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January 25 / volume 17 / number 1

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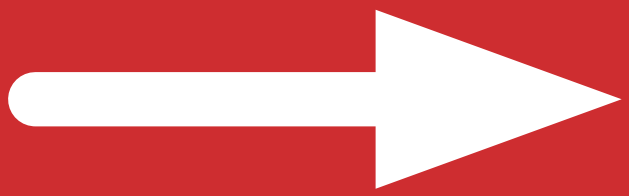

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LOWER EXTREMITY REVIEW

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VOLUME 17 NUMBER 1 LERMAGAZINE.COM

January 2025

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By Joanna M. Blodgett, Matthew N. Ahmadi, Andrew J. Atkin, et al for the ProPASS Collaboration

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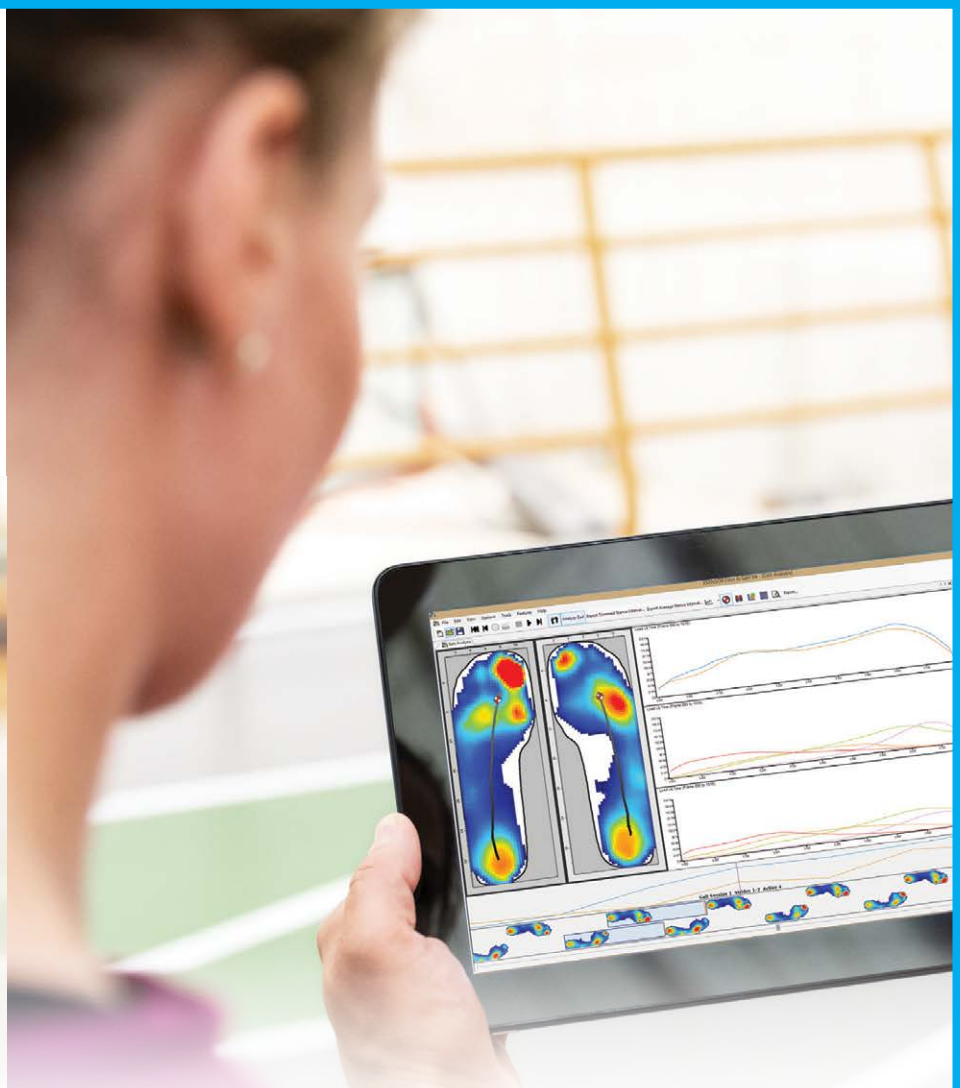

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Lower Extremity Review

Lower Extremity Review informs healthcare practitioners on current developments in the diagnosis, treatment, and prevention of lower extremity injuries. LER encourages a collaborative multidisciplinary clinical approach with an emphasis on functional outcomes and evidence-based medicine. LER is published monthly, except for a combined November/December issue and an additional special issue in December, by Lower Extremity Review, LLC.

Subscriptions may be obtained for $38 domestic and $72 international by writing to: LER, PO Box 390418, Minneapolis, MN, 55439-0418. POSTMASTER: Please send address changes to LER, PO Box 390418, Minneapolis, MN, 55439-0418.

LOWER EXTREMITY REVIEW
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Lower Extremity Review Mission

Showcasing evidence and expertise across multiple medical disciplines to build, preserve, and restore function of the lower extremity from pediatrics to geriatrics.

EDITORIAL PILLARS

- Biomechanics matter
- Movement is essential
- Injury prevention is possible
- Diabetic foot ulcers can be prevented
- Collaborative care leads to better outcomes

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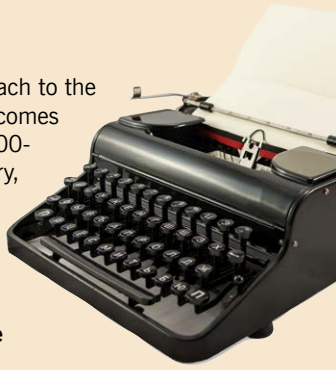

LER encourages a collaborative multidisciplinary clinical approach to the care of the lower extremity with an emphasis on functional outcomes using evidence-based medicine. We welcome manuscripts (1000-2000 words) that cross the clinical spectrum, including podiatry, orthopedics and sports medicine, physical medicine and rehabilitation, biomechanics, obesity, wound management, physical and occupational therapy, athletic training, orthotics and prosthetics, and pedorthics.

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Please attach manuscript as an MS Word file or plain text. Tables may be included in the main document, but figures should be submitted as separate jpg attachments. Send to: **janice@lermagazine.com**

Publisher's **Memo**

2025 Is ALREADY Off to a Great Start!

By Rich Dubin, Publisher

New Faces! New Partners! New Educational Opportunities for Professional Growth!

Welcome to 2025! It promises to be BIG with new faces, new collaborations, and new educational experiences to drive your professional growth.

First off, I am pleased to announce the appointment of Bradley P. Abicht, DPM, FACFAS, as the new Medical Director of lerEXPO. With extensive experience in podiatric foot and ankle surgery, Brad brings a wealth of expertise and a patient-centered approach to this arm of the Lower Extremity Review organization.

Brad has an impressive track record of advancing clinical programs, implementing patient care solutions and leading clinical education teams. In this new role, he will oversee lerEXPO events to ensure the highest quality of educational content and innovation.

Brad's commitment to clinical excellence, combined with his vision for the future of healthcare, aligns perfectly with LER's mission to provide innovative, engaging educational opportunities that will feed your professional growth. And while 2024 was a success, our dance card for 2025 is filling up rapidly with new programs drawing international expertise on a host of topics related to the care of the lower extremity.

Second, we are thrilled to announce a host of new collaborations for virtual events that bring together associations, manufactures, and clinicians. Indeed, our first event of the year was held with the American Podiatric Medical Association (APMA). This virtual seminar (7 CECH credits) on surgical complications covered topics ranging from rearfoot and forefoot issues to trauma and diabetic food complications. It was all recorded and you can catch it at APMA.surgical.lerexpo.com.

And registration for the 2025 No-Nonsense Seminar has already begun at Nononsense2025.lerEXPO.com. This world-class educational event will be held March 7-9 and offers up to 25 CECH credits. This event will discuss different surgical techniques of the foot and ankle, explain the biomechanics of the lower extremity, provide insights into limb salvage and endocrinology care, and identify wound care options with proven success.

Third, you're also invited to join another new collaboration – Gaitkeepers Journal Club – an online academic adventure between Pod Patrol and lerEXPO. This promises to be a monthly discussion full of insights from the authors of recently published studies led by LER's new medical director and Jeff Dikis, DPM, of the Pod Patrol Podcast. Gaitkeepers will meet on the last Thursday of each month at 8 pm EST. Register here: Gaitkeepers.lerEXPO.com.

Last, but not least, look for me at a host of face-to-face association meetings throughout the year. At the New York Podiatric Clinical Conference I was able to meet with APMA CEO Meghan McClelland and at SAM (Florida Podiatric Medical Association Annual Meeting) I met with APMA President-Elect Brooke Bisbee, DPM -- great conversations about the future of podiatry and ways to unify and elevate the profession. And now I'm looking forward to the American Academy of Orthotists & prosthetists in Atlanta in February, and on to the American College of Foot and Ankle Surgeons Annual Scientific Conference in Phoenix in late March.

Richard Dubin *has started 4 successful magazines for the medical, consumer health, and technology marketplaces. He was the previous publisher of BioMechanics and has been involved in every aspect of the medical publishing industry for 30 years. He started with Current Podiatry in 1991, moved to Podiatry Today in 1992 and created BioMechanics in 1994 to deliver a multi-disciplinary audience. In 2009, he created the start-up publication Lower Extremity Review. In 2020, he launched lerEXPO.com, an online educational resource, a pet project that had been in the works for years before the pandemic struck.*

Bradley P. Abicht, DPM, FACFAS*, is the Department Chair of Podiatric Medicine and Surgery at Gundersen Health System in LaCrosse, Wisconsin. He is a leader in minimally invasive (MIS) and percutaneous foot and ankle surgical procedures as well as foot and ankle reconstructive surgery, foot and ankle arthroscopy, and foot and ankle sports injuries. An educator to residents and medical students, he is frequently published in peer reviewed journals. A renown national and international speaker and founder of the annual Western WI Foot & Ankle.*

Jeffrey Dikis, DPM*, is a partner with McFarland Clinic, Iowa's largest physician-owned multi-specialty clinic. After residency at the University of Pittsburgh Medical Center, he worked at an orthopedic group in Tennessee before moving home to Iowa. He is certified in foot surgery and reconstructive foot and ankle surgery by the American Board of Foot and Ankle Surgery. He serves as clinical faculty with the Des Moines University College of Podiatric Medicine and Surgery. Dr. Dikis has extensive training in Arthroscopy, Trauma, Sports Medicine and Reconstructive Surgery, and has taught and lectured at national educational conferences and courses. He is the host and creator of the popular Pod Patrol podcast, an entertainment and educational podcast, covering topics of the foot and ankle with both podiatric and orthopedic colleagues. He is one-half of the instagram tandem FootDocDuo, producing educational content.*

Increasing Stride Angle as Injury Prevention?

By Bob Prichard

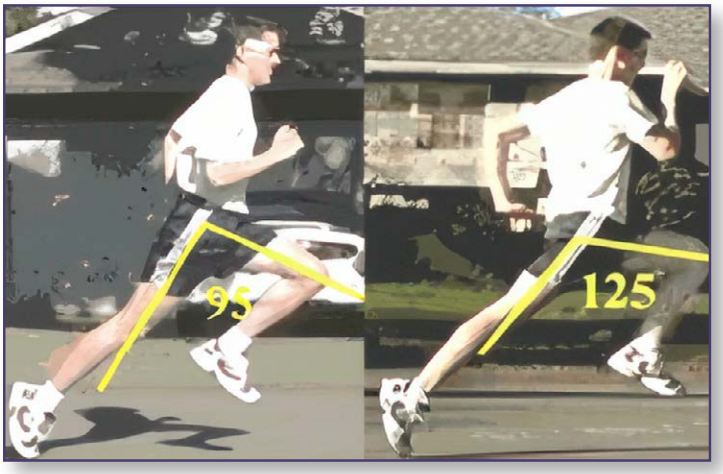


Figure 1: Increasing stride angle increases stride length.

The stride angle is a more useful metric than stride length.

For example, the stride angle is what creates stride length.

The stride angle is the maximum opening between the upper legs while running or pitching.

Our 6-month research project found that for every degree a runner increases his stride angle, he can increase the stride length 2%. This runner (Figure 1) increased his stride length 60%.

Major League Baseball (MLB) pitchers require elbow surgery 1-6 years after joining an MLB team. In the last century, before weight training was introduced, pitchers lasted 11-23 years before any elbow problems. Figure 2 shows the stride angles of current and pre-weights pitchers. The pre-weights pitchers were also more skillfull with sub-2 ERA's, while current stiff pitchers have much higher ERA's.

Figure 2: Stride angles of current and former pitchers

Figure 3: Lifting weights degrades number of stolen bases.

Weights also degrade sprint speed as shown by the number of stolen bases. Figure 3 shows an American (left) who started lifting weights when young compared to a much faster Japanese player who did not liftweights because Japanese baseball players do not lift. The Japanese stride length is 56% longer than the stiff American weightlifter. You can clearly see the difference in the muscle mass of their upper legs.

Billy Hamilton stole 56 bases in one season and decided to lift weights. Four years later (Figure 4), he stole 32 bases and declined year by year to 2.

Notice the difference in size of his hips and upper legs.

Measuring stride length just measures the result of the stride angle.

Measuring the stride angle measures the cause of the stride length.

Figure 4: Billy Hamilton stole 56 bases in 2014; 4 years after lifting weights, that count dropped to 34.

