

## Diagnosing and Treating Gastric Ulcers in Horses

*The horse you get off is not the same as the horse you got on. It is your job as a rider to ensure that as often as possible the change is for the better.*

A common case of heartburn can bring intense discomfort, even pain, to a person. Imagine your horse trying to perform with a stomach ulcer! Did you know that the clinical signs of ulcers in horses are subtle and nonspecific and might be reflected in a slight attitude change, a decrease in performance or a reluctance to train?

Gastric ulcers are common in horses. Their prevalence has been estimated to be from 50% to 90%, depending on populations surveyed and type of athletic activity horses are engaged in.

Gastric ulcers can affect any horse at any age. Foals are particularly susceptible because they secrete gastric acid as early as 2 days of age and the acidity of the gastric fluid is high. Foals that have



*Although the majority of horses with gastric ulcers do not show outward clinical signs, chronic or low-grade colic can be an indicator of ulcers.*

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infrequent or interrupted feeding and are recumbent for long periods have been found to have lower gastric fluid pH (aqueous solutions with a pH less than 7 are acidic), suggesting that milk has a protective effect against ulcers and that recumbency increases exposure of the stomach to acid.

In adult horses, gastric ulcers occur more frequently in horses that perform athletic activities, with the highest frequency found in Thoroughbred racehorses (80-90%), followed by endurance horses (70%) and show horses (60%). Researchers have found that exercise

increases gastric acid production and decreases blood flow to the GI tract. In addition, when horses exercise, the acidic fluid in the stomach splashes and exposes the upper, more vulnerable portion of the stomach (squamous mucosa) to an acidic pH.

Why are gastric ulcers so common in horses? First, the stomach of the horse is smaller compared with the stomach of other species (see illustration, page 4).

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## DIRECTOR'S MESSAGE



Dr. Claudia Sonder  
CEH Assistant Director

I had the luxury of hiking in the Berryessa foot hills a few weeks ago. I was not on call and I liked the idea of a good physical work out while enjoying nature. The trail was steep and complicated and the weather quite warm, but I was motivated and ready to put in the work. About half way through the hike I began to feel stomach pain. My energy sapped and my desire to push through began to wane. The presence of abdominal pain completely changed me physically and mentally. As I stood in a shady spot and drank some water, it occurred to me that equine athletes must face the same challenges. We ask them to perform rain or shine, rested or tired, fit or unfit, and sometimes with pain that we are not aware of.

As I continued to anthropomorphize, I thought about gastric ulcers in horses. In the sport horse arena, I see many horses that could be affected with ulcers. I hear my clients complain of poor performance, changes in attitude, resistance to girthing and jumping, dull hair coat, or reluctance to finish a meal. All of the risk factors are there. Most of these animals have been recently hauled to or from venues, are fed

twice daily in a confined situation, and are performance horses that splash their stomachs with acid as they execute their cues. In addition, these horses are occasionally treated with nonsteroidal anti-inflammatory drugs to control musculoskeletal discomfort, which can add to gastric ulcer formation.

Equine gastric ulcer syndrome (EGUS) diagnosis and treatment is frustrating for the horse owner and the veterinarian. Most ambulatory veterinarians do not possess the 3-meter gastroscope that allows for inspection of the equine stomach.

***Ultimately, we want our horses ready and willing to climb that mountain and to do so with the joy and vigor that are so inherent to their nature.***

Many a horse goes untreated due to economic and logistic limitations associated with diagnosis and treatment or reliance on medications that are ineffective.

The mechanism of ulcer formation in horses tends to be different from that in humans, which further complicates client understanding of treatment. These days, all one needs to do is open an equine journal, or search the internet and a virtual sea of equine products with all sorts of claims fills the pages. How does one navigate through the information and make the best choice for their situation?

Most equine nutraceuticals are unregulated by the Food and Drug Administration (FDA). The regulation process is expensive and requires scientific study and review. Unregulated products can make claims and list ingredients without oversight. When these products are held up to scientific scrutiny, it is not uncommon for them to fail to contain or achieve what they sell. This is

especially the case with equine ulcer products.

The unique qualities of the horse's digestive tract limit the absorption and effectiveness of many of the advertised treatments and it is important that one understands the lack of FDA regulation which permits faulty product claims on many of these less expensive treatment options. Many horse owners forgo diagnosis and spend time and money on products that will not solve their problem. In the long run, this approach ends up being more costly for the owner and the horse.

