

THE NEUROLOGIC DRESSAGE HORSE

They're not the top-of-mind suspects when a horse is not quite right, but nervous-system problems may be more common than we realize

BY HEATHER SMITH THOMAS





NERVE CENTER: Spinal issues, particularly in the neck, can lead to neurologic disorders

ILLUSTRATION BY SEBASTIAN KAULITZKI/SHUTTERSTOCK

Today's dressage horses are asked for extreme athleticism. Any physical issue can interfere with optimum performance.

Lameness, obviously. Gastric ulcers get fingered as the cause of all sorts of unwanted behaviors. But another category of disease that can be even more serious than ulcers and difficult to pinpoint is neurologic disease, or disorders of the horse's central nervous system.

In a neurologic disorder, a spinal lesion, spinal compression, or disease disrupts the body's ability to send signals from the brain through the spinal cord to the nerves governing the muscles. An affected horse's proprioception (body awareness) may be affected, and as a result he may lose coordination and muscle strength, among other things. In more severe cases the horse may become unsafe to ride or handle. Anyone who's ever suffered from sciatica knows that nerve impingement can also produce extreme and sometimes unpredictable pain.

In recent years, the conventional wisdom among some dressage enthusiasts has been that neurologic signs are cropping up more frequently in the modern extravagant-moving, super-elastic sport horse. To find out whether that's true, and to sort out the differences among the many ailments that produce neurologic deficits, we asked three prominent sport-horse veterinarians and neurology experts to share their insights.

A Diagnostic Challenge

Determining a neurologic issue can involve some trial and error because symptoms may be subtle, vague, intermittent, or similar to those of other physical or behavioral problems.

The problem "may be just an unevenness or abnormal way of moving, or sometimes just failure to move up the levels," says Amy Johnson, DVM, DACVIM, an associate professor of large-animal medicine and neurology at the University of Pennsylvania's New Bolton Center in Kennett Square.

In some instances, the horse seems fine outwardly but the rider notices a change in behavior, Johnson says. "Sometimes a horse just loses eagerness to work. Maybe he previously seemed to enjoy schooling, training, and performing and now doesn't. The horse may become increasingly spooky or unpredictable—bolting, bucking, or resistant."

"Nice horses that become fussy or difficult to shoe, or any horse that changes behavior, may be telling us he's in pain," says Barrie Grant, DVM, MS, ACVS, MRCVS, who



NEURO TESTS: A neurologic exam includes tests of the horse's coordination, strength, and balance, such as the tail pull and watching him navigate a hill

has worked with horses with the neurologic disease known as “wobbler syndrome” since the late 1970s and who maintains a consulting practice in Bonsall, California. “Sometimes when we see x-rays of a horse’s neck, it’s easy to see why he’s fussy or resists having one leg picked up, standing with all the weight on the other—when there’s a big facet [vertebral joint] shoving on nerves exiting the spinal canal. This can be very painful.”

A mercurial lameness issue can be another red flag. “He may favor one leg, then another, rather than [showing] a specific lameness,” Grant says.

Presented with such symptoms, the veterinarian will typically begin by ruling out illness and unsoundness. “If there’s no systemic health problem or lameness, we do a neurologic evaluation—and sometimes that’s the root of the issue,” Johnson says. “In horses, usually the signs are consistent with spinal-cord disease, specifically in the neck region: All four limbs are not moving as precisely and coordinated as they should. These signs are what we call general proprioceptive ataxia.”

The Neuro Exam

Unlike lameness, which tends to be most apparent at a trot, a neurologic exam is generally conducted at a walk, says Yvette S. Nout-Lomas, DVM, PhD, DACVIM, DACVECC, associate professor of equine internal medicine at Colorado State University’s College of Veterinary Medicine and Biomedical Sciences in Fort Collins. Typically, the veterinarian observes as a handler turns the horse in tight circles, asks him to back up, and walks him up and down an incline. To test the horse’s hind-end strength and stability, a helper may pull on the horse’s tail in one direction and the other; a horse that can be pulled significantly off balance may have neurologic-related weakness.