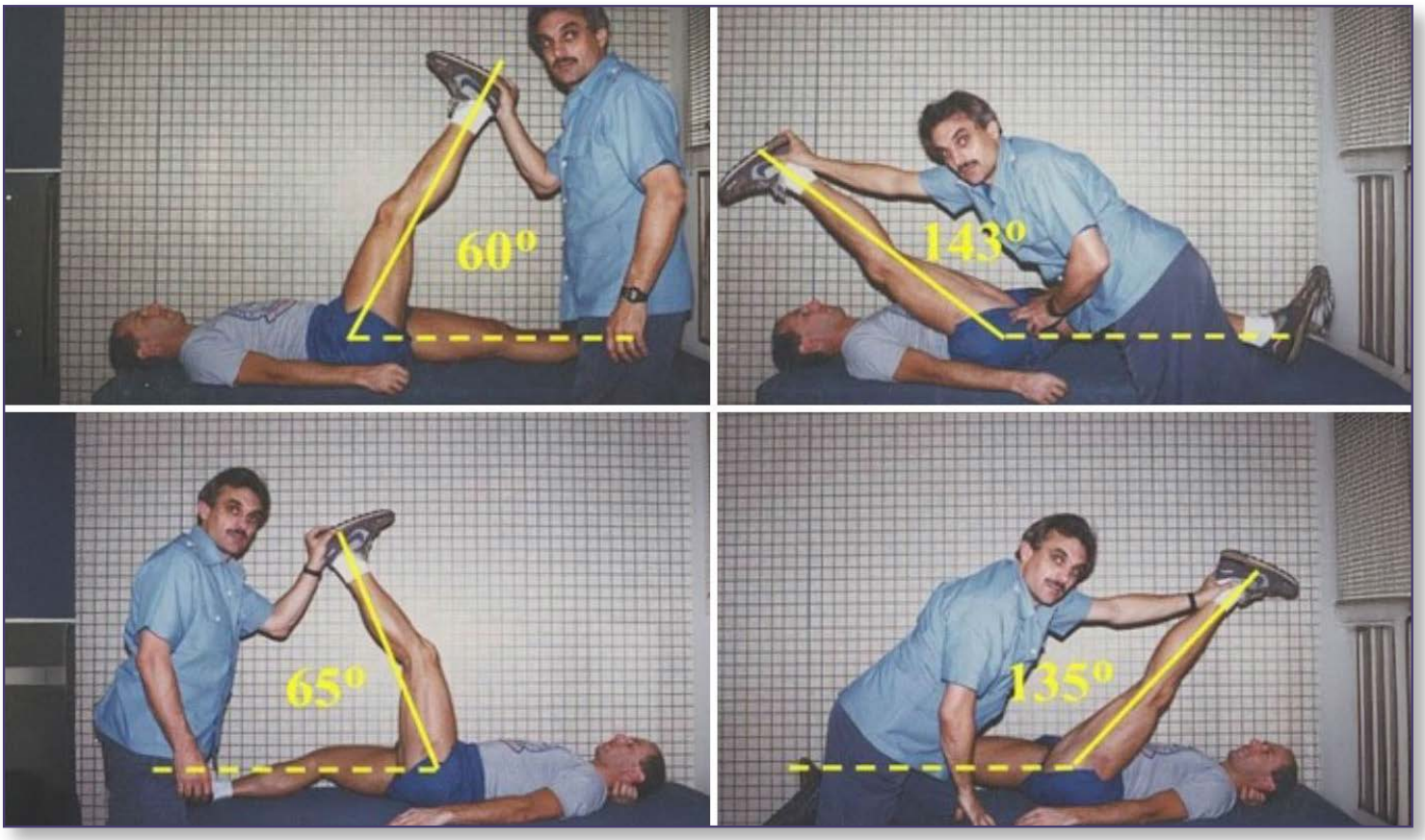


Figure 5: Releasing microfibers (mild scar tissue) can increase the stride angle.

Microfiber Reduction

We increase the stride angle by releasing microfibers (mild scar tissue) in the connective tissue between the muscles. Weights increase microfibers when they tear thousands of the 20–50,000 tiny muscle fibers that make up each major muscle. The body creates scar tissue within the muscle (autopsies have found that 30% of weightlifters 'muscle mass' is scar tissue) and between the muscles (microfibers) to restrict movement, much as we put a sling or cast around an injury. Like any form of scar tissue, microfibers cannot be released by stretching.

But they are released with Somax Microfiber Reduction, as can be seen in the short video at the top of www.somaxsports.com showing a runner improving his hamstring rang 45 degrees in one day.

Figure 5 shows another runner who stretched his hamstrings an hour every day for 6 months with no improvement. Two weeks at Somax more than doubled his flexibility.

After releasing microfibers created from lifting weights in a college golfer and then training him to triple his hip speed, he increased his average drive from 290 yards (PGA average is 292) to 350 yards--15 yards longer than longest PGA player. Figure 6 shows their upper body photos. The PGA golfer has 70 lbs. more muscle.

This shows that a flexible lower body is more powerful than a stiff, muscular upper body.

Figure 6: Releasing microfibers increases body flexibility, which can improve one's golf game.

Bob Prichard is President of Somax Performance Institute in Tiburon, California. He is the author of a sports instruction book, two DVD's and dozens of articles in sports magazines, as well as a monthly column for The New York Times, and broadcast analyst for NBC Sports Olympics where he correctly predicted the winner of the men's marathon at the halfway mark.

He holds 2 US patents for sports training aids.

Prichard also developed Microfiber Reduction, the first program to increase flexibility up to 900% beyond what stretching alone can do. As a result, his 18 Olympic athletes have won 44 Gold Medals and set 11 World Records. His baseball players have improved their batting average 61 points, from .321 to .381, tripled their balls to the warning track and over the fence, improved their 40-yard time 13%, from .492 to 4.27 seconds (equal to Deion Sanders best time), added 4 mph to their top pitch speed while increasing strikes thrown from 55% to 64%, and won their state championship followed by a 51-4 summer season.

ANKLE MOTION DURING LANDING MAY IMPACT KNEE INJURY RISKS

A team of researchers from China, Singapore, and New Zealand built a computer model to examine the role of ankle motion in anterior cruciate ligament (ACL) injury as related to single leg landing. Single-leg landing is an essential skill in sports such as basketball, soccer, and volleyball.

Their findings showed that:

- A larger ankle plantarflexion during landing can reduce the knee impact load.
- A larger ankle plantarflexion can reduce the risk of rupture of the medial femoral attachments area of the ACL.

Their proposed knee musculoskeletal model can realistically revert and simulate the mechanics of ACL injury as it relates to single leg standing biomechanics. (ler)

Source: *Xu D, Zhou H, Wang M, et al. Contribution of ankle motion pattern during landing to reduce the knee-related injury risk. Comput Biol Med. 2024;180:108965. doi: 10.1016/j.compbiomed.2024.108965.*

TEXTING WHILE WALKING PUTS PEDESTRIANS IN DANGER: UBC STUDY

New University of British Columbia research analyzing actual pedestrian interactions with vehicles on busy streets concludes that distracted pedestrians face higher safety risks compared with undistracted road users.

Previous studies have speculated that distracted pedestrians, such as those texting and talking on the phone, are at higher risk of being hit by a car due to failing to react to oncoming traffic or straying off designated crosswalks.

Indeed, the new study, published recently in *Accident Analysis and Prevention*, found that distracted pedestrians often remained unaware of their surroundings, making fewer adjustments to their path or speed, which decreased their overall navigational efficiency. This level of distraction can increase the severity of vehicle interaction and near misses by 45%.

"Non-distracted pedestrians made safer choices when interacting with vehicles," said lead researcher Dr. Tarek Sayed, a civil engineering professor and transportation safety expert. "They maintained greater distances from vehicles, yielded more frequently to oncoming traffic and adjusted their speed when necessary."

The researchers also noted differences in driver behaviour. Drivers often decelerated when approaching distracted pedestrians, indicating they recognized the increased risk posed by their unpredictable movements.

The study used a computer vision system developed at UBC and artificial intelligence simulation models to analyze video traffic data from 2 busy intersections in downtown Vancouver. Analysis focused on distracted pedestrians—those texting, reading from a phone, talking on the phone, or listening to music— undistracted pedestrians, and traffic conflicts, or situations in which road users, such as vehicles and pedestrians, are on a collision course and so, at risk of an accident.

The findings can inform pedestrian safety models and interventions to reduce traffic risks, Dr. Sayed added.

"For example, we can accommodate the risk of distracted walking and design safer infrastructure by adjusting crosswalk signal cycles or introducing audio signals to let pedestrians know when it is time to cross. City planners could also display warnings specifically for pedestrians distracted by their phones—perhaps even introduce mobile notifications that prevent pedestrians from using their phones while crossing," said study co-author Tala Alsharif, a graduate student in civil engineering at UBC.

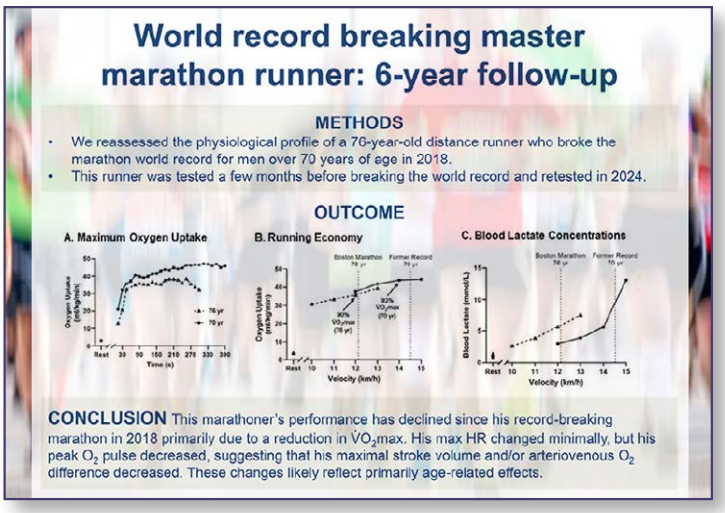
The insights can support infrastructure design by identifying high-risk zones that should be mobile-free and implementing methods such

as sensor-based alert systems to minimize distraction. In locations with a high frequency of pedestrian distraction, raised crosswalks could make pedestrians more visible to drivers.

"By incorporating our findings into future research and traffic management approaches, we'll be better able to assess pedestrian risks and develop strategies to improve road safety," said Gabriel Lanzaro, a UBC civil engineering graduate student and co-author of the study.

Source: *Alsharif T, Lanzaro G, Sayed T. Distracted Walking: Does it impact pedestrian-vehicle interaction behavior? Accid Anal Prev. 2024;208:107789. doi: 10.1016/j.aap.2024.107789.*

6-YEAR FOLLOW-UP OF AGING MARATHON RUNNER



Source: *Romberger NT, Stock JM, McMillan RK, et al. Six-year follow-up of a world record-breaking master marathon runner. J Appl Physiol (1985). 2024;137(5):1354-1358. doi: 10.1152/japplphysiol.00474.2024.*

FLAT FOOT UPDATE #1: STRENGTHENING HIP ABDUCTION IN WOMEN

Recent research has found that strengthening hip joint stability can considerably affect foot mechanics. The purpose of this study was to determine the effect of short foot exercises (SFEs), combined exercises (CEs), and SFEs with isometric hip abduction (IHA) on navicular drop (ND), static parameters (SP), and postural sway in women with flat foot (FF).

This study recruited 45 women with flexible FF. The participants were divided into 3 groups: the CEs group, who performed a series of strengthening, stretching, and balancing exercises, the SFEs group, and the SFEs with IHA group. The groups carried out their assigned regimens daily for 6 weeks. ND, SP, and postural sway (center of pressure [CoP] parameters) were measured using the ND test and pedoscan

device. The data was analyzed using a repeated-measures ANOVA statistical test ($P \leq 0.05$).

The results showed that all 3 groups decreased in ND, surface, and foot rotation in the post-test compared to the pre-test ($P < 0.05$). No difference was observed in the maximum pressure ($P = 0.616$) and anteroposterior fluctuations ($P = 0.065$) of the CEs group. Both SFEs and SFEs with IHA groups showed a reduction in all CoP parameters. When comparing the ND ($P = 0.22$) and mediolateral sway ($P = 0.035$) of the SFEs with IHA group, a significant difference was observed compared to the CEs group. Additionally, the SFEs with IHA group had a higher percentage of changes in all variables compared to the other 2 groups.

The findings showed that all 3 training methods effectively decreased foot rotation, surface, and ND. Both the groups SFEs and SFEs with IHA had a more significant impact on CoP parameters. Additionally, SFEs with IHA had significantly lower ND and ML postural sway than CEs. Moreover, the PCs in the examined variables were higher in the SFEs with IHA group compared to the other two groups. As a result, SFE with IHA is recommended for reducing ND and SPs and improving postural stability in women with FF.

Source: *Zarali A, Raeisi Z, Aminmahalati A. The effects of combined exercises, short foot exercises, and short foot exercises with isometric hip abduction on navicular drop, static parameters, and postural sway in women with flat foot: A randomized trial. BMC Sports Sci Med Rehabil. 2024;16:233. https://doi.org/10.1186/s13102-024-01019-9*

FLAT FOOT UPDATE #2: FOCUS ON INTRINSIC FOOT MUSCLES FIRST IN BOYS

A small study of 25 boys (age 10-12y) with flexible flat foot (FF) sought to understand the impact of intrinsic- versus extrinsic-first corrective exercises on on muscle morphometry and navicular drop (ND). The boys underwent a 12-week exercise program that shifted focus midway. The

Continued on page 17

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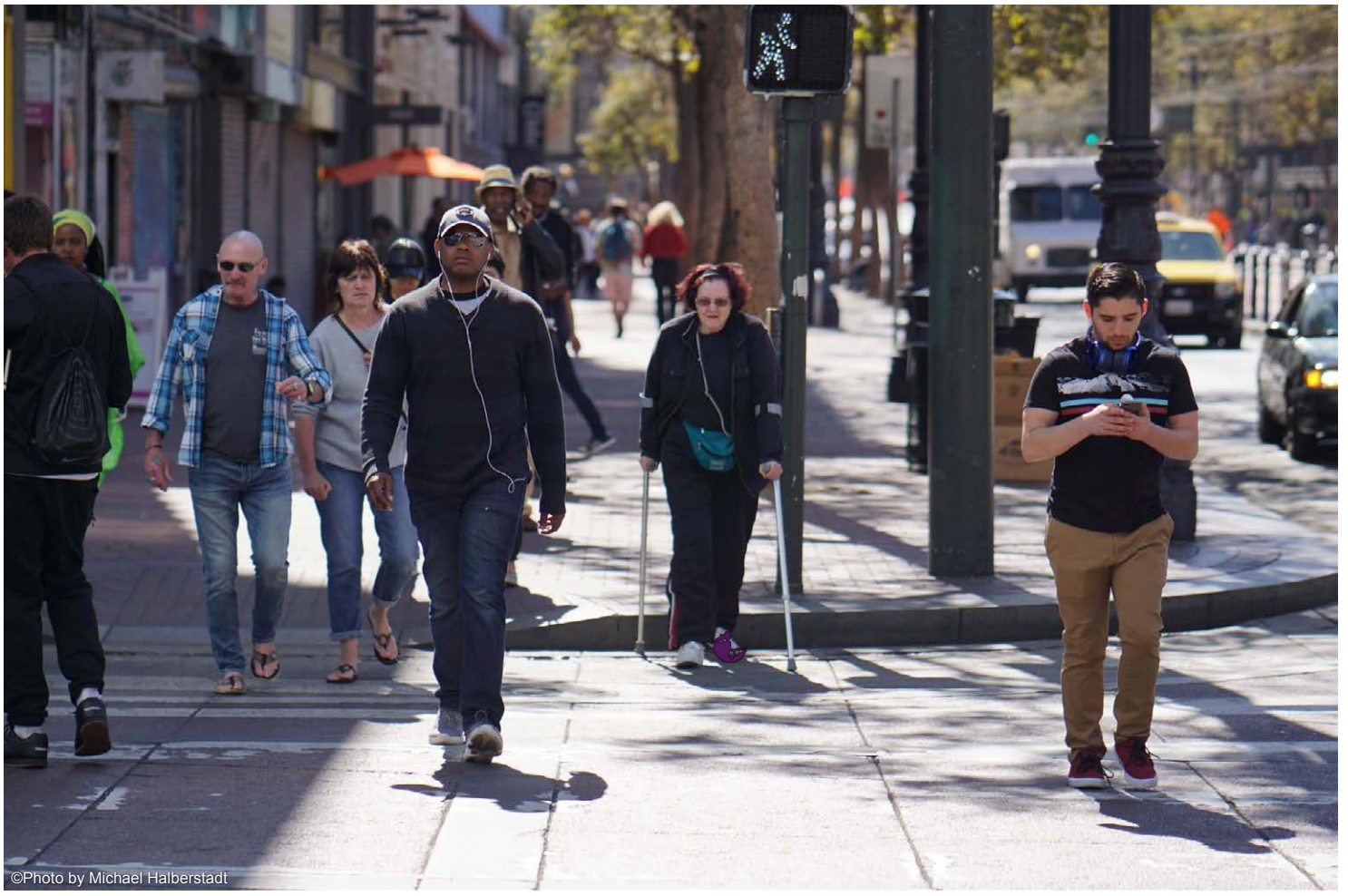

Healthcare innovation is no longer optional. **Technology Driven Progression** is required to make patient care more efficient, evidence-based and profitable.