This edition of *The Horse Report* will review the mechanisms and symptoms of equine gastric ulcers as well as diagnosis and treatment. A video in the Zmag edition of this publication shows the gastric scoping process and underscores the value of the investment in this diagnostic tool. Making a definitive diagnosis of gastric ulcers and choosing an effective therapy is the key to success, and the most rapid way to ensure your horse's comfort, well-being and performance.

Knowledge of ulcers and response to therapy will most likely dictate further management decisions down the road. Feeding routines and grazing access might be altered. Judicious use of anti-inflammatory drugs, timing of therapeutic joint injections, and preventative treatment around known trigger events may help to stop the cycle of gastric ulcer formation and pain as well. Ultimately, we want our horses ready and willing to climb that mountain and to do so with the joy and vigor that are so inherent to their nature. ■

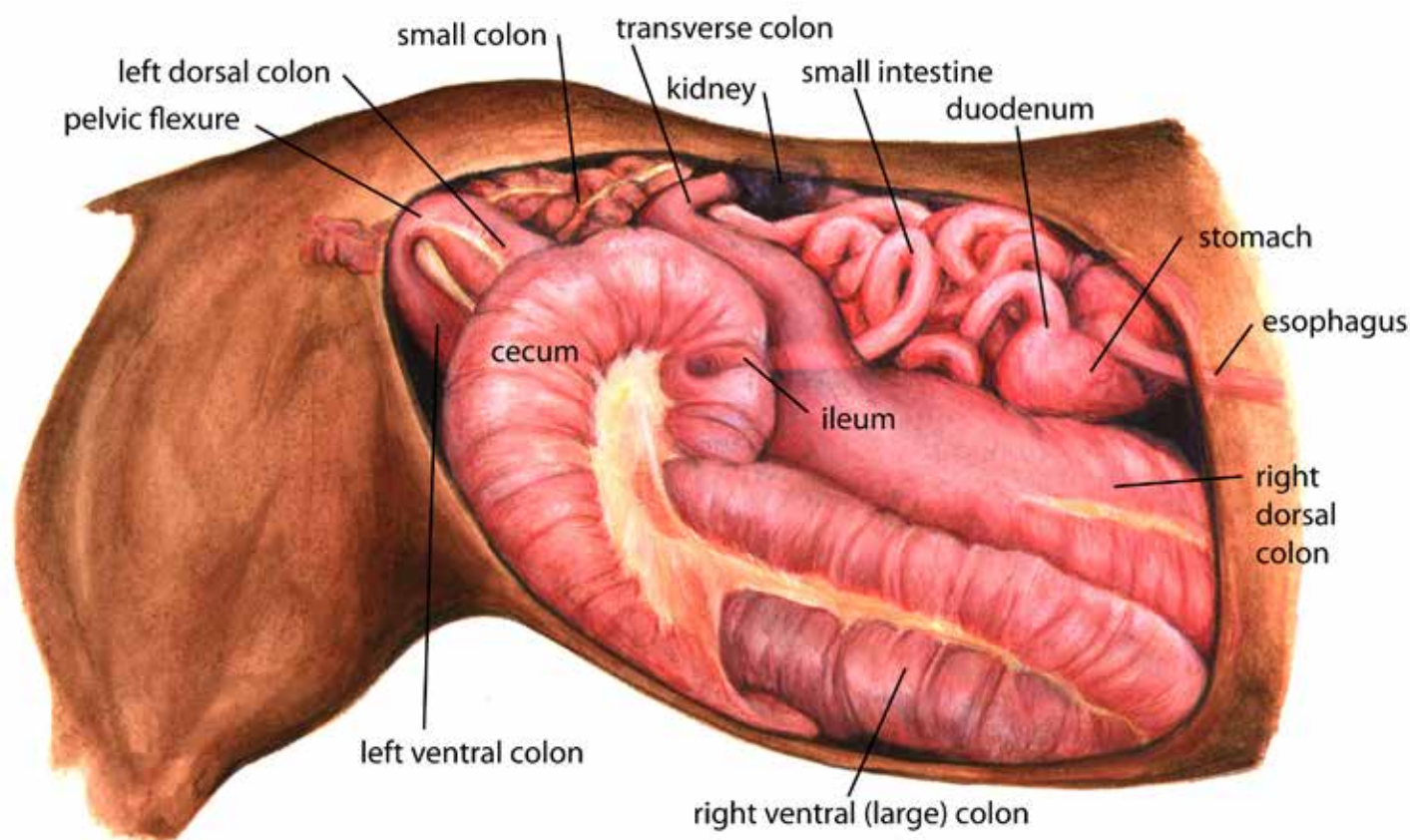


Illustration showing GI tract and stomach by Robin Peterson, 2008.

