

Active Bones

Orthopaedic Surgery and Sports Medicine
Teaching and Research Foundation Newsletter



otrfund.org

Fall 2018

Dear Readers:

The leaves are turning colors and school is back in session—fall is here as are the associative seasonal sports and activities. As you transition from your summer routine, be sure to take precautions when resuming new activities, whether those activities are a part of your job or fall athletics. Also, make sure to warm up appropriately to help prevent an injury. Despite good preparation, unfortunately injuries occur. We have several knee injury articles in this issue to help you be safe on and off the field this fall. One injury not often discussed is a knee dislocation. This injury can be very serious so we included an article on it as well as one on the most common knee injury—a meniscus tear. We look at its function/purpose, how tears occur and treatment options.

Knee injuries, such as dislocations and meniscal tears, have been associated with different athletic surfaces, as well as shoe surface resistance. The unavoidable questions when it comes to athletic fields concern the safety of new artificial turf (FieldTurf) compared to the safety of grass fields. Take a look at our article comparing new artificial turf fields to natural grass fields within the context of high school, college, and professional sports. You might be surprised to learn modern artificial turf (FieldTurf) fields may be just as safe as grass fields; however, more research needs to be conducted on the topic in order to come to a definitive conclusion.

Another all too common sports knee injury is a torn anterior cruciate ligament (ACL). In this issue, we feature an inspiring story of a young athlete's recovery from ACL reconstruction surgery and how she and her family navigated the healing and rehabilitation process. Her commitment to the physical therapy sessions and dedication to the at-home exercises helped her return to gymnastic competitions, but not before she completed a comprehensive functional capacity evaluation (FCE). This test, developed by my foundation, OTRF, is an important step in completing the rehabilitation treatment because it objectively measures the likelihood of an athlete re-injuring his/her knee.

Steven Chudik, MD
President OTRF
Orthopaedic Surgeon and Sports Medicine Physician



The latest dirt on artificial turf and sports injuries

From high school fields to professional stadiums, synthetic turf is in arenas across the country.



While synthetic turf requires less maintenance than their grassy counterparts, thus making them more economically feasible, there are questions concerning the impact of these fields on sports safety. Do synthetic turf fields have any impact on sports injuries, and if so, are they safer or more dangerous than grass fields? Recently, the American Orthopaedic Society for Sports Medicine (AOSSM) published a paper that reviewed current literature with the goal of finding an answer.

In order to answer this question, AOSSM described two categories for synthetic playing fields: first and second generation turf (developed before or during the 1970s, such as AstroTurf) and third generation turf (developed during the 1990s, such as FieldTurf). The type of playing field has a large impact on the incidence of sports injuries due to their ability to cushion an impact between the athlete and the field. FieldTurf absorbs a large portion of the energy produced by an impact between the athlete

and the field because of the presence of infill, whereas AstroTurf does not contain a large amount of infill and therefore does not provide any surface that decreases the impact of a fall. In addition to the type of turf employed, AOSSM also categorized sports leagues into three categories defined by the level of play—high school sports, college sports and professional sports—where the professional level is the most strenuous and the high school level is the least strenuous.

When examining the effect of synthetic fields and grass fields on knee injuries, there is no definitive answer with respect to which field is safest. One paper that examined the differences between an artificial field and a grass field at the high school level found that grass fields had a higher rate of knee injury than fields with FieldTurf; however, this finding may be due to the high schools' lack of resources for maintaining the quality of their grass fields. Another study that looked at the differences between modern synthetic turf and grass fields at the NFL level found that the prevalence of ACL sprains on FieldTurf was 67 percent higher than the prevalence of ACL sprains on natural grass; however, a study that examined the difference between FieldTurf and natural grass with respect to ACL injuries at the level of collegiate soccer found that FieldTurf had a smaller incidence of ACL injuries than grass fields. Therefore, the data surrounding modern artificial turf and regular grass with respect to knee injuries is inconclusive, and more studies must be performed in order to find a definitive correlation.

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How important is frequency of therapy?

by Kurt Gengenbacher, PT, DPT, OCS, SCS, CSCS

What physical therapists have long suspected regarding the relationship between success in rehabilitation and commitment to attendance has been documented. Those that attend early, defined as within 14 days after receiving the referral, have lower overall healthcare costs. Along with this, attending physical therapy sessions more regularly within a week leads to greater success rates. In short, when your physician recommends physical therapy, you should get started right away and commit to attending regularly.