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Continued from page 15

results were significant. Leading with intrinsic exercises led to sustained improvement throughout the 12 week program, while leading with extrinsic exercises caused deterioration in intrinsic muscle morphometry, but that was recovered in latter part of the program. Staring with intrinsics also saw significant improvements in muscle thickness and cross-sectional area (as measured by ultrasound), as well as more reduction in ND. These authors found that starting with corrective exercises in intrinsic muscles proved more effective in improving foot muscle morphometry and reducing ND in boys with flatfoot.

Source: *Ketabchi J, Seidi F, Haghighat S, Falsone S, Moghadas-Tabrizi Y, Khoshroo F. Differential effects of intrinsic- versus extrinsic-first corrective exercise programs on morphometric outcomes and navicular drop in pediatric flatfoot. Sci Rep. 2024 Dec 28;14(1):31393. doi: 10.1038/s41598-024-82970-y.*

METAL HYPERSENSITIVITY AND JOINT IMPLANTS

PREVALENCE OF CONTACT ALLERGIES TO METALS	
Nickel	24.4%
Cobalt	8.8%
Chromium	5.9%
Titanium	0.2–3%
ELEMENTS USED IN TOTAL HIP AND KNEE ARTHROPLASTIES	
Stainless steel	19% chromium 14% nickel
Cobalt-chromium-molybdenum	67% chromium 30% cobalt 2% molybdenum 1% nickel
Titanium alloys	91% titanium 5% aluminum 3.9% vanadium 0.1% nickel

Metal hypersensitivity (MH) is a controversial topic with limited evidence. It is more commonly observed in failed arthroplasties. The most common metal involved in MH is nickel. Orthopaedic implants contain nickel because of its ability to provide increased strength and durability. MH is a type IV hypersensitive reaction. Women are mostly affected and can present with pain and swelling in the early months after undergoing a joint replacement. Rashes occur in 35% of patients and are more commonly seen with knee replacements. Currently, preoperative screening should be limited to patients with a history of metal sensitivity. A thorough workup should be done post-implantation to rule out the large differential diagnoses for a failed/failing implant. MH is a diagnosis of exclusion. No gold standards exist for testing for MH, but the 2 most commonly used tests are patch testing and lymphocyte transformation tests. Once a diagnosis of MH is made, then treatment should be tailored to nonoperative means mainly, but if the surgeon embarks on surgical treatment, it is crucial to counsel patients appropriately regarding the limited evidence associated with hypoallergenic components to obtain more realistic expectations. Hypoallergenic components should be used in the revision setting ensuring all the metal constituents that demonstrated MH is eliminated. A lot of unknown factors with MH exist, and more research is needed to gain a better understanding of managing this challenging problem.

Source: *van der Merwe JM. Metal hypersensitivity in joint arthroplasty. J Am Acad Orthop Surg Glob Res Rev. 2021;5(3):e20.00200. doi: 10.5435/JAAOSGlobal-D-20-00200. Use is per CC BY.*

TKA OUTCOMES AMONG SELF-REPORTED NICKEL ALLERGY PATIENTS

In a study that looked at the data on more than 18,000 patients, researchers found that patients who have a self-reported nickel allergy can be advised that, on average, their clinical outcome scores will improve similarly to patients who do not have a self-reported nickel allergy, and revision rates will be similar.

Source: *Siljander BR, Chandi SK, Cororaton AD, et al. A comparison of clinical outcomes after total knee arthroplasty in patients who have and do not have self-reported nickel allergy: matched and unmatched cohort*

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comparisons. J Arthroplasty. 2024;39(10):2490-2495. doi: 10.1016/j.arth.2024.05.029.

SALTO TALARIS FIXED-BEARING TOTAL ANKLE ARTHROPLASTY: 10-YR RESULTS

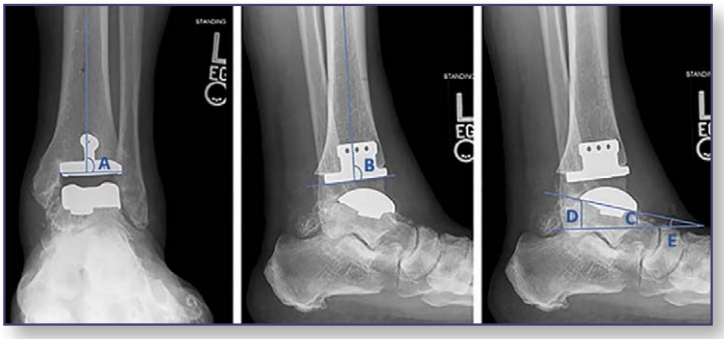

Figure 1: Preoperative radiographic measurements. Left: tibiotalar coronal alignment. Middle: talar tilt. Right: tibiotalar sagittal translation

Figure 2: Postoperative radiographic measurements. Left: (A) Tibial component coronal alignment. Middle: (B) Tibial component sagittal alignment. Right: (C) Talar component anterior height. (D) Talar component posterior height. (E) Talar component sagittal alignment.

In this longer-term follow-up of a limited cohort (48 patients/50 ankles, average age at index surgery: 64 years), Salto Talaris fixed-bearing total ankle arthroplasty demonstrated good long-term survival (Kaplan-Meier estimated survivorship was 84.2%) with relatively low rates of revision or other complications. Patient-reported outcome and range of motion measures revealed good stability.

Source: *Veale M, Endo A, Veale N, et al. Salto Talaris fixed-bearing total ankle arthroplasty: long-term results at a mean of 10.7 years. Foot Ankle Orthop. 2024;9(1):24730114231225458. doi: 10.1177/24730114231225458.*

SILASTIC JOINT ARTHROPLASTY FOR END-STAGE HALLUX RIGIDUS

Osteoarthritis of the first metatarsophalangeal joint (MTPJ) is a common forefoot problem affecting patients in later years. It leads to pain, gait problems, and difficulty with activities of daily living. Treatment is controversial and varies according to patient symptoms and surgeon preference. Arthrodesis remains the gold standard but it has its own complications. It is associated with adjacent joint arthritis and transfer metatarsalgia. The aim of this study from Great Britain was to analyze the outcome of double-stemmed silastic joint arthroplasty (Wright-Medical, Memphis, TN) for end-stage hallux rigidus.

This retrospective analysis included 117 consecutive first MTPJ silastic arthroplasties done between January 2016 and February 2023 for end-stage hallux rigidus. There were 77 females and 40 males with a mean age of 65 years (46-82 years). Radiological and clinical assessments were performed, and patient-reported outcome measure data (PROMS) and visual analogue scale (VAS) scores were collected pre- and post-operatively.

COMPLICATION	% (N)	NOTE
Stiffness	1.9 (2)	Responded to physiotherapy
Lateral metatarsalgia	2.6 (3)	Treated with orthotics and footwear modification
Superficial infection	0.9 (1)	Responded to oral antibiotics
CRPS	0.9 (1)	Settled at one year post-operatively
Wound Dehiscence	0.9 (1)	Healed with dressings
Deep Infection	0.9 (1)	Required revision surgery (debridement, antibiotics and arthrodesis)
Asymptomatic Osteolysis	0.9 (1)	Under observation

Table 1. Complications of first metatarsophalangeal silastic joint replacement in 112 patients. CRPS: complex regional pain syndrome

Findings showed 99.1% survivorship following a silastic joint arthroplasty with a mean follow-up of 4 years (6 months to 7 years). The MOX-FQ (Manchester Oxford Foot Questionnaire) score improved from a mean of 81 (59.8-100) to 13 (0-57). The mean VAS scores improved from 7.2 (5-10) to 1.5 (0-7) postoperatively. Five patients were lost to follow-up. Two patients developed deep infection and 1 required revision. The other patient with infection was lost to follow-up. In total 10 patients (8.9%) developed complications, out of which 8 patients responded to simple treatments.

The authors concluded that results have shown good to excellent outcomes following a silastic arthroplasty of the first MTPJ for the treatment of end-stage hallux rigidus. The survivorship at a mean follow-up of 4 years was 99.1% and the patient satisfaction rate was 90.1%. As historically reported, they did not see any soft tissue reaction or progressive osteolysis in any of their patients. It provides comparable and predictable outcomes to joint fusion for end-stage arthritis.

Source: *Sethi M, Limaye N, Alderton E, et al. Silastic joint arthroplasty as a joint-preserving alternative for end-stage Hallux Rigidus: outcomes from 112 first metatarsophalangeal joint arthroplasties. Cureus. 2023;15(10): e46561. DOI 10.7759/cureus.46561*

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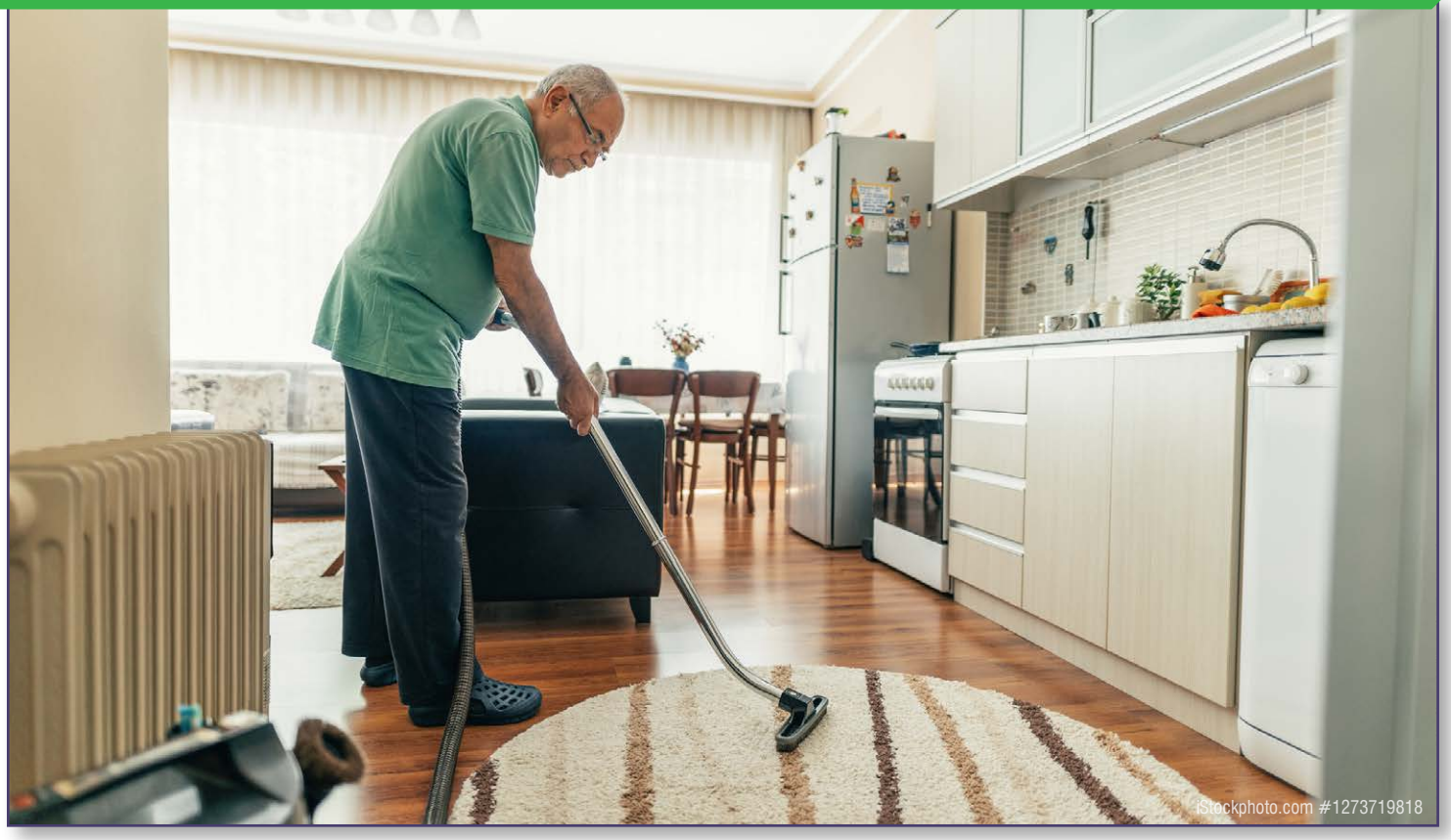
Movements Count: 5 Minutes of Exercise Per Day Could Lower Blood Pressure



In free-living environments, more time spent in exercise-like activities has the strongest association with blood pressure (BP), and even small changes to daily movement patterns can elicit clinically meaningful improvements.

Multinational researchers from the ProPASS Consortium (Prospective Physical Activity, Sitting and Sleep) used data from thigh-worn accelerometers and BP measurements of 14,761 free-living participants (mean age 54.2±9.6 years) to study associations between 24-hour behaviors in 6 areas (sleeping, sedentary behavior, standing, slow walking, fast walking, and combined exercise-like activities [eg, running and cycling]) and both systolic and diastolic blood pressure.

The average 24-hour composition consisted of sleeping (7.13±1.19 hours), sedentary behavior (10.7±1.9 hours), standing (3.2±1.1 hours), slow walking (1.6±0.6 hours), fast walking (1.1±0.5 hours), and exercise-like activity (16.0±16.3 minutes). More time spent exercising or sleeping, relative to other behaviors, was associated with lower BP. An additional 5 minutes of exercise-like activity was associated with estimated reductions of -0.68 mm Hg (95% CI, -0.15, -1.21) SBP and -0.54 mm Hg (95% CI, -0.19, 0.89) DBP. Clinically meaningful improvements in SBP and DBP were estimated after 20 to 27 minutes and 10 to 15 minutes of reallocation of time in other behaviors into additional exercise. Although more time spent being sedentary was adversely associated with SBP and DBP, there was minimal impact of standing or walking.

Clinical Implications:

- Small and feasible changes to habitual exercise levels are estimated to have meaningful benefits on BP, which can contribute to a reduction in prevalence of hypertension.
- Exercise-induced reductions in BP can reduce prevalence of cardiovascular outcomes by7% to 28% at the population level.
- Interventions targeting both the individual and the population (eg, public health policies) should consider the wider construct of the 24-hour day and incidental exercise embedded in daily activities.

