

Active Bones

Orthopaedic Surgery and Sports Medicine
Teaching and Research Foundation Newsletter



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Fall/Winter 2020

Dear Readers:

I hope this finds you and your family well and learning like the rest of us how to live and work in our “new norm” world. Never in all my years of practice could I ever imagined we would be faced with anything like the COVID-19 pandemic. Although it is important we learn how to cope and live safely in this environment, life goes on albeit changed.

In this issue of **Active Bones**, we look at a several things that have changed—some recently, some over time. One big change as a result of COVID-19 is the use of telemedicine or telehealth in the physicians’ offices. Our article on telemedicine looks at the history of the practice and how it has evolved into what may be another tool doctors have to treat patients even after COVID-19 passes.

Computer-aided surgery is another growing trend particularly for joint replacement. Robotics and computers make knee replacement surgery very customized and help surgeons precisely position the implants to replicate the original anatomy. It also lets the surgeon “pre-fit” and measure angles that improves outcomes. I think you’ll find this an interesting look at how computers are improving our lives in yet one more way.

Although COVID is limiting the return to sports for many athletes, practice to keep skills sharp and even improve during this downtime continues. Regardless if it is just practice, or practice and a sport, research has proved there is an association between sport specialization and injuries, so we look at the research more closely in our article, *Practice makes perfect—or does it?*

Are you a connoisseur of a new sparkling water beverage? We decided to see what all the fizz is about and if they really are good for you, or just marketing hype? And in Research Roundup, you’ll find information about whether 10,000 steps are an accurate goal and what do you need to know about getting enough Vitamin D to maintain your bones and ward off infections now that fall is here.

Thank you for reading **Active Bones**.

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

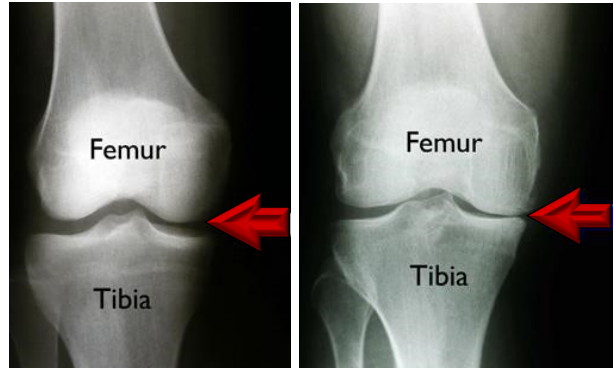


Robotic technology improves accuracy in joint replacement surgery

by Taylor Patton, ATC

Chances are you know people who have had knee arthroplasty (replacement) surgery, or perhaps you're considering the surgery. While joint replacement surgery is performed regularly before 1974 there was no procedure for patients with debilitating knee arthritis except ice, pain medication and rest. However, technology and innovation have changed making knee replacement surgery one of the most performed procedures in the world and the only cure for advanced knee arthritis.

Total knee arthroplasty (TKA) is indicated generally recommended for people with symptomatic knee arthritis who failed conservative treatment. Knee arthritis is the painful and limiting condition that results from the structural loss of cartilage, the thin protective layer of firm but compressible tissue along the surface of the articulating (contacting) ends of our bones. TKA replaces the worn joint surface with a new artificial surface composed of metal and high molecular-weight polyethylene plastic.



X-ray of knee with normal joint space and healthy cartilage.

X-ray of knee shows loss of joint space from compressed or missing cartilage causing arthritis.



A prototype of the first orthopaedic robot, ROBODOC, on display at the Smithsonian's National Museum of American History.

Aside from relieving severe knee pain, knee replacement surgery helps patients return to a functional ambulatory status which has an overall positive impact on the patient's general health and their quality of life. Studies on long-term survivorship for knee arthroplasty can be close to a 100 percent at 10 years and remains just greater than 80 percent at 25 years. Despite this promising data, not all patients obtain a satisfactory outcome. New technology, materials and designs continue to push forward for better results and outcomes.

One innovation—the robotic-arm assisted surgical procedure—is becoming increasingly more common especially in orthopaedics. In fact, according to the Smithsonian's National Museum of American History, robotics have been used in orthopaedic surgery in the United States since 1992 with the introduction of ROBODOC a surgical robot developed for planning and performing total hip replacements. Since then, the use of robotic technology has expanded and today includes spine, total joint arthroplasty, trauma, shoulder, and foot and ankle orthopedic subspecialties.