### Gastric Ulcers In Horses — From page 1

Because of this, horses cannot handle large amounts of food and are built to graze and eat frequent, small portions of feed for extended periods of time. In a natural grazing situation, the horse requires a steady flow of acid for digestion, so a horse's stomach produces acid 24 hours a day, 7 days a week—up to 9 gallons of acidic fluid per day, even when not eating. In a natural, high-roughage diet, the acid is buffered by both feed and saliva.

Second, understanding the horse's **anatomy**, it is possible to see how ulcers could be considered a “man-made” disease. When horses are fed two times per day, the stomach is subjected to a prolonged period without feed to neutralize the acid. Furthermore,

high-grain **diets** produce volatile fatty acids that can also contribute to the development of ulcers.

Other risk factors for developing gastric ulcers include physical and environmental stress such as **transport stress** and **stall confinement** (intermittent feeding and lack of exposure to other horses). Recent studies have demonstrated that a few hours of transport can induce gastric ulceration in horses that had none prior to departure, as determined by gastroscopy.

Finally, chronic administration of some **nonsteroidal anti-inflammatory drugs** such as phenylbutazone (“bute”), flunixin meglumine or ketoprofen can decrease the production of the stomach's protective mucus layer, making it more susceptible to ulcers.

### Anatomy of the Horse Stomach

The horse's stomach is divided into two distinct regions: the squamous region at the top (considered a continuation of the esophagus lining) and the glandular mucosa at the bottom (similar to the human stomach). The bottom part is glandular and secretes gastric acid. However, this region also produces mucus and bicarbonate, which protect the mucosa from acid exposure. So even though this region is also exposed to acid for several hours a day, it is not a common place for ulcer formation. When ulcers do form in this region of the stomach, they are usually secondary to chronic administration of nonsteroidal anti-inflammatory drugs.

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## Gastric Ulcers In Horses — From page 3

The top portion of the stomach is designed for mixing of the contents of the stomach and does not have as much protection from the acid. This is the most common place to find gastric ulcers. The lining of this section of the stomach is very thin and does not have many mechanisms for acid protection. Because the



*Stomach of a healthy adult horse. The upper pink part, known as the squamous (nonglandular) region, is where most ulcers in horses occur. The lower red part, known as the glandular region, contains several types of glands. It has a protective coating to keep it from being damaged by the acid.*

horse's stomach produces gastric acid at all times, even when not eating, the squamous mucosa is exposed to acid several hours a day, which can easily erode the lining of this region.

### Clinical Signs

The majority of horses with gastric ulcers do not show outward clinical signs. They have more subtle signs, such as:

- Poor appetite
- Dullness
- Attitude changes
- Decreased performance
- Reluctance to train
- Poor body condition
- Poor hair coat
- Weight loss
- Excessive recumbency
- Low-grade colic
- Loose feces

More serious cases will show abdominal pain (colic) and/or grinding of the teeth. Some horses are found on their backs, especially common with foals, since this position seems to provide some relief from severe gastric ulceration. Others will walk away from food for a period of time as if they experience discomfort when the food first hits the stomach.

Clinical signs of ulcers in foals include intermittent colic (after suckling or eating), frequent recumbency, intermittent nursing (interrupted nursing due to discomfort), diarrhea, poor appetite, grinding of teeth, and excess salivation. When a foal exhibits clinical signs, the ulcers are likely to be severe and should be diagnosed and treated immediately.

Note that horses that look completely healthy can also have gastric ulcers. Approximately half of the horses presented for colic at UC Davis have gastric ulcers and often it is hard to know whether the colic is the result of the ulcers or the other way around.

### Diagnosing Ulcers

The only way to definitively diagnose ulcers is through gastric endoscopy, or gastroscopy, which involves placing an endoscope into the stomach and looking at its surface. This procedure is easy to perform, is minimally invasive, and allows us to evaluate the esophagus, squamous and glandular regions of the stomach, and proximal segment of the small intestine in horses.

Since feed material can prevent a complete evaluation of the stomach, horses are fasted for a minimum of 12 hours and water is withheld for 4 hours before examination. To minimize stress, we sedate the horse slightly with a short-acting tranquilizer. We then insert the endoscope through the nostril

and down the esophagus into the stomach. The light and camera on the end of the endoscope allow the veterinarian to observe the stomach lining. The procedure is very safe, and a complete evaluation takes from 10 to 20 minutes.

