Collaborative Care for Better Outcomes

LOWER EXTREMITY REVIEW
February 23 / volume 15 / number 2

PERIPHERAL NEUROPATHY

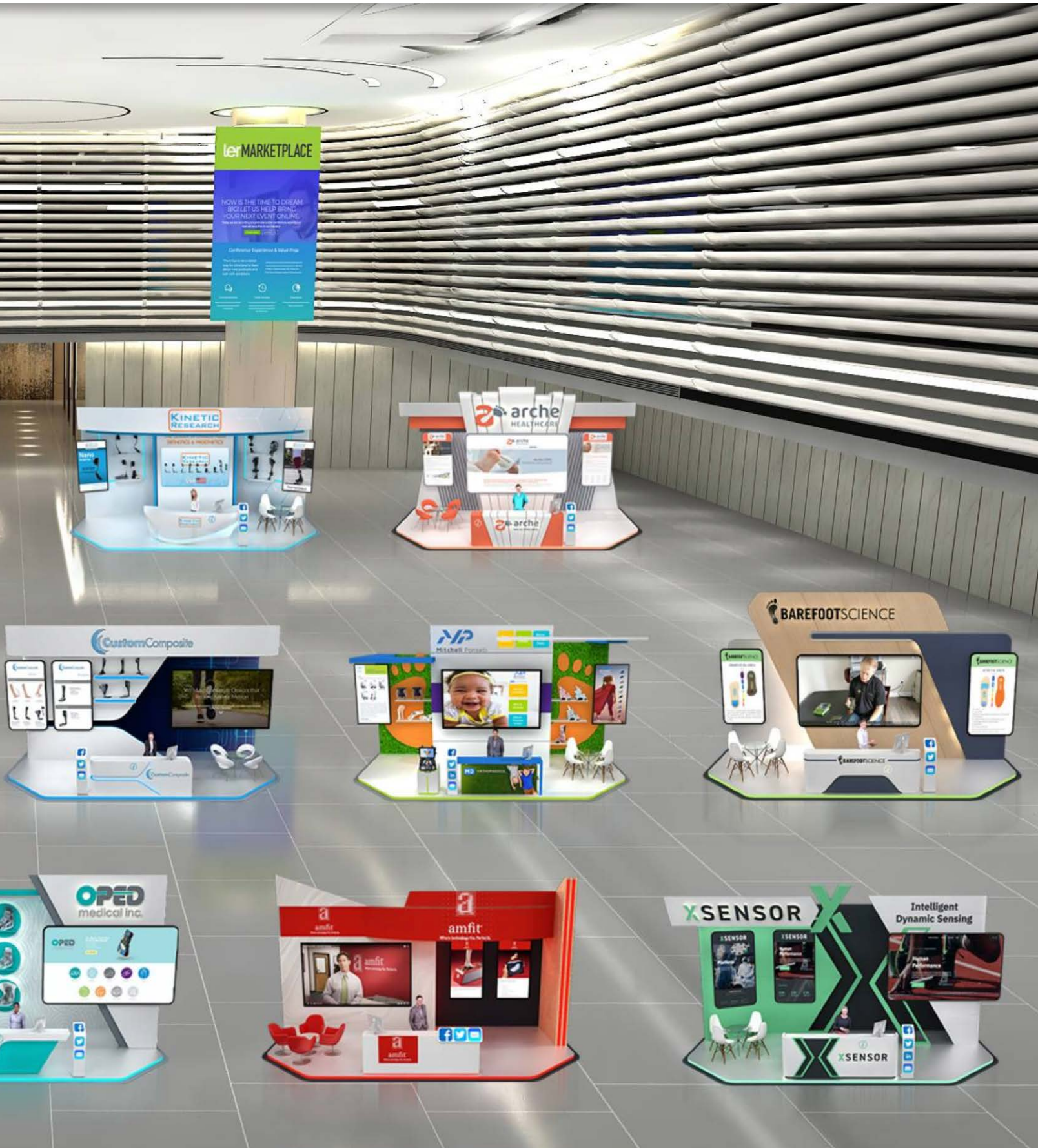
NOW OPEN

lerMARKETPLACE

A New Kind of Exhibit Hall

Available 24/7/365

IerMARKETPLACE.com is THE place to learn about the products you need now from the names you trust.



EXPLORE MORE.
ADVENTURE MORE.

The lightweight and breathable Expedition orthotic is engineered for repeated impact and shock absorption.

Start providing Footmaxx orthotics today!

1.800.779.3668

Footmaxx™

Footmaxx.com/get-started

LOWER EXTREMITY REVIEW

ler

VOLUME 15 NUMBER 21 LERMAGAZINE.COM

February 2023

contents

GUEST PERSPECTIVE

INTERNATIONAL GUEST PERSPECTIVE

NEW & NOTEWORTHY

AD INDEX

THE LAST WORD

COVER STORY

SHORTTAKES FROM THE LITERATURE

LEREXPO.COM

FEATURES

DIGITSOLE PRO

UNLOCK YOUR PATIENTS BIOMECHANICS SECRETS!

Powered by our **EXCLUSIVE AI ALGORITHM,** Digitsole Pro is your in clinic digital partner to objectively measure biomechanical data not observed by the naked eye.

- Run and walk analysis
- Remotely monitor mobility with our Digitsole smart insole
- Discover rich biomechanical data to guide clinical discussions for Plantar Fasciitis, Hallux Valgus, Achilles injuries, and more.

RUN
All terrain including treadmills

WALK
For use in any environment

COMING SOON - **REHAB Analysis**

SMART MOTION, EMPOWERING YOU

SCAN HERE TO REGISTER FOR OUR WEBINARS

ASK ABOUT OUR EARLY ADOPTER PROMOTION!

TO LEARN MORE AND ACCESS A FREE DEMO GO TO **DigitsolePro.com**
Contact us at: USASALES@DIGITSOLE.COM

LOWER EXTREMITY REVIEW

ler

Richard Dubin
Publisher and Chief Executive Officer
rich@lermagazine.com | 512.231.4042

STAFF

Editor
Janice T. Radak | janice@lermagazine.com

Associate Editor
Laura Fonda Hochnadel | laura@lermagazine.com

Marketing Manager
Glenn Castle | glenn@lermagazine.com

Graphic Design/Production and Website Development
Anthony Palmeri | PopStart Web Dev
webmaster@lermagazine.com

Operations Coordinator
Melissa Rosenthal-Dubin | melissa@lermagazine.com

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
41 State St. • Suite 604-16 • Albany, NY 12207
518.452.6898

Lower Extremity Review Mission

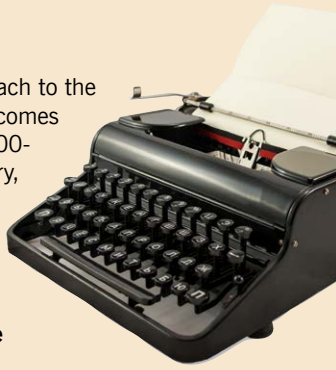
Showcasing evidence and expertise across multiple medical disciplines to build, preserve, and restore function of the lower extremity from pediatrics to geriatrics.

EDITORIAL PILLARS

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

EDITORIAL ADVISORY BOARD

INFORMATION FOR AUTHORS



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.

See detailed Author Guidelines at lermagazine.com – click the Editorial tab on the homepage.

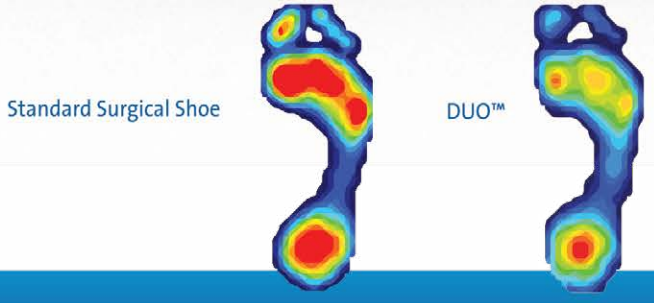
ELECTRONIC SUBMISSIONS

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**

Introducing the new

DARCO DUO

Dual Density



The MedSurg Duo™ shoe combines two different densities of EVA to provide excellent pressure relief long term. The sole provides 4x better shock absorption than a standard TPR sole. The MedSurg DUO™ shoe is built to last.

DUO™ Features and Benefits

- The Dual Density EVA sole is lightweight, more durable, and provides better shock absorption.
- Adjustable ankle strap with ankle pad is softer, meaning more patient comfort.
- Dual Buckle means strap and pad can be switched left or right
- The DUO™ is compatible with the PQ - Peg Assist Offloading Insole to form the premier offloading combination on the market.
- 5 Sizes means reduction in inventory.
- Duo EVA sole provides up to 40% pressure reduction over a standard post op. shoe.

Pair with the PQ Peg Assist to enhance offloading.

www.darcointernational.com
Contact your DARCO distributor today!

Guest **Perspective**

Hello, NBD Participants, Fans, and Sponsors!

By Paul DeVita, PhD

National Biomechanics Day 2023 is gearing up for a new year and we can't wait to have you join us on the ride! Set your sites on April 5, 2023 for this year's big event!

We are pleased to report that we have announced our 2023 grant recipients which included 23 grants totaling over $21,000 for graduate students from 7 nations around the world. These grants support NBD events focused on increasing diversity in Biomechanics through events with women, black and LatinX students, and programs working in disability biomechanics. The women's program continues to get the most applications and we funded 9 of 17 in this group. As we say, National Biomechanics Day is now part of the Biomechanics Firmament and through our grant programs, we are now able to give back to our fans, supporters, and the field of Biomechanics. The grant programs are partially funded through donations from all our sponsors but are also directly sponsored by Bertec, Inc, The American Society of Biomechanics, and Books of Discovery.

In other news, NBD is collaborating with the new and vibrant organization, International Women in Biomechanics, to fulfill our often stated idea, "NBD provides a platform upon which we unite into one synchronized, worldwide celebration of Biomechanics." We will synchronize 3 independent NBD events through a virtual link-up. Each event will show the other 2, "what's happenin' in Biomechanics," at its site. The high school participants will better understand the around-the-world nature of NBD and of Biomechanics, itself. This synchronized NBD event will occur on the official NBD date, April 5, 2023. Please watch for the link on Twitter and join in if you can.

In the "well, that's interesting" category: While there have been (approximately) a billion biomechanics science articles, two billion smiles on kids' faces during NBD events, and… a few good NBD stories, we have now produced our first NBD Parable. In fact, we are pretty sure it is the first parable on anything Biomechanics. Why? Because we love to have fun while promoting the Breakthrough Science of the 21st Century!!! Please take a few minutes to watch the parable (it's less than 5 minutes long) and learn how our Biomechanics-STEM outreach will enhance and grow the science and the application of Biomechanics. Then perhaps, if you are not signed up already, consider holding an NBD event this year. It's very simple: invite high school kids to your lab and show them fun and cool Biomechanics, as has been done at over 500 NBD events worldwide throughout the past few years and shown in our Archives. Please join the worldwide NBD celebration this year.

Paul DeVita, PhD, is director of the Biomechanics Laboratory and professor of kinesiology at East Carolina University in Greenville, North Carolina. He is past-president of the American Society of Biomechanics and a leader in The Biomechanics Initiative which hosts National Biomechanics Day. He also serves on the Editorial Advisory Board for Lower Extremity Review.