There are many advantages to using robotic technology and computer navigation for orthopaedic surgery including helping the surgeon precisely position the implants to replicate the original anatomy location as close as possible, balance and adjust

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Robotic surgery

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the knee ligament tension to allow for normal kinematics (motion), minimize surgical trauma, provide better access to difficult anatomic areas, decrease X-ray use, and potentially reduce complications.

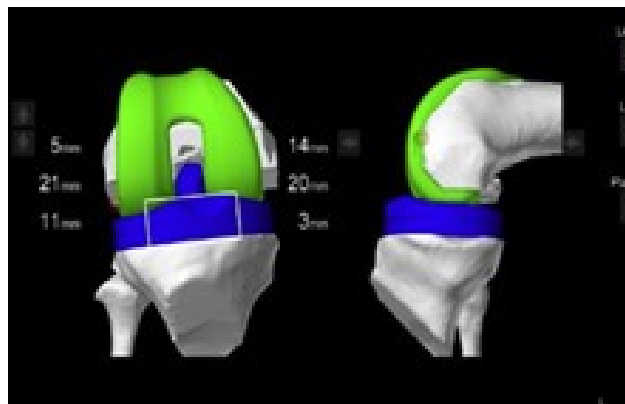
Dr. Steven Chudik, orthopaedic surgeon, sports medicine specialist and founder of Orthopaedic Surgery and Sports Medicine Teaching and Research Foundation (OTRF), uses the latest, state-of-the-art computer navigation technology with robot-arm assistance to perform joint replacement surgery. The computer navigation allows Dr. Chudik to plan and virtually perform the surgery on the computer even before making an incision. Prior to scheduling surgery, patients have a special computerized tomographic (CT) scan of the knee. The highly accurate, anatomic CT scan data is loaded into a computer and processed

with special software to create a preliminary surgical plan. The computer plan is so detailed Dr. Chudik can position implant images on the plan to pre-determine the optimal size, position and alignment of prosthetic implants. According to Dr. Chudik, the closer I can position the implant to my patient's native joint location, the better the recovery and outcome will be.

Once the virtual procedure on the computer is complete, Dr. Chudik makes a small incision and exposure in the patient's knee—considerably smaller than he would if performing conventional open or minimally-invasive, non-assisted surgery. Inside the incision, he places markers and arrays (special wireless navigation instruments) that tell the computer and robot the exact position and coordinates of the knee. The computer-navigated robotic system is so precise and responsive, it can track and move with the leg in real time.

After exposing the knee and placing the navigation instruments, Dr. Chudik moves the actual knee through a wide range of motion and stresses the ligaments. The computer-navigated robotic system tracks these movements and allows Dr. Chudik to virtually adjust the implant positions on the computer to correctly balance the knee ligaments and allow proper movement of the knee. After determining the optimal position and alignment of the implants and the knee, Dr. Chudik drives the computer-navigated robotic arm and its cutting instrument to precisely prepare the worn arthritic surfaces of the knee—just as it was virtually performed on the computer. The computer-navigated robotic arm is controlled by Dr. Chudik, but it possesses safe boundaries and controls allowing him to make the perfect cut every time.

After preparing the joint surface, Dr. Chudik temporarily places trial prosthetic implants in place and moves the knee while feeling the leg and watching it on the computer screen to ensure that proper



Prior to beginning the knee replacement surgery, Dr. Steven Chudik places markers and arrays (special wireless navigation instruments) that tell the computer and robot the exact position and coordinates of the knee and projects 3-D images on a screen to guide Dr. Chudik during surgery.

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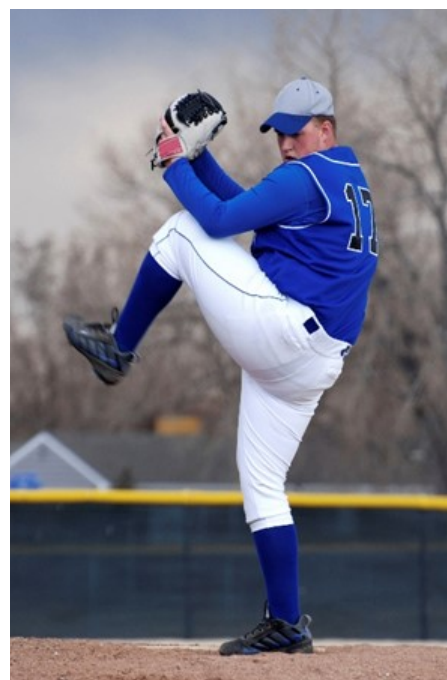
Practice makes perfect—or does it?

by Steven Chudik, MD

For generations, parents, coaches, teachers, bosses and countless others have repeated those words of wisdom—*practice makes perfect*—in hopes of inspiring the recipient to keep working on whatever the task was that prompted the comment.