Additional diagnostics may include tests of blood and spinal fluid, radiographs, myelography, and computerized tomography (CT) scans. Equine protozoal myeloencephalitis (EPM), a disease of the central nervous system caused by the protozoan *S. neurona*, is diagnosed by comparing antibody titers

in blood and (even more accurately) in spinal fluid, says Johnson. (Learn more about EPM in “EPM: Not Just Playing Possum,” June 2016.)

If a spinal-cord lesion is causing the clinical signs, the neuro-exam findings can point the way to the likely location of the lesion, says Nout-Lomas. For instance, if neurologic signs are evident only in the hind legs, the defect might be in the horse’s back. If all four legs are affected, the lesion may be in the neck. And “if the horse has abnormal behavior or is circling to one side, the lesion might be in the brain,” she says.

Spinal-cord compression, another potential cause of neurologic symptoms, shows up using a combination of survey radiographs and myelography, says Johnson. A neck CT scan also can show spinal-cord compression as well as other abnormalities not visible on radiographs, says Grant.

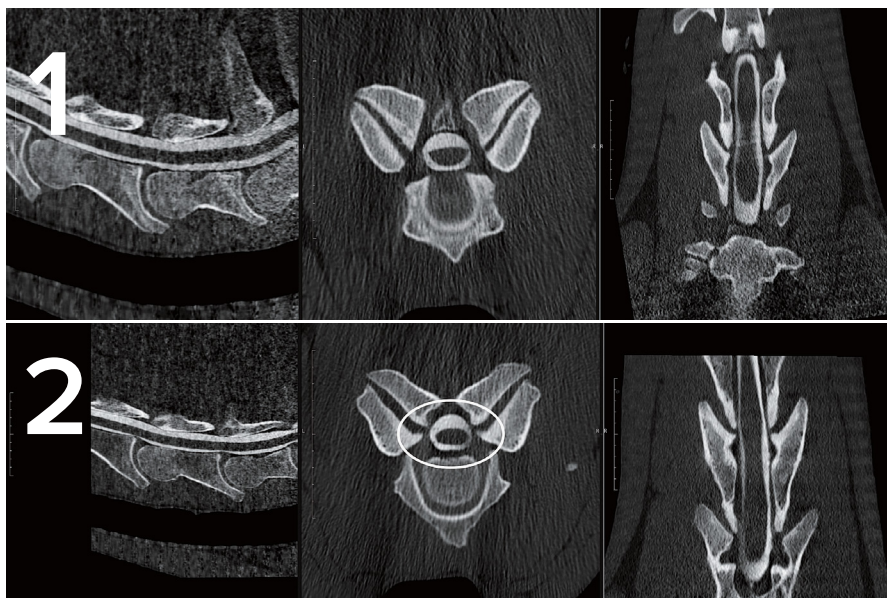
Unfortunately, the only current method of definitely diagnosing the degenerative condition known as equine motor neuron disease (an umbrella term encompassing two

similar conditions known as equine degenerative myeloencephalopathy and neuroaxonal dystrophy, which we'll discuss more in a minute) is to look at a horse's brain and spinal cord under a microscope at necropsy.

"To diagnose a live horse, we must rule out everything else and [then we] assume it is EDM or NAD," says Johnson. "If a horse with neurologic disease is negative for EPM and has no evidence of spinal-cord compression, we suspect a neurodegenerative disorder, though it is hard to prove."

Types of Neurologic Disease

Most neurologic disorders seen in sport horses cause signs consistent with cervical myelopathy, which "just means dysfunction of the spi-



INSIDE LOOK: CT scan images of two horses' cervical (neck) joints. Photo 1 shows normal anatomy. The horse in photo 2 has severe arthritis of a vertebral facet joint that is protruding toward the spinal cord (circled in yellow).

nal cord in the neck region," Johnson says. Although many diseases can affect the cervical spinal cord, most affected horses fall into one of three categories, she says.