CELIARUIZ®

It's Not Just **Footwear**
It's Your **Health**

Find Comfort in Fully Adjustable
Therapeutic Wellness Footwear

Shop Now

www.celiaruizusa.com

Phone: 410-983-3982

E-mail: info@celiaruizusa.com

Incorporating Green Podiatry

BY ANGELA MARGARET EVANS, AM*

"The climate emergency is a multidisciplinary, multisectoral crisis that transcends professional and organizational barriers. Health professionals can help bring sharp focus to the urgent reforms required from individuals, organizations, and governments".[1]

Table 1 The three pillars of Green Podiatry for clinicians. Assess carbon calculations – work (UK) https://www.gpcarbon.org/#/; and at home (Australia): https://www.wwf.org.au/get-involved/change-the-way-you-live/ecological-footprint-calculator#gs.u5agd1

Green Podiatry Pillars		
Exercise	**Evidence**	**Everyday**
Feet as C-neutral transport Walk, ride, swim, run, dance • Good for people • Good for the planet • Evidence-based	**Stop treatment which is not evidence-based** eg Bespoke foot orthoses for paediatric flat feet	**Supply chains are the major healthcare emission** • Use less of everything • Reuse, repair • Recycle, reform (circular economy) • Buy from local sources • Adopt active travel for work (even once/week)
Feet for exercise should be the primary podiatry focus for every patient Use wearable technology to measure physical activity General advice • Screen time • Diet • Sleep • Exercise 'dosage'/age https://www.who.int/news-room/fact-sheets/detail/physical-activity	Use 'choose wisely' questions with patients: 1. Do I really need this test, treatment or procedure? 2. What are the risks? 3. Are there simpler, safer options? 4. What happens if I don't do anything? 5. What are the costs? https://www.choosingwisely.org.au/resources/consumers-and-carers/5questions Attend online webinars, reduce your travel emissions, especially long flights	Energy • electrify with renewables • e-records, telehealth Minimise single use items Collection bins: • Paper • Plastics • e-waste • Footwear to recycle

I share the view that sustainability in practice begins with embedding climate change in university curriculums.[2] The [British] National Health Service (NHS) has ambitious targets to reach net zero over the next 2 decades. Clinicians will require knowledge and support to achieve this goal, as part of the NHS responsibility for achieving climate targets.[3,4]

Climate action needs promotion in public health to include the large emission areas (eg, transport, energy, food, agriculture, and housing) to reduce air pollution, increase physical activity, and improve diets.[5,6]

A fresh focus on 'big picture health,'[3] must balance/lessen the management of illness. Medical 'prescribing' can prioritize 'green health,' to encourage time in the natural world as therapeutic, as occurs in Canada,[7] Scotland,[8] and China.[9]

Green Podiatry – Pillars for Practice

Green Podiatry is founded on: 1) exercise, 2) evidence, and 3) everyday actions[4] (Table 1). Calculation of your carbon footprint [visit footprintnetwork.org], at work and at home, is illuminating, and provides a baseline for targeting change, eg,

– walk to the shops rather than drive

– use public transport

– walk/cycle to work (even once/week)

and encourage patients similarly.

Such simple changes are good for health, good for our planet, and raise awareness of both.[10]

1. Exercise

Podiatrists need to focus on foot health for carbon-neutral transport. Physical activity is easily measured with wearable technology (phones, watches, Fitbits) and 'dosed', eg adults: 300 min moderate-vigorous physical activity/week, and more if sedentary.[5,10] This is essential primary healthcare for podiatrists to champion, and a great antidote for noncommunicable diseases (eg, diabetes, arthritis, obesity, depression, cancer, heart disease). Exercise may allay 'eco-anxiety' in children, with cycling fostering children's well-being and independent transport.[11]

A 'green shoe list' [https://angelaevanspodiatrists.com.au/wp-content/uploads/2022/08/green-shoes-2022.pdf, accessed January 15, 2023] acknowledges that exercise involves feet and footwear. Podiatry needs transparency from footwear manufacturers to avert 'green-washing' for commercial gain.[6] Aware manufacturers increasingly use natural materials, including raffia palm and banana skin fibers.[12] Footwear can be repaired and recycled (access local footwear recycling[7]), and dedicated companies offer 'take back' programs[8] and even shoes for lease.[9]

The Green Foot Orthoses Project (GFOP) is a new initiative,[10] and foot orthoses use must be supported by diagnosis and evidence. Repairing orthoses further extends product life.

2. Evidence

We can encourage 'health', over 'healthcare,' In the lower limb, knee arthroscopy[13] and customized foot orthoses for pediatric flat feet[14] are interventions no longer evidence-based, and clinicians should stop using them. Healthcare

This article has been excerpted from "Incorporating 'Green Podiatry' into your clinic, and into your life" Foot Ankle Res. 2022;15(1). https://jfootankleres.biomedcentral.com/articles/10.1186/s13047-022-00591-y. Editing has occurred, including the deletion and renumbering of references for brevity.

Continued on page 13

Fall in Love With Your Orthotic Lab

Unrivaled custom orthotics are just the beginning at Orthotica Labs

MAY WE TELL YOU MORE?

888.895.1305
orthotica.com/learn-more

ORTHOTICA Labs

Continued from page 11

needs to focus on evidence-based care, and dispense with unnecessary treatments, imaging, and tests.[14,16] We can engage patients in 'Wiser Healthcare' to avert overdiagnosis[17] and excessive healthcare.[11] Podiatrists are in prime position to promote healthy feet for physical activity which aids health,[18] is evidence-based,[10] and provides carbon-neutral transport.[5]

3. Everyday

The first commentary outlined changes for podiatrists to lessen greenhouse gas emissions.[19] Fossil fuels comprise 98% of plastics, and approximately 40% of plastics are single-use.[21] Healthcare is a large user, especially hospitals,[22] where use of personal protection equipment and single-use items creates enormous waste. Pegna and McNally[20] have suggested a pause:

"We are constantly told that for 'infection control reasons' we must wear and use single-use items. But where is the evidence for this? Is there evidence that single-use items are always safer than reusable ones? Is there evidence that disposable drapes are better than washable for infection prevention?"

The NHS and Climate and Health Alliance support the Global Green and Healthy Hospital network to reduce environmental impacts of workplaces.[14] Supply chains cause most emissions (approximately 70%), and the Royal College of Podiatry and Australian Podiatry Association could partner with suppliers, footwear manufacturers, waste hubs (eg, Treadlightly[15]), to access 'green' supplies, and circular economy waste cycles.

Conclusion

Ultimately, we each share the responsibility to work and live as 'green' as we can. What we do as podiatrists–reduce waste, reduce unnecessary treatment, promote and live 'green podiatry'–and as citizens–buy local, buy less, choose renewable energy, vote thoughtfully, divest fossil fuel investments, manage waste–is important for every aspect of health.

Two suggestions for podiatrists are to: 1) adopt the 3 pillars of Green Podiatry, viz., exercise, evidence, and everyday practices; 2) promote feet as carbon-neutral transport, and physical activity as evidence based and health enhancing. Podiatry has a great opportunity for positive legacy.

Angela Eveans, AM, is adjunct associate professor in the Discipline of Podiatry, School of Allied Health, Human Services and Sport at La Trobe University in Adelaide, Australia.

References

1. Dobson J, Cook S, Frumkin H, Haines A, Abbasi K. Accelerating climate action: the role of health professionals. BMJ. 2021;375:n2425.
2. Brand G, Collins J, Bedi G, Bonnamy J, Barbour L, Ilangakoon C, et al. "I teach it because it is the biggest threat to health": Integrating sustainable healthcare into health professions education. Med Teach. 2020:1–9.
3. Tennison I, Roschnik S, Ashby B, Boyd R, Hamilton I, Oreszczyn T, et al. Health care's response to climate change: a carbon footprint assessment of the NHS in England. Lancet Planet Heal. 2021;5:e84–92.
4. Watts N, Amann M, Arnell N, Ayeb-Karlsson S, Beagley J, Belesova K, et al. The 2020 report of The Lancet Countdown on health and climate change: responding to converging crises. Lancet. 2020;397:129–70.
5. Brand C, Götschi T, Dons E, Gerike R, Anaya-Boig E, Avila-Palencia I, et al. The climate change mitigation impacts of active travel: Evidence from a longitudinal panel study in seven European cities. Global Environ Change. 2021;67:102224.
6. Marshman J, Blay-Palmer A, Landman K. Anthropocene Crisis: Climate Change, Pollinators, and Food Security. Environ. 2019;6:22.
7. Pitt TM, Aucoin J, HubkaRao T, Goopy S, Cabaj J, Hagel B, et al. The Relationship of Urban Form on Children and Adolescent Health Outcomes: A Scoping Review of Canadian Evidence. Int J Environ Res Pu. 2021;18:4180.
8. McDougall CW, Hanley N, Quilliam RS, Bartie PJ, Robertson T, Griffiths M, et al. Neighbourhood blue space and mental health: A nationwide ecological study of antidepressant medication prescribed to older adults. Landscape Urban Plan. 2021;214:104132.
9. Zhang J, Cui J, Astell-Burt T, Shi W, Peng J, Lei L, et al. Weekly green space visit duration is positively associated with favorable health outcomes in people with hypertension: Evidence from Shenzhen, China. Environ Res. 2022;212:113228.
10. Bull FC, Al-Ansari SS, Biddle S, Borodulin K, Buman MP, Cardon G, et al. World Health Organization 2020 guidelines on physical activity and sedentary behaviour. Brit J Sport Med. 2020;54:1451–62.
11. Wild K, Woodward A. The bicycle as 'constructive hope': Children, climate and active transport. J Paediatr Child H. 2021;57:1785–8.
12. Unal F, Avinc O, Yavas A. Sustainable approaches in textiles and fashion, fibres, raw materials and product development. 2022. p. 157–93.
13. Siemieniuk RAC, Harris IA, Agoritsas T, Poolman RW, Brignardello-Petersen R, de Velde SV, et al. Arthroscopic surgery for degenerative knee arthritis and meniscal tears: a clinical practice guideline. BMJ. 2017;357:j1982.
14. Evans AM, Rome K, Carroll M, Hawke F. Foot orthoses for treating paediatric flat feet. Cochrane Db Syst Rev. 2022;2022:CD006311.
15. Fleck LM. Choosing Wisely. Camb Q Healthc Ethics Cq Int J Healthc Ethics Committees. 2016;25:366–76.
16. Levinson W, Kallewaard M, Bhatia RS, et al. "Choosing Wisely": a growing international campaign. BMJ Qual Saf. 2014;24:167–74.
17. Barratt A, McGain F. Overdiagnosis is increasing the carbon footprint of healthcare. BMJ. 2021;375:n2407.
18. Grunseit A, Richards J, Merom D. Running on a high: parkrun and personal well-being. BMC Public Health. 2017;18:59.
19. Evans AM. Sustainable healthcare – Time for 'Green Podiatry.' J Foot Ankle Res. 2021;14:45.
20. Pegna V, McNally SA. Are single use items the biggest scam of the century? Bulletin Royal Coll Surg Engl. 2021;103:233–5.