As an orthopaedic surgeon and sports medicine specialist, I know firsthand that adhering to that mindset ended many athletic careers and participation. Why? Overuse.

An estimated 60 million children age six to 18 in the United States participate in sports as a form of exercise, socialization and entertainment. Unfortunately, we're seeing a troubling movement toward sport specialization at earlier and earlier ages resulting in more instances of overuse injuries. Research supports what I'm seeing in my clinic.



A study out of the University of Wisconsin reported in the *Orthopaedic Journal of Sports Medicine* looked at the affect of sports on approximately 1,000 female and male youth club sport athletes. Researcher asked about their attitudes and beliefs toward sport specialization and sport participation. Despite the well-documented connection between overuse and specialization with the risk for injuries, only 45.8 percent believed specialization increased their chances of getting injured either “quite a bit” or “a great deal.” Conversely, 91 percent of the athletes believed sport specialization improved their chances of improving at their sport either “quite a bit” or “a great deal.” Furthermore, most of the athletes believed specialization increased their chances of making their high school team (80 percent) or a college team (66.9 percent) “quite a bit” or “a great deal,” and 15.7 percent felt they were either “very” or “extremely” likely to receive a college scholarship based on their athletic level of sports performance. Highly specialized athletes in the study were two times more confident about receiving a college scholarship based on performance when compared to less specialized athletes.

Based on their findings, the researchers concluded that the disagreement between athletes’ beliefs and previous research on the injuries caused by overuse and specialization indicates the need for improved communications and education regarding the risks and benefits.

An earlier study referenced by the researchers and reported in *The American Journal of Sports Medicine*, surveyed more than 2,000 male and female athletes between the ages of 12 to 18 about how many times a week and year they participated in a sport(s) and what injuries they sustained. The researchers classified the specialization as low, moderate or high sport participation and grouped as either meeting

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Overuse injury research

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or exceeding current volume recommendations which is “children participating in organized sports should not play one sport more than eight months per year and not more hours per week than their age,” i.e., a nine year old should not participate more than nine hours a week of the same sport. Researchers noted the recommendation of eight months of participation per year is the most well-known benchmark, but is data based on previous baseball injuries research and resulting arm injuries. Therefore, they made no definitive recommendation on whether the same duration would be appropriate for other sports, ages and even for the prevention of lower body injuries.

Given that, the researchers limited their scope of investigation to determining the association between sport specialization and injury history in young athletes. What they learned is highly specialized athletes were more likely to report a previous injury of any kind or an overuse injury in the previous year

compared with athletes in the low specialization group. These findings independent of age, sex and weekly organized sport volume and those who exceeded recommendations are significant and need to be heeded by athletes, parents and coaches.

Even with all the cumulative research and findings concluding sport specialization causes overuse injuries, an additional study was done and presented at the 2019 annual meeting of the American Orthopaedic Society of Sports Medicine and published in *The Orthopaedic Journal of Sports Medicine*. The study followed 602 high school students with the intent of tracking their sports specialization throughout their high school playing years.

Just two years into the research, 255 of the 602 athletes (42.4 percent) reported they were specializing in a sport. The highest participation rates were in soccer at 26.9 percent; 20.6 percent in baseball; 18.3 percent in softball and 15.6 percent in swimming. Of the 255 specializing athletes, 95 (37.3 percent) reported spending more than 10 hours a week in sports-related activities compared to 105 (30.3 percent) athletes that didn’t specialize. Slightly more than half (56.5 percent) of those in the specialized group were injured playing their primary sport in the past compared to 43.5 percent of non-specialized athletes.

When the researchers looked further into the differences between the specialized versus non-specialized athletes, they found that 78 percent of the specialized athletes were injured before the study period that prevented them from participating in sports for part or the whole season. Conversely, 40 percent of the non-specialized athletes suffered an injury prior to the start of the season that prevented them from participating.

