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CEH HORSE REPORT

A publication of the Center for Equine Health, UC Davis School of Veterinary Medicine

School of Veterinary Medicine

Chiaroscuro and the Art of Medicine

by Gregory L. Ferraro

Chiaroscuro (*ke-ar-e-skyuro*) is an Italian word referring to the contrasting use of light/dark or clear/obscure to dramatize an intellectual or emotional concept in painting. The term and its implied concept were first made popular in the seventeenth century when describing the artistic technique and significance of the work of Michelangelo Merisi da Caravaggio (1573-1610), an Italian baroque painter. Caravaggio was the most revolutionary artist of his time and was known for dramatic, selective illumination of form out of deep shadow. He used this technique to reveal the subtleties of the human soul.

Three centuries later, chiaroscuro has been reconfigured and applied in the medical arts to visualize equally important aspects of the human experience. Science and technology have taken the painter's tool of contrasting light and shadow to reveal subtle truths, not of the soul but of the body. We have used our knowledge of physics and molecular structure in the medical diagnostic field to develop techniques for imaging the innermost structures of the human/animal body.

Beginning with the discovery of the X-ray beam, through the employment of contrast radiology, the advent of diagnostic ultrasound, nuclear medicine and computerized axial tomography (CAT scan), and now the development of magnetic resonance imaging (MRI), the contrast between light and dark has taken on a significance that only the great masters of art and science could have envisioned.

History has shown that the advent of new technology always changes the way medicine is practiced. These imaging technologies are a demonstration of that treatise. Today, more lives—both human and animal—are being improved as a result of the knowledge and skill of medical imaging specialists and their fascinating new tools.

Clinical diagnostics, disease management and curative therapeutics within the field of equine medicine, like all other medical fields, are being revolutionized through the implementation of a continually evolving array of sophisticated imaging techniques. Medical professionals can make diagnostic decisions more quickly, with more confidence and with less stress to their patients because of the emerging science we refer to here as "medical chiaroscuro."

What we present in this issue of our ***Horse Report*** is a layperson's guide to the world of medical diagnostic imaging as it pertains to the horse. We will attempt to define and describe what is currently available and what is on the horizon. You will meet some of the people involved in this exciting field and learn how these techniques can help your horse. Please join us as we explore the similarities between art and science in the truths they reveal about humans and their beloved creatures.

Conversion of Saint Paul
Michelangelo Merisi da Caravaggio (1573-1610)

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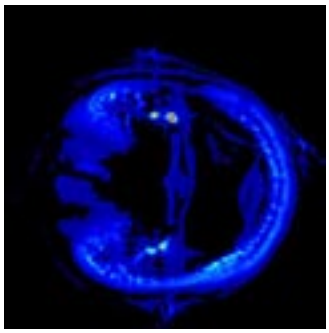
UCDAVIS School of Veterinary Medicine

The Visible Horse: The Wonders of Diagnostic Imaging

In the past decade, the ability to diagnose a variety of diseases and conditions in the horse has been propelled by astonishing advances made in the world of imaging: magnetic resonance imaging, computed tomography, and nuclear scintigraphy added to the reliable standbys of radiology and ultrasound. Historically, veterinarians and horsemen were limited to close inspection of the outer, visible anatomy of the horse and made diagnoses through observation and information provided by the owners or trainers. Although these remain important sources of information for diagnosing problems in the horse, vast amounts of information can be gained about internal abnormalities through medical imaging.



Contrast tomography scan showing blood flow to the lamina in the foot.

