Letter from the Chair

I am happy to report that the Department is academically strong, excelling in education, growing our clinical programs and providing vital leadership across all aspects of our profession. Our mission has always been four-pronged: excellence in clinical care, education, research, and leadership.

We believe that the most productive and enjoyable way to demonstrate leadership is through collaboration. In this newsletter, we feature three examples of collaborations in which our faculty are leading change and discovery.

On the education front, it is now required that every residency program provide surgical simulation training as part of their curriculum. Assistant Professor Paul Lafferty is involved in research to identify the most effective application of surgical simulations. As members of the Midwest Orthopedic Surgical Skills Consortium (MOSS), Dr. Paul Lafferty and his team — in collaboration with the University of Iowa — are testing best practices for surgical simulations that will soon set the standard for orthopedic surgery education and improve surgical practice. Details of the MOSS program and comments from Dr. Lafferty are provided on page 2. (continued on page 2)
Letter from the Chair, continued

Professor Cathy Carlson, a musculoskeletal veterinary pathologist, has discovered novel imaging method to understand the pathophysiology of osteochondrosis dissecans, a painful condition that affects children. This groundbreaking research brought many disciplines together in unique ways. These include veterinary surgery, veterinary pathology, MRI research physicists, medical radiology, and orthopedic surgery. On page 3, Dr. Carlson describes her team’s work and fascinating three dimensional MRI images are displayed.

Clinical leadership has been critical for our robust Sports Medicine program. This program has thirteen physicians. Faculty care for Big 10 and professional teams. The outstanding care they provide is truly interdisciplinary and involves effort and collaborative work of Radiology, Physical Therapy, Non-Operative Physicians, Athletic Trainers, Orthopaedic Surgeons, Physiatry, Pediatrics and Podiatry. Associate Professor Brad Nelson is a key member of our Sports Medicine Program. He summarizes some of our interdisciplinary activities on page 4.

These examples of collaboration both within and outside the University have been critical for our success and demonstrate leadership by bringing disciplines and expertise together to achieve excellence in patient care.

We hope you enjoy this issue. As always, please feel free to contact me with any questions or comments at clohi001@umn.edu.

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Simulations prove to be an effective teaching tool for orthopedic surgeries

With the aid of new technologies, surgical simulation models are playing an increasingly important role in medical education. As part of the Midwest Orthopedic Surgical Skills (MOSS) consortium, the University of Minnesota is helping to set the standard for simulation curriculum in orthopedics.

“As is the case in any surgical specialty, the more repetition, the safer the surgery,” said Assistant Professor Paul Lafferty, MD, “We have found that the skills do translate. The better residents are in the simulation lab, the better they are in the operating room.”

The Accreditation Council for Graduate Medical Education (ACGME) now requires that every orthopedic residency program have a surgical simulation curriculum. Exactly what that curriculum looks like is the work of the MOSS consortium. Founded by University of Iowa faculty Matthew Karam, MD and Lawrence Marsh, MD, the consortium consists of 15 participating schools, including the University of Minnesota. The goal of MOSS is to develop proven simulation training methods that can be used throughout the medical education community.

A total of 32 University of Minnesota residents have participated in the various MOSS simulation exercises, which take place in the simulation lab at Gillette hospital in St. Paul. While exercises focus on ankle, hip, wrist and knee, most techniques are applicable to all areas of the body. Cadaveric knees are used for arthroscopic surgery simulations. Fracture surgeries are performed on Sawbones, which are models made of a special composite material that simulates bone and soft tissue.

All exercises are videotaped, and a faculty surgeon is present to give real-time feedback. Trainees use standard surgical tools with a position tracker, which follows the tool movement within the bone. These movements are captured and recorded as computerized images, which can be studied and evaluated later. For some surgeries, the trainee wears a GoPro® camera for an additional first-person point of view.

Getting better, faster

“We’re at the stage now where we’re validating the exercises to prove that they do make a difference in the skill level of trainees,” said Lafferty. “We’re also testing the effectiveness of the didactic approach in translating to practical skills.”

For this effort, residents were divided into two groups. One group was given instruction before the simulation exercises, while the other group was not. Exercises were performed again and results compared one year later.

“What we found was that simulations do make a difference, and that structured education along with the simulations has the biggest impact of all,” reported Lafferty. “Now we’re working to refine that instruction to best accelerate the learning curve.”