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Telemedicine makes physician visits easy, convenient, comfortable

by Sarah Menzuber, ATC



Created by Hanna-Barbera Productions, The Jetsons was an animated cartoon about a family living sometime in the future with elaborate robotic technology. In an episode that aired between 1962-1963, Jane Jetson arranges a doctor's appointment for her son, Elroy. The appointment was virtual and a precursor of today's telemedicine capabilities

What was once only an idea depicted in science fiction or cartoon shows about what future communication would be, has become reality. Using a smart phone, watch or even a tablet to communicate were inconceivable. To think Jane Jetson didn't take her son Elroy to the doctor when he was sick, but instead scheduled a telemedicine visit which in 1962 was really a "far out" concept.

Telemedicine, as depicted by Hanna-Barbera, is now in practice but according to historians, telemedicine, or the remote diagnosis and treatment for patients by means of telecommunication actually has been used as early as 1615 when messengers rode from village to village to relate medical advice and/or deliver potions and medicine. As technology improved so did the forms of communication including smoke signals, drums, horns, telegraph, telephone and eventually to today's computers.

Prior to the outbreak of the COVID-19 pandemic and quarantine, telemedicine primarily was used to provide healthcare support and technology to rural or less populated parts of the country. For example, a cardiologist can "examine" a patient admitted to the hospital hundreds of miles away to diagnose and begin treatment for a stroke or heart attack and monitor the patient's progress.

However, the pandemic forced healthcare providers to find ways to see and treat patients safely without them having to leave home. Telemedicine for everyone soon became the "new normal." While many were reluctant at first, the option quickly caught on because of many benefits including:

- Convenient and requires no travel time or expenses
- Discuss acute injuries and decide if X-ray, further imaging or an in-office visit is needed
- Discuss possible treatment for chronic injuries and required care management
- Ideal for a quick "check-in" with patient
- Time to thoroughly answer any questions or concerns
- Avoids expensive clinics, urgent care offices and ER visits
- Easily review imaging such as X-ray, MRI, or CT with the screen sharing abilities
- Less waiting time as patient visits are more efficient.



Dr. Steven Chudik reviews the findings of a knee MRI with a patient via a telemedicine visit.

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Telemedicine

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How does it work?

If your physician incorporated a telemedicine appointment option into his/her practice as Dr. Steven Chudik with the Shoulder, Knee & Sports Medicine Injury Clinic did, you will be provided instructions ahead of your appointment and it will include an email or meeting link. You will need a tablet, phone, or computer with a microphone and camera, and internet access that can open the appointment link and “to arrive you” at your scheduled time.

Once you open the provided link and enter information such as your name, you have “arrived” and most likely will be moved to “a virtual waiting room” until the doctor connects and begins your visit. Dr. Chudik uses a telemedicine platform that is encrypted and HIPPA-compliant to ensure your privacy. Also, while you wait for your visit to begin, check to make sure your camera and microphone options are on so you and your doctor can see and talk to each other.



To get the most out of your telemedicine visit check these items ahead of time:

- Make sure you have a strong WIFI or ethernet connection
- Close any unused programs that might be open on your computer or device
- Restart computer prior to your visit
- Check for any updates on your browser. Google Chrome, Firefox or Safari are generally compatible with web-based meeting software.
- Make sure to sit in a quiet area with good lighting that preferably illuminates you from the front so you face is visible. Do not sit with a window or light behind you.
- Test your camera and microphone ahead of time and make sure you have enabled or turned them on in your settings options.
- Position the computer, or test where to place your tablet so your injury, body part or concern is easily visible. This may require you to wear clothing that allows the injury or condition to be viewed without having to undress.

If you’ve put off getting evaluated and diagnosed for a knee, shoulder, sports injury, or even a second opinion on a previously diagnosed issue because of COVID-19 concerns, time, travel or any other reason, call Dr. Chudik’s office today at 630-324-0402 or email contactus@chudikmd.com to set up a telemedicine appointment you can have from the comfort and convenience of your home.

Note: Because insurance coverage varies, please check with your carrier before scheduling a telemedicine appointment to determine if your visit will be covered.