Some practitioners will treat a horse for gastric ulcers and look for a change in clinical behavior. This can be helpful but does not answer the question of when to discontinue treatment. Horses that improve with treatment should be scoped prior to discontinuing therapy.

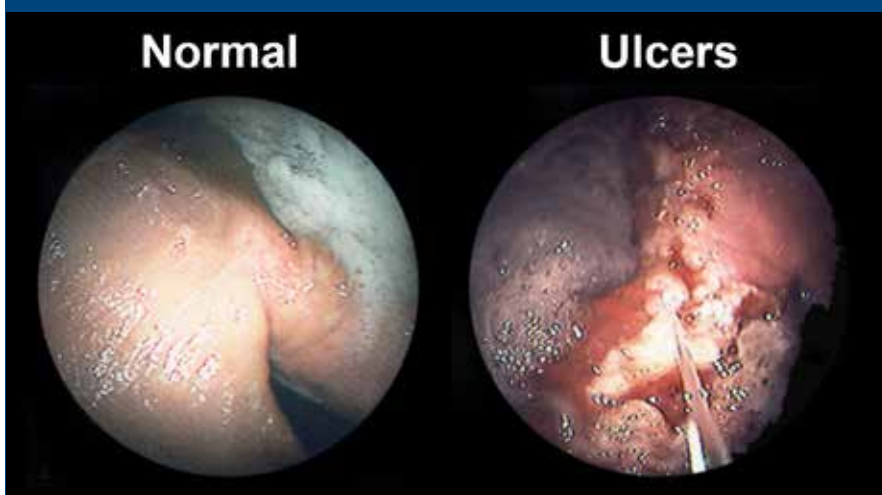
### Prevention and Treatment

As always, prevention is preferable to treatment. We have described some common risk factors that can contribute to the formation of gastric ulcers in horses. The following management techniques may assist in preventing ulcers:

- ▶ Feed horses frequently or on a free-choice basis (pasture). This helps to buffer the acid in the stomach and stimulate saliva production, nature's best antacid.
- ▶ Reduce the amount of grain and concentrates and/or add alfalfa hay to the diet. Discuss any feed changes with your veterinarian so that medical conditions may be considered.
- ▶ Avoid or decrease the use of anti-inflammatory drugs. If anti-inflammatory drugs must be given, use newer, safer ones such as firocoxib, if appropriate.
- ▶ Limit stressful situations such as intense training and frequent transporting.
- ▶ If horses must be stalled, allow them to see and socialize with other horses as well as have access to forage.



*Dr. Nieto (left) and Dr. Sole (second from left) insert the endoscope through the sedated horse's nostril and down the esophagus into the stomach while animal technician Gabriel Gil (right) holds and soothes the horse.*



*Images of the stomach of two horses obtained by using a 3-meter gastroscope. The squamous portion of a healthy stomach is shown on the left image. The right image is of the same region of the stomach of a Thoroughbred racehorse with severe gastric ulceration.*

A common question asked by horse owners is, "If the prevalence of gastric ulcers is so high, do I need to treat my horse for the rest of its life?" Considering that treatment is expensive and that acid in the stomach is there for a reason, we do not recommend that horses be treated continuously.

Antacids are commonly used in humans to buffer or neutralize gastric acid and protect the mucosa. However, in horses, the dose of antacids required to buffer the pH is high and would need to be used several times a day to be effective. If antacids are used for treating gastric ulcers in horses, they should be used in combination with agents that decrease acid production.

Acid pump inhibitors such as omeprazole and pantoprasole stop gastric acid secretion completely. Other effective types of drugs for the treatment of ulcers are the histamine type 2 (H-2) receptor blockers such as cimetidine, ranitidine and famotidine, which partially block acid production. H-2 receptor blockers work in a similar way to antihistamines used for allergies, except that antihistamines act on type 1 histamine receptors, while the acid blockers act on type 2 histamine receptors. H-2 receptor blockers are less expensive than acid pump inhibitors, but they need to be administered three times a day and only partially block acid production.

Currently, there is only one treatment—omeprazole—approved by the U.S. Food and Drug Administration (FDA) for gastric ulcers in horses. In 2000, the Federation Equestre Internationale (FEI) allowed the use of the gastric ulcer medications omeprazole and ranitidine during competition.