In 2012, Julie Fritz and colleagues reported on the benefit of early care initiation, specifically related to low back pain. They found that starting physical therapy within 14 days of receiving a referral led to decreased healthcare costs. They examined individuals with low back pain and tracked the amount of time it took for them to start physical therapy. Individuals who initiated therapy within the first two weeks had decreased healthcare costs, as well as a decreased risk of advanced imaging, additional physician visits, surgery, injections and opioid medication prescription.

Additionally, a 2017 research study published in the *American Physical Therapy Association's Orthopaedic Practice Journal* confirmed that more frequent attendance leads to greater success. The researchers analyzed 669 cases and looked at cancellation rates, overall number of visits, average visits per week, overall number of weeks in treatment, amount of co-pay, and therapist experience, among other items. The group defined success at discharge as having met three criteria: "the patient's condition improved to his or her satisfaction, all short-and/or long-term goals were achieved, and discharge was agreeable between patient and clinician." The only thing measured that led to any significant change in likelihood of success was the average number of visits per week. They found that those individuals seen less than 1.67 visits per week on average had a 64.14 percent success rate, where those seen 1.68 times or greater per week realized a 93.06 percent success rate.

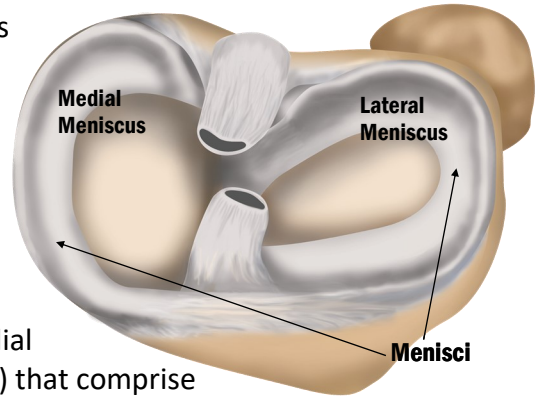
This said, the medical community knows life does not slow down because of an injury. If you have scheduling issues, or are concerned about mounting costs related to co-pays or insurance limitations, discuss this with your physical therapist to see how your visit frequency can be adjusted yet still allow for optimal benefit. One thing that will help is the regular use of a prescribed home exercise program. These exercises parallel what you are doing at your physical therapy visits.

Another factor to consider when assessing the impact and importance of physical therapy is whether you recently had surgery. The surgical procedure is often just the first step in returning to your normal lifestyle. Physical therapy is critical in your recovery process and helping to restore your mobility, strength and flexibility. In order to ensure you are strong enough to perform functional tasks, your physical therapist will use guidelines provided by your surgeon, as well as the surgeon's feedback, to help determine when you need to push forward and when to pull back. Surgery only fixes the injury. It takes your dedication to completing the necessary physical therapy to help ensure the best possible recovery outcome.

Meniscus root tear, a well known injury, suddenly getting a lot of attention

With fall's arrival comes the beginning of sports such as cross-country, football and field hockey. Unfortunately, one knee injury common to all is a meniscal tear. Actually, there has been a lot of research and treatment focused on meniscal root tears.

A meniscus is a C-shaped fibrocartilaginous structure in the knee that sits between the leg bone (tibia) and the thigh bone (femur). There are two in each knee—a medial meniscus (inner side) and a lateral meniscus (outer side) that comprise the knee menisci. Each meniscus has an anterior and a posterior root which serves to anchor it to the tibia. The menisci act to absorb the forces between the femur and the tibia and to distribute these forces over a large surface area. Additionally, the menisci assist in the stabilization of the knee and trap synovial joint fluid which provides nutrition and lubrication for the cartilage surface of the knee. They become less elastic overtime, more susceptible to injury, and may tear. Specifically, the inner meniscus (medial meniscus) is injured the most often, as this portion of the meniscus absorbs the majority of the force applied in the knee. When a meniscal root tears, the meniscus is no longer attached to the tibia and therefore the meniscus loses its function. This can mechanically result in increased forces on the cartilage and rapid degeneration of the cartilage surface, leading to osteoarthritis.



There are two causes of meniscal root tears: an acute injury, or a chronic injury. In an acute injury, the root tears due to a traumatic incident, such as a fall or a blow to the knee. In the chronic setting, the root tears due to a chronic ailment, such as degenerative arthritis. These injuries due to a chronic condition are usually found in older patients, and they do not respond to repair as well as tears that occur due to an acute cause.