Magnetic Resonance Imaging

Magnetic resonance imaging (MRI or MR) is currently at the forefront of the newly available imaging techniques for horses. Although MRI has long been available to humans, it has only recently become available to veterinarians for evaluating horses. In humans, MRI is used to examine the brain and spinal cord, abdominal organs and orthopedic injuries to soft tissues such as joint, ligaments and tendons. Of all the available techniques, MRI offers the best imaging capability for tendon and ligament injuries. Magnetic resonance imaging produces images by exposing tissue to a very strong external magnetic field. When tissues are exposed to a magnetic field, the protons comprising water molecules throughout the body align with it. Once the protons are aligned, different pulse sequences are used to change their alignment and cause radiofrequency information to be given off. This information is mapped by the sensitive electronics of the MRI scanner, giving visual information about the structure in cross-sectional manner. Depending on the characteristics of the tissue, the protons will act differently and give off different radiofrequency information. For example, protons in normal tendon tissue will display one set of characteristics, while torn, swollen or inflamed tendon will show another. Different manipulations of the image can be performed to emphasize different characteristics of the tissue, such that joint fluid will look black on one image and white on another. All of these features of MRI are used to develop a number of imaging sequences that, when evaluated together, give an accurate depiction of the area being imaged.

MRI scanners used for clinical diagnoses generally fall into two different categories: high-field-strength scanners and low-field-strength scanners. Generally speaking, a high-field-strength magnet will produce a better quality image and shorten the scanning time. However, there are several difficulties when considering its use in the horse. First, MRIs are designed to fit humans and not 1,000-pound horses. Because of this, MRIs are used almost exclusively to examine the legs and feet and require the horse to be completely anesthetized. Anesthesia requires specially designed ventilation equipment as well as a table devoid of any metals with magnetic properties to support the horse.

Low-field-strength magnets produce high-quality images and have several advantages over high-field-strength scanners. Low-field magnets depend on a large, horseshoe-shaped magnet to create the images. This allows for different physical configurations of scanning, including an upright field useful for examining horse feet while the horse is standing.

At the UC Davis Veterinary Medical Teaching Hospital, both high- and low-field-strength MRI scanners are currently used. The high-field-strength magnet is limited to small animals and postmortem evaluation of horses. The low-field-strength magnet is generally used to evaluate orthopedic structures up to the level of the carpus and hock. This allows us to obtain very high-quality images of the soft tissues and the bone, obtained in a cross-sectional manner. With this capability, we have been able to diagnose laminitis, heel pain caused by soft tissue injury, and tendon and ligament injury of the pastern and cannon bone region. Other applications have included the detection of early bone bruising that may predispose a horse to a catastrophic fracture and detection of fractures that have not yet displaced, making them impossible to see on routine X-rays. One of the main limitations of MRI is that the calcium and phosphorus found in bone show up on all sequences as black, so that information about bone—particularly chronic bone remodeling such as that found in arthritis and navicular disease—can only be inferred by the size and shape of the black space.

This low-field-strength MRI is a remarkable diagnostic tool that can be used in the standing, sedated horse. Scan times may extend to 2 to 3 hours. Several practical items must be addressed before using this MRI on a horse. First, a horse must be healthy enough to withstand several hours of sedation. In addition, all metal shoes and especially any nail fragments must be removed because they may interfere with the image quality.

Computed Tomography

Computed tomography, also known as computerized axial tomography (CT or CAT scan), is another technnique that is available for use in horses. CT uses X-rays to create cross-sectional images of the body. In CT there is a circular "gantry" that houses the important electrical equipment that includes an X-ray tube positioned directly across from a semicircle of detectors. The detectors measure the strength and number of X-rays that pass through the patient from all angles around 360 degrees, so that a cross-sectional map can be made of a given slice of the anatomy.

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Large-animal CT unit at the Veterinary Medical Teaching Hospital.

An anesthetized horse is hoisted onto a table for CT scanning.

This photo shows the horse's right forelimb in the gantry of the CT unit, where the images are taken.