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## Gastric Ulcers In Horses

— From page 5

Omeprazole is available as a paste formulation and it has been very effective in preventing and treating gastric ulceration in all types of horses. Although the commercial paste is expensive, it is very effective and requires administration once a day. Due to the cost of this product, some compounding pharmacies prepare and sell paste or liquid omeprazole at cheaper prices. However, several studies have shown that the amount of active omeprazole in those products is lower than the label. In addition, the ability of those products to inhibit gastric acid production and their ability to resolve gastric ulcers has been variable.

Horse owners should be wary of claims for products that are not controlled or regulated by the FDA (compounding products) or evaluated in scientific studies. While those products may be less expensive, they may cost you more in the long run.

We recommend treating (1) horses with severe gastric ulceration, (2) horses with clinical signs of gastric ulceration, and (3) horses that are under stressful conditions and at risk of gastric ulceration. Under these circumstances, treatment with a product that is labeled specifically to prevent and/or treat gastric ulcers and approved by the FDA should be used. Treatment should be given for a full month, followed by a recheck endoscopy to confirm complete healing.

A preventative dose of omeprazole is commercially available for use around transport or stressful events. Horses with a history of gastric ulceration may benefit from proactive treatment to decrease the chances of ulcer recurrence. At this dosage, the omeprazole is less costly and may serve as a good investment in your horse's well being. ■



Photographs of the stomach of a racehorse during gastroscope examination. The horse had severe ulceration of the squamous mucosa (above photo). Treatment with omeprazole paste for 35 days healed the ulcers (below).



### Summary of Treatment for Gastric Ulcers in Horses

- ▶ Treatment of gastric ulceration should include management modifications.
- ▶ Antacids may not be practical for treating gastric ulcers in horses because they require high volumes and frequent doses.
- ▶ If antacids are used in horses, they should be used in conjunction with drugs affecting acid production.
- ▶ The goal for the treatment of gastric ulcers is to maintain a stomach pH >4 for as long as possible during the day.
- ▶ Proton pump inhibitors and H-2 receptor blockers effectively decrease gastric acid production.
- ▶ Preventative treatment may be a good option for performance horses that are going to be hauled or stabled in a new environment.



## Congratulations to Dr. Carrie Finno, Winner of 2012 Wilson Award

This year's James M. Wilson Award was presented to Dr. Carrie Finno for her work on neuroaxonal dystrophy (NAD), an inherited neurologic disease that affects all breeds of horses. The Wilson Award is given each year to an outstanding equine research publication authored by a graduate academic student or resident in the UC Davis School of Veterinary Medicine. Dr. Finno's publication, *Electrophysiological Studies in American Quarter Horses with Neuroaxonal Dystrophy*, was honored with the Wilson Award.

Horses affected with this disease appear to be normal at birth but develop signs of neurologic disease, including incoordination and an abnormal posture (standing with limbs crossed or base-wide) during the first two years of life. Some horses will also develop an abnormally quiet or dull mentation, often appearing sedated. Equine degenerative myeloencephalopathy (EDM) is considered a more severe variant of equine NAD and therefore, the disease is termed NAD/EDM.



Dr. Carrie Finno with Smart N Cody

Although there is strong evidence that NAD/EDM is inherited, it appears that dietary vitamin E plays a role in the development of the disease. When foals are predisposed to developing NAD/EDM due to their genetic makeup and they do not receive enough vitamin E during the first year of life, they appear to develop more severe neurologic abnormalities than foals with the same genetic "risk" that received enough vitamin E.

Dr. Finno received her DVM in 2004 from the University of Minnesota, where she also completed an internship in large animal medicine and surgery. During that time, she developed a strong background in equine genetic research. She then completed a residency in large animal internal medicine at UC Davis and obtained her board certification in internal medicine in 2008. Most recently, she obtained a PhD in comparative pathology, for which she performed clinical and genetic investigations of equine NAD. She is currently continuing her research into the genetics of equine NAD at the University of Minnesota. Congratulations Dr. Finno!

### Equine Surgical Emergency and Critical Care Service William R. Pritchard Veterinary Medical Teaching Hospital

The William R. Pritchard Veterinary Medical Teaching Hospital at UC Davis performs gastric endoscopies every day. Horses are scoped as part of a diagnostic plan for specific problems or to evaluate the presence of gastric ulcers.