BAUERFEIND®

GenuTrain® OA
TARGETED RELIEF AND COMPLIANCE DELIVERED

GenuTrain® OA

+ **INNOVATIVE UNLOADING SYSTEM**
  PROVIDES TARGETED PAIN RELIEF
+ **EASY ADJUSTABLE RELIEF**
  WITH BOA® FIT-SYSTEM
+ **ALL-DAY WEARING COMFORT**
  LIGHTWEIGHT, LOW-PROFILE DESIGN

For more information
Please contact info@bauerfeindusa.com
or call (800) 423-3405

BAUERFEIND.COM

100MG ASPIRIN UPS RISK OF SERIOUS FALLS

Following on the 2018 ASPREE trial findings that the daily use of aspirin did not improve disability-free survival among aging adults, a new substudy now reports that aspirin (100mg daily) was associated with a higher risk of serious falls (incidence ratio: 1.17; P = 0.01). The researchers recruited 16,703 people (median age, 74; 55% women; 8322 in intervention group, 8381 in control group) for the ASPREE-FRACTURE substudy; data were analyzed from October 17, 2019 to August 31, 2022. Primary outcome was the occurrence of any fracture; secondary outcome was serious fall resulting in hospital presentation. There were 2865 fractures and 1688 serious falls in near 5-year follow-up.

The authors concluded that based on their findings, aspirin provides "little favorable benefit" in the healthy, white older adult population.

Source: *Barker AL, Morello R, Thao LTP, et al. Daily low-dose aspirin and risk of serious falls and fractures in healthy older people: a substudy of the ASPREE randomized clinical trial. JAMA Intern Med. 2022;182(12):1289–1297. doi:10.1001/jamainternmed.2022.5028*

TELMISARTAN DID NOT IMPROVE MOBILITY IN PERIPHERAL ARTERIAL DISEASE

The blood pressure medication telmisartan did not improve walking performance in patients with peripheral arterial disease (PAD) in the lower extremity, according to new research. These results challenge previous studies that found telmisartan improved running strength in mice and increased treadmill walking distance in people with PAD. The new findings did indicate, however, that people with PAD could improve their walking performance through exercise.

Researchers from multiple sites randomly assigned 114 participants who had PAD to either receive telmisartan or a placebo; average age was 67 years, 40% were women, and 71% were Black. Participants were randomly assigned walking exercises on a treadmill 3x/week with an expert or 1-hour educational sessions on health topics with study personnel. The researchers compared results on the 6-minute walk distance between the telmisartan and placebo groups at baseline and at a 6-month follow-up and evaluated several measures of speed, performance, and function.

Participants who took telmisartan had lower blood pressure after 6 months. However, telmisartan did not improve 6-minute walk distance, speed, performance, or function compared with placebo at a 6-month follow-up. Instead, the effects of telmisartan trended–albeit insignificantly–toward worse performance on 6-minute walk distance compared with placebo. A follow-up analysis, however, did show that exercise improved the 6-minute walk distance.

Source: *McDermott MM, Bazzano L, Peterson CA, et al. Effect of telmisartan on walking performance in patients with lower extremity peripheral artery disease: the TELEX randomized clinical trial. JAMA. 2022;328(13):1315-1325. doi: 10.1001/jama.2022.16797*

BLOOD FLOW RESTRICTION EXERCISE AFTER ACL RECONSTRUCTION

It is well known that muscle mass is lost following anterior cruciate ligament reconstruction (ACLR) surgery. These researchers sought to compare muscle strength gain in the quadriceps and hamstring muscles in patients following ACLR surgery using exercises with and without

Continued on page 17

New Hallux Treatment Options

Relieve Big Toe Joint Pain — Comfortably... with New 1stRaythotics™ from PediFix®

Innovative Preforms® for Turf Toe, Hallux Limitus, Rigidus, More

Morton's Extensions — with Integrated Orthotic Support — Limit, Stabilize MTPJ Function

- *Targeted Shoe Stiffening Relieves Discomfort, Speeds Healing*
- *Keep Patients Active, With Less or No Forefoot Pain*
- *Never Dispense Another FLAT Turf Toe Plate Again!*
- *Order by Shoe Size or Enable Patient Direct Purchase at www.pedifix.com*

New 1stRaythotics™ relieve MTPJ pain with an exclusive combination of Morton's Extensions, integrated mid-foot support, and thin, light, semi-flexible XTS Carbon Fiber construction. These allow your patients to remain active while they speed healing of common forefoot conditions. So thin, they fit comfortably in most footwear styles. The Turf Toe Plate has finally evolved! Try a pair yourself today.

Thin, Comfortable, Flexible Support

PediFix®
Medical Footcare

To order or get more information, mention code LER822-1

Call: 1-800-424-5561

Fax: 845-277-2851

E-mail: info@pedifix.com

Visit: https://medical.pedifix.com/t-1straythotics.aspx

Return this Coupon to:
PediFix, 301 Fields Lane, Dept. LER822-1, Brewster, NY 10509

Yes, I'm interested in new 1stRaythotics™ to relieve MTPJ pain. Please send me:

PediFix® Medical Footcare

☐ More information

☐ 1/2-Priced Sample Pair ($37.50, Free Shipping)
☐ Men's ☐ Women's Shoe Size _____

Your Name _____

Practice Name _____

Shipping Address _____

City _____ State _____ Zip _____

Phone _____

Fax _____

Email _____

In our practice, we see approximately _____ (#) patients each week.

My favorite supplier is _____

I prefer: ☐ to Dispense ☐ to Prescribe ☐ Patient Direct Order

Mail to: PediFix, Dept. LER822-1, 301 Fields Lane, Brewster, NY 10509

Fax to: 845-277-2851

Please provide all information requested.

*This offer is for healthcare professionals only. Limit one free sample per customer.

Continued from page 15

blood flow restriction.

Following a randomized controlled trial protocol (Figure 1), 50% (n = 14) of participants were allocated to the intervention group and 50% (n = 14) to the control group. All participants were post-ACLR patients. Exercises included leg press and flexor chair. The intervention group used pressure gauges measuring 10 × 80 cm in width and a 7 × 52 cm pneumatic bag (Cuff Scientific Leg® – WCS, Curitiba, Paraná, Brazil) in the region close to the inguinal ligament of the right and left leg. The control group performed the same proposed exercises without any occlusion material.

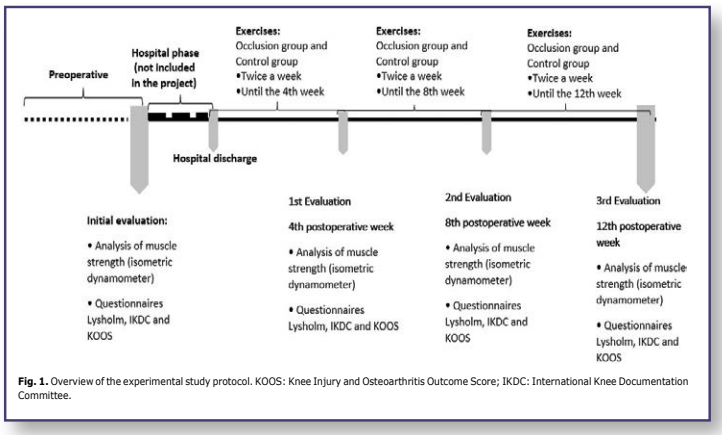


Fig. 1. Overview of the experimental study protocol. KOOS: Knee Injury and Osteoarthritis Outcome Score; IKDC: International Knee Documentation Committee.

At the end of rehabilitation of the groups, the researchers saw a statistical difference in the quadriceps with an increase in muscle strength ($P < 0.01$) after 12 weeks and an increase in hamstring muscle strength ($P < 0.01$) after 8 and 12 weeks in the injured legs of the intervention group compared to the control. In the analysis of the participants' physical function, there was a significant increase difference in the Lysholm questionnaire ($P < 0.01$) after 8 and 12 weeks; in the KOOS pain questionnaire ($P < 0.01$) after 4 weeks a decrease was observed; symptoms and daily activities ($P < 0.01$) after 8 and 12 weeks, quality of life ($P < 0.01$) after 12 weeks, and in the IKDC questionnaire ($P < 0.01$) after 8 and 12 weeks there was a significant increase difference of the intervention group compared to the control.

The team concluded that after anterior cruciate ligament surgery, exercises with blood flow restriction proved more efficient for improving the muscle strength of the quadriceps and hamstrings, and the physical function of the knee than the same exercises without blood flow restriction. (ler)

Source: *Shuman BR, Totah D, Gates DH, et al. Comparison of five different methodologies for evaluating ankle–foot orthosis stiffness. J NeuroEngineering Rehabil. 2023;20:11. https://doi.org/10.1186/s12984-023-01126-7*

AGE-RELATED MUSCLE DECLINE RELATED TO LETHAL CHILDHOOD DISEASE?

Adopting some of the strategies behind successfully treating the childhood disease spinal muscular atrophy (SMA) may enable development of therapies to curb the muscle decline that accompanies aging, new research suggests.

At the heart of both disorders is the survival motor neuron (SMN) protein, which is present throughout the body, and is important for keeping motor neuron cells alive and sending proper signals from the central nervous system to muscles. A gene mutation leading to reduced levels of this protein causes SMA, and gene therapy is among the 3 SMA therapeutics clinically available. The first children to receive gene therapy are now 6 years old.

Based on what years of SMA research has shown about the importance of SMN protein to neuromuscular integrity, Ohio State University scientists are exploring links between the protein and sarcopenia, the age-related loss of skeletal muscle mass and strength.

Their new study in mice suggests a clear role for SMN protein and muscle decline with aging: Levels of the protein in the spinal cords and motor neurons of advanced-age mice were 22% and 55% lower, respectively, than the levels in middle-age mice, and those protein drops were accompanied by reduced muscle function.

"We found that SMN protein and aging are related–there is a decline in the protein with age and it correlates with a decline in neuromuscular function," said first author Maria Balch, a postdoctoral scholar in neuroscience in Ohio State's College of Medicine. "Based on what we know about SMA and therapeutics, we have background in targeting SMN protein–and it's possible that could be something down the line that could be applied to age-induced neuromuscular decline."

Two genes, SMN1 and SMN2, are involved in production of SMN protein. SMN1 does most of the work to produce the full-length protein

Continued on page 19

THE WESTERN
Foot and Ankle Conference

JUNE 22-25
2023

REGISTER NOW
Save the most through **March 29**

Regular registration rates **March 30-May 10**

Late fee begins **May 11**

Simply **choose your option** when registering!

FACE-TO-FACE IS BACK!

For those craving to meet and visit exhibits again in person, we will have limited space available, so be sure to **register early**. We can't wait to see you!

VIRTUAL OPTION*

For those wanting to watch the live sessions from home, we will have **unlimited tickets** available.

PLEASE NOTE:

Registration for the virtual meeting will not grant access to the onsite event, and registration for the onsite event will not grant access to the virtual sessions. Virtual attendees wishing to visit the exhibit hall may purchase an Exhibit Hall Pass onsite. Confirm your selection before paying for registration.

DISNEYLAND® HOTEL
CONVENTION CENTER
ANAHEIM, CA
AND **ONLINE**

* Assistants will only have the face-to-face option.

Clinical and Administrative sessions will be combined into one program.