The Visible Horse

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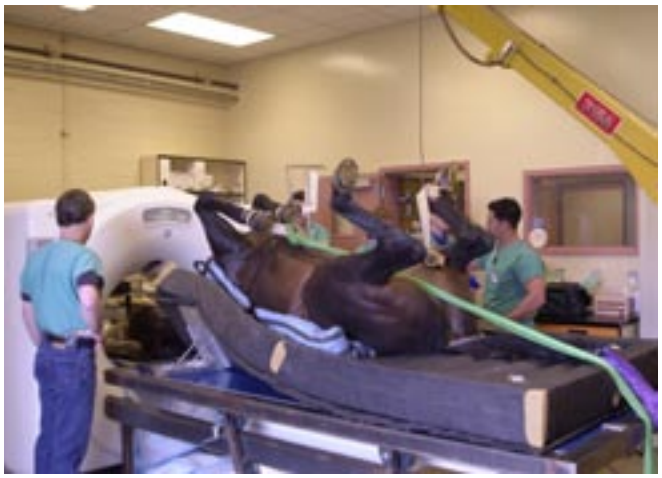
One major recent advance in CT scanners that has had a big impact on its use in the horse is the advent of helical scanning. In a helical scanner, there are no electrical cords housed within the gantry. There is just open circuitry that allows the detectors and the X-ray generator to continuously spin around the patient as the patient is advanced through its center. Many older models of CT scanners do not allow for this, so that the gantry must be reset after each slice or image is obtained. The advent of helical scanning greatly decreases the amount of time necessary to obtain a diagnostic study. An average horse head can be scanned in approximately 60 seconds.

The images generated by computed tomography are dependent on the density of the tissue. This is very different from the way that images are produced using MRI. In CT, damaged tendons can be identified because they become less dense due to the inflammation and swelling. This ability to measure small differences in density makes CT the best imaging technique available for evaluating the structure of bone.

Computed tomography is considered ideal for imaging the equine head for dental, nasal and sinus disease as well as fracture depiction. Many times, CT is performed before surgery so that the surgeons can design the best approach to injury repair. It has recently been shown to be extremely useful for identifying tendon and ligament injury within the foot of the horse. Because of its rapid acquisition time, computed tomography is also used to help guide therapy. For example, at the Veterinary Medical Teaching Hospital we have used CT to help guide medications into specific locations within the foot that would otherwise be inaccessible.



Horse undergoing CT scan of skull.

CT scan of equine skull showing a fractured tooth (bottom arrow) and infection surrounding its root (top arrow). Compare right side of skull with left side, which is normal.

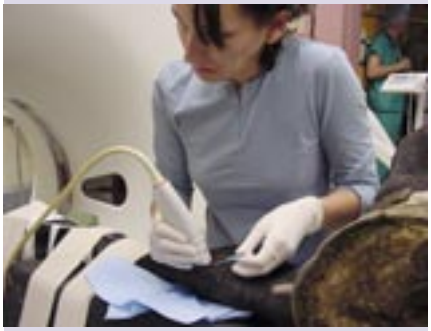
Contrast CT

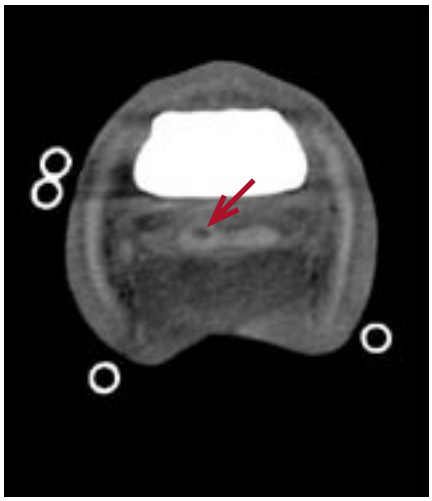
Contrast agents are substances that are sometimes used with computed tomography to allow greater visibility of an area of the body, whether it is a particular organ, tissue or circulatory system. Iodine-based contrast agents can be administered either within a space, such as a joint space, or within blood vessels, which show up as a different shade, usually white, on an image. In humans and small animals, contrast is given intravascularly (into an artery or vein) to the whole body to better identify abnormalities caused by inflammation or neoplasia (cancer). In horses, the total dose that would be necessary to achieve a diagnostic image is very large, adding significant expense to the process.