Robotic surgery

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Dr. Steven Chudik controls the computer-assisted robot (indicated by the red arrow) to prepare the knee surface and accept the replacement components.

position, balance, stability and motion have been achieved. After the “dry run,” Dr. Chudik inserts the real implants and the surgery is completed with most patients able to be discharged home to begin physical therapy as an outpatient. Early research shows advantages for using computer navigation during knee replacement surgery. In one study, researchers reported computer navigation reduced the overall rate of revision and the rate of revision needed for prosthetic loosening following total knee replacement surgery in patients less than sixty-five years of age. Another study found that computer navigation resulted in better outcomes with regards to post-operative prosthetic implant alignment than conventional unassisted knee replacement surgery. A third

study demonstrated that computer navigation led to an improvement in the accuracy of implant positioning during unicompartamental (partial knee) replacement. However, at this time, none of the studies proved whether these advantages led to differences in long-term functional outcomes and joint survivorship because the surgery techniques and materials haven’t reached long-term designation.

Computer navigated robotic assisted knee replacement is still being studied along with other innovative technologies and is just one of the many ways that Dr. Chudik remains at the forefront of medicine and provides the most advanced care for his patients

Overuse injury research

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Because the research did not run the full four years as planned, the researchers noted the relationship between high school specialization and a higher number of injuries warranted further investigation into the potential health effects of early sports specialization.

Research has discovered association between sport specialization and injuries. I believe it has more to do with the association of sport specialization with overuse that leads to injury, especially in our developing (growing) athletes. Regardless of whether your child plays one sport or multiple sports, we need to protect our developing children from overuse that increases their risk for injury and the development of degenerative joints.



What's all the fizz about?

Sparkling, carbonated, seltzer, club soda, mineral water, tonic and soda water; just a few of the names in the latest water craze. According to the Beverage Marketing Corporation, about ten years ago the bubbly drinks and bottled water segments comprised only a three percent market share with soft drinks making up the balance. Today, bottled water and carbonated water consumption have surpassed soft drinks.

This significant shift is attributed to consumers perceiving bubbly beverages to be better for them

and a healthier alternative than a carbonated soft drink—regular or diet—and a demand for product variety.

But, are these new options really a better alternative to water and are they all the same? In short, no. To understand why, you need to know about the content of each, as well as any adverse or negative concerns in consuming the beverage in place of water.

Sparkling water: Also known as carbonated water, is made by infusing carbon dioxide into water under pressure which creates the effervescence. This produces carbonic acid with an acidic pH of three to four (seven is neutral). For comparison, A&W Root Beer (4.75 pH), Diet Coke (3.65 pH), Diet Mountain Dew (3.36 pH), Sprite (3.29 pH), Pepsi (2.53 pH), Coca-Cola (2.52 pH) and RC Cola (2.38 pH).

The American Dental Association warns that highly acidic beverages can harm teeth because dentin dissolves below a pH of 6.5 and tooth enamel dissolves below a pH of 5.5. Dentin is the layer beneath the tooth enamel. surface.

The effect of soft drink consumption on bone health—bone mineral density (BMD) and bone mineral content (BMC)—has been a highly studied and debated topic for many years. It was believed carbonated beverages because they contain phosphoric acid affected bone mineral density making people prone to fractures. In the Framingham Osteoporosis Study, researchers reported in the *American Journal of Clinical Nutrition* that women who drank specifically cola soft drinks had a significantly lower BMD at each hip. but not their spine. Men showed no difference. Similar results were seen with diet cola intake and, although weaker, for decaffeinated cola. No affect was noted with noncola beverage consumption. Researchers also reported that total phosphorus intake was not significantly higher in daily cola consumers than in nonconsumers, but the calcium-to-phosphorus ratios were lower.

However, other research on the affect of carbonated beverages and bone health reported no negative evidence. Nearly all the research done to date made mention on the importance of maintaining appropriate calcium and phosphorus intake for good bone health because one without the other can affect bone growth and strength. They also noted the most common form of calcium consumption by study participants under age 50 came from milk, and from supplements in those older than age 50. In several studies, researchers noted that they and physicians are concerned about growing children and women substituting soft drinks, or the new carbonated waters for milk.

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What's fizzing?

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Other claims attributed to sparkling water include weight loss, irritable bowel syndrome (IBS) and weight gain. Research again found none of these to be true. Carbon dioxide is not an appetite suppressant and will not stay in your stomach any longer than plain water. IBS is not caused by carbonation, but carbonation can contribute to bloating and gas and it won't cause weight gain. However, not all waters are created equal so it is important to read the nutrition label carefully to see what sweeteners, flavor enhancers or other additives are in the water that can contain hidden calories and extra sodium.



Seltzer water: Is the same as sparkling or carbonated water, however the flavorings actually can lower the acidic level so it is on par with orange juice at 3.7 pH. Seltzer water is the water in LaCroix.