This article has been excerpted from: Blodgett JM, Ahmadi MN, Atkin AJ, et al for the ProPASS Collaboration. Device-measured 24-hour movement behaviors and blood pressure: A 6-part compositional individual participant data analysis in the ProPASS Consortium. Circulation. 2025;151(12):159-170. doi: 10.1161/CIRCULATIONAHA.124.069820. Epub: Nov. 6, 2024. Permission is by CC BY 4.0.

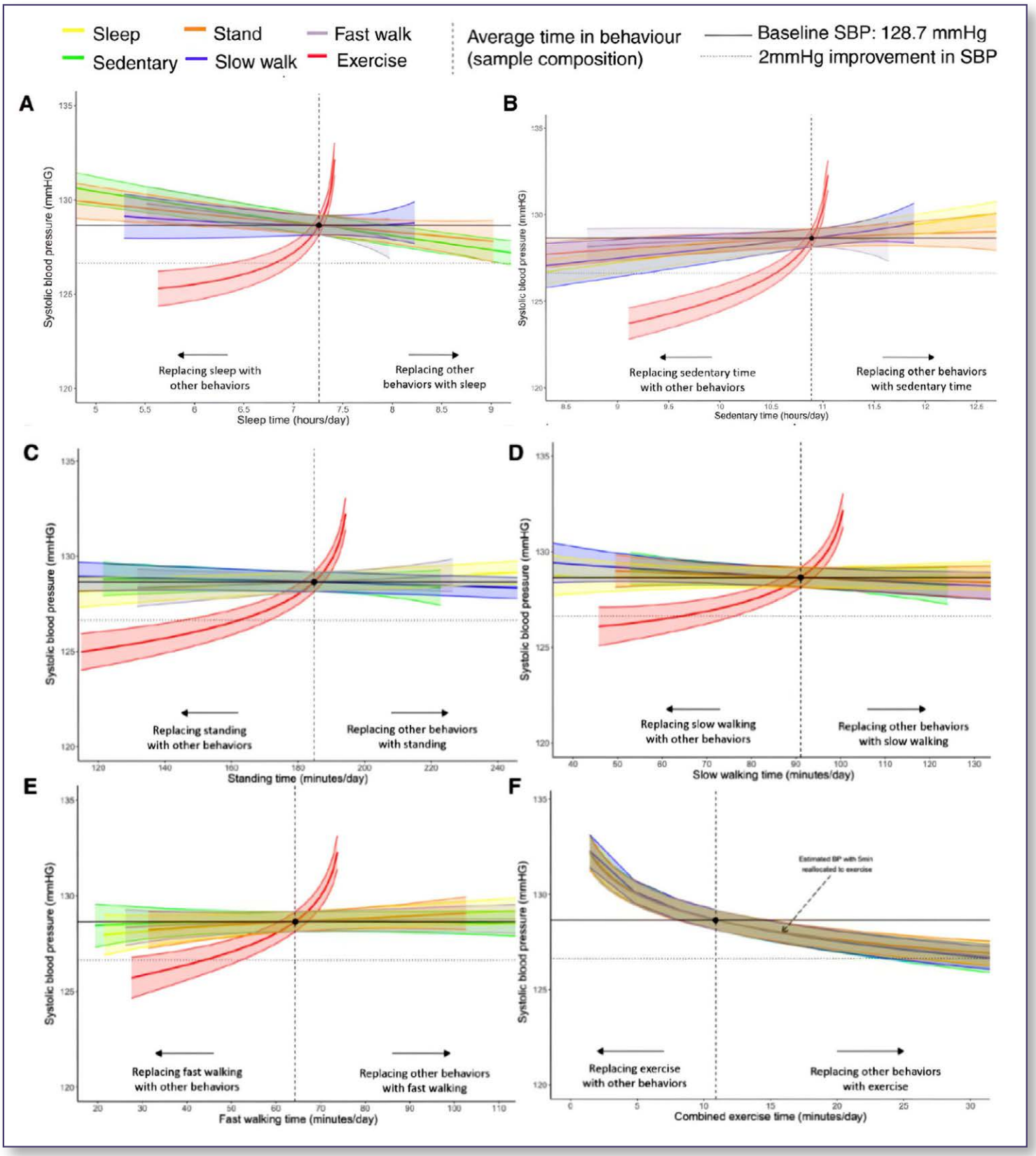


Figure 1. Estimated change in systolic blood pressure (n=14 761) based on behavioral relocation from the average composition of the population: Sleep (A), sedentary behavior (B), standing (C), slow walking (D), fast walking (E), and combined exercise-like activities (F). Data to the left of the reference line indicate the predicted change in systolic blood pressures if a given behavior were replaced by any of the other behaviors. Data to the right of the reference line indicate the predicted change if a given behavior replaced any of the other behaviors. Model adjusted for sex (reference: female), age (reference: 54.2 years; mean-centered), and cohort (reference: The Maastricht Study). Reallocations are based on baseline systolic blood pressure (SBP; 128.7 mm Hg) expected given the average sample composition (sleep, 7.3 hours; sedentary behavior, 10.9 hours; stand, 3.1 hours; slow walk, 1.5 hours; fast walk, 1.1 hours; and combined exercise-like, 10.9 minutes per day).

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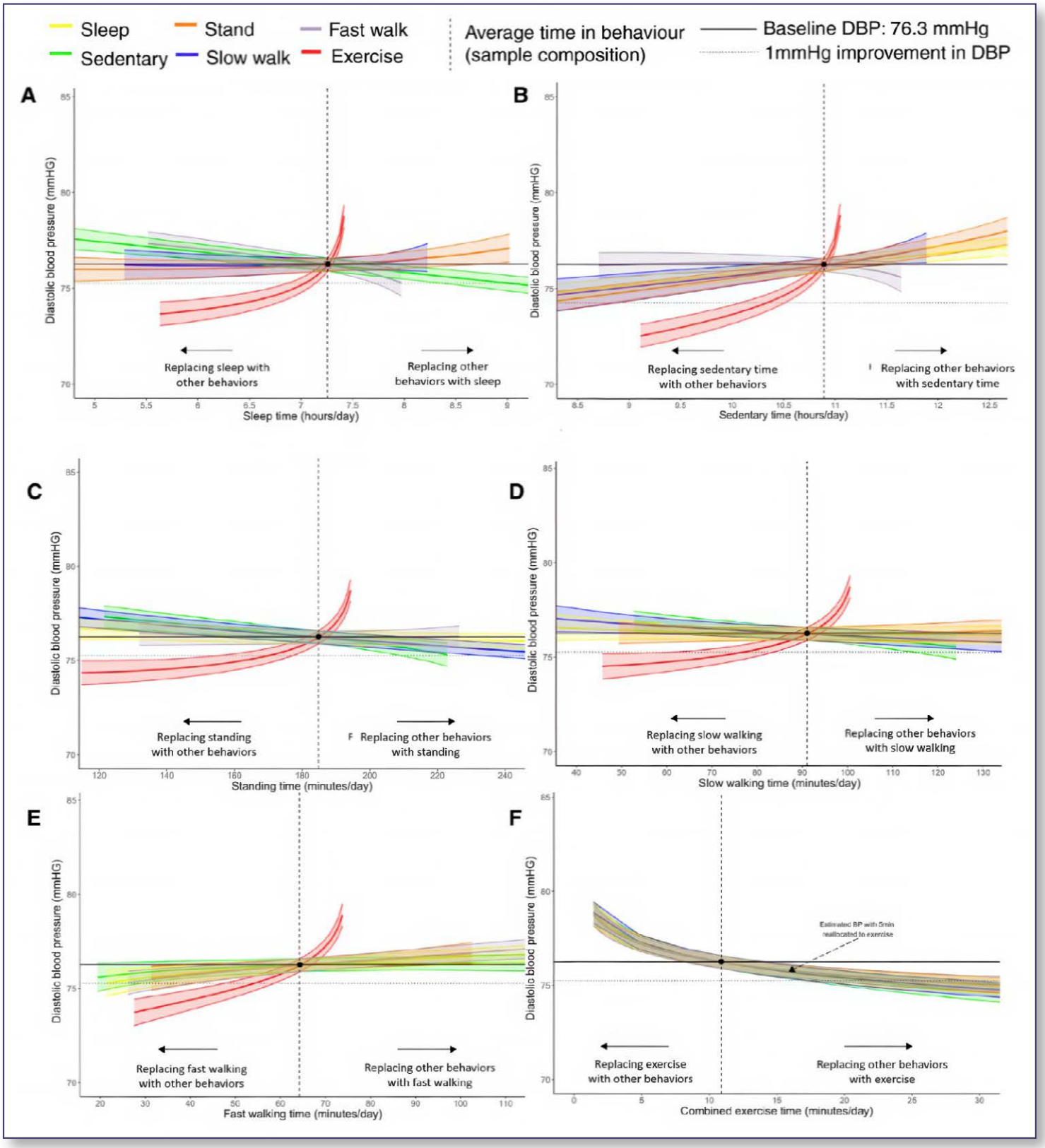

Figure 2. Theoretical change in diastolic blood pressure (n=14 761) based on behavioral relocation from the average behavior composition of the population. Sleep (A), sedentary behavior (B), standing (C), slow walking (D), fast walking (E), and combined exercise-like activity (F). Data to the left of the reference line indicate the predicted change in systolic blood pressures if a given behavior is replaced by any of the other behaviors. Data to the right of the reference line indicate the predicted change if a given behavior replaces any of the other behaviors. Model adjusted for sex (reference: female), age (reference: 54.2 years; mean-centered), and cohort (reference: The Maastricht Study). Reallocations are based on baseline diastolic blood pressure (DBP; 76.25 mm Hg) expected given the average sample composition (sleep, 7.3 hours; sedentary behavior, 10.9 hours; stand, 3.1hours; slow walk, 1.5 hours; fast walk, 1.1 hours; combined exercise-like, 10.9 minutes per day).

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Minimally Invasive Bunion Surgery for Hallux Valgus: A Surgical Technique

By Erdi Özdemir, MD, and Michael Aynardi, MD

3rd generation MIS techniques have demonstrated promising results in short and midterm follow-up clinical studies.

Hallux valgus (HV) is a common forefoot problem with a reported prevalence of 23% in adults age 18–65 years and 35.7% in adults aged over 65 years. More than a hundred procedures were described to treat HV deformity. Traditionally, surgical treatment of HV included open osteotomies and soft tissue procedures. In recent years, minimally invasive surgery (MIS) techniques have gained popularity because they can potentially provide decreased postoperative recovery period, smaller incisions, and a greater range of motion. [Figure 1]

The early generation of MIS techniques lost their popularity due to high complication rates and a lack of promoting scientific evidence. The most common reasons were inadequate fixation, recurrence, and burr-related complications. However, the third-generation MIS techniques regained popularity with the utilization of a low-speed, high-torque Shannon burr with continuous irrigation devices and modern cannulated screw technology.

The most used techniques are minimally invasive distal metatarsal osteotomy and metaphyseal extra-articular transverse and akin osteotomy. Using beveled screws after MIS osteotomies reduced the hardware irritation rate. Promising outcomes were reported in multiple studies regarding MIS bunion surgery. Based on the published series, the most attractive advantage of MIS bunion surgery seems to be the reduced early postoperative pain scores compared to open bunionectomy. Given the growing trend in MIS techniques in foot and ankle surgery, we aimed to review the MIS bunion surgery surgical technique in this article.

Indications & Contraindications

MIS bunion surgery has a wide indication range. It can be used for mild to severe HV deformities. Excessive lateral translation of the distal fragment can correct severe deformities. The transverse osteotomy also allows deformity correction in the coronal plane. It can also be used in recurrent HV deformities and patients with fragile skin, especially in the elderly.

Contraindications for MIS bunion surgery include arthritis at the first metatarsophalangeal (MTP) joint requiring arthrodesis, severe instability at the first tarsometatarsal (TMT) joint, and neuromuscular disorders requiring fusion. There is also no evidence of MIS hallux valgus surgery in patients under the age of 16.

SURGICAL TECHNIQUE

Surgical Preparation

The patient may be anesthetized with general anesthesia or sedation with a regional block. A supine position with a diving board is utilized. Depending on the surgeon's preference, a tourniquet may be applied to any location proximal to the ankle joint. However, surgeons should be aware that working off tourniquet is highly recommended in MIS hallux valgus surgery to decrease the heat generated by the

This article has been excerpted from "Minimally Invasive bunion surgery for hallux valgus: A surgical technique," by the same authors. The article was published in the journal SurgiColl. 2024;2(1). doi:10.58616/001c.82177 Editing has occurred, including the removal of references for brevity.

burr during osteotomy.

The operating room setup is designed based on the surgeon's dominant hand. The side of the foot undergoing the surgery does not make a difference. Bilateral feet must be hanging off from the bed for better visualization of the foot with fluoroscopy. The mini C-arm should come from the right side of the patient, and it should be used as a table. The MIS power and burr are placed on the patient's left side. The surgeon's position depends on the foot being operated on. For the left foot, the surgeon needs to be left side of the patient, while for the right side, the surgeon needs to be distal to the foot.

Surgical Equipment

The MIS hallux valgus surgery is a technical procedure. The necessary equipment includes MIS power that can produce high torque and low speed, 20 mm Shannon burr, pencil burr driver, special periosteal elevators, 6400 beaver blade, beveled cannulated screws, and fluoroscopy.

Surgical Steps (Figure 2)

The surgery starts with identifying the topographic anatomy of the first metatarsal, proximal phalanx, and first MTP and TMT joints. The medial-lateral and dorsal-plantar borders of both the first metatarsal and proximal phalanx are marked with a marking pen under fluoroscopic guidance. The osteotomy location is determined using biplanar fluoroscopy proximal to sesamoids. A stab incision is made on the medial side of the osteotomy, staying midline in the sagittal plane. The periosteal elevator is then advanced to protect the extensor hallucis longus tendon and dorsomedial cutaneous nerve, thereby creating the working space for the burr. The Shannon burr is introduced under fluoroscopic guidance perpendicular to the metatarsal shaft if lengthening or shortening is not planned. The transverse osteotomy is performed with high-torque, low-speed burr irrigating copiously to avoid a thermal necrosis. Once the osteotomy is completed, the metatarsal head is translated laterally utilizing a head pusher. The metatarsal head can also be supinated at this point if preoperative pronation deformity exists. After correcting the HV deformity, the metatarsal head is locked with a K-wire placed through the head pusher. The position of the metatarsal head was confirmed with biplanar fluoroscopy to avoid any malposition. Then, a targeting guide is used to localize proximally for 2 beveled cannulated screws. Two guide wires are advanced over the targeting guide. The proximal screw commonly starts close to the first TMT joint, exits 8-10 mm proximal to osteotomy, and engages the lateral half of the first metatarsal head. The distal screw is placed parallel to the proximal screw engaging the medial half of the metatarsal head. An aggressive correction may result in a medial spike on the proximal fragment. In these cases, the medical spike should be removed with the burr to create a smooth contour.