Recently at our Veterinary Medical Teaching Hospital a technique was developed to deliver contrast to the distal limb of the horse through its arterial blood supply, making the total dose of contrast agent significantly less. This has opened a whole new world of imaging that has proven to be extremely useful for several major diagnostic categories. First, it allows surgeons to accurately assess the blood supply of the limb in fracture cases. Often fractures are associated with damaged blood vessels, and this is known to slow healing. Second, because contrast agent will accumulate in places where there is active inflammation, it can be used to identify tendon and ligament injuries. It also serves to visualize the lesion more completely, as shown in the top right photo on page 5. The

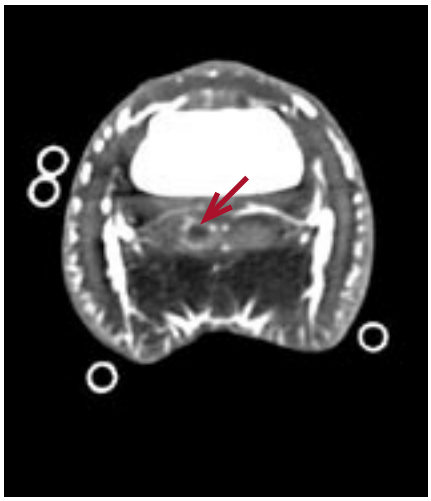
tear identified in the center of the deep digital flexor tendon has no central blood flow, indicating that the region may be very slow to heal and may benefit from a specific kind of therapy. Another major benefit of using contrast agents is that contrast can be used to measure the actual amount of blood that is flowing to the foot. This can be represented as a blood flow map, shown in the bottom right photo. Blood flow is expected to be altered in cases of laminitis. Currently, we are investigating the use of contrast agents with MRI.

Dr. Puchalski using ultrasound to guide the catheter into the artery where an iodine-based dye is injected for contrast CT. The photos to the right show CT images before and after admininstration of contrast dye.





CT image showing tear in the center of the deep digital flexor tendon (at point of red arrow).



After contrast dye administered through a catheter at the time of scanning. White areas indicate blood flow in the vessels. Contrast CT more clearly shows the tear in the tendon. The tear has no central blood flow, indicating that the region may be very slow to heal and may benefit from a specific kind of therapy.

Layperson's Guide To The Cost Of Diagnostic Imaging

The newer and more complicated the machine, the higher the cost.

Ultrasound

Ultrasound is another very important imaging technique and, like MRI and CT, is cross-sectional. It is relatively familiar to most people because of its widespread use in medicine. Ultrasound produces images through a very unique crystal that is housed within the ultrasound probe. This crystal can change sound waves into electrical potential (voltage) and vice versa. This is important because the probe initiates a series of sound waves that travel through the tissues. As the sound waves are reflected back through the tissue, the probe then stops initiating sound and "listens". When the returning sound waves hit the tiny crystal and electrical signal is created, this is represented as gray shade on the screen. The computer maps the location of the signals based on how long it takes for the signal to return. In this way, a two-dimensional image of the tissue is created. Ultrasound has evolved significantly over the last several years and currently, extremely high-quality equipment is available at a relatively low cost.

Ultrasound has some unique properties. It produces no ionizing radiation so it is very safe, the scanners are portable and versatile, high-quality images can be obtained of outer structures with high-frequency probes, and good images can be obtained of very large, deep structures with low-frequency probes. This makes it useful for evaluating structures as small as a peripheral nerve and as big as the heart, spleen or liver. Ultrasound cannot penetrate

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The Visible Horse
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either gas (e.g., in the GI tract) or bone, so although it can be used for early signs of infection or bruising at the surface of the bone, it cannot detect a bone's internal structure.

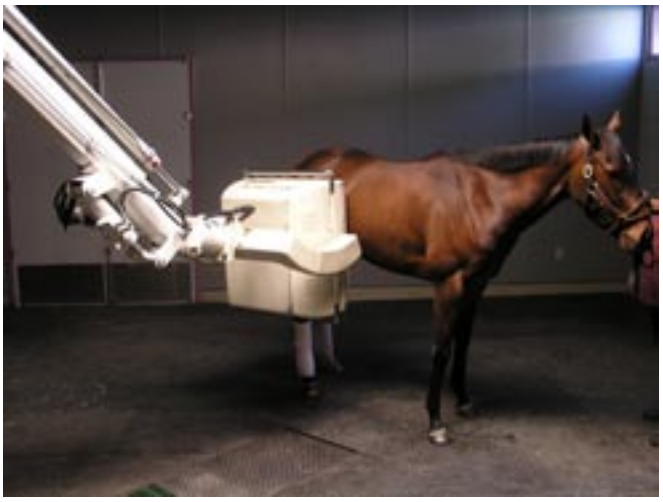
Ultrasound has classically been used for identifying tendon and ligament injuries. Currently, it is used for a vast array of abnormalities that include ocular, vascular, cardiac, lung, abdominal organs (liver, spleen, kidneys, gastrointestinal tract), internal and external lymph nodes, and reproductive tract. It can also be used for identifying early bone infections and pelvic fractures that cannot be seen on X-rays. When considering diagnostic tests for a lame horse, ultrasound should always be considered first because it is relatively inexpensive, safe and readily available.