The Service is staffed by three full-time faculty surgeons:

**Dr. Jorge Nieto, DVM, PhD, DACVS**  
**Dr. Julie Dechant, DVM, MS, DACVS**  
**Dr. Sarah LeJeune, DVM, DACVS/ECVS, CVA**

The Service's home base is the Equine Intensive Care Unit, a dedicated animal nursing unit that cares for critically ill equine patients. The Intensive Care Unit operates 24 hours a day, 7 days a week, to provide state-of-the-art care and treatment to horses with gastrointestinal problems and other critically ill horses. **To make an appointment, telephone (530)752-0290 or (530)752-5438.**

# When Things Are “Not Quite Right”

## Case Studies from the William R. Pritchard Veterinary Medical Teaching Hospital

**KADEN, A 12-YEAR-OLD SPOTTED** Saddle horse, was presented to the Equine Emergency Service at the William R. Pritchard Veterinary Medical Teaching Hospital for signs of mild colic. He lived in a paddock with access to a stall and had been switched from a grass hay diet to a pelleted diet five days earlier.

On presentation, Kaden was bright, alert and responsive. We performed a complete physical and blood chemistry examination on him, which showed that he was mildly dehydrated and had decreased abdominal sounds. X-rays shows a moderate amount of sand in the large colon.

We treated Kaden with fluids intravenously and passed a nasogastric tube into his stomach to give him mineral oil. Kaden was observed overnight. In the morning, he looked bright and alert, had a good appetite and was passing normal feces. He was released from the hospital.

Discharge instructions included general recommendations to prevent colic, such as regular deworming and dental care, providing fresh water at all times, making feed changes gradually, giving the horse psyllium, and avoiding feeding on the ground to prevent sand ingestion.

Five days after Kaden was released from the hospital, the owner reported that the horse was still not completely normal. He was

not rolling or pawing, but his appetite was not normal. The owner said, “I know my horse and I know he is not right,” and brought the horse back to the hospital.

The second physical exam and blood evaluation were normal. Kaden looked bright and alert, and he was responsive and had passed normal feces in the trailer. He was put on observation overnight, continued passing normal feces and had a complete abdominal ultrasound examination the following morning. No abnormalities were detected during the ultrasound exam.

We then performed a gastroscopy to evaluate Kaden’s stomach and part of the small intestine. The squamous portion of the stomach was free of

inflammation and ulceration, but the pyloric antrum—the glandular part of the stomach that connects to the small intestine—had severe ulceration.

Kaden was placed on an antiulcer medication for 40 days. We recommended feeding him a mixture of grass hay and alfalfa hay three to four times a day and avoid all anti-inflammatory drugs.

At a 40-day recheck, Kaden was doing well, and a recheck gastroscopy showed complete resolution of the ulcers.



*A Spotted Saddle horse (not Kaden) by Sheryl Leigh.*



*Gastroscopy showed severe ulceration of Kaden’s pyloric antrum, the glandular portion of the stomach.*



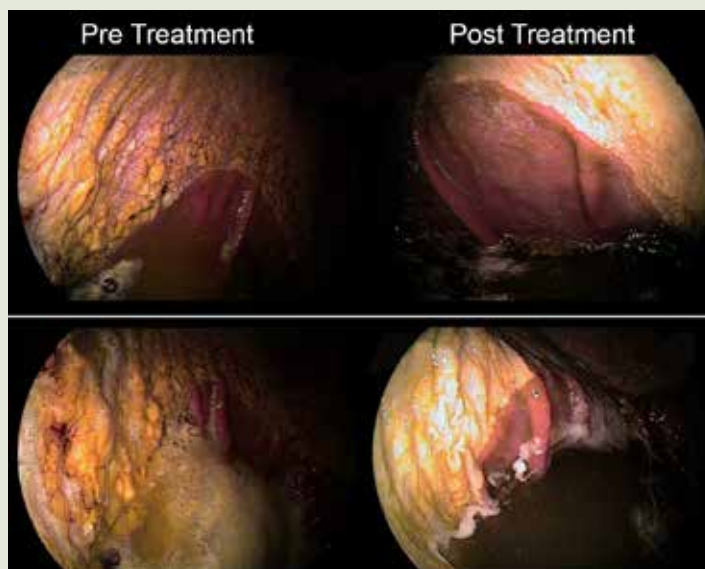


## Dakota Rebounds!

**DAKOTA WAS A 3-YEAR-OLD RACEHORSE** who presented to the William R. Pritchard Veterinary Medical Teaching Hospital with a primary complaint of exercise intolerance and weight loss. Four months previously, the horse was able to compete at his expected level, but in the two previous races he did not perform well. Because he had had some bleeding from the nostrils after racing and had lost weight, Dakota was sent to a rehabilitation center. After 3 weeks there, he still was not gaining weight.