Compressive or stenotic myelopathy comprises several conditions.

"Most well-known is cervical vertebral stenotic myelopathy (CVSM), often called wobbler disease; but other things, like trauma, tumors, or abscesses, can put pressure on the spinal cord," says Johnson.

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compression of the spinal cord produces the neurologic symptoms. Older horses may be more prone to developing “wobblers” and to neck arthritis causing secondary spinal-cord compression, Johnson says.

Wobblers is the most common cause of neurologic dysfunction in dressage horses, according to Nout-Lomas.

“This problem can occur when anything narrows the canal through which the spinal cord runs, in the neck,” Nout-Lomas says. A foal can be born with the defect but show no clinical signs until it’s a few months old or, more commonly, between the ages of two and four. Other horses develop the condition when they reach the double digits, and sometimes not until their late teens, she says.

In the US, *infectious disease* as a cause of neurologic disease usually means EPM or West Nile virus, and possibly herpes, according to Johnson. EPM is the most common infectious neurologic disease in horses in this country, especially east of the Mississippi. Although the symptoms of EPM can mimic those of wobblers disease, “horses with EPM tend to have more asymmetric signs, more muscle atrophy, or some signs that would be indicative of disease in the brain stem in addition to the spinal cord,” Johnson says.

According to Johnson, one infectious disease that usually *isn’t* to blame for neurologic problems is Lyme disease.

“In theory, neurologic Lyme disease could affect this region of the spinal cord, but it is rare,” she says.

Degenerative disease is the most difficult of the three types to diagnose, says Johnson. Equine motor neuron disease (EMND) causes degeneration of muscle nerves, which eventually leads to muscle weak-

ness and atrophy with weight loss. EMND “goes by two names but is basically the same disease—equine degenerative myeloencephalopathy (EDM) and neuroaxonal dystrophy (NAD),” she says.

EMND is more prevalent in California and in parts of the East and Midwest, according to Nout-Lomas. “It seems to develop in young horses from a combination of vitamin E deficiency and genetic predisposition,” she says.

Horses that receive limited turnout may become short on vitamin E because levels of this vitamin diminish in dried, stored forage. “If these horses do not receive any supplemental vitamin E or a ration balancer, they could be at risk for EMND or vitamin E-related myopathy,” Nout-Lomas says.

Although Nout-Lomas says she’s seeing fewer cases of EMND caused by vitamin E deficiency, at New Bolton Center Johnson reports seeing more—and she doesn’t know why. “In my case population, over the last couple years the number of EDM cases I’ve diagnosed surpassed the number of EPM cases or wobblers, and these are not young horses,” says Johnson, who adds that EDM has turned up in warmbloods of all bloodlines, Thoroughbreds, Quarter Horses, and other breeds.

“These horses are usually in the prime of their career—between five and 15 years old,” Johnson says. In the typical case, “the owner first notices the bolting, spooking, rearing, bucking, et cetera, that is out of character for the horse. Later we start to detect mild to moderate ataxia,” she says.

Some research has indicated a possible genetic component—an inability to absorb vitamin E normally—that in some cases could

be a contributing factor to the development of EDM. A University of California, Davis study found a degenerative disease in a group of Quarter Horses that may be related to inability to absorb vitamin E. Years ago, an Oregon State University researcher discovered a family line of Appaloosas with the same problem. In such cases, “these horses may respond if supplemented with vitamin E at high levels so they can get enough,” Grant says.

Treatment and Prognosis

Some horses diagnosed with a neurologic disorder “plateau at a certain level of function for a long time—even years—and don’t deteriorate further,” says Johnson. “The question then is whether that level is safe for them [to be working or at pasture] or safe for the people handling and riding them. In other horses, this disease progresses more rapidly.”