Routine ultrasound, like plain CT and MRI, will demonstrate structural abnormalities where they are located. One other feature of ultrasound—Doppler ultrasound—can map blood flow. There are different ways to use Doppler but in general, it is used to visualize blood flow in an artery, vein or even within the heart. This technique is used for identifying leaking or faulty heart valves. In humans, ultrasound contrast agents are now being used to a greater extent, and we expect that ultrasound contrast will soon be under investigation for use in the horse.

All imaging methods send images to a network of computers where radiologists can evaluate them.

Nuclear Scintigraphy

Nuclear scintigraphy, or bone scanning, is another imaging technique that is readily available for use in the horse. It is inherently different from MRI, CT and ultrasound in that it is two-dimensional. Instead of taking cross sections of the anatomy, it produces a two-dimensional image of a three-dimensional structure. In other words, the entire limb is portrayed as a flat object, somewhat like an X-ray. Nuclear scintigraphy is a truly functional test. Rather than portraying the anatomy as it stands, an image is developed based on the function of the underlying bone. This will become clearer as image formation is discussed.



A horse undergoing a bone scan with nuclear scintigraphy.

The first step in developing a scintigram, or bone scan, is to administer a low-level radioactive agent (technetium) that is attached to a bone-seeking molecule. This molecule is taken up by active cells normally present in bone but to a much higher degree in inflamed, damaged, fractured or infected bone. Thus, the entire skeleton will in effect become temporarily radioactive, with abnormal areas being much more radioactive. The radioactivity is emitted from the horse and recorded using a gamma camera. The gamma camera records the outline of the horse's skeleton with any abnormalities that may be present.

Nuclear scintigraphy has an important role in many different clinical situations. One of the most important roles is that stress or occult fractures can be identified in regions that either cannot be radiographed or are not able to be seen on traditional X-rays. This includes fractures of the

pelvis, scapulae, humerus or tibia—bones that are not usually X-rayed because of their high location. Additionally, it can be used in cases where horses have nonspecific pain or lameness that is originating in many different limbs at the same time. Interestingly, as horses are trained for their specific disciplines, their bones will remodel to suit that specific task and this can be visualized with scintigraphy.

There are both advantages and disadvantages to scintigraphy. It can be used in the awake and sedated horse, it is very sensitive for small changes in bone metabolism, and it is noninvasive. The one major disadvantage is that the horse is radioactive for a short period of time after the scan and cannot be returned home for approximately 24 hours. It is also a nonspecific test such that infection and fracture will appear similar, and most often additional radiographs will be made after an abnormality is identified.

A Concluding Word of Caution . . .

Each of the imaging techniques described here provide a useful and specific way of capturing a "picture" of the equine body. All of them have strengths and weaknesses that should be considered in seeking a diagnosis for a particular problem. The proper use of the imaging technique that is most appropriate in any given case can be instrumental in reaching a diagnosis.

None of these imaging techniques represents a "stand alone" diagnostic tool. Medical imaging, like all other laboratory tests and methods, are merely tools that aid veterinarians in reaching a correct diagnosis. The knowledge, skill and experience of the examining veterinarian are foremost in determining the cause of disease and its appropriate therapy. The technological advances described here are merely another weapon in the armament of the clinician. Each of these weapons must be properly used at the correct moment to effectively win the war against disease. ❄

Penitent Magdalene with Candle
Georges de La Tour (1593-1652)

The cradle rocks above an abyss, and common sense tells us that our existence is but a brief crack of light between two eternities of darkness.