Common signs and symptoms of meniscal root tears include pain when standing on the affected leg and/or squatting along with tenderness along the joint of the knee. Additionally, this injury is associated with swelling of the affected knee (usually starting one to two days after the injury has occurred), locking or catching of the knee joint, and buckling of the knee. An MRI is required in order to diagnose a meniscal root tear. For chronic tears, non-operative treatment is recommended.

Crutches may be recommended in order to minimize the force on the injured knee. Additionally, range-of-motion exercises, stretching, and strengthening exercises may be carried out at home, although referral to a physical therapist or athletic trainer may be recommended.

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Gymnast, family dedicate themselves to successful ACL rehabilitation

by James Wolf, PT, DPT

Anterior Cruciate Ligament (ACL) injuries are very common in teenagers and young adults. There are approximately 150,000 ACL reconstruction surgeries performed in the United States each year. These injuries and the recovery have a profound impact on the life of the patient and their family. I had the opportunity to work with a patient and her family during the recovery process which lasted nearly a year. The patient was 11-years-old at the time of her injury. Dr. Chudik performed a growth plate-sparing ACL surgery he developed. Now, four years after her injury and surgery, I recently met with the patient and her mother to talk with them about their experience.



Savannah first came to physical therapy a few weeks after her injury, which was still a month prior to her surgery. Her medical report stated that she was injured doing gymnastics. Savannah more specifically stated that she was doing a front walkover on a hill with her cousins. Her main sport at that time was gymnastics.

The few therapy sessions prior to surgery focused on preparing Savannah and her mother Amy for what to expect in the coming months. Amy is a mother of three, one of whom is now injured. This meant that during first few therapy sessions Savannah's young brothers often came along. Amy was accustomed to watching all three of them after school. While the siblings' presence was not a problem, it was clearly not going to be a solution for therapy three times a week for the next nine months.

Farther out from surgery, Savannah's biggest concern was whether or not she was going to be able to catch up in gymnastics after missing nearly a year of participation. Her friends were all in one group at the same level, and if she couldn't join them, returning to her sport would not be the same. Amy was kept very busy organizing logistics to get Savannah to and from therapy. A neighbor helped Amy by watching Savannah's two brothers during therapy. It took effort from the entire family to make sure Savannah was getting to her therapy regularly.

When asked what she learned from her surgery, Savannah stated, "It might take a long time, but you'll be okay and get back to where you were before." She has done just that—she currently participates in high school gymnastics, and just made her school's badminton team. Savannah says she is not concerned about hurting herself again while playing sports. Amy attributes this lack of fear of re-injury to Savannah's young age at the time of her injury. I personally recall her being highly fearful of different activities as they were introduced in therapy. For the first few weeks any bending of the knee was painful and difficult for her to do.

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Knee dislocation can be a devastating injury

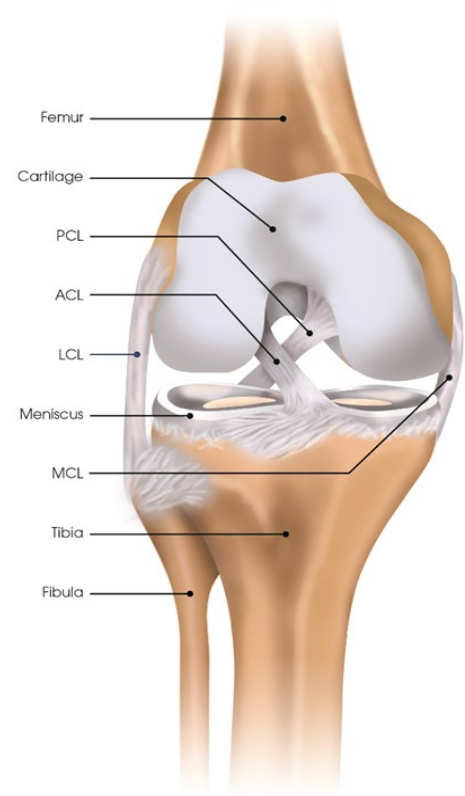
Knee dislocations, while uncommon, are serious injuries with significant consequences when it comes to staying active or even going about every-day life. According to the UCLA Medical Center, there are approximately 1.3 million emergency department visits each year for knee trauma. However, the number of knee dislocations is underreported because it is estimated that as many as 50 percent of the injuries “self-reduce” before an emergency room visit occurs. The most common causes of a knee dislocation are falls, motor vehicle accidents, industrial accidents or sports injuries with football, downhill skiing, etc.