“I’ve seen wobblers that were negative on x-rays and myelogram,” says Grant, “and then we checked blood levels and found they were very low [on vitamin E]—and when we supplemented with vitamin E they returned to normal after about three months. It’s always wise to check vitamin E.”

Some horses with mild neurologic disease continue to compete successfully at the lower levels, and occasionally even at higher levels. But “the disease may progress over time, and then the horse struggles to maintain performance or develops a second problem, such as lameness,” says Johnson. “I think many horses can compensate fairly well for a single problem, but when you stack more problems, some of their compensatory mechanisms begin to fall apart. If the horse is lame, some neurologic signs may become more evident,” she says.

“It can be tricky to know how much the neurologic problem is contributing to the overall picture. In some cases it clearly is the primary reason for poor performance, and in other cases there may be something else at play as well.”

“If a veterinarian says your horse might be a wobbler,” says Grant, “we need a differential diagnosis to figure out which problem it might be. Simply treating symptoms won’t do much good—although most of these horses respond temporarily to small doses of phenylbutazone” (“bute,” a nonsteroidal anti-inflammatory drug). “Some will also respond favorably to steroid injections in their hocks or neck, but the underlying problem is still there. When we inject a joint, steroids also get into the bloodstream and go to whatever place is inflamed. People tell us their horse went so much better after they injected the hocks, but the hocks may not have been the problem,” he says.

Research: Focus on the Equine Neck

Recent research has shown that surprising numbers of horses have spinal anomalies in the cervical (neck) area, according to Grant. In one study of various breeds including warmbloods, 12 to 38 percent were found to have congenital defects in the transverse processes (the bony projections off the vertebrae) in the cervical vertebrae at the base of the neck identified as C6 and C7, he says. And in a UC Davis study reported at the 2018 American Association of Equine Practitioners convention, of a sample of 100 horses, a full 50% showed arthritis in their necks—“yet they were still showing and competing,” Grant says.

Given the evidence, “we wonder



DIAGNOSIS: Radiographs (x-rays) can show neck arthritis and spinal-cord compression. A technician prepares to radiograph the area of the equine neck that sometimes shows a vertebral defect that can lead to neurologic disease.

if these abnormalities are detrimental. For example, a change in the navicular bone on a radiograph doesn’t necessarily mean the horse is lame,” Grant says. At the same time, radiographic changes could indicate that “sooner or later, the horse may have a problem.”

More details need to be fleshed out in order for researchers to draw firmer conclusions, Grant says. For instance, “if we looked at older show horses that were still actively showing and none of them had that [congenital C6/C7] anomaly, does that mean that the younger horses that have this anomaly will never make it to be successful middle-aged show horses? If none of the older horses have this—yet 20 to 30% of the population is thought to have this anomaly—it must mean it hinders their ability to be successful.”

Research is also ongoing to find ways to help horses with neck problems. Several surgical procedures have shown promising results in recent decades, such as modifying the bone to relieve spinal-cord compression, to stabilize disc spaces, and to fuse the vertebrae to resolve the

narrowing that presses on the spinal cord. Stem cells have also been used.

A new method was developed recently at Colorado State University, based on research in humans. Nout-Lomas and two other veterinary researchers used an intervertebral device to reduce compression while also inserting connecting rods and screws with rotating heads to stabilize the problem vertebrae.

Nature, Nurture, and Neurology

The development of neurologic disease is not specific to any particular breed or equestrian discipline, says Nout-Lomas. “In warmbloods there’s no specific condition that we don’t see in other breeds,” she says.

So is there in fact any link between extravagant movement and neurologic disease? Not that’s been discovered, our experts say; but some similarity in movement patterns may give rise to the speculation.

“When there’s disease of the spinal cord in the neck,” explains Johnson, “the neuronal tracts affected



UNSAFE AT ANY SPEED: A horse with proprioceptive ataxia has diminished coordination and, in serious cases, can pose a danger to himself and to riders and handlers

include the upper motor neuron and the general proprioceptive tracts. Upper motor neuron involvement tends to cause a long-strided, over-reaching type of gait. It looks like the horse has a long, sometimes very floating stride, which is often looked on favorably when selecting dressage horses.”