- **Live General Sessions** Offering 25 CECH for DPMs
- **Radiology** and **Fluoroscopy CECH**
- **Risk Management Program** for PICA discount
- **Hands-On** Workshops
- 3 Days of **In-Person Exhibits**
- **Combined Clinical** and **Administrative Assistants Program**
- **Full Featured Web** and **Mobile App**
- **Discounted Hotel Rates** for In-person Attendees
- **'Easy to Get to'** from Anywhere – and Everywhere!

PICA
A ProAssurance Company

DPMS GET 15% OFF

their PICA Renewal Premiums by attending the risk management sessions

STAY CONNECTED

TheWestern.org
/WesternFootandAnkleConference
@TheWesternFAC

(800) 794-8988
7311 Greenhaven Dr Ste 208, Sacramento, CA 95831

Continued from page 17

and is vital to motor neuron survival and function. SMN2, which mostly makes a truncated form, contributes minimally to full-length protein production and could be thought of as an assistant–the presence of more copies of the SMN2 gene is associated with milder forms of SMA.

The Ohio State team found that mice engineered to express higher-than-normal levels of SMN protein had more overall neuromuscular resilience and recovered faster from nerve injury. "That raised some questions," said senior Ohio State author Arthur Burghes, a professor of biological chemistry and pharmacology and molecular genetics who developed the mouse model that advanced SMA research. "Different people get different amounts of weakness with age."

Why are some people completely resistant to it, and other people are more susceptible?

"With aging and sarcopenia, there is an increased chance of injury due to falling. So it's an important problem."

Though the researchers speculate that a combination of genetics and behavior are at play, there is a chance, based on what they've found so far, that the problem could be addressed by coaxing the aging body to produce more SMN protein.

This new study compared a range of measures in mice separated into 3 age groups: 6–10 months, 21 months, and 27 months, roughly equivalent in human years to 35–50, 55, and over 70. In addition to observing the natural decrease in protein levels in the spinal cord and motor neurons with advancing age, researchers detected other trends in the older mice: reductions in the number of motor units, or motor neurons plus the muscle cells they stimulate, as well as a decline in the function of muscles responding to nerve stimulation.

In terms of potential treatment approaches, the viral-mediated gene therapy currently in the clinic for infants with SMA isn't a likely solution due to the large amount of virus that would be required for an adult. The team is exploring other ways to increase SMN production.

"We know in the field of SMA that targeting an increase in SMN protein can be approached from different directions. If we can determine that this is a viable therapeutic target in aging, there's a lot of research we can lean on to help drive the direction of age-related therapeutics," Balch said.

Source: *Balch M, Bobbili P, Harris H, et al. Age-associated reduction of survival motor neuron protein as a potential target for sarcopenia. Poster 477.15/KK18 presented at Neuroscience 2022, Nov. 15, 2022, in San Diego, California. https://www.abstractsonline.com/pp8/#!/10619/presentation/81504*

Continued on page 21

Introducing

THE MOORE BALANCE BRACE

Signature Edition

Developed by Jonathan Moore, DPM, in collaboration with Orthotica Labs, the *MBB Signature Edition* will help seniors maintain and prolong independent living by reducing their risk of falling.

Compelling new features, enhanced patient outcomes...

Faithfully captures the contour of the arch

Rearfoot extrinsic post for enhanced stability

Single Velcro® closure for easier donning & doffing

Premium leather inside and out for superior durability and comfort

If Dr. Moore hasn't signed it,
it's not an MBB

Jon Moore

ORTHOTICA Labs

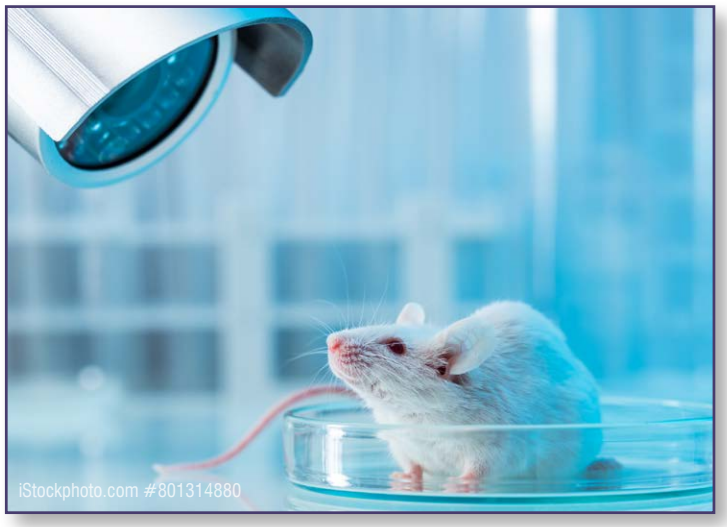
Call to order or for more information.

888.895.1305

orthotica.com/learn-more

Continued from page 19

SMART BANDAGE IMPROVES WOUND HEALING IN MICE



- A smart bandage used wireless power to protect and monitor wounds, provide feedback on tissue health, and encourage healing using electrical current.
- Mice treated with the bandage healed faster than those protected with standard wound dressings.

The skin has a remarkable capacity to regenerate itself after injury. This complicated process starts with inflammation and ends with the formation of new skin and scar tissue.

But wounds can get infected. And some diseases and conditions, such as diabetes and immunosuppression, may interfere with wound healing. Nonhealing wounds can lead to pain, loss of functioning, and even amputation or death. More than 6 million people in the U.S. alone are living with a chronic, nonhealing wound.

An NIH-funded research team at Stanford University led by Geoffrey Gurtner, MD, FACS, and Zhenan Bao, PhD, has been testing technologies to encourage wound healing.[1] In a new study, they designed a smart bandage to actively assist the healing process. They described their results on November 24, 2022, in *Nature Biotechnology*. (Gurtner is among the members of the Diabetic Foot Consortium [DFC, diabeticfootconsortium.org], a group dedicated to studying how to improve diabetic wound healing and prevent amputations.[2])

The smart bandage consists of an extremely thin, flexible printed circuit. A small, coiled antenna draws power wirelessly from a nearby source. This allows the bandage to provide electrical stimulation to injured tissue. Such stimulation has been shown to boost wound healing.

The wireless power also allows the bandage to monitor the skin underneath for signs of healing or infection. It does this by measuring temperature and how easily an electrical current passes through the area.

To stick the bandage to the skin, the researchers developed an adhesive gel that loosens when heated above body temperature. This allows it to be removed without causing damage to vulnerable skin. At normal skin temperature, the gel proved to be as sticky as a standard medical tape.

Healthy mice wearing the bandage moved normally, and the bandage was able to capture information about their skin during movement. No skin irritation was observed over a period of about 2 weeks.

Skin wounds on mice treated with electrical stimulation provided by the smart bandage healed about 25% more quickly than those covered with a standard sterile dressing. The new skin on the mice who got the smart bandage showed an increase in new blood vessels. It was also thicker and stronger than that on mice given standard bandages. Similar results were seen in mouse models of burn healing and diabetic wounds.

When the researchers examined cells from mice given the smart bandage, they found that certain types of immune cells had increased activity of genes involved in tissue regeneration. This was accompanied by increases in the corresponding proteins needed for healing processes.

"With stimulation and sensing in 1 device, the smart bandage speeds healing, but it also keeps track as the wound is improving," explained Artem Trotsyuk, PhD, who helped lead the study.

"It is an active healing device that could transform the standard of care in the treatment of chronic wounds," added Yuanwen Jiang, PhD, who also helped lead the study.

Before the proof-of-concept bandage can be tested in people, several steps need to be taken. These include enlarging it to a human-size version and testing it on larger animals before beginning human trials. ler

References

1. Wireless, closed-loop, smart bandage with integrated sensors and stimulators for advanced wound care and accelerated healing. Jiang Y, Trotsyuk AA, Niu S, Henn D, et al. Nat Biotechnol. 2022 Nov 24. doi: 10.1038/s41587-022-01528-3. Online ahead of print.
2. New research network tackles diabetic foot complications. Lower Extremity Review. 2021. 13(5):19.

BY THE NUMBERS: TOTAL ANKLE ARTHROPLASTY TRENDS ↗

Use of total ankle arthroplasty (TAA) has been on the rise and researchers from Emory University in Atlanta, Georgia, put the numbers together:

- 41,060 – the number of primary TAAs performed between 2009 and 2019.
- 52.5% – percentage of procedures done in males.
- 136.1% – percentage by which annual volume increased.
- 2,180–5,147 – annual volume increase from 2009 to 2019.
- 120.8% – percentage by which incidence reported per 100,000 population increased.
- 86.6% – percentage by which outpatient procedures increased.

Continued from page 21

- 242.5% – percentage by which inpatient procedures increased (nearly 3x more than outpatient growth).
- Median length of hospital stay decreased from 3 days in 2009 to 1 day in 2019.
- Incidence grew in patients above the age of 54, with largest growth in those 65–74 years.
- 111.8% – percentage incidence grew in the U.S. South.
- 136.5% – percentage incidence grew in the U.S. West.

The authors concluded that cumulative annual growth rates of TAA were found to be 2 times greater than total knee arthroplasty and 3.6 times greater than total hip arthroplasty.

Source: *Karzon AL, Kadakia RJ, Coleman MM, Bariteau JT, Labib SA. The rise of total ankle arthroplasty use: a database analysis describing case volumes and incidence trends in the United States between 2009 and 2019. Foot & Ankle International. 2022;43(11):1501-1510. doi:10.1177/10711007221119148*

BIOMECHANICAL PERFORMANCE FACTORS IN SPRINT STARTS

The 100m race is the highlight of many track and field events; indeed, in the Olympic Games, it defines the fastest man and woman in the world. In this event, the block start performance and subsequent first 2 steps can be of critical importance since they directly influence the runner's overall time. In a systematic review of 36 peer-reviewed articles reporting biomechanical analysis of the block start and/or first 2 steps in 100m events, researchers from Portugal identified several biomechanical deter-