In cases of accompanying hallux valgus interphalangeus deformity, minimally invasive Akin osteotomy is indicated. Using the previously marked topographic anatomy, osteotomy location is determined distal to the MTP joint line and midline in the sagittal plane of the proximal phalanx. A stab incision is made, and

Figure 1. A) Preoperative appearance of a patient with hallux valgus deformity. **B)** Minimally invasive hallux valgus surgery is performed with percutaneous incisions. **C)** Preoperative and **D)** postoperative anteroposterior radiograph of a patient underwent minimally invasive hallux valgus surgery.

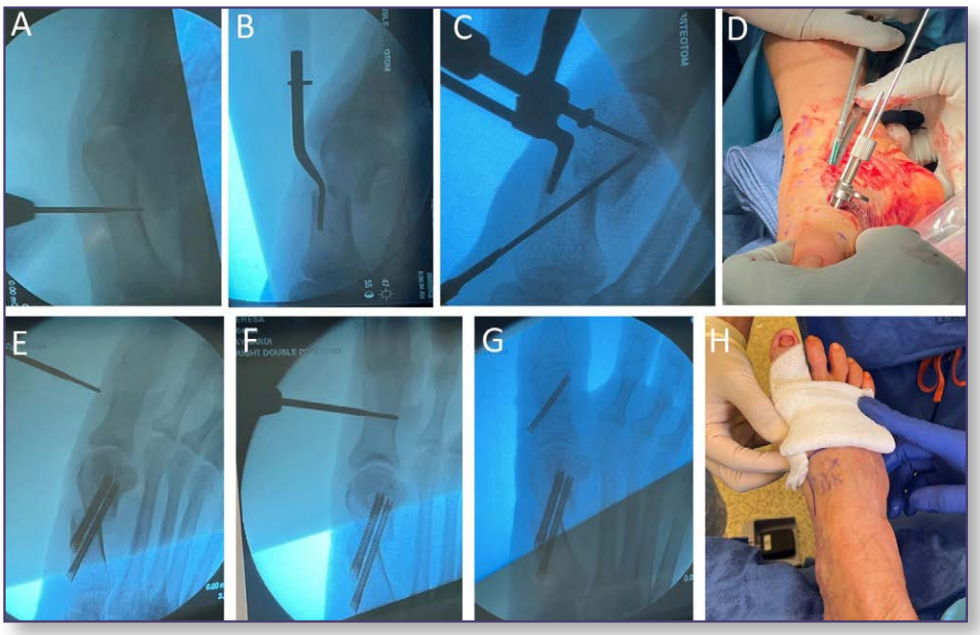

Figure 2. A) Osteotomy side is marked under fluoroscopy. After minimally invasive distal metatarsal transverse osteotomy, **B)** the metatarsal head is translated laterally and **C)** a guide wire is advanced to hold the metatarsal head. **D)** Beveled cannulated screws are introduced over the guide wires. **E)** Osteotomy side is marked for Akin osteotomy under fluoroscopy. **F)** Minimally invasive Akin osteotomy is performed with the Shannon burr and **G)** fixed with headless cannulated screw. **H)** Application of the HV spica bandage.

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the surrounding soft tissue is elevated with the periosteal elevator. After establishing the working space, Shannon burr is introduced from the medial side to make the osteotomy. The lateral cortex should be kept intact to preserve stability. After completion of medial wedge osteotomy, fixation is performed with a cannulated headless screw.

Post-Operative Management

Patients are allowed to weightbear through their heels in a controlled ankle motion (CAM) boot for the first 6 weeks. Weight-bearing foot radiographs are obtained in the 6-week follow-up, and the patients are weaned from a CAM boot to regular shoes. Postoperative HV spica bandage is kept for 6 weeks. Patients are educated about doing HV spica bandage during early postop visits. Appropriate anticoagulation is initiated postoperatively.

A complete list of pearls and pitfalls for minimally invasive HV surgery can be found in Table 1 .

PEARLS	PITFALLS
Pay attention to the operation room setup, patient positioning	Do not do the dorsal limb of the osteotomy while the big toe flexed
Copious irrigation and no tourniquet	Avoid working with the burr for more than 20 consecutive seconds
Use fluoroscopy frequently, especially during the learning curve	Do not forget to remove the medial spike after aggressive correction
Bicortical fixation of the proximal segment of osteotomy with the proximal screw increases stability	
Postoperative dressing is one of the critical factors for success	

Table 1: Pearls & Pitfalls

Discussion

There is a growing trend in MIS hallux valgus surgery due to the potential advantages such as less surgical dissection and rapid postoperative recovery. Recent series showed that MIS hallux valgus surgery had good outcomes in 2 years and 5 years. However, there was no significant difference in clinical and radiologic outcomes in 5 years between MIS and open HV correction.

Postoperative pain control seems to be one of the major advantages of MIS hallux valgus surgery. Lai et al compared the MIS metatarsal osteotomies and open scarf Akin osteotomies. The author reported MIS group had significantly lower average perioperative pain scores. Lee et al also showed that MIS surgery reduced postoperative pain compared to open Scarf Akin osteotomies. Michail et al suggested the mean oxycodone use in the first 2 weeks after MIS hallux valgus surgery was 2.2 tablets, and no patients required opioids after 2 weeks. Patient satisfaction after MIS is reported to be over 80%. MIS hallux valgus surgery has superior patient satisfaction in some series than open procedures. However, some studies reported similar satisfaction rates among open and MIS hallux valgus correction.

The complication rate for open HV surgeries is around 7-8%. There is a concern about the complication rate of MIS hallux valgus surgery as it is a new technique. In a recent systematic review, Gonzalez et al showed an overall 10.3% complication rate with MIS hallux valgus correction. Individual complication rates were reported as 2.2% recurrence, 2.4% nerve damage, and 0.4% nonunion. On the other hand, Barg et al. conducted a systematic review regarding complications of open hallux valgus surgery. The authors showed that distal metatarsal osteotomies had 4.1% recurrence, 3.3% nerve injury, and 0.01% nonunion. Based on these studies, the overall complication rate appears to be comparable between both open and MIS techniques. Although nonunion rates are still low, MIS hallux valgus surgery has a higher nonunion risk than open procedures. This can be related to heat generation during osteotomies, higher lateral translation amounts than open procedures, and the surgeons' learning curve.

In conclusion, MIS hallux valgus correction is a sound alternative to open procedures. We believe MIS hallux valgus surgery can provide better postoperative pain control and higher patient satisfaction, especially in patients expecting cosmetic improvement. However, the MIS procedure still has drawbacks, such as a relatively higher nonunion rate. We strongly recommend that surgeons should be aware of the learning curve and limits of MIS hallux valgus surgery.

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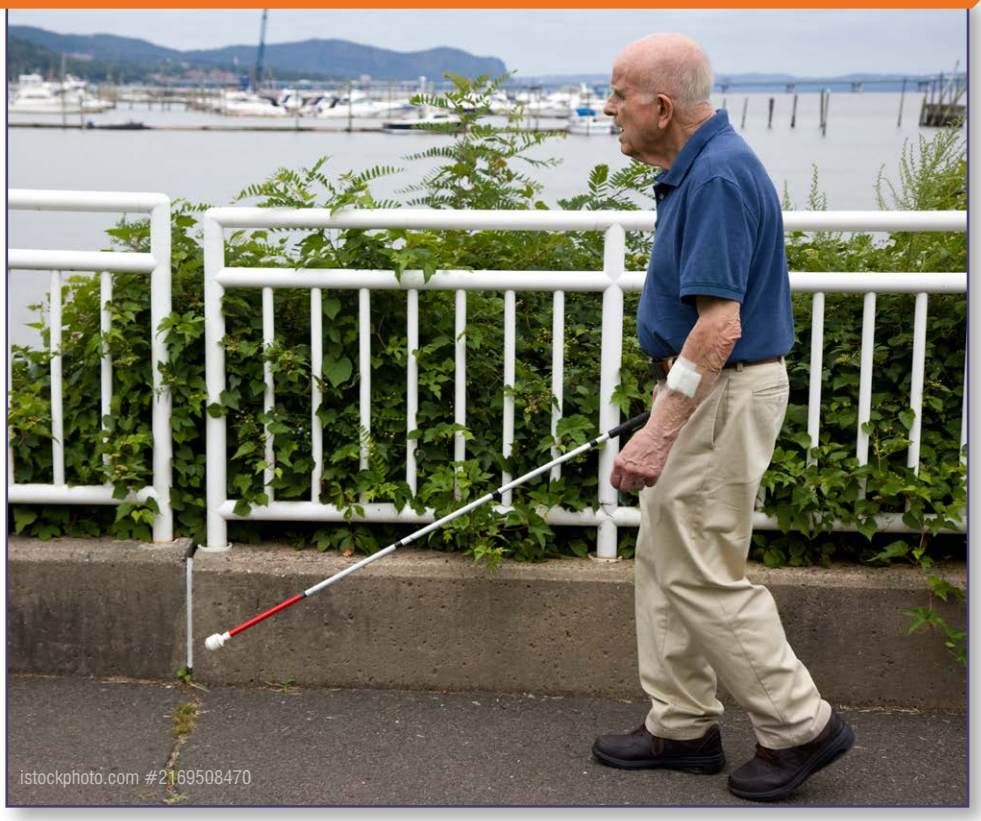
Computer-Aided Gait Analysis Can "See" Blind Gait

By Jay Segel, DPM; Sally Crawford, MS; Ronald Sherman, DPM, MBA

Identifying this increasing fall risk can help older patients stay safe.



Imagine for a moment, you were cast into a world of uncertainty by the loss of sight. Your relationship with all you know is forever changed. We have "tells" to these challenges and learn ways of adapting to our new circumstances. We do things slower, with less confidence, and rely on our other senses. We listen for auditory cues, but perhaps the sense we lean on most is that of touch. We reach out with our hands, feeling our surroundings and cautiously find our footing in this altered state of reality called "blind gait." As clinicians, if we are skillful in our gait analysis, we can observe this sign before a patient is aware of or willing to share their concerns about balance and stability.

Successful quantification in gait analysis is the first step, though it is typically lacking as outcomes are not always related to a patient's baseline, or patient's report of their motion or pain/soreness as these are solely subjective. To understand such outcomes more objectively, gait and balance variables and even movement variability are assessed to uncover the patterns illustrating characteristics of "blind gait." We can measure these patterns for any individual and being proactive is paramount especially when dealing with blind motions.

Potentially dangerous, "blind gait" characteristics from such tests are often seen in patients with sensory and motor neuropathy, patients with a history of low back pain, those who present status post-joint replacement, and of course, in our aged population. The traits or outcomes of this "blind gait" are highlighted by a distal shift in the initial point of impact, later forefoot peak pressure times, increased segmental duration times, positional changes, such as increased step width and foot abduction, as well as the classic a-propulsive gait with an unwillingness to lift the heel off the ground that can

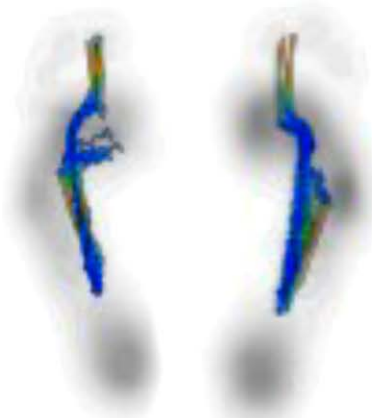


Figure1: Distal shift in the initial point of impact of the center of pressure path.

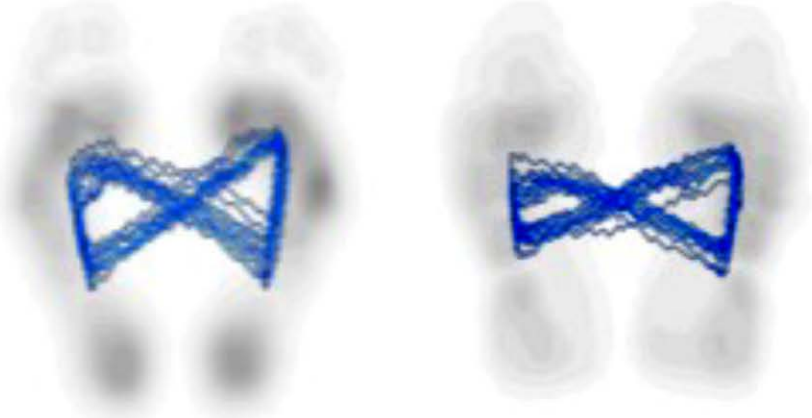


Figure 2: Positional changes, such as increased step width and foot abduction, as well as heightened variability correspond to increased fall risk.

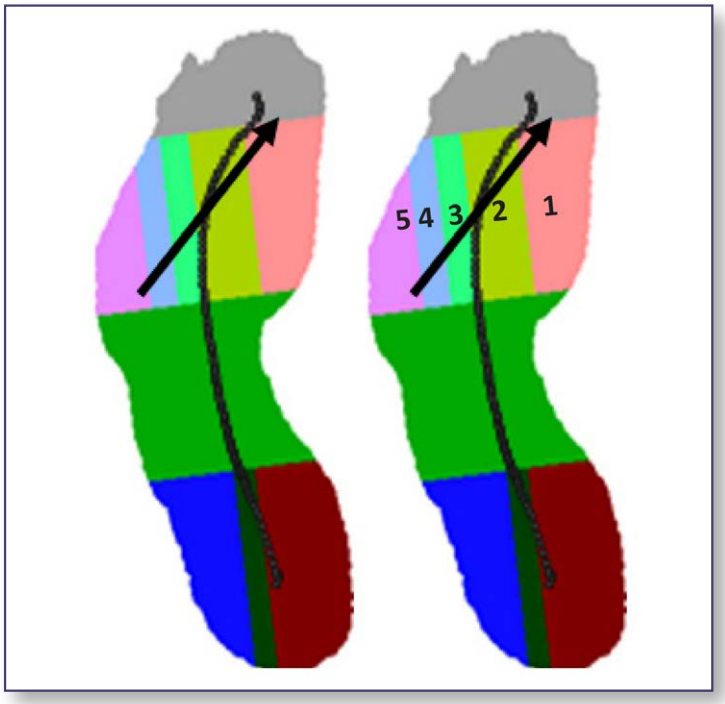


Figure 3: 10 zone system identifying metatarsal head positions and corresponding path and timing of center of pressure.