At UC Davis, Dakota was examined and was found to have no obvious abnormalities. His lungs were clear, both at rest and after exercise, radiographs of the lungs were normal as were the results from blood analysis. We decided to examine Dakota's upper respiratory tract and stomach using an endoscope to ascertain that there were no internal abnormalities. Aside from a minor inflammation on the throat—a common finding in young racehorses—no abnormalities were observed in the respiratory tract. When the endoscope was passed into the stomach, however, we found severe ulceration on the squamous mucosa (upper portion of the stomach).

Oral omeprazole was prescribed for 30 days along with recommendations for treating the gastric ulcers. Dakota was to be fed several times a day and concentrates such as grains should be avoided or decreased. Corn oil also was recommended as it has been shown to protect the stomach. After 30 days of treatment, Dakota was presented for a recheck endoscopy, which showed marked improvement of the gastric ulceration. In addition, Dakota had gained 30 kg of body weight. At this time, we recommended that the dose of omeprazole be cut in half as Dakota returned to training. Four months later, Dakota returned to racing and placed third in his first race back!



*Left photos show severe hyperkeratosis and bleeding ulcers in Dakota's squamous mucosa. Right photos show marked improvement after treatment of gastric ulceration for 30 days.*

## Equine Oncology Program Unveils New Cancer Research Project

Horses are living longer than ever, much like their human counterparts, but longevity also brings its own set of problems. Although cancer is not as common in horses compared with other species, the number of horses that do develop cancer has been increasing with the growing population of geriatric horses.

The **Equine Oncology Program** at the UC Davis School of Veterinary Medicine, led by Dr. Alain Théon, Professor and Chief of Radiation Oncology at the William R. Pritchard Veterinary Medical Teaching Hospital, is a unique group that has evolved from an interest in horses with a high risk for developing tumors. Many of these horses are aging recreational and companion horses or horses that have passed their prime athletic abilities.

The Program offers all aspects of diagnosis and conventional treatments as well as experimental treatments for horses with malignancies. Dr. Théon has had a long-standing commitment to research in equine oncology and to the development of improved treatment options, particularly for equine melanomas.

Melanoma is a cancer that arises from melanocytes, the cells producing pigments in the skin and hair. These tumors often occur in the area of the tail, perineum, perianal region, external genitalia and below haired skin on the head, neck and trunk. **Melanoma is commonly thought to be benign because it grows relatively slowly, but nearly all forms of melanoma in the horse are malignant because, with time, there is always a chance that cancer cells may spread to other internal organs.** In addition, there is a subset



*Connemara Ponies come in all colors, but many of them have a genetic mutation that initiates graying of their coat color.*

of particularly aggressive melanomas with a fast growth rate that usually arises in younger horses or ponies, which if left untreated has the potential to significantly compromise the health of the horse and even lead to its death.

The current proven method for control of these tumors is removal, through surgery, by laser, or with cautery. However, sometimes complete removal of melanoma is not possible. For those cases, the Equine Oncology Program has been involved in research on immunotherapy, where tumor vaccines are used to immunize the patient against its own tumor cells. Unlike most vaccines, which prevent specific infections, the goal of therapeutic cancer vaccines is to train the body's immune system to (1) recognize and destroy cancer cells that already exist within its tissues, and (2) continue killing malignant cells long after treatment has ended.

### **A Collaborative Research Project**

Another important research area that offers promise for improving the diagnosis and treatment of melanoma is in the area of genetics, made possible by the 2009 completion of the Horse Genome Project. With genetic mapping of the horse, it is now possible to identify mutations that may be linked to melanoma (and other diseases) by comparing the genetic profiles from healthy and affected horses.

Dr. Théon and his group now have a unique opportunity to study genetic alterations associated with graying horses, which have altered pigmentation of the hair and skin. At UC Davis, well known for its collaborative approach to solving many different kinds of problems, oncology researchers will collaborate with the **UC Davis Genome Center** to carry out the research described below.

### The Connemara Pony Breed

It is well established that about 80% of graying horses and ponies with dark skin over the age of 15 years have or will develop melanomas. The association of graying of the hair coat with a mutation on Chromosome 25 has been demonstrated recently. It is also known that the incidence of melanomas is relatively low in young animals and increases with aging. Because the Connemara Pony breed has had a significant increase in graying hair coat over the last few years as a result of selective breeding to control the Blue-Eyed Cream phenotype, and the fact that the registered breed population is aging, it is reasonable to be concerned that this will lead to an increased incidence of melanoma in the breed when compared with other breeds.