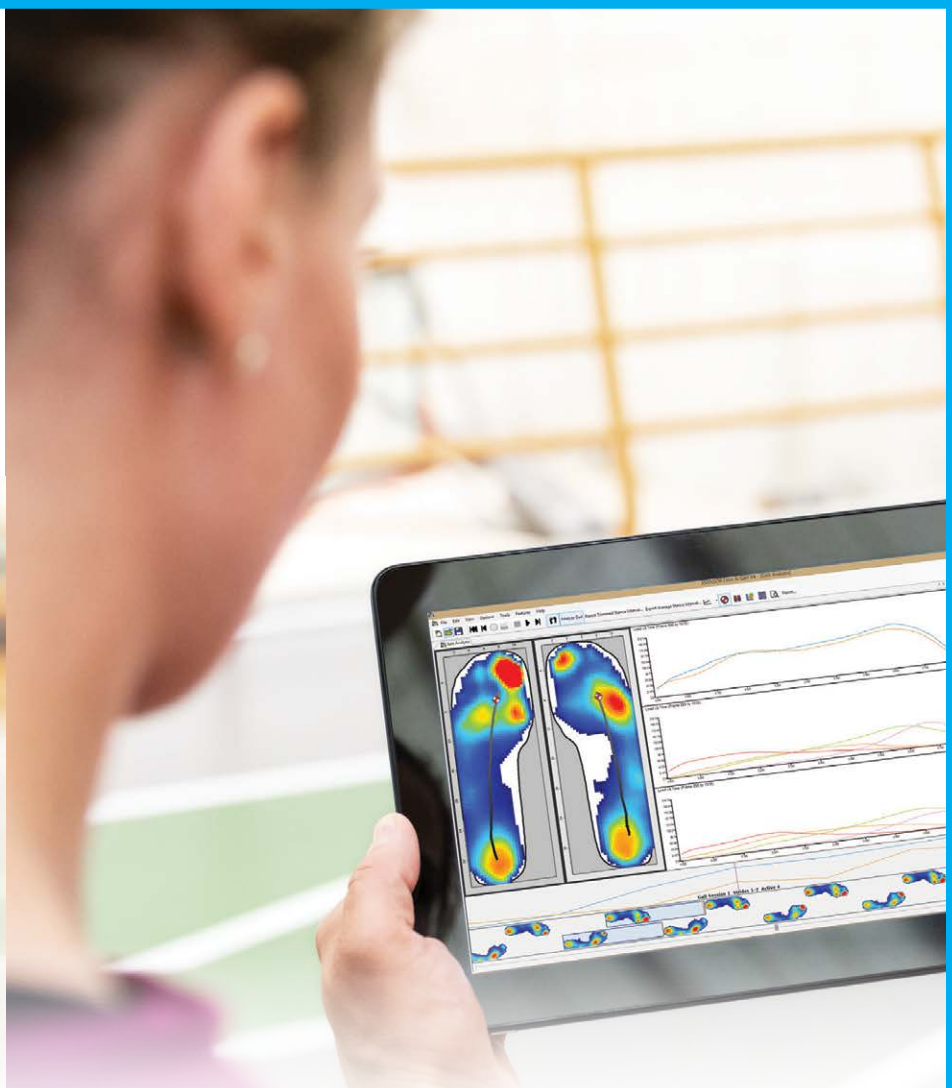
minants for successful sprint starts:

- In the "set" position, an anthropometry-driven block setting facilitating the hip extension and a rear leg contribution should be encouraged.
  - o Faster sprinters tend to move their center of mass (CM) closer to the starting line and closer to the ground.
  - o Horizontal CM velocity at the block take-off and along the first 2 steps increases significantly when the rear knee angle is set to 90° instead of 135° or 115°. A 90° rear knee angle allows for a better push-off of the rear leg than larger angles, showing such condition may be a strategy that allows some elite sprinters to maximize their strength capacity.
- At the push-off, a rapid extension of both hips and greater force production seems to be important.
- After block exiting, shorter flight times and greater propulsive forces are the main features of the best sprinters.

This systematic review emphasizes important findings and recommendations that may be relevant for researchers and coaches.

The authors call for future research to focus on upper limb behavior and on the analysis of the training drills used to improve starting performance.

Source: *Valamatos MJ, Abrantes JM, Carnide F, Valamatos M-J, Monteiro CP. Biomechanical performance factors in the track and field sprint start: a systematic review. Int J Environ Res Public Health. 2022; 19(7):4074. https://doi.org/10.3390/ijerph19074074*



MAKE CONFIDENT DECISIONS WITH RELIABLE, HIGH-RESOLUTION LAB-QUALITY INSOLE PRESSURE DATA

For foot clinicians and physical therapists, XSENSOR®'s X4 Intelligent Insole System provides accurate foot function, gait analysis, and plantar pressure data for any patient evaluation scenario. With fast, compact, and discreet on-shoe wireless electronics paired with durable, thin, and flexible sensors, the X4 system offers assurance of quality data to better understand the impact of orthotic, surgical, or therapeutic interventions and pathology.

EASY TO USE
Fast set-up and user-friendly software means you can capture and review plantar data in under 10 minutes

UNPARALLELED IMAGERY
Highest quality, high-resolution dynamic pressure data and imagery

ADVANCED FUNCTIONALITY
Complete analysis for clinical and research testing with XSENSOR's Foot & Gait VU software

LAB-QUALITY DATA
High-speed sampling allows for collection of anatomically accurate in-shoe data from 230 sensing points per foot

WIRELESS & UNDETECTABLE
Ultra-thin sensors conform to the footbed and compact on-shoe electronics are virtually undetectable to the wearer

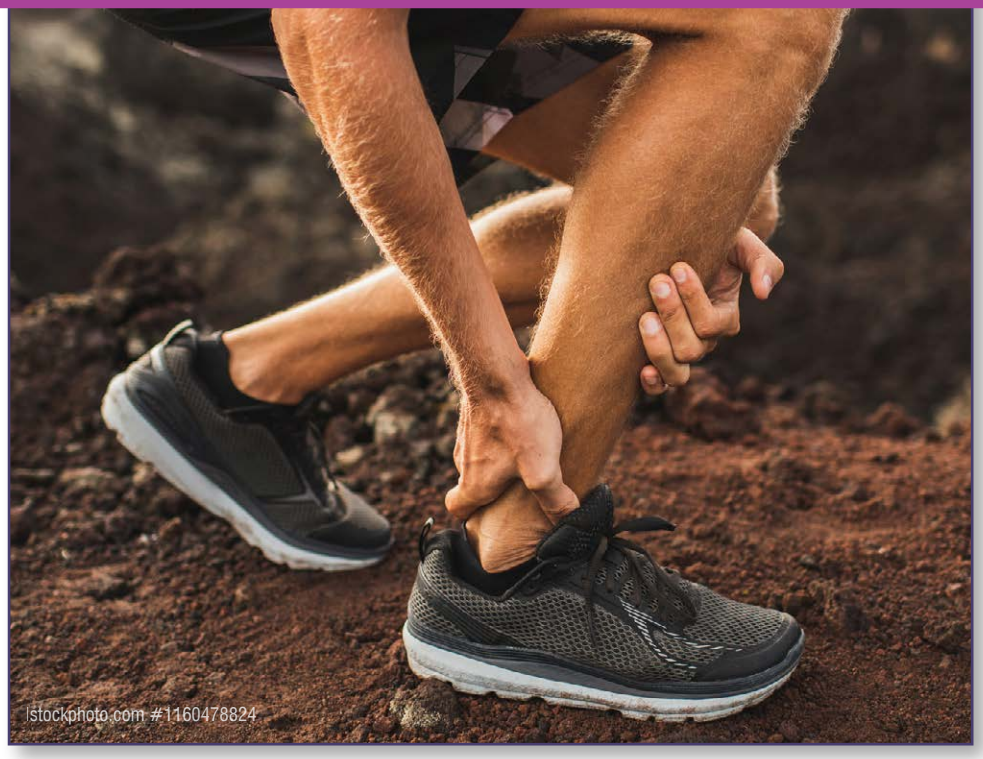
ROBUST SENSORS & ELECTRONICS
Easy-to-use sensors are ready out of the box and support trouble-free testing

CONTACT US TODAY TO LEARN MORE
www.**xsensor**.com | **sales@xsensor**.com

XSENSOR
Intelligent Dynamic Sensing

Eccentric Exercise Effective in Treating Mid-Portion Achilles Tendinopathy

By Diego Ailton Prudêncio, Nicola Maffulli, Filippo Migliorini, Thiago Teixeira Serafim, Luis Felipe Nunes, Luciana Sayuri Sanada, and Rodrigo Okubo



Achilles tendinopathy (AT) is one of the most frequent overuse injuries in athletes, yet there is still a gap in the evidence for the efficacy of any modality of treatment in high-quality studies.

Achilles tendinopathy (AT), a clinical syndrome characterized by pain, swelling, and loss of function, is one of the most frequent overuse injuries in the ankle and foot. In most patients, the condition improves with conservative interventions, the first line management option, which can be combined with a variety of other agents. Conservative therapies for the management of AT include kinesiotherapy, electrotherapies, cryotherapy, dry needling, bandaging, and splints. Exercise programs are the most widely studied interventions for the management of AT, and eccentric (the muscle contracts while being lengthened), concentric, isometric, and isokinetic contractions have all been used, alone or in combination. Surgery is generally undertaken when appropriately conducted conservative management has failed.

While the evidence base for conservative therapy for AT continues to evolve, there is still a gap in the evidence for its effectiveness in high-quality studies. Toward this end, the study authors performed a systematic review and meta-analysis to investigate the efficacy of eccentric exercise (EE) in improving pain and function in adult patients with mid-portion Achilles tendinopathy compared to other forms of exercise.

Methods

A search was performed in PubMed, BIREME, SportDiscus, Cinahl, Web of Science, and PEDro, in November 2022. The search was limited to human studies published in Portuguese, English, or Spanish, due to the language capabilities of the researchers. The methodological quality was evaluated using the Risk of Bias 2 tool (RoB2) of the Cochrane collaboration, and the meta-analysis was performed using the Review Manager 5.1 program.

The study authors included randomized clinical trials (RCTs) with mid-portion Achilles tendinopathy in whom a program of EE was compared to another conservative modality, and in whom the outcome measure was assessment of pain and/or disability. Regarding the studies selection, the authors of this article were interested in identifying the effects and harms associated with an intervention.

A meta-analysis was performed to synthesize study data and verify the effect size of the intervention. Heterogeneity was tested by P value and I2.* If $P > 0.10$ and $I2 < 50\%$, the heterogeneity was considered low enough to conduct a meta-analysis with a fixed-effect model. If $P < 0.10$, $I2 > 50\%$, there was a high level of heterogeneity, and a random effect model was used. Sensitivity analysis was conducted by 1-by-1 exclusion method for individual studies. Descriptive analysis was performed if the heterogeneity was too large ($I2 > 85\%$).

This article has been excerpted from "Eccentric Exercise is More Effective than Other Exercises in the Treatment of Mid-portion Achilles Tendinopathy: Systematic Review and Meta-analysis" BMC Sports Sci Med Rehabil 15, 9 (2023). https://doi.org/10.1186/s13102-023-00618-2. Editing has occurred, including the renumbering of tables and figures, and references have been removed for brevity.

Continued on page 26

Continued from page 25

** Per Cochrane training materials, I2 informs the proportion of the variance in observed effect is due to variance in true effects rather than sampling error–it does not directly inform us abut the distribution of effects. A high I2 estimate is not necessarily synonymous with important heterogeneity.*

Results

Of the 2,024 articles that were identified, 8 fulfilled the inclusion criteria, all of which were RCTs. The included studies reported a total of 401 Achilles tendons in 371 patients (54.2% male; ages 19–77, mean 46.6 years); 2 studies included individuals with bilateral and unilateral AT. Clinical examination (7 of 8) was the most common criterion for the diagnosis of AT; 3 studies used ultrasound, and 1 added the Victorian Institute of Sport Assessment-Achilles (VISA-A) questionnaire and the VAS pain scale to complete the diagnosis. All studies included only patients with tendinopathy of the main body of the Achilles tendon. The minimum duration of symptoms was 3 months.

Six studies included 2 intervention groups: 1 was EE compared to another exercise modality, such as concentric exercise, light training, heavy slow resistance (HSR), and with another protocol of EE. Two articles included 3 groups: EE, electrotherapy, and wait-and-see and EE, vibration training, and wait-and-see. Most studies (75%) applied the intervention for 12 weeks. All articles evaluated change in pain; 7 verified function/disability; and 3 verified patient satisfaction with treatment.

