out of ground parallel alignment. This can happen if the heels are too long (fig 3.) or wedges or some sort of other unnatural angle altering device is applied (fig.4). The horse can also be mechanically prevented from landing heel first if a saddle fitting issue prevents him from fully rotating his scapula (shoulder blade), and extending the front leg.

Pain in the rear of the foot will also cause a horse to have a toe stabbing gait. There are many ways for a horse to develop pain in his heels. Here are some common ones:

- Thrush or other fungal infection of the frog.
- Over thinning of the frog during trimming.
- Digital cushions and lateral cartilages that have not developed enough to support the weight of the adult horse.
• Contracted heels with underdeveloped frogs (an outward symptom of underdeveloped inner structures).

• Heels that are allowed to grow too long and become weak and painful.

• Heels that are taken too short, too fast before the hoof indicates it is ready.

• Not using appropriate protection (hoof boots and pads) on harsh terrain before the foot is fully transitioned to healthy barefootedness.

Removing the Obstacles to Heel First Landing

We now know that Navicular is caused by unnatural toe first landing. Toe first landing is caused by either heel pain or a mechanical obstacle preventing heel first landing. We also know that we must remove the obstacles to heel first landing in order to prevent and rehabilitate Navicular disease. Here is how to go about it:

• Find competent natural hoof care.

A good practitioner will know which parts of the horse’s hoof is causing him pain and why. They will know how to re-establish balance to the foot. They will know which areas of the foot have already been over thinned, and which may be overgrown. They will be able to read the foot to tell how quickly it is safe to take down the overgrown areas, without causing the horse more discomfort. A competent professional will leave your horse at LEAST as comfortable after a trim, but usually more. Any method that leaves your horse worse after the trim will propagate the unhealthy movement, and therefore worsen the problem. Don’t accept any method that sacrifices short term results for long term, or vice versa. Your horse needs to become more comfortable immediately AND begin the healing process so that his soundness is maximized in the long run.

• Use an appropriate booting and pad system to allow the horse to be exercised.

Exercise with correct movement will help stimulate new healthy growth in the hoof. Using pads and boots in order to keep the horse comfortable, he can be reacclimatized to landing in a healthy way, not in reaction to chronic heel pain. It is highly recommended you find a competent professional to fit a boot and pad set up for you, and teach you how to properly apply them. You may do your horse more harm than good (and waste a lot of money) if this step is not done properly. For more information on the use of boots and pads with navicular horses, please see Pete Ramey’s excellent article at www.hoofrehab.com.

• Control thrush and fungal infections.

If the frog is not already healthy, it will be prone to fungal infection. Keep the grooves on the side of the frog and the central cleft (especially if it is deep) cleaned out on a regular basis. If the horse walks through mud or manure sometimes, this is not a
disaster—just make sure to clean it out regularly and expose the area to air. Note that “walks through mud or manure sometimes” does not mean you can have your horse wallow in fetlock deep muck all day, and expect the thrush will go away of its own accord if you pick the feet.

You will probably also need to treat the infection with an anti-fungal agent. Soaking (or at least spraying) the foot in a 2 oz/gal solution of Lysol, making sure to get down into the clefts usually does the trick. Soaking/medicine boots are an easy, convenient way to do this. For a severe long-standing infection, a product such as Clear Trax is expensive, but very effective. Do not use any chemical that will harm the live tissue (bleach, koppertox, etc.) Giving the horse a bed of pea gravel to stand on will also help dry the frog out.

Making sure the diet is reasonably natural can also help stem fungal infections. Excess sugars (from grass, palletized feeds molasses, etc.), can make the horse’s tissue more friendly to invaders. Although navicular is not as connected to diet as some diseases like founder, the systems of the horse are interconnected, and a healthy diet will positively impact the feet.

• Encourage the development of the structures of the back of the foot.