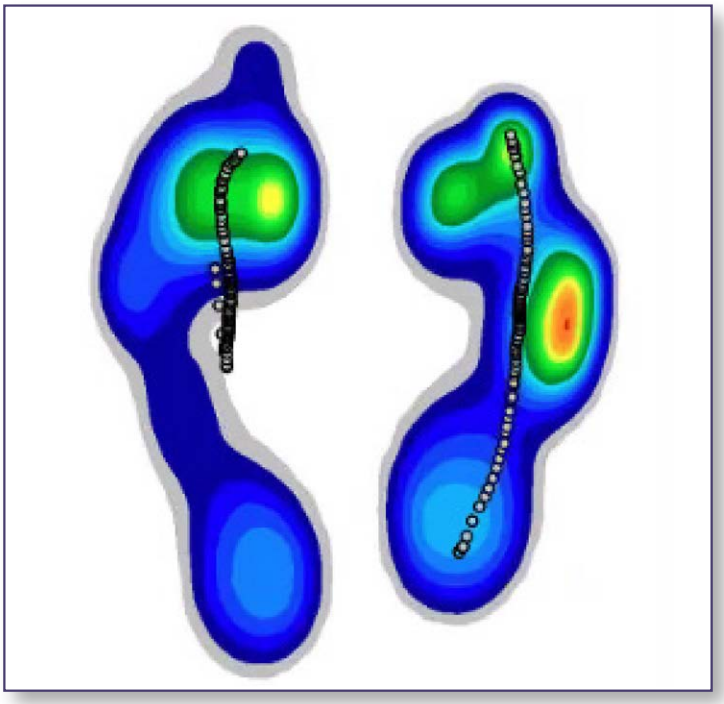


Figure 4: The converse loading pattern is indicative of forefoot valgus and is seen more commonly in the Pes Cavus foot type.

be tracked by a decrease in swing phase (Figure 1, Figure 2). The ironic thing about this gait pattern is that it actually makes the patient less stable and more prone to falls, in other words, this gait pattern is characterized by variables corresponding to increased fall risk. Skillful gait analysis will identify these risk factors.

Consider the spinning of a top: When the top is balanced and moving rapidly through its revolutions, it stays upright and very straight. However, when the top slows down, it becomes wobbly and more prone to falling. When measuring the spinning top's path through the center of pressure (COP), the variability of COP worsens, and the area increases with decreasing speeds. For patients, it is not only important for you to notice this worsening COP area, but to offer counsel, through the use of orthotic devices and gait training for fall prevention, and improvements of the patient's biomechanics. Identifying the COP mechanics following this algorithm is also meaningful to the patient as a means of illustrating the danger.

Another problematic gait analysis outcome that can be measured is "Retrograde COP." Retrograde identifies the momentum of the foot during the first 5% of the gait cycle which is moving distal to proximal while the body's momentum is moving proximal to distal, thus having the potential to create sheer stress at the ankle and subtalar joints in addition to creating wear and tear, heat and deformation at the principal joints of the kinetic chain.

One of the key elements in reading gait mechanics involves understanding planes of motion and loading order. In "blind gait," the spatial data gathered cannot be applied in the usual manner to assess forefoot loading. Most consider a lateral initial forefoot loading order of 5, 4, 3, 2, 1 to be common, and often representative of the biomechanical deformity known as forefoot varus.

There are other clinical and computer-aided gait analysis (CAGA) factors to be considered as well, chiefly, the starting times that these landmarks make landfall. Given that the initial point of impact does not occur at the heel region, the phasic activity and data deviate from all norms and, as such, must be considered regionally, ideally with a high-definition, slow-motion camera synched to our CAGA treadmill.

The converse loading pattern is indicative of forefoot valgus and is seen more commonly in the pes cavus foot type.

Capturing these quantified patterns early is possible with CAGA. Understanding only a piece of the puzzle regarding changes in gait with age may create a gap in understanding how motion impacts a patient's safety. To narrow this gap and provide more insight to potentially "blind" biomechanical strategies, learnings from CAGA become important. With such CAGA tools, an understanding of all-encompassing gait metrics and their additional impact in understanding objectively optimized clinical outcomes can be achieved. ler

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Cell Phone-Related Lower Extremity Injuries While In or On a Motor Vehicle

By Mathias B. Forrester, BS

Background: In 2023, 97% of United States (US) adults reported that they owned a cell phone. Use of cell phones while driving may result in crashes and injuries. This study characterized cell phone-related lower extremity injuries while in or on a motor vehicle that were treated at US hospital emergency departments (EDs).

Methods: An analysis was performed of cell phone-related lower extremity injuries while in or on a motor vehicle reported to the National Electronic Injury Surveillance System during 2000-2023. The NEISS collects reports of product- and activity-related injuries treated at a representative sample of 100 US hospital EDs. These records can be used to calculate national injury estimates.

Results: An estimated 3,793 cell phone-related lower extremity injuries while in or on a motor vehicle were treated at US hospital EDs during 2000-2023, representing 8.8% of the estimated 43,204 such injuries affecting all body parts. The estimated number of lower extremity injuries increased from 148 during 2000-2003 to 1,601 during 2020-2023. The type of motor vehicle was 82.4% automobile, truck, or unspecified motor vehicle; 12.0% motorcycle, moped, or dirt bike; and 5.7% other. The most severe diagnosis was 38.5% fracture, 18.8% contusion or abrasion, 12.0% laceration, 5.9% strain or sprain, and 24.9% other or not stated. The patient disposition was 72.6% treated or evaluated and released from the ED; 22.8% admitted, transferred to another hospital, or held for observation, and 4.6% left without being seen or against medical advice.

Conclusion: The estimated number of cell phone-related lower extremity injuries while in or on a motor vehicle increased by over an order of magnitude during the study period. Although most of the injuries involved an automobile, truck, or unspecified motor vehicle, other types of vehicles also were involved. While most patients were treated or evaluated and released from the ED, almost one-quarter required further hospital intervention. The results of this study may be useful for creating educational activities to attempt to reduce the occurrence of these injuries.

In 2023, 97% of United States (US) adults reported that they owned a cell (mobile) phone.[1] With millions of people using cell phones, injuries related to the devices are likely to occur. One well-recognized cell phone-related mechanism of injury involves motor vehicle crashes where the driver is using or otherwise distracted by a cell phone.[2,3] Cell phone use while driving is considered such a problem that many states have enacted laws restricting cell phone and other electronic device use while driving.[4]

The objective of the study was to describe cell phone-related lower extremity injuries while in or on a motor vehicle managed at US hospital emergency departments (EDs).

Methods

This retrospective epidemiologic study used data downloaded from the National Electronic Injury Surveillance System (NEISS) website at https://www.cpsc.gov/cgibin/NEISSQuery/home.aspx. The NEISS database has previously been described in detail in *Lower Extremity Review*.[5] In brief, operated by the US Consumer Product Safety Commission (CPSC), NEISS collects data on consumer product- and activity-related injuries from a probabilistic sample of the EDs of approximately 100 US hospitals. National estimates are calculated from database records according to the sample weight assigned to each case based on the inverse probability of the hospital being selected for the NEISS sample.[6,7] The data are publicly available and de-identified, so the study is exempt from institutional review board approval. Previous studies used NEISS data to examine cell phone-related injuries. However, none of these studies focused on injuries while in or on a motor vehicle.[8-12]

Cases were cell phone-related injuries while in or on a motor vehicle reported to NEISS during 2000-2023. Complete methods and search terms are detailed online at **https://lermagazine.com/article/cell-phone-related-lower-extremity-injuries.**

Table 1. Type of motor vehicle involved in cell phone-related injuries while in or on a motor vehicle treated in United States hospital emergency departments, National Electronic Injury Surveillance System, 2000-2023

Type of motor vehicle	Lower extremity (LE) injuries		Total injuries		LE rate %
	Est.	%	Est.	%	
Automobile, truck, or unspecified motor vehicle	3,124	82.4	40,011	92.6	7.8
Motorcycle, moped, or dirt bike	453	12.0	1,317	3.0	34.4
Electric scooter	120	3.2	458	1.1	26.3
Bus	0	0.0	429	1.0	0.0
Golf cart	17	0.4	287	0.7	5.9
All-terrain vehicle	5	0.1	202	0.5	2.4
Electric bicycle	0	0.0	180	0.4	0.0
Go-kart	0	0.0	84	0.2	0.0
Riding lawnmower	0	0.0	74	0.2	0.0
Motorized wheelchair	69	1.8	69	0.2	100.0
Airplane	0	0.0	67	0.2	0.0
Trolley	0	0.0	16	0.0	0.0
Hoverboard	5	0.1	10	0.0	50.0
Total	**3,793**		**43,204**		**8.8**

The lower extremity analysis is based on those records where the most severe diagnosis involved the lower extremity.

LE rate = lower extremity injury estimate/total injury estimate, presented as a percentage.

Estimate = Weighted estimate (sum of the Weight numeric field in the National Electronic Injury Surveillance System database). The numbers in the Weight field are not whole numbers but include decimals. As a result of rounding to whole numbers when performing analyses, the sum of the estimates for a given variable might not equal the total.

Results

There were an estimated 3,793 cell phone-related injuries while in or on a motor vehicle treated at US hospital EDs during 2000-2023 where the most severe diagnosis affected the lower extremity, representing 8.8% of the estimated 43,204 such injuries affecting all body parts. The distribution of lower extremity injuries by body part was 1,522 (40.1%) knee, 728 (19.2%) upper leg, 669 (17.6%) lower leg, 577 (15.2%) ankle, 169 (4.5%) foot, and 129 (3.4%) toe. Of the lower extremity injuries, an estimated 3,763 (99.2%) involved a cell phone, 15 (0.4%) involved a cell phone charger, and 16 (0.4%) involved a cell phone holder. Of the total injuries, an estimated 42,917 (99.3%) involved a cell phone, 249 (0.6%) involved a cell phone charger, and 38 (0.1%) involved a cell phone holder.

The most frequently reported motor vehicle was an automobile, truck, or unspecified motor vehicle followed by a motorcycle, moped, or dirt bike and electric scooter (Table 1). The lower extremity rate was higher for motorcycle, moped, or dirt bike and electric scooter than for automobile, truck, or unspecified motor vehicle.

The Consumer Product Safety Commission considers an estimate unstable and potentially unreliable when the estimate is <1,200.

When the patient age of cell phone-related injuries while in or on a motor vehicle was examined (Table 2), patients aged 13-39 years accounted for roughly 70% of the injuries. Of patients with lower extremity injuries 2,122 (56.0%) were male; of patients with all injuries, 21,485 (49.7%) were male.

Table 3 shows the distribution of cell phone-related injuries while in or on a motor vehicle by most severe diagnosis and patient disposition. For lower extremity injuries, the most frequently reported diagnosis was fracture followed by contusion or abrasion and laceration. For total injuries, the most frequently reported diagnosis was contusion or abrasion followed by strain or sprain and fracture. For both lower extremity injuries and total injuries, most patients were treated or evaluated and released from the ED, although this proportion was greater for total injuries than for lower

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Table 2. Patient age of cell phone-related injuries while in or on a motor vehicle treated in United States hospital emergency departments, National Electronic Injury Surveillance System, 2000-2023

Patient age (years)	Lower extremity (LE) injuries		Total injuries		LE rate %
	Est.	%	Est.	%	
0-5	94	2.5	506	1.2	18.6
6-12	21	0.6	1,071	2.5	2.0
13-19	456	12.0	7,847	18.2	5.8
20-29	1,378	36.3	13,638	31.6	10.1
30-39	945	24.9	8,732	20.2	10.8
40-49	235	6.2	5,194	12.0	4.5
50-59	179	4.7	3,275	7.6	5.5
60-69	261	6.9	1,646	3.8	15.9
70-79	84	2.2	860	2.0	9.8
80+	138	3.6	434	1.0	31.8
Total	**3,793**		**43,204**		**8.8**

*Please see footnote in Table 1.

extremity injuries. In addition, a greater proportion of patients with lower extremity injuries were treated and admitted for hospitalization in the same hospital.

The distribution of cell phone-related injuries while in or on a motor vehicle by time period and location of the incident can be found in Supplementary Table 4 online. The estimated number of both lower extremity injuries and total injuries increased over the 24-year period of the study with approximately 40% of the estimated injuries occurring during the last 4 years of the study period. The lowest proportion of injuries were treated during December-February. Most of the injuries occurred on a street or highway.

Discussion

This study examined cell phone-related injuries while in or on a motor vehicle, focusing on lower extremity injuries. Although the hazards of cell phone use while driving are well-recognized,[2,3] and many states have enacted legislation to restrict the use of cell phones while driving,[4] published data on injuries while in or on a motor vehicle are limited.

For both lower extremity injuries and total injuries, most of the injuries involved an automobile, truck, or unspecified motor vehicle followed by a motorcycle, moped, or dirt bike and electric scooter. While motorcycles, mopeds, or dirt bikes and electric scooters accounted for a small proportion of the injuries, their lower extremity rates were 3-4 times higher than for automobiles, trucks, or unspecified motor vehicles. The lower parts of the bodies of riders of motorcycles, mopeds, dirt bikes, and electric scooters are more exposed, and thus may be at greater risk of injury, than of riders of automobiles and trucks.

The estimated number of cell phone-related injuries while in or on a motor vehicle increased during the 24-year study period, with the estimated number of injuries during 2020-2023 being more than 10 times that during 2000-2003. This increase has continued into recent years, with the estimated number of injuries during 2020-2023 being 70-90% higher than during 2016-2019. This has occurred despite numerous states passing legislation restricting, but not completely banning, cell phone use while driving.[4] It may take time for the full impact of these legislative efforts to take effect. Furthermore, several other factors should be taken into consideration when evaluating the increase in the estimated number of cell phone-related injuries while in or on a motor vehicle. The increase may partly be due to the hospital staff providing records to NEISS increasingly documenting in the Narrative field that the injury involved a cell phone while the patient was in or on a motor vehicle. In addition, the study included injuries where either the driver or a passenger was using or distracted by a cell phone. Legislative restrictions on cell phone use while driving will not likely restrict cell phone use by passengers.

The lowest proportion of cell phone-related injuries while in or on a motor vehicle were treated during December-February. These are the coldest months of the year, and people may be less likely to use motor vehicles or less likely

Table 3. Most severe diagnosis and patient disposition of cell phone-related injuries while in or on a motor vehicle treated in United States hospital emergency departments, National Electronic Injury Surveillance System, 2000-2023

Variable	Lower extremity (LE) injuries		Total injuries		LE rate %
	Est.	%	Est.	%	
Most severe diagnosis					
Contusion or abrasion	712	18.8	9,009	20.9	7.9
Strain or sprain	223	5.9	6,700	15.5	3.3
Fracture	1,461	38.5	5,392	12.5	27.1
Internal organ injury	0	0.0	5,133	11.9	0.0
Laceration	454	12.0	4,716	10.9	9.6
Other or not stated	944	24.9	12,252	28.4	7.7
Patient disposition					
Treated or examined at emergency department and released	2,753	72.6	37,715	87.3	7.3
Treated and admitted for hospitalization (within same facility)	772	20.3	3,391	7.8	22.8
Treated and transferred to another hospital	79	2.1	757	1.8	10.5
Held for observation (includes admitted for observation)	15	0.4	220	0.5	7.0
Left without being seen or left against medical advice	174	4.6	1,121	2.6	15.5
Total	**3,793**		**43,204**		**8.8**

*Please see footnote in Table 1.

to be injured in motor vehicle crashes during these months. When data on 25,608,360 estimated injury only motor vehicle crashes during 2008-2022 were obtained from the National Highway Traffic Safety Administration of the US Department of Transportation Fatality and Injury Reporting System Tool (FIRST) at https://cdan.dot.gov/query, 23.9% occurred during December-February, 24.8% during March-May, 25.4% during June-August, and 25.9% during September-November.