Five of the studies used the VISA-A scale to assess pain and symptoms, 2 used functional tests (jump tests, toe-raise test, hop test, side-step test), 1 used isokinetic strength, and 2 assessed range of motion (ROM). One study also used the VISA-A to evaluate pain evolution. The other articles used the Visual Analogue Scale/Numerical Visual Scale (VAS/NVS). Most of the articles performed the evaluations at the beginning and end of the treatment, with 1 study undertaking follow-up at 36 weeks, 1 at 6 months, and 3 at 1-year. Four studies showed better outcomes in the EE treatment group, and 1 article did not present statistically significant differences. Among the 3 articles comparing 2 EE protocols, 1 presented better results with Alfredson et al's[1,2] protocol—a program of EE to treat AT while the uninjured limb is used to return (concentrically) to the initial position—and 2 did not find statistically significant differences between groups (Table 1).

The only variable for which a meta-analysis was possible was pain (5 articles), analyzed with the VAS/NVS and compared EE with another conservative treatment. RoB2 score showed 62.5% of the studies presenting "some concerns" and 37.5% (5 and 3 articles, respectively) presenting "high risk" of bias. The analysis of heterogeneity resulted in the I2

value of 91%, showing heterogeneity between the studies. The Mean Difference found in the treatment effect was − 1.21 (− 2.72 to − 0.30), with 95% confidence interval, with a significant positive effect for the treatment of pain in AT with EE, with the result in favor of EE compared to CG or other exercises in pain improvement (Figure 1). The rest/wait-and-see approaches do not provide significant benefits when compared to EE. In addition, controlled tendon loading can continue during the intervention, though further studies are needed to determine which activities are beneficial, and the recommended frequency and intensity.

Discussion

In the 8 studies evaluating the effect of pain and disability of EE with another type of exercise, 4 presented favorable EE results for pain, and 1 presented similar results between interventions. Regarding the effect on disability, 2 articles were in favor of EE.

One study investigated EE and concentric exercise. This study found improvement in pain and function/return to activity in both groups, with EE producing significantly better results, and suggested that EE produced significantly better results than concentric exercises because of the energy efficiency of eccentric exercises on the calf muscles, with comparable muscle force developed at lower loads on the tendon during movement. In addition, EE may produce changes in the metabolism of neural transmission in the tendon, inducing alterations in the perception of pain.

Two studies compared EE with rest/wait-and-see. The first studied verified improvement in pain and function of the EE group, which, despite not presenting a statistical difference, showed considerably better results than the control group. They reported a successful outcome in the EE group of 50% to 60% of patients, reporting that EE is inexpensive, although it is technique dependent. The wait-and-see protocol was the most convenient and easy intervention to implement, but also the least effective. The second study in this group showed significant improvement in the EE group, including a significant reduction in pain on palpation, compared to the control group. While interventions improved pain 2cm proximal to the insertion of the Achilles tendon in the calcaneus, only EE reduced pain at the musculotendinous junction as well. They reported that pain reductions following EE correlated with reduction in neovascularization in patients with tendinopathy, although such changes were not actually observed.

Silbernagel et al[3] compared light training (eccentric plus concentric) and EE, and verified improvement in palpation, walking, and activity pain, as well as improvement in functional tests and ROM for the EE group, with no statistically significant differences between the groups. The authors also reported that the exercise load has to be relatively high for better results. Beyer et

Continued on page 29

"Excellent as always! As prescribed, as designed, as promised. A real time saver for my clinical hours. "

– Joshua U., CPO

Discover the DAFO® Experience

We offer a wide variety of bracing solutions with dynamic, flexible support for your patients' unique needs.

Fast Fit® Chipmunk®

JumpStart® Leap Frog®

DAFO 3.5

DAFO 2

DAFO FlexiSport

DAFO Turbo

cascadedafo.com

Helping kids lead healthier, happier lives®

CASCADE dafo

1360 Sunset Avenue, Ferndale, WA 98248 | ph: 800.848.7332 | fax: 855.543.0092 | intl: +1 360 543 9306

Continued from page 27

Study	Intervention(s)	Sample size	Gender (M/F)	Age (mean)	Intervention duration (wk)	Comparison and outcome measure	Study conclusions (*p* value/SMD—95% CI)
Eccentric exercise vs another exercise therapy or rest/wait-and-see							
Mafi 2001	EE	22	12/10	48.1 ± 9.5	12	VAS	The results after treatment with EE was significantly better ($p < 0.002$) than the results of treatment with the concentric training regimen; Between groups comparisons of pain not presented
	Concentric exercise	22	12/10	48.4 ± 8.3			
Silbernagel 2001	Eccentric overload training;	22	17/5	47 ± 14.7	12	VAS Jumping test; toe-raise test	Eccentric loading had better strength and pain outcomes ($p < 0.05$)
	Light training	18	14/4	41 ± 10.2			
Beyer 2015	EE	25	18/7	48 ± 2	12	VISA-A VAS_H VAS_R	VISA-A: there was no significant interaction ($p = 0.26$) or difference between groups ($p = 0.62$). VAS_H and VAS_R there was no significant interaction (VAS_H, $p = 0.08$; VAS_R, $p = 0.38$) or difference between groups (VAS_H $p = 0.77$; VAS_R, $p = 0.71$). Similar treatments
	HSR	22	14/8	48 ± 2			
Rompe 2007	EE	25	9/16	48.1 ± 9.9	12	1 vs 3 VISA-A VNE	VISA-A and VNE: Patients from group 1 achieved significantly better results than patients from group 3 ($p < 0.001$)
	SWT	25	11/14	51.2 ± 10.2			
	Wait-and-see	25	9/16	46.4 ± 11.4			
Horstmann 2013	Vibration training	23	13/10	46.0 ± 6.9	12	2 vs 3 VAS Isokinetic	Pain improvements were greater in the EE groups than in the wait-and-see group (– 27.0; 95% CI –50.9, – 3.1)
	EE	19	10/9	45.7 ± 8.5			
	Wait-and-see	16	9/7	44.4 ± 7.7			
Silbernagel 2007	EE	19	12/7	44 ± 8.8	6–52	VISA-A-S VAS Jump tests, strength tests, endurance test	Both groups showed significant ($p < .01$) improvements on the VISA-A-S score and decrease in pain during hopping at 6 weeks and at 3, 6, and 12-month evaluations
	EE + active	19	8/11	48 ± 6.8			
Stasinopoulos 2013	Stanish protocol	21	NR	48.44 ± 5.12	12	VISA-A	VISA- A: there were significant differences in the magnitude of improvement between the groups at weeks 12 and 36 ($p < 0.05$)
	Alfredson protocol	20		48.24 ± 5.09			
Stevens 2014	Alfredson protocol	15	6/9	48.2 ± 10.8	6	VISA-A VAS	The between-group difference change score was not statistically significant at week 6 for VISA-A (ITT, $p = 0.20$; PP, $p = 0.32$) and VAS (ITT, $p = 0.14$; PP, $p = 0.73$)
	Alfredson protocol (do-as-tolerated)	13	5/8	49.2 ± 11.3			

SMD, standard mean difference; M, male; F, female; NR, not reported; CI, confidence interval; EE, eccentric exercise; VAS, visual analogue scale; VISA-A, Victorian Institute of Sports Assessment-Achilles; HSR, heavy slow resistance; VAS_H, visual analogue scale heel rises; VAS, VAS, visual analogue scale running; SWT, shock-wave therapy; VNE, visual numerical scale; VISA-A-S Victorian Institute of Sports Assessment-Achilles Swedish; ITT, intention-to-treat; PP, per-protocol

al[4] presented a comparison of the EE and HSR groups. Both interventions showed significant gains in improving physical activity and pain, but without statistical difference between groups: the treatments are similar to each other, although patient satisfaction tended to be higher after 12 weeks with HSR (100%) than EE (80%).

Three studies compared EE with EE. The first applied the same treatment protocol, but only 1 group was released for physical activity. Both groups presented improvement in pain and function during the evaluations, with no statistically significant differences between the groups. The study demonstrated no negative effects in patients who continued physical activity (such as running and jumping) when using pain monitoring during rehabilitation and the authors believe that important factors in tendon improvement are intensity and type of load. The second study compared Alfredson's and Stanish's protocols. The former reduced pain and improved function to a greater extent than the latter. The protocol recommends the completion of 180 eccentric repetitions per day, and has been widely adopted in research and clinical practice. Stanish et al's[5] protocol for the management of AT includes eccentric and static stretching exercises and is based on 3 principles: length, load, and contraction velocity. According to the study authors, the protocol by Alfredson et al[1,2] reduced pain and improved function more efficiently because patients exercised both calf muscles (gastrocnemius and soleus) only eccentrically, with more series and with more repetitions every day for the same treatment period. In addition, the load of EE in the Alfredson's protocol[1,2] was increased according to the patients' symptoms, and the exercises were performed at low speed, which is supposed to allow suitable tissue adaptation.

The third study applied only the Alfredson's protocol.[1,2] One group was asked to perform 180 repetitions, and the other performed until tolerated. A statistically significant difference was found for improvement in function in each group at 3 weeks and for pain in the "do-as-tolerated" group; statistically significant differences between the groups in improvement of function were evident at week 3, but by 6 weeks there was no statistical differences between the groups for pain and function.

Conclusion

The available evidence supports the use of EE in the management of AT. Continuous load on the Achilles tendon does not adversely affect the results of pain and function, suggesting the possibility of practicing some physical activities during the intervention. Some of the studies analyzed herein report that EE and HSR produce similar results, but more studies are

Continued on page 31

FOR ADULTS & CHILDREN
GUARANTEED FOOT DROP SOLUTIONS

DORSI-LITE™
FOOT SPLINT

- Outstanding comfort.
- Easy On & Off
- Ultra-low profile
- Near-Normal Gait
- Will not slip off
- Also use in bath or swimming pool
- $60/EA. + $7 Shipping/Order
- Optional EXPRESS shipping: $30
- Low cost replacement parts available

DORSI-STRAP™
FOR FOOT DROP

- No Special Shoes Needed
- Nothing put into the shoe
- Outstanding comfort
- Ultra-low profile, 3OZ
- Near-Normal Gait
- Easy On & Off
- In White, Black, or Brown
- $42/EA. + $7 Shipping/Order
- Optional EXPRESS shipping: $30
- Low cost replacement parts available

30 DAY MONEY-BACK WARRANTY

X-STRAP® SYSTEMS
9 Stonegate Drive
Hyde Park, NY 12538

www.x-strap.com
(845) 233-4713

11/20

SPECIAL 15% OFF/ORDER: CODE MDAZ, AT CHECKOUT

Continued from page 29

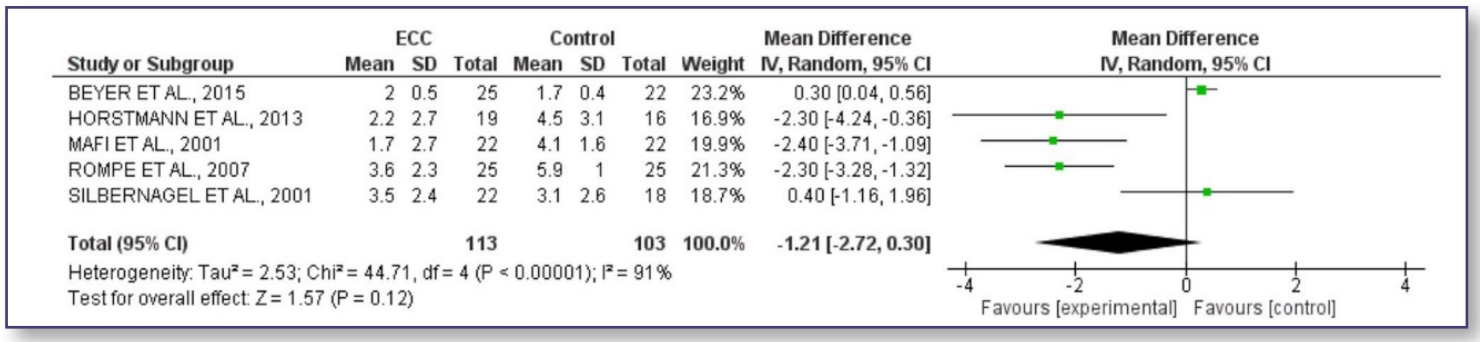


Figure 1. Meta-analysis for intervention with EE.

needed to confirm this. Also, the rest/wait-and-see approaches probably do not play a role in the management of AT.