Lafferty and the MOSS consortium have shared their results through posters and podium presentations at regional and national meetings, as well as publication in the Journal of Bone and Joint Surgery.
Veterinary and human medical communities unite to help children

Veterinary pathologist Cathy Carlson, DVM, PhD has always been interested in the potential of the animal world to understand and treat human diseases. While studying the pathology of osteochondrosis dissecans (OCD) in animal samples, Carlson saw similarities to human OCD, a disorder that is very difficult to study in the children it afflicts. With the help of a National Institutes of Health grant and an inter-disciplinary team of scientists, she has gathered strong evidence to indicate that the two are, indeed, the same disease.

“We’re validating the use of animal models to study human disease,” explained Carlson. “It’s opening up an entirely new field that didn’t exist before.”

OCD is a developmental disorder that is extremely common in horses, pigs and large-breed dogs, but occurs less frequently in children. In humans, the condition has many names, depending on the body part affected (Sever disease, Panner disease, Blount disease, etc.). OCD occurs in the joints, where a piece of cartilage and a thin layer of bone beneath it separate from the end of the bone. If the loosened cartilage and bone stay close to where it detached, there may be little or no pain and the lesion may heal itself. If the fragment comes loose and gets caught in the moving joint, there is persistent pain. In livestock, OCD often results in lameness and death due to culling of affected animals.

Three-dimensional reconstructions of susceptibility weighted imaging data showing the vascular architecture to the femoral condyles in the axial plane ex vivo in an 11-day-old goat, a 3-month-old human, and as 21-day-old pig. Arrows mark the avascular areas. Lateral is to the left and anterior is towards the top of the figure. Predilection site for OCD is indicated by red ellipse.

Scientists know the cause of these lesions in animals is loss of blood flow to the cartilage during bone growth. However, this has not been clarified in humans. Because these blood vessels exist in the cartilage for only a short period of time (weeks to months in animals and the first ten years of life or so in humans), by the time symptoms are present, the mechanisms that caused them have vanished.

While veterinary pathologists like Carlson are able to examine the ex vivo cartilage of animals, it’s almost impossible to obtain this tissue from children. This led Carlson to an idea.

“What if we could show that this is the same disease?” posed Carlson. “We could unite the veterinary and human medical communities to help children.”

First, Carlson needed to create a technique that would allow her to closely analyze and compare the joint tissue in living subjects. For this, she and her postdoc, Dr. Ferenc Tóth, turned to the Center for Magnetic Resonance Research at the University of Minnesota. Utilizing technology similar to that used to visualize vessels in the brain, scientists including Drs. Jutta Ellermann, Michael Garwood, and Mikko Nissi developed a technique that shows blood vessels in cartilage with amazing clarity.

(continued on page 4)
Going pro: expertise with elite athletes benefits all patients

When it comes to sports medicine, orthopedic surgeon Brad Nelson, MD has seen it all. Whether he’s caring for the $1 million shoulder of a Minnesota Wild player or treating a weekend warrior who may have overdone it just a bit, both patients benefit from his experience working with the pros.

“The expertise you get from treating elite athletes is something you can take to clinic,” said Nelson, an associate professor at the University of Minnesota and team physician for the Minnesota Gophers and Minnesota Wild. “Patients benefit, athletes benefit.”

As the largest supplier of team physicians in the state, the UMN Health Sports Medicine Program provides care for more than 750 Golden Gopher athletes. In addition, it provides team physicians for the pros — Minnesota Vikings, Wild, and Twins — and their visiting teams during home games.

This program provides a unique opportunity for residents and fellows in the Sports Medicine Program. By observing and working side-by-side with team physician faculty as part of their rotation, they receive a high level of training that can be applied throughout their career. Residents put this training into practice as volunteer team physicians through the Minnesota State High School League during football games and other sporting events in Minneapolis and St. Paul.

“We like residents to cover games, as well as work with a practice,” said Nelson. “This gives them experience working with athletes right when injury occurs.”

Caring for teams is just one aspect of the UMN Health Sports Medicine Program. Physicians treat patients of all ages — from Little Leaguers to seniors — at four locations: TRIA Orthopaedic Center in Bloomington, University of Minnesota Medical Center, Sports Medicine Clinic on the edge of the Twin Cities campus, and Fairview Medical Center in Maple Grove. Patients have access to 23 orthopedic surgeons and primary care physicians, with many specializing in a specific injury or chronic condition.

Most people know sports medicine for the evaluation, treatment and rehabilitation of acute athletic injuries, but this program goes a step further to include a more holistic approach. Physicians collaborate with certified trainers, physical therapists and others to help patients manage an active lifestyle in ways that are healthy and safe.