For both lower extremity injuries and total injuries, roughly 70% of the patients were age 13-39 years. This may reflect the fact that individuals age 13-39 years are more likely to use a cell phone while in motor vehicles.

For total injuries, the estimated number of cell phone-related injuries while in or on a motor vehicle were similar for males and females. In contrast, for lower extremity injuries, 56% of the patients were male. It may be that males are slightly more likely than females to be involved in situations that result in lower extremity injuries. For example, automobiles, trucks, and unspecified motor vehicles accounted for 82% of lower extremity injuries but 93% of total injuries, and motorcycles, mopeds, and dirt bikes accounted for 12% of lower extremity injuries but only 3% of total injuries. Among the total injuries involving automobiles, trucks, and unspecified motor vehicles, 48% of the patients were male, while among the total injuries involving motorcycles, mopeds, and dirt bikes, 82% of the patients were male.

Lower extremity and total injuries differed by type of diagnosis. For lower extremity injuries, the most frequently reported diagnosis was fracture followed by contusion or abrasion and laceration. For total injuries, the most frequently reported diagnosis was contusion or abrasion followed by strain or sprain and fracture. Other parts of the body can experience diagnoses that the lower extremity cannot (eg, concussion, internal organ injury). Moreover, the circumstances that lead to lower extremity injuries may

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differ from those that lead to injuries of other body parts, and consequently differences in the types of diagnoses.

When compared to patients with total injuries, patients with lower extremity injuries were less likely to be treated or evaluated and released from the ED (87% vs 73%, respectively) and more likely to be admitted, transferred to another hospital, or held for observation (10% vs 23%, respectively). This suggests that lower extremity injuries may be more serious or require greater hospital intervention than injuries involving the rest of the body.

This study has limitations. The NEISS database does not have any fields or codes to easily identify cell phone-related injuries. For this study, all records where the product code for telephones or telephone accessories was used in any of the product code fields or "phone" was used in the Narrative field were identified. Then the Narrative for each record was reviewed to determine whether the injury was related to a phone while in or on a motor vehicle. Any records that did not include the product code or "phone" in the Narrative would not have been included in the study.

The study included records where either the driver or passenger was using or distracted by a cell phone. Whether it was the driver or a passenger who was using or distracted by a cell phone could not easily be distinguished in all records and thus was not examined.

A person involved in a motor vehicle crash may experience multiple injuries of multiple body parts. However, this study was limited to the data fields that coded the single most severe diagnosis and affected body part because these were the only fields that consistently documented diagnosis and affected body part throughout the entire study period. Thus, a higher proportion of patients may have experienced lower extremity injuries.

The selection of records for inclusion in the study was made by a single person. Finally, the study included only patients treated at hospital EDs. Examination of patients treated elsewhere, such as at home, at an independent urgent care, or by a primary care physician, would provide a more complete understanding of injuries that occur while in or on a motor vehicle.

In conclusion, the estimated number of cell phone-related lower extremity injuries while in or on a motor vehicle that were treated at US hospital EDs increased during the 24-year period of the study. Over 70% of the patients were age 13-39 years, and most patients were male. The most frequently reported diagnoses were fracture followed by contusion or abrasion and laceration. Although most patients were treated or evaluated and released from the ED, almost one-quarter required further hospital intervention. The results of this study may be useful for creating educational activities to attempt to reduce the occurrence of these injuries. ler

Mathias B. Forrester, BS, is an independent researcher in Austin, Texas. Now retired, he has performed public health research for various university and government programs for 38 years.

References

See online at https://lermagazine.com/article/cell-phone-related-lower-extremity-injuries.

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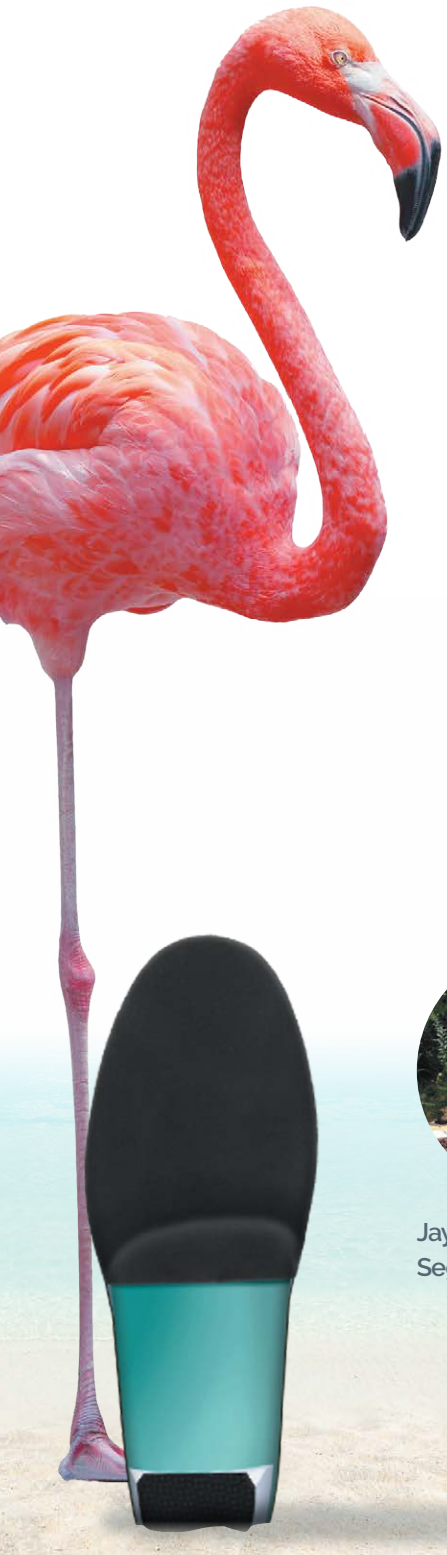

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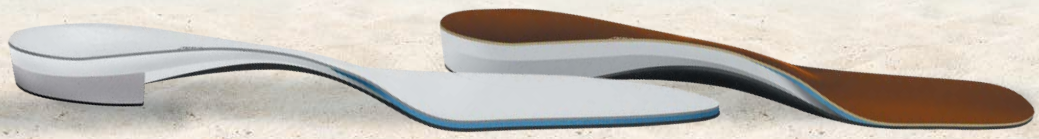

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AAOS Updates Guideline to Prevent THA and TKA Periprosthetic Joint Infection in Patients Undergoing Dental Procedures

The American Academy of Orthopaedic Surgeons(AAOS) issued an updated Clinical Practice Guideline (CPG) for the Prevention of Total Hip and Knee Arthroplasty Periprosthetic Joint Infection (PJI) in Patients Undergoing Dental Procedures, which replaces the previous guideline from 2012. The CPG supports patients who are scheduled for or have undergone total joint arthroplasty (TJA) and may need dental procedures by addressing antibiotic use and the timing of dental procedures before or after joint replacements, such as total knee arthroplasty (TKA) or total hip arthroplasty (THA) to help prevent infection.

"Dental procedures are believed to possibly allow bacteria to enter the bloodstream and attach themselves to hip or knee implants, potentially causing PJI in a patient," said Yale Fillingham, MD, FAAOS, co-chair of the AAOS' guideline development group. "PJI is one of the most devastating complications for patients following TJA, and we must do everything possible that is supported by evidence to prevent these infections. Given the large number of annual TJA procedures and that most of these patients undergo a dental cleaning at least twice a year, this CPG is relevant to nearly every TJA patient."

THA and TKA are 2 of the most common surgical procedures performed worldwide. In the United States, over 1 million THAs and TKAs are performed each year, and these cases are estimated to increase by 659% and 469%, respectively, by 2060. Unfortunately, PJI is associated with increased mortality (up to 250% greater than patients who do not have PJI, along with the risk of a higher incidence of mental health disorders).

The workgroup studied the latest data to provide clinically backed evidence for orthopaedists and dentists aimed at prevention but also weighed it against potential patient harm. The updated guideline includes 2 limited-strength options and 3 consensus options. Options are developed when little or no evidence exists on a particular topic.

The group issued a limited-strength option stating that routine use of a systemic prophylactic antibiotic before a dental procedure in patients with a hip or knee replacement may not reduce the risk of a subsequent PJI.

"The committee took a close look at the data on the administration of antibiotics before a dental procedure after both hip and knee replacement to see if it mitigated the potential risk of a PJI associated with that dental procedure," said Charles Hannon, MD, FAAOS, co-chair of the AAOS' guideline development group. "Based on the best available data, no study found that administering antibiotics before a dental procedure changed a patient's risk of getting a parasitic joint infection. With that said, it is important to recognize there may be other considerations that may lead a provider to prescribe antibiotics for an individual patient. This decision should be made with the patient, and the unique risks and benefits for the patient should be considered."

> Routine use of a systemic prophylactic antibiotic before a dental procedure in patients with a hip or knee replacement may not reduce the risk of a subsequent PJI.

The second limited-strength option states that screening patients who have received certain dental procedures before their hip or knee replacement may not reduce the risk of subsequent PJI. However, the workgroup recognizes that patients should be aware of the potential risks of poor oral hygiene.

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Guidelines At-A-Glance Table

The workgroup also developed a new resource with suggested time intervals between dental procedures and TJA that supports 2 consensus statements. These statements address whether to delay an arthroplasty after a dental procedure or delay a dental procedure after TKA or THA.

The majority of dental procedures should be delayed for up to 3 months after TJA based on the type of procedure performed.

The updated CPG was jointly developed by the AAOS and the American Association of Hip and Knee Surgeons, with contributions from the Infectious Disease Society of America, the Musculoskeletal Infection Society, and the American Dental Association.

Source: *AAOS/AAHKS. The prevention of total hip and knee arthroplasty periprosthetic joint infections in patients undergoing dental procedures. Available at https://www.aaos.org/globalassets/quality-and-practice-resources/dental/dental-2024/prevention-of-total-hip-and-knee-arthroplasty-pji-in-patients-undergoing-dental-procedures-cpg.pdf. Accessed Dec. 20, 2024.*

AAOS/ AAHKS Clinical Practice Guidelines

Suggested Time Intervals Needed Between Dental Procedures Prior to and Following Surgery

Dental Procedure Group*	Considerations	Minimum Time Before TJA#	Minimum Time After TJA§
Dental examination without probing dental radiograph or cone beam CT imaging, denture adjustment procedures, clear orthodontic aligner (invisible braces) adjustment procedures, occlusal guard or bite splint adjustment	Not considered invasive dental procedures. No possibility of manipulation of gingiva.	Same day	Same day
Oral hygiene procedures including dental cleaning, dental prophylaxis using a rubber cup and handpiece [without scaling] or periodontal probing (without SRP)		One day	Three months
Orthodontic procedures including banding or debanding orthodontic fixes or removable appliances, archwire adjustment, orthodontic mini-implant removal, orthodontic separate placement		One day	Three months
Other non-invasive procedures including suture removal, anesthetic injection, crown and bridge placement, dental restorative procedures, rubber dam clamp or matrix band wedge between teeth, impression taking, endodontic treatment (root canal therapy).	Impressions may be taken digitally (no risk) or with intraoral impression material use in a tray (minimal risk).	One day	Three months
Scaling and/or root planing (SRP) with manual (hand instruments) or ultrasonic scaler		One week	Three months
Dental Extractions including single, multiple, impacted third molar	With or without bone graft or platelet-rich fibrin material for socket augmentation	Three weeks	Three months
Oral Surgery (including dental implant surgery, periodontal surgery, cleft palate surgery, piezoelectric surgery, osteosynthesis plate removal)		Three weeks	Three months
Treatment of Active Dental Infection	Antibiotics and oral surgery (e.g. extraction) or endodontic treatment (e.g. root canal therapy)	Three weeks after resolution of active infection	Same day

Notes:

** (Martins, 2023)*

 # Minimum Time Pre TJA is based on dental-procedure induced bacteremia and related procedure healing time. Most transient bacteremia in healthy mouth resolves in several hours but studies indicate longest times for extractions and scaling procedures and 2 hours is the farthest time point assessed in most studies (Martins, 2023).

§ Minimum Time Post TJA is based on joint healing required for stability prior to dental-procedure induced bacteremia.

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INOTEC SECURES $33 MILLION IN SERIES C FINANCING TO ACCELERATE US EXPANSION

Inotec AMD, Cambridge, UK, whose product NATROX® O_2 is a topical oxygen therapy (cTOT) for advanced wound care, recently announced the successful close of a $33 million Series C financing round. The funding, led by existing investors, Amadeus Capital Partners, Meltwind, Puhua Capital, and the Wealth Club, marks a major milestone in the company's mission to heal every chronic wound and improve patients' lives on a global scale.

The proceeds from this round will be strategically used to secure national reimbursement in the US for NATROX O_2, ensuring broader accessibility for patients. Additionally, the funds will support the expansion of the company's leadership team, strengthening its global capabilities to drive future growth and innovation.

NONINVASIVE CONTINUAL BLOOD PRESSURE TESTING DEVICE

The team aims for the device to first be used in hospitals, where it would connect via wire to existing hospital monitors. Eventually, the device could even replace blood pressure cuffs as well.

A multidisciplinary team of California Institute of Technology (Caltech) researchers has figured out a method to noninvasively and continually measure blood pressure anywhere on the body with next to no disruption to the patient. A device based on the new technique holds the promise to enable better vital-sign monitoring at home, in hospitals, and possibly even in remote locations where resources are limited.

The new patented technique, called resonance sonomanometry, uses sound waves to gently stimulate resonance in an artery and then uses ultrasound imaging to measure the artery's resonance frequency, arriving at a true measurement of blood pressure. In a small clinical study, the device, which gives patients a gentle buzzing sensation on the skin, produced results akin to those obtained using the standard-of-care blood pressure cuff.

"We ended up with a device that is able to measure the absolute blood pressure—not only the systolic and diastolic numbers that we are used to getting from blood pressure cuffs—but the full waveform," said Yaser Abu-Mostafa, PhD, a Caltech professor of electrical engineering and computer science.

The current prototype, built and tested by a spin-off company called Esperto Medical, is housed in a transducer case smaller than a deck of cards and is mounted on an armband, though the researchers say it could eventually fit within a package the size of a watch or adhesive patch.

WEARABLE ELECTRIC STIMULATION LEGGINGS

WE-STIM (Wearable Electric Stimulation) harvests natural electric energy generated from body movement. This harvested energy is then delivered to specific targets on the body using special conductive fibers designed inside the clothing. By simply wearing and moving, a microcurrent is activated that rejuvenates muscles without any batteries or wires. This innovative technology boosts athletic performance, aids in

muscle recovery, and minimizes fatigue. The leggings are ideal for users seeking peak performance in any situation, and are especially recommended for activities like long-distance running or interval training. Easy to understand and human-centric in its design, the leggings offer both an eco-friendly and effective approach to health and wellness.