References

1. Alfredson H, Pietila T, Jonsson P, Lorentzon R. Heavy-load eccentric calf muscle training for the treatment of chronic achilles tendinosis. Am J Sports Med. 1998;26:360–6.
2. Stevens M, Tan C. Effectiveness of the Alfredson protocol compared with a lower repetition-volume protocol for midportion Achilles tendinopathy: a randomized controlled trial. J Orthep Sports Phys Ther. 2014;44:59–67. https://doi.org/10.2519/jospt.2014.4720.
3. Silbernagel KG, Thomeé R, Thomeé P, Karlsson J. Eccentric overload training for patients with chronic Achilles tendon pain—a randomised controlled study with reliability testing of the evaluation methods. Scand J Med Sci Sports. 2001;11:197–206.
4. Beyer R, Kongsgaard M, Kjær BH, et al. Heavy slow resistance versus eccentric training as treatment for achilles tendinopathy: a randomized controlled trial. Am J Sports Med. 2015. https://doi.org/10.1177/0363546515584760.
5. Stanish WD, Rubinovich RM, Curwin S. Eccentric exercise in chronic tendinitis. Clin Orthop Relat Res. 1986;2085:65–8.

Beyond the Basics of Edema and Wound Management

April 22nd, 2023
10:00 AM – 5:00 PM EST

American Occupational Therapy Association

ILWTI International Lymphedema & Wound Training Institute

USD $199
6.5 CME Contact Hours

The new paradigm shift for edema and wound management; the gold standard in effective lymphedema treatment and how to incorporate these principles to optimize patient outcomes and maximize profitability in your practice!

SPEAKERS

Brandy Mckeown
OTR/L, CLT-LANA, CLWT

M. Mark Melin
MD, FACS, RPVI, FACCWS

Marijke Carson
PT, CWS, CLT, CLWT

Windy Cole
DPM, CWSP, FAPWH

Suzie Ehmann
PT, DPT, PhD(c), CWS, CLT

Heather Hettrick
PT, PhD, CWS, AWCC

James McGuire
DPM, LPT, LPED, APWHc

Richard Dubin
Founder & CEO, LER Magazine, lerEXPO

AGENDA

- **Edema Pathophysiology and Management Approaches – a Paradigm Shift that Impacts all Disciplines**
  - *April 22, 2023, 10:00 AM – 10:45 AM*
  - M. Mark Melin, MD, FACS, RPVI, FACCWS
- **Role of Compression for Management of Edema – Why do we use Compression for Edema Management**
  - *April 22, 2023, 10:45 AM – 11:15 AM*
  - Marijke Carson, PT, CWS, CLT, CLWT
- **Medical Compression: What Options are Available and How to Individualize Product Choice and Utilization**
  - *April 22, 2023, 11:15 AM – 11:45 AM*
  - Suzie Ehmann, PT, DPT, PhD(c), CWS, CLT
- **Medical Management of Edema Beyond Compression. Addressing Co-exisiting Comorbidities**
  - *April 22, 2023, 11:55 AM – 12:25 PM*
  - M. Mark Melin, MD, FACS, RPVI, FACCWS
- **Speaker Roundtable**
  - *April 22, 2023, 12:25 PM – 01:00 PM*
  - Marijke Carson PT, CWS, CLT, CLWT; Suzie Ehmann, PT, DPT, PhD(c), CWS, CLT; M. Mark Melin, MD, FACS, RPVI, FACCWS
- **Phlebolymphedema and Lymphatic Immunopathy: How it's a Causative Factor in Many Wounds**
  - *April 22, 2023, 02:00 PM – 02:30 PM*
  - James McGuire, DPM, LPT, LPed, FAPWHc
- **Understanding Edema and its Impact on Tissue Healing**
  - *April 22, 2023, 02:30 PM – 03:00 PM*
  - Heather Hettrick, PT, PhD, CWS, AWCC
- **Lymphedema in the Diabetic Foot**
  - *April 22, 2023, 03:00 PM – 03:30 PM*
  - Windy Cole, DPM, CWSP, FAPWH
- **Billing and Coding for Lymphedema and Wound Care profitability**
  - *April 22, 2023, 03:40 PM – 04:20 PM*
  - Brandy McKeown, OTR/L, CLT-LANA, CLWT
- **SPEAKER ROUNDTABLE**
  - *April 22, 2023, 04:20 PM – 05:00 PM*
  - Heather Hettrick, PT, PhD, CWS, AWCC; Windy Cole, DPM, CWSP, FAPWH; Brandy Mckeown, OTR/L, CLT-LANA, CLWT; James McGuire, DPM, LPT, LPed, FAPWHc

Wound Care Game Changer

Help More Patients Relieve Plantar Pathologies — Offload In Their Shoes!

Introducing New PressureOFF™ Customizable Offloading Insoles from PediFix®

Reduce Pressure, Friction & Pain in Everyday Footwear

*With the proven 'removable pegs' offloading design you know, PressureOFF™ insoles help prevent, relieve and promote healing of common plantar pathologies — **in ordinary shoes** — for higher compliance and better outcomes.*

If pressure and friction offloading will benefit your patients, get them onto PressureOFF™ Insoles. Order today, request a free Sample Pack, or get more information. This is an offloading innovation with instant benefits for you, your patients and your practice.

Offload —
- Calluses
- Bursitis
- Capsulitis
- Sesamoiditis
- Warts
- Prominences
- Lesions
- IPKs
- Fat Pad Atrophy
- Bone Spurs
- Metatarsalgia
- Sensitive Areas
- Friction Zones
- Diabetic Hot Spots
- Diabetic Ulcers
- Ulcers in Remission
- Wounds
- Surgical Sites
- More

PediFix®
Medical Footcare

Introductory Trial Sample Pack Offer!

Yes, I'm interested in PressureOFF™ Insoles for Offloading in patient footwear. Please send me:

☐ More information
☐ FREE Sample Trial Pack (while supplies last)

Your Name_____

Practice Name_____

Shipping Address_____

City_____ State_____ Zip_____

Phone_____

Fax_____

Email_____

In our practice, we see approximately _____ (#) patients each week.

My favorite supplier is_____

I prefer: ☐ to Dispense ☐ to Prescribe ☐ Patient Direct Order

Mail to: PediFix, Dept. LER822-P, 301 Fields Lane, Brewster, NY 10509

Fax to: 845-277-2851

Please provide all information requested.

*This offer is for healthcare professionals only. Limit one free sample per customer.

To order, get a free sample* or more information, mention code LER822-P

Call: *1-800-424-5561*

Fax: *845-277-2851*

E-mail: *info@pedifix.com*

Return this Coupon to:
PediFix, 301 Fields Lane, Dept. LER822-P, Brewster, NY 10509

Visit: *www.pedifix.com/t-POIOffloading.aspx*

Peripheral Neuropathy: Diagnosis and Treatment

By Lilly Khavari, DPM, DABPM, FACPM

Neuropathy can challenge both patients and clinicians; epidermal nerve fiber density testing provides an objective measure of disease progression and can help show therapeutic progress.

Peripheral neuropathy is something we see plenty of in our everyday practice settings and it can be very challenging to treat. We all know that the sooner we can get to an objective diagnosis, the sooner we can treat the patient, and the earlier we can start that treatment, the better it will be for the patient.

Topics we'll cover here include what is small fiber neuropathy, how to perform epidermal nerve fiber density (ENFD) tests, and the advantages of doing it – plus I'll add some pearls for actually performing the biopsy, and lastly, how to treat small fiber neuropathy.

Small Fiber Neuropathy

As all we know, there's small fiber and large fiber neuropathy. Large fiber neuropathy is when the fibers from the neck or the back are degenerated and cause some neuropathy type issues. Small fiber neuropathy is more about sensory information, so pain, temperature, and strange or unusual sensations. We see that a lot in the feet, starting in the toes, where patients are complaining about pain or a burning sensation. What's being affected is the myelinated, which are our delta fibers as well as unmyelinated C fibers. This form of neuropathy often involves peripheral nerves in a length-dependent pattern, meaning that the earliest and most severely affected nerves are located most distally – in that stocking/glove distribution.

What type of symptoms are we looking for? Most common are the "positive" sensory symptoms—what the patients are feeling, like pain, burning, prickling, shooting pain. The negative symptoms are what's not there, numbness or coldness when their foot feels dry and tight. And of course, anhidrosis as well as hyperhidrosis– those are the autonomic sensory symptoms.

We always want to check for these when we're getting the patient's history: Do they have positive sensory symptoms or is it more negative symptoms? Or are we purely autonomic, which would lead you more into a large fiber neuropathy? If it's only presented as an autonomic symptom, then you're looking at large fiber neuropathy.

Common causes of small fiber neuropathy are listed in Figure 1. It's not always frank diabetes. There are a lot of other reasons that a patient could have this type of neuropathy. For example, patients who are prediabetic with altered glucose could have this, and about 67% of the US population is prediabetic – so really anybody could have neuropathy-type symptoms.

I see a lot of chemotherapy-induced neuropathy in my practice coming from a big oncology center across the street. It is amazing how much these chemo patients start to experience – not only are they losing their toenails and fingernails, but they're also getting pretty severe neuropathy type symptoms. And there are patients 20-years' post-chemo who are still having symptoms that have never been

lerEXPO.com is currently hosting "Special Considerations in Peripheral Neuropathy." During the first session of the 3-hour CEU program, Lilly Khavari, DPM, DABPM, FACPM, from the Carrollton Foot Center in Texas gave a presentation titled, The Foundations of Peripheral Neuropathy and its Diagnosis. This edited transcript is an excerpt of that talk. To hear the entire lecture with case studies and view the video she mentions plus other speakers from the event, check out lerEXPO.com/past-events/.