“Some of these [dressage] movements are similar to what we see in some horses with neurologic disease,” Nout-Lomas concurs, “but there’s no evidence at this point to say that any of the horses that move this way have neurologic disease.”

That said, experts don’t discount the idea that selective breeding could—at least in theory—lead to the production of greater numbers of neurologic-disease-prone equines.

“In other breeds,” Johnson observes, “people have selectively bred for certain traits or qualities that, when taken to extreme, become

health issues. This could theoretically occur in horses selected for dressage, if as youngsters they have mild neurologic disease and look very ‘floaty’ and fancy in their movement. Some people might unintentionally select for problems.”

Or, as Grant puts it, “When does a good trait become a bad one? Certain things, taken to extreme, can be detrimental. Some of the things we want to see in a dressage horse, like floating gait and excessive suspension, may actually be a gait abnormality. We’ve noticed in treadmill testing that some of the older wobbler horses can’t take as many strides as a normal horse. They tend to ‘float’ more because they can’t quite get themselves together. It’s a form of incoordination—unable to adapt the gait fast enough. Everything is in slow motion. They have more ‘air time,’ but that’s not always the best for staying sound.”

But rest assured that there’s a

major difference between a big mover and a bona fide neurologic case. A horse suffering from proprioceptive ataxia “has lost a sense of where its feet are relative to the ground and to the body’s center of gravity, and is making coordination mistakes,” Johnson explains.

Nout-Lomas postulates that spinal biomechanics may play a role in the development of wobblers disease. “This in part may be related to head position, the type of work the horse is doing, and so on. Some wobblers have OCD lesions in the neck.”

Genetics also may play a role in wobblers disease; some breeding pairs have been known to produce multiple foals with problems. However, genetics is not the only factor, says Nout-Lomas. “There are many situations where a sire or dam produce one wobbler but plenty of other foals with no problems.”

Then there’s dressage training

itself. The takeaway: Don't overdrill.

"Horses don't need to be always collected, tucked in, and in 'frame' all the time," says Grant. "A horse in the wild trying to get away from a predator isn't having to travel with his neck bowed and his nose pointed toward his chest. This is not a normal way to move. We see some stress and strain problems and even some deformities that may be caused or aggravated by what we do to these horses. If there are structural changes in the lower part of the neck, it may be detrimental to crank the neck around."

If in Doubt, Check It Out

As veterinary medicine advances, evidence continues to mount that many so-called resistances or behavioral issues may in fact stem from physical discomfort. As Grant

points out, "Some horses go through multiple trainers or frustrating periods in training where the owner, rider, or trainer thinks it's a training issue or a behavioral problem, and later we discover it's a medical or neurologic issue that prompted the behavior."

Early diagnosis of neurologic disease may enable better management of the condition, says Johnson—who admits that "sometimes this is difficult because signs in the beginning can be so subtle you don't recognize them as a medical problem. Some clues may be misread."

When a horse's performance begins to deteriorate or a previously willing partner objects to his work, "Most people assume it's a lameness or gastric ulcers because these are more common issues," says Johnson, "but it's important to do a neurologic exam, even just to know that the

horse is neurologically normal and to rule out any neurologic disease."

"If gait abnormalities can't be readily identified, owners, trainers, and riders need to think about neurologic disease," says Nout-Lomas. "We see horses that have been sold, moved to another place, maybe had a year of pasture turnout to try to resolve a problem, evaluated again and again, joints injected, and so on; then someone does a thorough neurologic exam and identifies neurologic disease. If a horse is not following expectations, it is better to check for neurologic disease sooner rather than later."



Idaho cattle rancher and freelance writer Heather Smith Thomas has been writing about horses and cattle, and raising and training horses, for 50 years.



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