The knee is one of the largest and more complex joints in the human body. The knee joint (tibiofemoral joint) is comprised of the area where the femur (thighbone), the tibia (shinbone), fibula (small bone between the knee and ankle) and the patella (kneecap) come together (see the anatomy picture for a visual representation). The knee is stabilized by four main ligaments that connect the femur to the tibia. Those main ligaments are:

1. Anterior cruciate ligament (ACL)
2. Posterior cruciate ligament (PCL)
3. Medial collateral ligament (MCL)
4. Lateral collateral ligament (LCL)

Knee dislocations occur when a large amount of indirect force is placed on the knee, which results in the tearing of multiple ligaments and the dislocation of the tibia from the femur. These injuries are typically high energy and tear both the ACL and PCL or three of the four main ligaments. Associative cartilage and meniscal injuries also are common. Sometimes, the forces are so large that they also injure (stretch or tear) the nerves and arteries crossing the knee and compromise the function and survival of the lower leg and foot.

Chicago Bears tight end, Zach Miller, suffered a torn popliteal artery when he dislocated his left knee in a game against the New Orleans Saints. Fortunately for Miller, the team’s medical staff quickly diagnosed his injury and Miller underwent emergency surgery at University Medical Center New Orleans. Surgeons repaired the damaged popliteal artery and saved his leg. Had Miller not had immediate care to repair circulation to his leg, the injury would have resulted in the amputation of his lower left leg. Early evaluation of serious knee injuries is important for the identification of nerve or muscular injuries like Zach Miller’s.



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Return to sports is possible after knee dislocation, physical therapy

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Signs and symptoms of a knee dislocation include, but are not limited to:

- Knee pain, usually with injury
- Difficulty or inability to put weight on the knee
- Popping felt or heard during the injury
- Edema or swelling noted after the injury
- Inability to fully straighten knee
- Knee “giving out,” “locking,” or buckling
- Possible numbness, tingling, paralysis, discoloration, and/or a feeling of coldness in the joint or limb



After the knee dislocation is reduced and splinted, a thorough physical exam is required to identify which ligaments are torn. Additionally, several evaluations of the pulses in the lower leg and foot are required. If there are any abnormalities, an arthrogram is needed to evaluate the arterial blood flow to the legs. Surgery is required for significant arterial injuries compromising blood flow. If there are no vascular injuries, the knee is elevated, iced, splinted, and sent for an MRI to confirm and diagnose the full extent of any injury to the ligaments, meniscus, and cartilage of the knee. For knee dislocations with multiple ligament injuries, surgery (within two to three weeks) to repair and reconstruct (make new) all of the injured ligaments of the knee results in the best outcome. Surgery typically involves an open and arthroscopic approach. Arthroscopy is used to address and repair any meniscus or cartilage damage and repair or reconstruct the ACL and PCL within the joint. Open incisions are needed to repair or reconstruct the MCL and PCL injuries.

To allow the ligaments to heal properly following surgery, the knee is typically braced in full extension for four to six weeks. The patient is non-weight-bearing and physical therapy is needed to help maintain surrounding joint motion and function. After six weeks, the brace is discontinued, weight-bearing is progressed and aggressive rehabilitation continues. Eventually, Dr. Chudik performs FCE (functional capacity exam) testing. Upon passing this exam, the patient can return to sports. After surgery, the knee is never the same; however, if the patient has a successful surgery with no more neuromuscular injuries, has high compliant rates with physical therapy, and works hard, Dr. Chudik expects the knee to be stable, and thus predicts that the patient will be able to return to high functioning activities such as sports.

Surgery not appropriate for all meniscus root tears

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For acute injuries, surgery is often recommended to repair the meniscal root and is performed arthroscopically. Non-operative treatment is best for chronic degenerative root tears; however, sometimes surgery is needed to partially remove the torn meniscus in order to relieve pain. Surgical repair requires six weeks of non-weight bearing followed by four to six months of physical therapy, a considerably longer recovery than surgery to remove only torn meniscus fragments which may require six to 12 weeks.