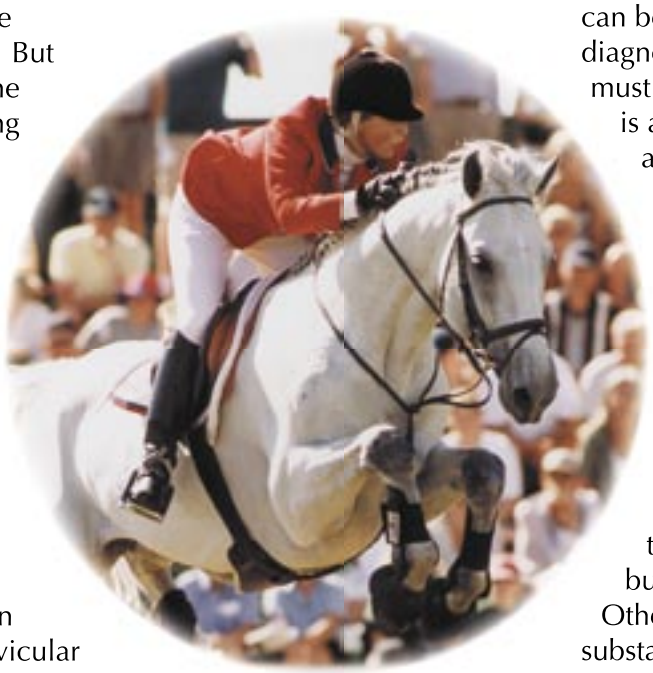
—Vladimir Nabakov, 1899-1977

New Imaging Methods Demonstrate That Navicular Disease Isn't Always What It Seems

by Sarah Puchalski, DVM

Horses have been lame due to pain in their feet as long as people have been associated with them. Navicular disease and laminitis are two major diseases that have caused significant economic loss through layup, decreased sales value and veterinary expenses. Throughout history, horsemen have dreaded the diagnosis of both diseases. But now, due in large part to the introduction of new imaging techniques to the equine world, our understanding of navicular disease is rapidly changing.

As technology has improved over the years, significant leaps forward have been made in our general understanding of lameness in the horse. Many of these improvements have been associated with advances in imaging. In the case of navicular disease, the development of a simple radiographic projection—the navicular skyline view—that enables visualization of the navicular bone without interference by other bones, has allowed researchers and clinicians to evaluate the bone in much greater detail. Unfortunately, as visualization of the bone has become clearer, the disease has become more difficult to understand. For example, navicular bone degeneration occurs in horses with and without lameness, and horses that are lame may or may not have navicular bone degeneration. Some cases are clear-cut, but a significant number are not. Furthermore, radiographic changes in some breeds of horses seem to be more indicative of lameness than in other breeds.



The traditional thinking on navicular disease has changed over the past several years. Historically, it was thought of as a specific disease of the navicular bone itself, but now it is generally accepted that lameness arising from the heel of the horse may be due to injury of any number of structures within the hoof capsule. One major factor that can obscure an accurate diagnosis of the disease is the use of a local anesthetic (palmar digital or PD nerve block) as a primary tool to localize the painful structure. When a heel block is used, multiple structures within the foot can be anesthetized, rendering the horse sound. If no significant radiographic abnormalities involving the bones of the feet are identified, a veterinarian can be faced with a significant diagnostic challenge. They must assume that the lameness is arising from any one of a number of soft-tissue structures within the foot and/or the navicular bone. Typically in a horse with this problem, therapy is fairly general and would include shoeing changes, anti-inflammatory drugs administered orally, or anti-inflammatory drugs administered into the coffin joint, navicular bursa or tendon sheath. Other therapies could include substances to improve joint fluid composition and even shock wave therapy through the sole of the foot. However, a universal frustration with this syndrome is that the lameness will often recur, even with the best of care.

Most of the recent research involving navicular disease/ syndrome has focused on imaging. Although navicular bone degeneration may indeed be the cause of lameness in many horses, one must not discount the role of the soft tissues within the hoof capsule. These include tendons, ligaments, the navicular

bursa, the flexor tendon sheath and the digital cushion. We believe that all of these structures work together to allow the horse to propel itself forward. All of the soft tissue damage is not typically seen on standard X-rays unless the damage is very severe and chronic. Ultrasound evaluation is used for tendons and ligaments higher up on the horse's limb but is seriously hampered in evaluating the foot. In humans, diagnosing injury to these types of structures is done with either MRI or CT. Today, because of the advances made in these imaging techniques, both are now available for horses at UC Davis.