This is best done with pads and boots while under saddle (see above), and through providing a variety of terrain while the horse is turned out. The horse should be provided adequate space to move in while he is not being ridden. Giving him an area with a bed of pea gravel 2 inches thick will help stimulate and support the back of his feet. He should also have the opportunity to stand in other textures too—mud (if the fungal infections are under control), hard packed dirt, sand, rocks, etc. He will choose what feels good to stand on and will recondition his feet at his own pace.

It takes around 5 years to fully develop the digital cushions and lateral cartilages from start to finish. Be patient—your horse will probably have no idea anything is wrong with him long before that. Meanwhile you will be able to enjoy outward signs of the fruits of your labor—decontracting heels, denser frogs, shorter tougher heel buttresses, and of course, greater soundness for your horse.

What NOT To Do For Your Navicular Horse

There are certain things that are commonly done to navicular horses either because they are popular and because the owner is unaware they are bad. Here are some common traps to avoid.

• Wedges are often used on horses with navicular disease, because lifting the heel off the ground brings temporary pain relief. The problem with this is two fold: 1. The wedge prevents the foot from landing heel first RELATIVE TO THE COFFIN BONE, even if the back of the prosthetically modified foot touches down first and 2. The structures of the back of the foot are taken even further out of function, and without the proper stimulation they continue to weaken making the back of the foot prone to pain.
• Heart bar and egg bar shoes are often applied (sometimes with pads) because the thought is that they will stimulate the frog by placing pressure on it. These measures will stimulate the frog—one step worth. Effective stimulation only occurs with pressure AND release.

• For that matter, don’t use any shoes at all! Research now indicates that the use of affixed shoes causes a cessation of the development of the digital cushions and lateral cartilages. The same lab (Dr. Robert Bowker at the University of Michigan) has also found a correlation between underdeveloped digital cushions and lateral cartilages and navicular in a comparative study of pleasure horses euthanized for navicular and horses euthanized for other reasons. In addition the peripheral loading of the shoe places additional stress on the hoof wall (in the back as well as front, changes the shock absorption properties of the foot, and raises the frog out of function.

• Do not keep the horse on stall rest. He needs plenty of healthy movement at his own pace to help restore his hoof function. Hand walking for 10 minutes a day or (mercy forbid!) strapping him to a hot walker will not be enough. Turning him out with a buddy to help encourage movement is a much better option.

• Do not have your horse nerved! It is unnecessary, and will make him more prone to stumble. The surgery often has to be repeated after several years, and carries the risk of side effects such as ruptured deep flexor tendons.

• Do not overdo the first few weeks of exercise. If he has been uncomfortable for a while and you have found a boot/pad combo that makes him comfortable, be aware that overdoing the riding at first will stress the muscles and tendons, and possibly make him sore again. He has probably gotten out of shape—give him an adequate amount of time to “leg up”, before you ask more than 20 or 30 minutes from him.

• NEVER force walk a lame horse. He knows how much he can take. If he is too sore to move, don’t make him. You have not found the right trim/boots/pads/fungal control to make him comfortable enough yet. Forcing him to walk will only increase his toe first landing.

• Don’t “bute” him in order to make him comfortable enough to ride. Not only will long term use of bute or other pain killers cause stomach and metabolic problems, it also does not allow you to have feedback on how you are doing on fixing the root of the problem. If he is still too sore, you have not found the “magic” combination yet, and should not stop trying until you do!

Navicular was a death sentence in the not so distant past. Advances in science and hoof care methodology are now allowing an extremely high success rate in the rehabilitation of navicular disease, returning many horses to soundness and usability for the duration of their lives. This is a preventable condition—if you are reading this article now and your horse does not have navicular, you can still be on alert for the unhealthy movement pattern that may eventually cause it. Prevention includes the same steps as...
rehabilitation—it’s just an easier process on everyone, especially the horse. If your horse has been diagnosed with navicular, don’t despair—educate yourself, get competent help, and whatever you do, refuse to accept less than a plan which improves him now AND sets him on the path for a lifetime of soundness later.