FCE guides safe return after ACL surgery

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When Savannah first started working on walking, stairs and squats, she was eager to get moving, but cautious. The progression to running, jumping and basic tumbling was slow. We continued to practice these activities frequently until Savannah showed good body mechanics and no hesitations.

Savannah said the hardest part about all the rehabilitation after surgery was that she missed a lot of time that she could have been hanging out with her friends. She did acknowledge that it would have been very hard for her to do her training consistently without therapy. She thought it was important for her to go to therapy to have someone make sure she was doing all the exercises needed to recover. Amy agreed therapy was very important for Savannah's full recovery; however, looking back now, Amy is not quite sure how she was able to manage everything with Savannah and the rest of her family. Thankfully, after months of hard work,

Savannah successfully passed Dr. Chudik's ACL Functional Capacity Examination (FCE), a test designed to ensure that patients are ready to return to sports.

Some of the exercises will remain in Savannah's memory forever. She and her mother would do Bosu squats together and she dreaded Russian electrical stimulation used to activate the quadriceps muscle after surgery; however, for Savannah and Amy, this experience is best remembered as a challenging time where their hard work really paid off.

Research Roundup

Middle age not too late to benefit from exercise

It's never too late to start exercising! A new research study from the Texas Health Presbyterian Hospital suggests that middle-aged individuals who are sedentary can start exercising and still reap the rewards of an active lifestyle, such as improving cardiovascular health and staving off the physical consequences of aging. The study consisted of a randomized trial that had 61 participants split across two groups—an experimental exercise group, and a non-active control group. Originally, all participants only had exercised for less than 30 minutes a day, three times a week.

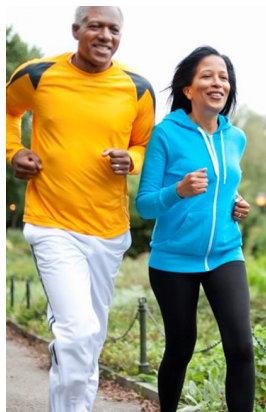
Additionally, participants did not have a history of hypertension, untreated hypo- or hyperthyroidism, obstructive sleep apnea, tobacco use within the past 10 years, heart disease, or chronic obstructive pulmonary disease.



The experimental group underwent an exercise routine that consisted of a work-out session at least 30 minutes long performed four to five days every week. After two years, researchers compiled data concerning training frequency, duration and intensity for the experimental group and found the exercise group, compared to the control group, had significantly improved their maximal oxygen uptake and general cardiovascular health (including a decrease in heart stiffness, and an increase in the heart's carrying capacity). These results suggest that an exercise regimen performed regularly over a long period of time can improve the health of middle-aged adults.

Both partners benefit even if only one is actively trying to lose weight

When one spouse actively tries to lose weight, the other spouse may find that they lose weight too—even if they do not actively try to lose weight. The University of Connecticut in Storrs recently published a paper suggesting that individuals who have partners that undergo weight loss programs will also lose some weight, but not nearly as much as the partner who is in the program. This effect can be attributed to a phenomenon coined as the “ripple effect.” This effect explains how the changes in one partner's life style can influence the other partner's lifestyle.



The study consisted of 128 couples where 63 were in a Weight Watchers program and 65 were in a self-guided program. Researchers obtained results after one partner in each couple participated in their given program for six months, and the data suggests the presence of the ripple effect because partners who did not participate in the exercise activities reported a constant amount of weight loss across both groups. Therefore, this data underscores that the ripple effect occurs in both structured (i.e. the Weight Watchers program) and unstructured (i.e. the self-guided program) programs. If you have a significant other in your life, or even a group of friends, try exercising together. You just may find that changes in your lifestyle will positively impact your friends' lifestyle, or perhaps changes in your friends' lifestyle will positively impact yours.