The closed breeding process imposed on the Connemara Pony breed has produced a homogenous population of individuals with common morphological and behavioral traits. This genetic uniformity presents a tremendous opportunity to detect individual genetic alterations associated with melanoma. In other breeds, the separate variations of a few genes associated with the disease would be lost in the huge background of genetic variations between individuals.

Our research project will compare and analyze by Genome-Wide Association Studies the entire genome (DNA) of melanoma-bearing and melanoma-free Connemara ponies. Altered genes and their expression will be analyzed to determine which ones promote the disease. As importantly, we will identify pathways that may vary from pony to pony and may explain the multitude of clinical presentations of melanomas in horses.

### How Pony Owners Can Help

A necessary component of this project is to establish a tissue bank to

provide quality biological samples for genomic analysis. Tissue samples will be needed from:

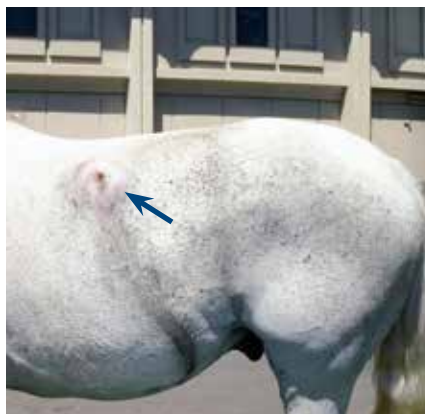
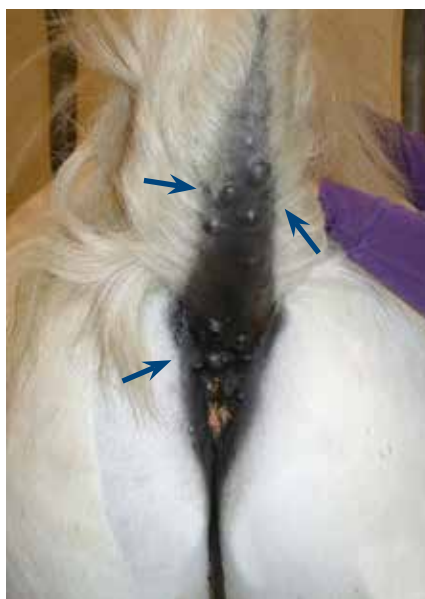
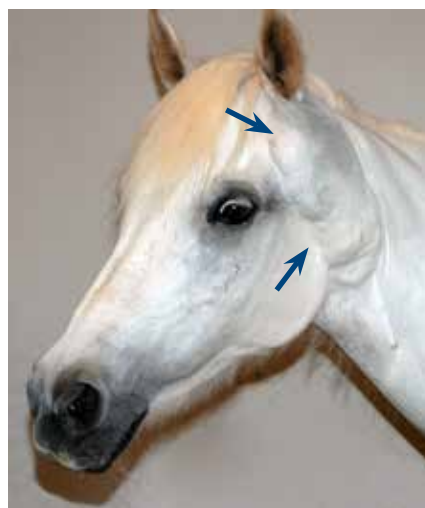
- Ponies less than 6 years old with melanomas.
- Ponies over 6 years old with melanomas.
- Older graying ponies (20 years old and older) without melanoma.
- Middle-age (approximately 10 years old) non-graying ponies without melanoma.

Once ponies have been identified and entered in the study, Dr. Theon's laboratory will send a shipping kit to the owner/breeder for tissue collection and shipment. The kit will include a veterinary medical questionnaire, informed consent form, and collection protocols for blood and urine as well as tumor (affected ponies only) samples obtained by their local veterinarian.

Horse owners and breeders who are interested in participating in the study are asked to e-mail Dr. Théon at [aptheon@ucdavis.edu](mailto:aptheon@ucdavis.edu), or Teri Guerrero, Oncology Clinical Trials Coordinator, at [taguerrero@vmth.ucdavis.edu](mailto:taguerrero@vmth.ucdavis.edu) (telephone 530/752-0125). Interested parties will be provided with more information about the study and whether their pony is eligible for the study.

### Benefits of This Research

This research will benefit not only the Connemara Pony industry but also all graying horse breeds and may provide information about melanomas in other animal species, including humans. The results of the study will identify targets for improving the treatment of melanomas. Identification of defective genes will also be used to prevent or minimize melanoma risk through genetic screening and careful breeding. ■



*Melanoma tumors often occur below haired skin on the head, neck and trunk as well as in the area of the tail, perineum, perianal region and external genitalia. The top photo shows melanoma of the parotid gland, the middle photo shows tumors in the area of the tail and perianal region, and the bottom photo shows melanoma on the back.*

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