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The Revitalign® Wrigley High Top casual sneaker blends functionality with a contemporary design, tailored for a youthful, style-conscious audience. Available in a lace-up/zip-up style, this chic suede sneaker offers a customized fit that prioritizes everyday comfort. With the company's patented Full Contact Comfort® footbed, wearers can expect unparalleled support and cushioning throughout the day. In addition to the high-top style, an exclusive low-top version will be available only through QVC, giving customers another fashionable option that doesn't compromise on comfort or quality. Waco Shoe Company provides footwear solutions that integrate innovative designs with orthotic comfort. The Wrigley High Top is a testament to this commitment, designed for consumers who desire both style and functionality.

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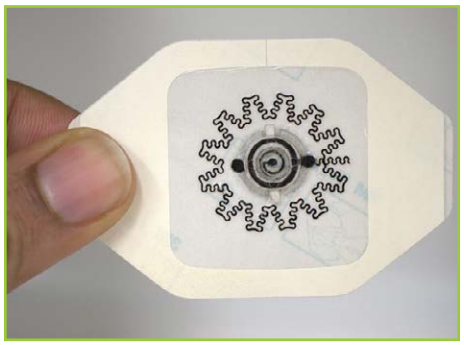
ELECTRIC BANDAGE HOLDS PROMISE FOR TREATING CHRONIC WOUNDS



With additional testing, the researchers will get closer to clinical trials and—ultimately—practical usage. Image courtesy of Kaveti.

Researchers at North Carolina State University (NC State) and Columbia University have developed an inexpensive bandage that uses an electric field to promote healing in chronic wounds. In animal testing, wounds that were treated with these electric bandages healed 30% faster than wounds treated with conventional bandages.

Specifically, the research team developed water-powered, electronics-free dressings (WPEDs), which are disposable wound dressings that have electrodes on 1 side and a small, biocompatible battery on the other. The dressing is applied to a patient so that the electrodes come into contact with the wound. A drop of water is then applied to the battery, activating it. Once activated, the bandage produces an electric field for several hours.

"That electric field is critical, because it's well established that electric fields accelerate healing in chronic wounds," said Rajaram Kaveti, PHD, a researcher at NC State.

The electrodes are designed in a way that allows them to bend with the bandage and conform to the surface of the chronic wounds, which are often deep and irregularly shaped. With the ability to conform to the wound's surface, the electric field is able to be directed from the periphery of the wound toward the wound's center. To focus the electric field effectively, the electrodes need to be in contact with the patient at both the periphery and center of the wound itself. And since these wounds can be asymmetrical and deep, the electrodes need to conform to a wide variety of surface features.

In addition, the WPEDs can be applied quickly and easily. And once applied, patients can move around and take part in daily activities. This functionality means that patients can receive treatment at home and are more likely to comply with treatment.

"Next steps for us include additional work to fine-tune our ability to reduce fluctuations in the electric field and extend the duration of the field," said Amay Bandodkar, PhD, an NC State assistant professor of electrical and computer engineering.

NEW SHOE TECHNOLOGY MAY MITIGATE DFUS

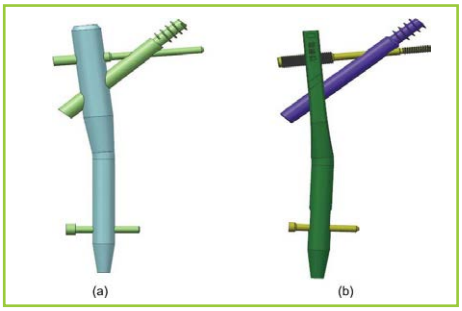
Researchers have developed a new shoe insole technology that helps reduce the risk of diabetic foot ulcers (DFUs), a dangerous open sore that can lead to hospitalization and leg, foot, or toe amputations.

"The goal of this innovative insole technology is to mitigate the risk of diabetic foot ulcers by addressing 1 of their most significant causes: skin and soft tissue breakdown due to repetitive stress on the foot during walking," said Muthu B.J. Wijesundara, PhD, principal research scientist at The University of Texas at Arlington Research Institute (UTARI).

In the US, over 160,000 lower extremity amputations are performed annually due to complications from DFUs; this shoe technology may mitigate DFUs. Image courtesy of UTARI.

"Although many shoe insoles have been created over the years to try to alleviate the problem of foot ulcers, studies have shown that their success in preventing them is marginal," he said. "We took the research a step further by creating a pressure-alternating shoe insole that works by cyclically relieving pressure from different areas of the foot, thereby providing periods of rest to the soft tissues and improving blood flow. This approach aims to maintain the health of the skin and tissues, thereby reducing the risk of diabetic foot ulcers."

SOLUTION OFFERS HOPE FOR TREATING INTERTROCHANTERIC FEMUR FRACTURES IN THE ELDERLY



Schematic of (a) the proximal femur bionic nail (PFBN) and (b) its modified version for preventing bone nonunion, Yingze nail. Image courtesy of Kaixuan Zhang, Wei Chen, and Yingze Zhang.

A research team from various universities and health institutes in China have announced a new innovation as a potential panacea for unstable intertrochanteric femur fractures in the elderly: the Proximal Femur Bionic Nail (PFBN). With the aging population, intertrochanteric femur fractures have become a critical public health concern, prompting a surge in research focused on trauma orthopedics.

Traditional internal fixation techniques have often fallen short in addressing the mechanical challenges posed by these fractures, leading to prolonged recovery times and increased complication rates for patients. However, the development of the PFBN, incorporating the lead researcher's N triangle theory to provide triangular supporting fixation, represents a paradigm shift in the treatment of these fractures.

The key innovation of the PFBN lies in its ability to significantly reduce the occurrence of complications, leading to improved patient outcomes and faster recovery times. Through the use of an equivalent biomechanical model, the research team demonstrated that the PFBN outperforms existing solutions such as the proximal femoral nail antirotation (PFNA) and InterTan, by dramatically decreasing the maximum strain in the proximal femur. Furthermore, the PFBN has been shown to regulate the local mechanical environment in the proximal femur, creating a state of physiological overload that favors post-operative recovery for elderly patients with intertrochanteric femur fractures. This promising outcome offers hope for a transformative approach to internal fixation, with the potential to revolutionize treatment not only for this specific type of fracture but for other fractures as well, based on elastic deformation.

EVERYDAY LIPEDEMA MANAGEMENT LEGGINGS

The Marena Group's innovative Everyday Early-State and Mid-State Management Leggings compression garments are designed for use by patients suffering from lipedema. This collection of leggings is designed to aid in the daily management of early-state and mid-disease-state lipedema and support recovery following lipedema reduction procedures. Both styles feature 15–20 mmHg compression and the company's patent-pending FlexFit Comfort Ankle™ to help improve mobility and comfort. The Early-State leggings are tailored with a tapered leg silhouette for a snug fit and optimal compression during the early state of the disease, while the Mid-State leggings are designed with a fuller leg and ankle silhouette to accommodate these more enlarged areas of the body without causing discomfort or constriction.

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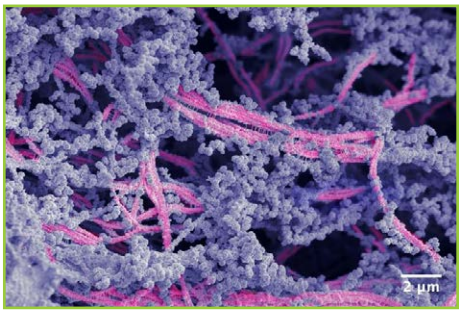
NEW BIOMATERIAL PROMOTES CARTILAGE GROWTH



A microscropy image of the new biomaterial. Nanofibers are pink; hyaluronic acid is shown in purple. Image courtesy of Samuel I. Stupp, Northwestern University.

Northwestern University scientists have developed a new bioactive material that successfully regenerated high-quality cartilage in the knee joints of a large-animal model. Although it looks like a rubbery goo, the material is actually a complex network of molecular components, which work together to mimic cartilage's natural environment in the body.

The researchers tested the material in sheep with cartilage defects in the stifle joint, a complex joint in the hind limbs similar to the human knee. Much like humans, sheep cartilage is stubborn and incredibly difficult to regenerate. Sheep stifles and human knees

also have similarities in weight bearing, size and mechanical loads. Within 6 months, the researchers observed evidence of enhanced repair, including the growth of new cartilage containing the natural biopolymers (collagen II and proteoglycans), which enable pain-free mechanical resilience in joints.

The new biomaterial comprises 2 components: a bioactive peptide that binds to transforming growth factor beta-1 (TGFb-1)—an essential protein for cartilage growth and maintenance—and modified hyaluronic acid, a natural polysaccharide present in cartilage and the lubricating synovial fluid in joints. Stupp's team integrated the bioactive peptide and chemically modified hyaluronic acid particles to drive the self-organization of nanoscale fibers into bundles that mimic the natural architecture of cartilage. The goal was to create an attractive scaffold for the body's own cells to regenerate cartilage tissue. Using bioactive signals in the nanoscale fibers, the material encourages cartilage repair by the cells, which populate the scaffold.

With more work, the researchers say the new material someday could potentially be used to prevent full knee replacement surgeries, treat degenerative diseases like osteoarthritis, and repair sports-related injuries like anterior cruciate ligament tears.

BIO LEG NAMED 2025 BEST OF INNOVATION BY CES INNOVATION AWARDS

BionicM, Tokyo, Japan, announced that its powered prosthetic knee, Bio Leg®, was named a 2025 Best of Innovation in Accessibility & AgeTech by the CES Innovation Awards® 2025 program. The prosthesis offers a new walking experience through its power-assist feature, which sets it apart from traditional prosthetic devices. In May 2024, it received U. medical insurance coverage approval.

The CES Innovation Awards program, owned and produced by the Consumer Technology Association (CTA)®, is an annual competition honoring outstanding design and engineering in 33 consumer technology product categories. Those with the highest rating receive the "Best of Innovation" distinction. An elite panel of industry expert judges, including members of the media, designers, engineers, and more, reviewed submissions based on innovation, engineering and functionality, aesthetic, and design.

SOCKS WITH INFRARED TECHNOLOGY

Hologenix, a pioneer in textile innovation and the company behind CELLIANT® infrared (IR) materials, has linked up with Cadense, an adaptive shoe company, to debut the Cadense Energy Boost Performance sock. When embedded into socks, CELLIANT captures body heat and converts it into IR energy, which is reflected back into the foot and lower leg to increase local circulation and cellular oxygenation. While anyone can benefit from IR light therapy via wearing IR socks, the circulation benefits are particularly helpful for people who spend a lot of time on their feet or need extra support.

Cadense
805/225-7765
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HEEL REVIVAL CREAM

In honor of Mentholatum's 135th anniversary, the company announced the launch of its Heel Revival Cream. Developed in the FootHealth™ Innovation Lab, the cream features a groundbreaking patented formula that penetrates deep

into the skin to target and eliminate fungal infections at their source. With daily use, this unique technology not only resolves current issues but also helps prevent the recurrence of cracked heels. The formula ensures ongoing protection, giving users long-term relief and healthier, smoother heels. Backed by robust clinical trials, Mentholatum® Heel Revival Cream has been proven to dramatically improve cracked heels and dryness within just 2 weeks of use. 100% of users experienced significant improvement in their heel condition, while 9 out of 10 users reported immediate soothing relief upon application. After 4 weeks, all participants in the study maintained visible and sustained improvements, affirming the cream's powerful ability to deliver real, lasting results

Mentholatum
716/677-2500
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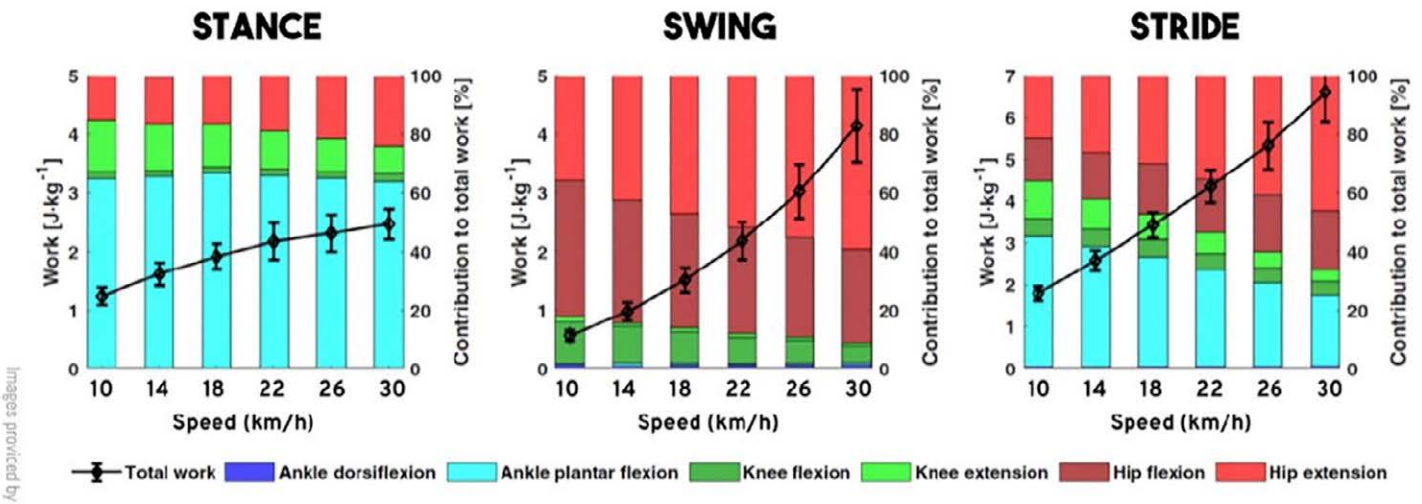
HOW HUMANS RUN FASTER

Reference et al. : Willer et al. SJMSS 2024

Designed by @YLMSportScience

Eleven male middle-distance runners were tested on an instrumented treadmill to characterize the contributions of functional muscle groups to running at six wide-ranging speeds (10–30 km/h)



Images provided by PresenterMedia

- These results reinforce the importance of the plantar flexors for running at ≤18 km/h, as they made the largest contribution of any muscle group, not just during stance, but also to whole stride positive and negative work (45%–35%), despite their relatively modest size.
- Large speed-dependent changes meant that at >29 km/h the largest contributors to the work of a running stride were the hip extensors (positive work) and knee flexors (negative work), which concurs with the importance of these muscle groups for sprint performance and the high incidence of hamstrings injury in sprint athletes.
- These findings support the importance of long-distance athletes conditioning the plantar flexors, and sprint athletes conditioning the hip extensors and knee flexors for enhancing performance and mitigating injury risk.

Source: Willer J, Allen SJ, Burden RJ, Folland JP. How Humans Run Faster: The Neuromechanical Contributions of Functional Muscle Groups to Running at Different Speeds. Scand J Med Sci Sports. 2024;34(8):e14690. doi: 10.1111/sms.14690.

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