Synthetic turf vs. grass

Continued from page 2

Similar to knee injuries, the data on artificial and grass fields with respect to ankle injuries does not point to one conclusion. Several studies suggest that ankle injuries occur more often on third generation synthetic fields when compared to grass fields, and researchers have postulated that this is due to the high traction between the players' shoes and the field. High traction prevents the planted foot from slipping and/or moving, and therefore a sudden twist of the body may promote an ankle sprain. When it comes to other ankle-related injuries such as tibiofibular joint derangements, other studies have found that FieldTurf is safer than regular grass. Furthermore, some data underscores that there is no difference with the rate of ankle injuries on either field. Therefore, more research needs to be conducted on this subject as there is not definitive proof that states how third generation synthetic fields compare to regular grass fields within the scope of ankle injuries



When examining the impact of synthetic fields on concussions, one study suggests that second generation and early third generation synthetic fields are not as safe as grass fields due to their inability to absorb the energy of impact when a head hits the field. Additionally, when comparing new FieldTurf to a grass field when studying collegiate men's and women's soccer, two studies revealed that there was no significant difference between the two fields with respect to concussions. Another study analyzing high school football injuries depicted higher concussion incidence rates on regular grass fields than on FieldTurf fields. This collection of data suggests that when it comes to concussions, third generation synthetic fields such as FieldTurf are safer than first and second generation fields due to an increased ability to absorb energy; however, there is not enough data to say whether or not third generation synthetic fields are safer than regular grass fields.

Synthetic fields have a host of benefits: they are easier to maintain than grass fields, more resistant to fluctuations in temperature and weather, and are more cost-efficient. When it comes to the safety of athletes on the field, there is enough evidence to state that third and fourth generation synthetic fields are safer than first and second generation artificial fields due to increased cushioning as well as several other aspects that are geared toward protecting the athlete. When it comes to comparing the safety between these third and fourth generation synthetic fields and grass fields, more research must be conducted in order to definitively say whether or not one field is safer than the other. Until we have that research, it is important to practice activities that will help to prevent sports injuries from occurring, such as conducting proper warm-ups and cool-downs and wearing protective equipment on the field.

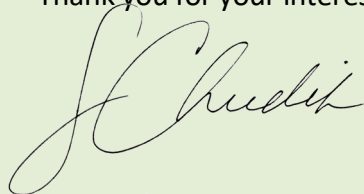
Orthopaedic Surgery and Sports Medicine Teaching and Research Foundation helps people stay fit and healthy

Steven Chudik, orthopaedic surgeon and sports medicine physician with the Steven Chudik Shoulder, Knee & Sports Medicine Injury Clinic, founded the Orthopaedic Surgery and Sports Medicine Teaching and Research Foundation (OTRF) in 2007. OTRF is a nonprofit, 501 (c)(3) organization dedicated to funding research and education for the purpose of keeping people active and healthy.

Dr. Chudik saw a growing demand by patients, athletic trainers and clinicians for up-to-date medical information and unbiased research on injury prevention—especially for children—as well as facts on arthritis and wear and tear on joints, cartilage, tendons, ligaments, etc. To fulfill these requests, OTRF produces and distributes this newsletter, shares information about health performance-related issues like nutrition and fitness, hosts athletic training educational programs, conducts seminars for healthcare providers and the community. Most important, OTRF funds unbiased research and development particularly in emerging areas such as arthroscopic and minimally invasive surgery for injuries to the meniscus, labrum, rotator cuff, ACL and cartilage.

However, none of this is possible without ongoing financial support. We are extremely grateful to all those who have contributed in the past. Many of the donations came from patients or their family members who benefited from Dr. Chudik's orthopaedic and sports medicine expertise you might be interested in helping us continue our educational programs and research, please visit our website, otrfund.org and click on the donation link. Or, if you prefer, email me at contactus@chudikmd.com/. Also, many companies sponsor programs that match their employees' charitable contributions. Some even match donations made by retirees and/or spouses. Matching gift programs are a great way to double your generosity. Regardless of the amount, every contribution helps make a difference.

Thank you for your interest in our newsletter, *Active Bones*, and the ongoing work of OTRF.



Steven C. Chudik, MD
OTRF Founder and President
Orthopaedic Surgeon and Sports Medicine Physician



Orthopaedic Surgery & Sports Medicine Teaching & Research Foundation

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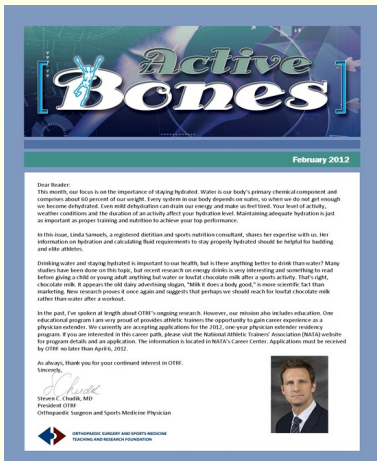
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