MRI has come to the forefront of diagnosing lameness in the horse. Different manipulations of the images produced by MRI can be used to emphasize different characteristics of tissues. All of these features of MRI are used to develop a number of imaging sequences which together give a much clearer anatomic description of the abnormal tissue than previously possible. While MRI allows for better evaluation of the soft tissue structures, CT has better bone imaging capability. CT has long been accepted as the best imaging technique for identifying bone lesions. With the use of contrast-enhanced CT, soft tissue lesions have become much more visible, and with helical scanning, directed treatment such as tendon injection can be performed all at the same time. Each has its advantages, but together, MRI and CT are even better for diagnosing injuries involving both bone and soft tissue. ❄

Dr. Sarah Puchalski, Assistant Professor of Imaging Sciences Department of Surgical & Radiological Sciences

Dr. Sarah Pulchalski

Sarah Puchalski is a decisive person. She was only six when she decided to become a veterinarian. Born into a family that lived and worked with a variety of animals, Sarah rode horses throughout her childhood and continued eventing competitively for many years. Clearly, veterinary medicine was an interest that began very early. Her attraction to radiology also came early. As a young college student, she worked for a veterinarian whose practice comprised mainly sport and racehorses. Because the work usually involved lameness, this veterinarian routinely used diagnostic imaging (ultrasound and radiography). He encouraged Sarah to consider becoming a specialist, and the idea never left her. After receiving her veterinary degree from the University of Saskatchewan, she completed a two-year internship that combined field service and sports medicine at New Bolton Center, University of Pennsylvania, where her mentors also encouraged Sarah to pursue her interest in radiology. In 2001, she came to the UC Davis Veterinary Medical Teaching Hospital where she began a residency in radiology. She received her board-certification from the American College of Veterinary Radiology in 2004.

Dr. Puchalski was recently appointed a faculty member in the Department of Surgical and Radiological Sciences, where she will divide her time between clinical duties, teaching, and research beginning this fall. When asked about her plans in radiology, she sees "a lot of hard work. . . but I would like to see the equine imaging program at UC Davis become second to none. I believe that the advances in equine imaging have opened doors to a wealth of opportunity." Given her decisive nature, we have no doubt that Dr. Puchalski will capitalize on those opportunities.

Technological Innovation and the UC Davis Veterinary Medical Teaching Hospital

One of the roles of the UC Davis Veterinary Medical Teaching Hospital is to find clinical applications for newly discovered scientific tools and methods and to distribute them to veterinary students and practitioners. New knowledge is moved from the research laboratory into practical treatment applications by skilled and highly specialized clinicians. As those treatment methods are proven, they are passed on to medical students in the hospital's teaching program and distributed to veterinarians through continuing-education programs (see page 11).

Diagnostic imaging is a prime example of how clinical research provides a basis for implementing a new technique throughout an entire veterinary field. It is not enough to be able to create an image of a body part or organ. Each new imaging technique that is developed requires a learning curve before it can be used in the field. We must develop a library of image interpretations that clearly establish what the images mean in terms of disease. Without such a library, new imaging methods cannot reach their full potential.

The UC Davis Veterinary Medical Teaching Hospital has long been involved in developing imaging techniques used in human diagnostics for use in equine medicine. For more than 30 years, Dr. Timothy O'Brien has been refining the role of radiology in equine research and diagnostics. Literally thousands of veterinary students and practitioners have been taught by Dr. O'Brien to properly use and interpret X-ray images. Now with CT scanning and MRI, a new generation of equine imaging specialists at UC Davis and other teaching institutions will be required to educate students and clinicians in their use. A new library of knowledge needs to be created so that these imaging techniques can be incorporated into the equine veterinary field. What has been done by Dr. O'Brien over the past decades will now be taken up by Dr. Sarah Puchalski. Her work and that of others will take equine medical imaging far into this new century. The torch has been passed and new imaging territory is being discovered. This is an exciting time in a new and emerging area of equine medical science and Dr. Puchalski will undoubtedly lead many a student and veterinarian along the new path of discovery.