Club soda: Is water that has been carbonated, but unlike seltzer, it has the addition of sodium salts and/or potassium salts in the water. These can include table salt and sodium bicarbonate (baking soda) and give it a slightly saltier taste than seltzer. The pH level for carbonated club soda is 3.69.

Sparkling mineral water: Made with natural spring or well water, it has naturally occurring minerals (like salts and sulphur compounds) which sometimes give the water a natural carbonation; other times, carbon dioxide is added. The taste is dependent upon where the water is drawn and the amount and type of naturally occurring minerals. Popular brands such as San Pellegrino and Perrier have a pH of 5.6

Tonic water: Considered a carbonated soft drink, tonic water has carbonic acid in it as well as dissolved quinine and often high fructose corn syrup. Originally used as a prophylactic against malaria, tonic water today typically has a significantly lower quinine content and is consumed for its bitter flavor. The pH of tonic water is 3.

Soda water: This is an ambiguous term used since carbonated water became popular in the late 1800s. It is what the first commercially available artificially carbonated water was called. Today, the term *soda water* is frequently used interchangeably with *seltzer and/or club soda*. If salt or other additives are a concern, it is best to make sure you know what to order or read the label before you purchase.

So, next time you reach for a refreshing healthy beverage, remember not all waters are equal and read the labels before you drink.

Research Roundup

Do you really need 10,000 steps a day?

Since the introduction of the Fitbit® in 2014, people have been counting steps with a daily goal of at least 10,000. But, is that realistic, sustainable or based on research? Also, are more steps better?

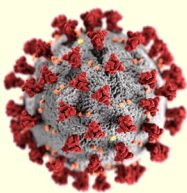


In a prospective cohort study reported in *JAMA Internal Medicine*, researchers studied 18,289 U.S. participants with a mean age of 72 from the Women's Health Study who wore an accelerometer during waking hours for seven days. Data was successfully downloaded from 17,466 devices of which 16,741 were found to be worn as instructed, at least seven waking hours per day and more than four days. From this researchers not only measured steps per day, but also stepping intensity (i.e., peak one-minute cadence; peak 30-minute cadence, maximum five-minute cadence, time spent at a stepping rate of more than 40 steps per minute and purposeful steps.)

Their conclusions were that for older women as few as 4,400 steps per day made a significant difference in lowering mortality rates. They also noted that walking more steps progressively decreased mortality rates leveling off at approximately 7,500 steps per day—not the 10,000 generally associated with walking benchmarks. Also, they found stepping intensity was not clearly related to lowering mortality rates after accounting for total steps per day.

Ongoing Vitamin D research studying effectiveness against viruses

With the arrival of fall and winter, daylight hours are fewer which can affect the amount of Vitamin D you naturally get from sunlight. Fortunately, it is readily available in foods such as dairy, fatty fish, egg yolks and fortified juices and breakfast cereals. Yet, research shows many people don't get the recommended dietary allowance (RDA) of 600 IU for those age one to 70, and 800 IU for adults older than 70 which is the reason physicians regularly check levels and prescribe multivitamins and calcium supplements.



Vitamin D is a fat-soluble vitamin that helps calcium absorption and bone mineralization, both necessary for building strong bones, as well as cell growth, immune function and fighting inflammation. It also is the reason researchers are studying the relationship between Vitamin D and virus suppression, including COVID-19. But before you rush out and stock up on Vitamin D, researchers and physicians warn there has not been sufficient

evidence to support this claim or correlation. More important, Vitamin D can be toxic in amounts greater than the recommended RDA. Therefore, before adding a vitamin or supplement to your diet, check with your physician to determine if a supplement is right for you, and if so, take only what is recommended.



Orthopaedic Surgery & Sports Medicine Teaching & Research Foundation

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Sports Medicine Injury Clinic

Monday
Evenings

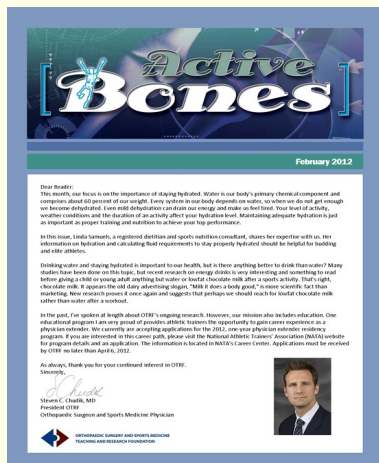
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