Congratulations to ***The Horse Report*** for being recognized by American Horse Publications for excellence as a newsletter! *The Horse Report* was presented with a First Place award for Newsletter, as well as a Second Place award for Horse Care, at the AHP Conference held in Seattle on June 11. We are proud to be making a contribution to the welfare of our equine friends.

Dr. Keith Latson Wins the 2005 Wilson Award

This year's James M. Wilson Award was presented to Dr. Keith Latson for his work in the early and accurate recognition of intestinal ischaemia (decreased blood flow) for decreasing complications and increasing survival from colic.

The Wilson Award is given each year to an outstanding equine research publication authored by a graduate student or resident in the UC Davis School of Veterinary Medicine. Dr. Latson's research culminated in the manuscript, *Evaluation of Peritoneal Fluid Lactate as a Marker of Intestinal Ischaemia in Equine Colic,* and was honored with the Wilson Award.

Colic is a major cause of death in horses. Approximately 50% of horses referred to a major veterinary institution for colic require emergency abdominal surgery. The most common cause of death as a direct result of colic is due to acute circulatory failure secondary to intestinal ischaemia. Early and accurate recognition of an ischaemic segment of bowel is essential to decrease complications and increase patient survival. The objective of Dr. Latson's research was to determine whether blood lactate values and peritoneal fluid lactate, electrolyte, bicarbonate and glucose values are sensitive indicators of intestinal ischaemia and to develop a method for determining the probability of a horse with colic having this condition.

Dr. Latson received his veterinary degree from the University of Texas A&M and completed an internship at the Littleton Large Animal Clinic in Colorado. He is currently a third-year resident in equine surgery at the UC Davis Veterinary Medical Teaching Hospital.

Coming Events

CALLING ALL VETERINARY HEALTH CARE PROFESSIONALS !

UC Davis School of Veterinary Medicine presents

THE 18th ANNUAL FALL SYMPOSIUM ON RECENT ADVANCES IN CLINICAL VETERINARY MEDICINE

and OSCAR W. SCHALM MEMORIAL LUNCHEON AND LECTURE

Sunday, September 18, 2005
Health Sciences Complex, UC Davis

Topics will include vaccinations for mares and foals, diagnostic approaches to muscle disease in the horse, treating tumors, computed tomography for investigating lameness, and management of the critically ill neonate.

For more information, contact Saundra Wais, Center for Continuing Professional Education, **(530)752-3905**, or to download a brochure and registration form visit their Web site at **www.vetmed.ucdavis.edu/ce**

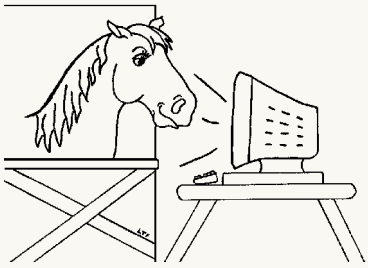
Coming Events

Dollars for Davis Poker Ride!

Date: Saturday, September 10, 2005
Where: Upper San Leandro Reservoir, Moraga
Time: Staggered starts between 9:00 and 10:30

Come ride the beautiful Moraga hills on this annual fundraiser to benefit our equine friends through the UC Davis Center for Equine Health. The trail is approximately 6 miles of moderate to steep terrain on mostly fire trails and will be available to both poker ride competitors and those riding just for pleasure. Minimum donation for participating in the ride is $25.00, with an optional poker hand entry fee of $10.00. Lunch may be pre-ordered for a cost of $5.00 and will be served after the ride. Prizes will be awarded after lunch. For more information, call Laura Fend, Moraga Horsemen's Association, **(925)935-8147**, or e-mail her at **ljfend@pacbell.net**. To download a flyer and for directions to the trail, visit our Web site at **www.vetmed.ucdavis.edu/ceh** (see Links, Events, Questionnaires).

WHOAH, CEH IS ON LINE!



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