Continued on page 36

Continued from page 35

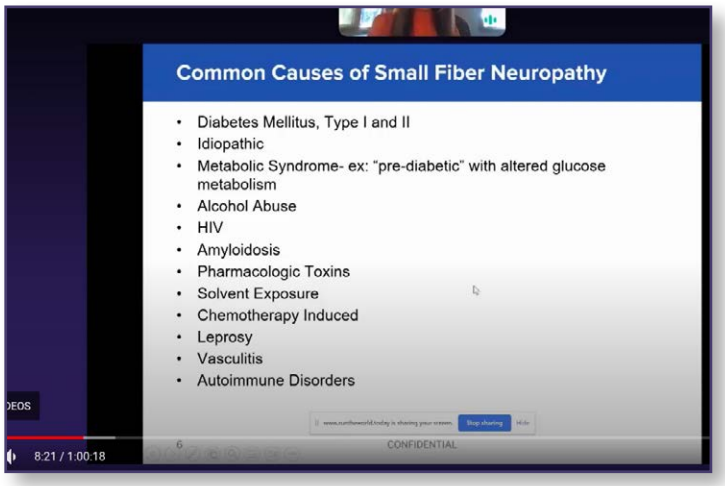


Figure 1

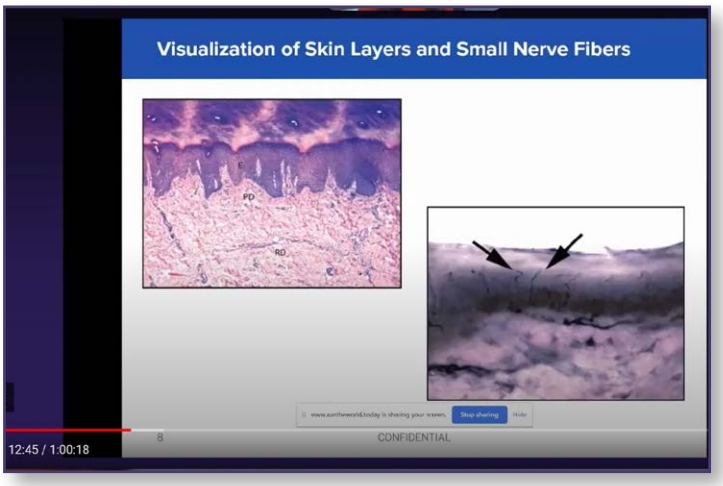


Figure 2

Figure 3

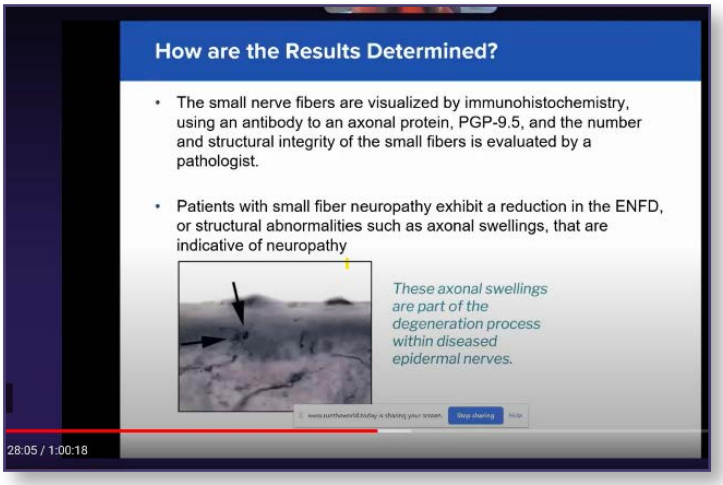


Figure 4

addressed. Doing a test like ENFD on these patients can help prevent progressively worsening nerve degeneration. Because chemo is typically a temporary thing for them, if we address them in a timely manner, we are able to reverse their symptoms and make it much more tolerable for them. You're doing these patients a huge favor and they will appreciate you for diagnosing them early and giving them a way to do their daily walks and live their life without that burning pain, or numbness in their feet.

Epidermal Nerve Fiber Density Testing

Epidermal nerve fiber density testing has been widely used since the 1990s. It qualifies and quantifies small fiber neuropathy by looking at the number of healthy nerves that a patient has. It provides a definitive diagnosis of small fiber peripheral neuropathy that's objective. Doing a Semmes Weinstein test or taking a clinical history is not enough to diagnose the degree of severity of a patient's neuropathy. You can't tell if they have mild, moderate, borderline, or severe neuropathy by just doing a vibratory test or by doing a monofilament test. Having these test results available helps you determine the degree of severity so if you want to go back 6 months or a year later and redo the test, you have something objective to compare it to, whereas you can't base your follow-ups on a Semmes Weinstein.

The ENFD test is highly sensitive and very specific for small fiber neuropathy. As far as sensitivity of this skin, it is about 88% versus just 54% for clinical examination. And it's highly specific–about 95% to 97% specific. So, with this test, not only are you diagnosing them properly, but you know that's the only diagnosis and you're able to determine the course and what degree of disease is present.

Figure 2 is a diagram of what the test looks at. On top left, you can see the layers of skin: the dark purple layer on top is the epidermal layer, which is the layer that we are testing to look for those nerves, followed by the papillary dermis, immediately below. And lastly, on the bottom is our reticular dermis. So we're not really getting that far into the dermis when we're doing the test. We're mostly looking at that epidermal layer to check those nerve endings.

On the bottom right, these arrows point to healthy nerve endings. And as you can see, this is a healthy nerve. We don't have any kind of swelling; the nerve is nice and thin and it's very fine – exactly what we're looking for.

Continued on page 39

MultiMotion

Pediatric Hip Abduction System

FOR SAFE TREATMENT
of correctable pediatric hip contractures!

- **Safe and gradual joint mobilization**
- **Improved joint movement**
- **Stretch spastic muscles**

allard USA

allardusa.com

ALLARD USA, INC.
300 Forge Way, Suite 3
Rockaway, NJ 07866-2056

info@allardusa.com
Toll Free 888-678-6548
Fax 800-289-0809

The path to FOOT PAIN RELIEF *has never been* EASIER

NEW CUSTOM POLY

NEW RICHIE BRACES

Better for YOU. *Better for* YOUR PATIENTS.

$

Northwest Podiatric Laboratory provides industry-leading value

Everything you need - custom & OTC orthotics, scanning, AFOs & more

Since 1964

Unbeatable NWPL support, reliability & patient outcomes for nearly six decades

EST. NW 1964
PODIATRIC LABORATORY

LEARN MORE AT NWPODIATRIC.COM

Continued from page 36

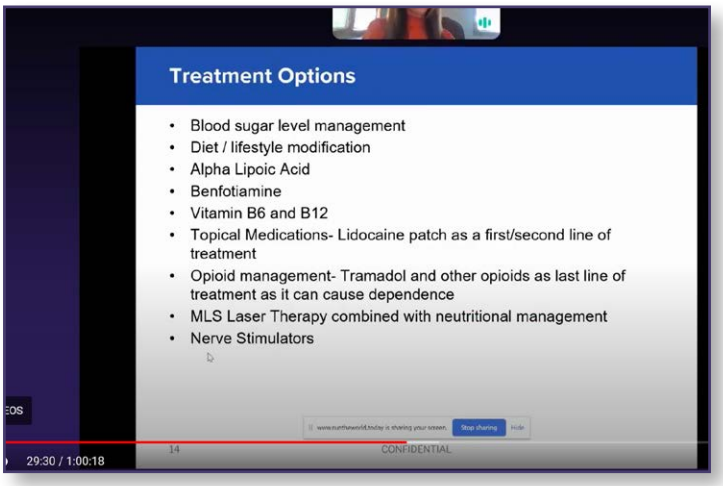


Figure 5

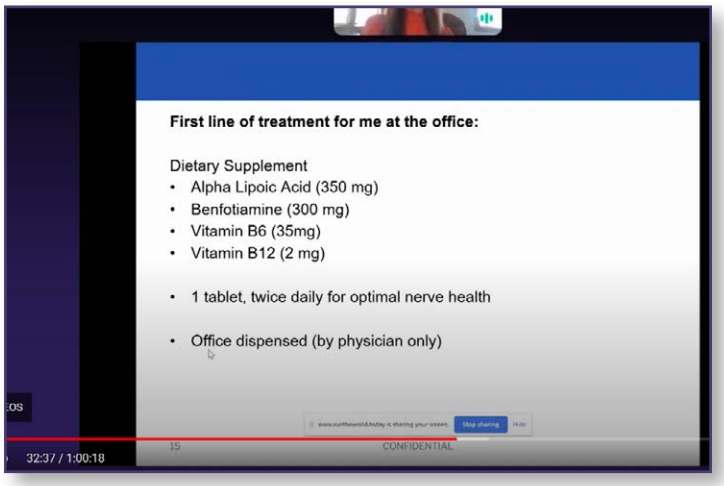


Figure 6

We're looking for about 10 of these nerves in about a millimeter of biopsy. The more the patient has, the healthier the nerves are. The less the pathologist sees on the test, however, the more severe the patient's disease. If there is swelling, that would mean degeneration of the nerves, so even if the number of nerves is good, if they are swollen or very thinned out, these are degenerated nerves. Not only are we looking at the number of nerves present, but also the health of the nerves and what condition they're in to determine what type of disease and what degree of disease the patient has.

Advantages

Advantages of performing this test include:

- It's a confirmatory diagnostic tool
- It can be both prospective and predictive
- It can serve as a baseline against which to measure therapy.

If it's performed right. You're going to have great results every time.

You can follow up with patients in 6 months to a year. They don't always need a rekit test because you go with how they're feeling, how their symptoms are doing. But if you see that you're not having the improvement that you want, you can always go back and redo the test in a 6-month period to see if your treatment is changing the number of nerve endings that are showing up on the path report.

The ENFD test is a great tool to be able to compare over time and use it to discuss progress with patients—especially when symptoms aren't decreasing as quickly as they would like. This test allows you to show that the treatment plan is working.

It's an in-office procedure that takes less than 5 minutes to do per site, given that you have a protocol, and everything is ready to go. It's not a big production, you don't need an hour to just do a biopsy. If patients are in and out for their regular appointment, you can have a protocol that allows you to do these as part of a patient's established appointment and have your results within 2 weeks and then you can start their treatment. It's a very easy test for the physician to perform and patients have no downtime. They can immediately return to work. They can go back to their physical activity. They don't have any pain or limitation. They have a small dressing–a Band-Aid on the biopsy site–that's another great thing that patients love–there's no downtime.

This test is covered by Medicare (Avg $90-100 per site) and private insurance using your average skin biopsy CPT code. We use 11104 for the first biopsy site, and if you're doing bilateral testing, which I always advise, then for the second site, use 11105. Of course, you want to have proper documentation in the patient's chart. Those materials are necessary to be able to get this covered in case the carriers request any kind of a documentation. Having a consent and proper diagnosis and showing that you explained why we're doing this test should be adequate to get the test covered by insurance.

It's an in-office procedure that takes less than 5 minutes to do per site.

How to Do the Biopsy

The best site for biopsy – by far the most studied anatomic location – is 10 centimeters proximal to the lateral malleolus, that spot has the most nerve endings (Figure 3).

Symmetrical testing is advised. I always do symmetrical testing because most people have symmetrical symptoms. But even if they only have unilateral symptoms, It's good to have the other side for comparison, to be able to see what their "normal" is and what we're trying to achieve.

I always advise having your NFT kits from your lab ready to use. Your medical assistant has already opened it, laid everything out, and all you're doing is going in, numbing them up, and performing the biopsy. You'll want to familiarize yourself with the type of fixative that your lab uses. Some require you to send it after washing the sample. Some don't have that requirement,

Continued on page 41

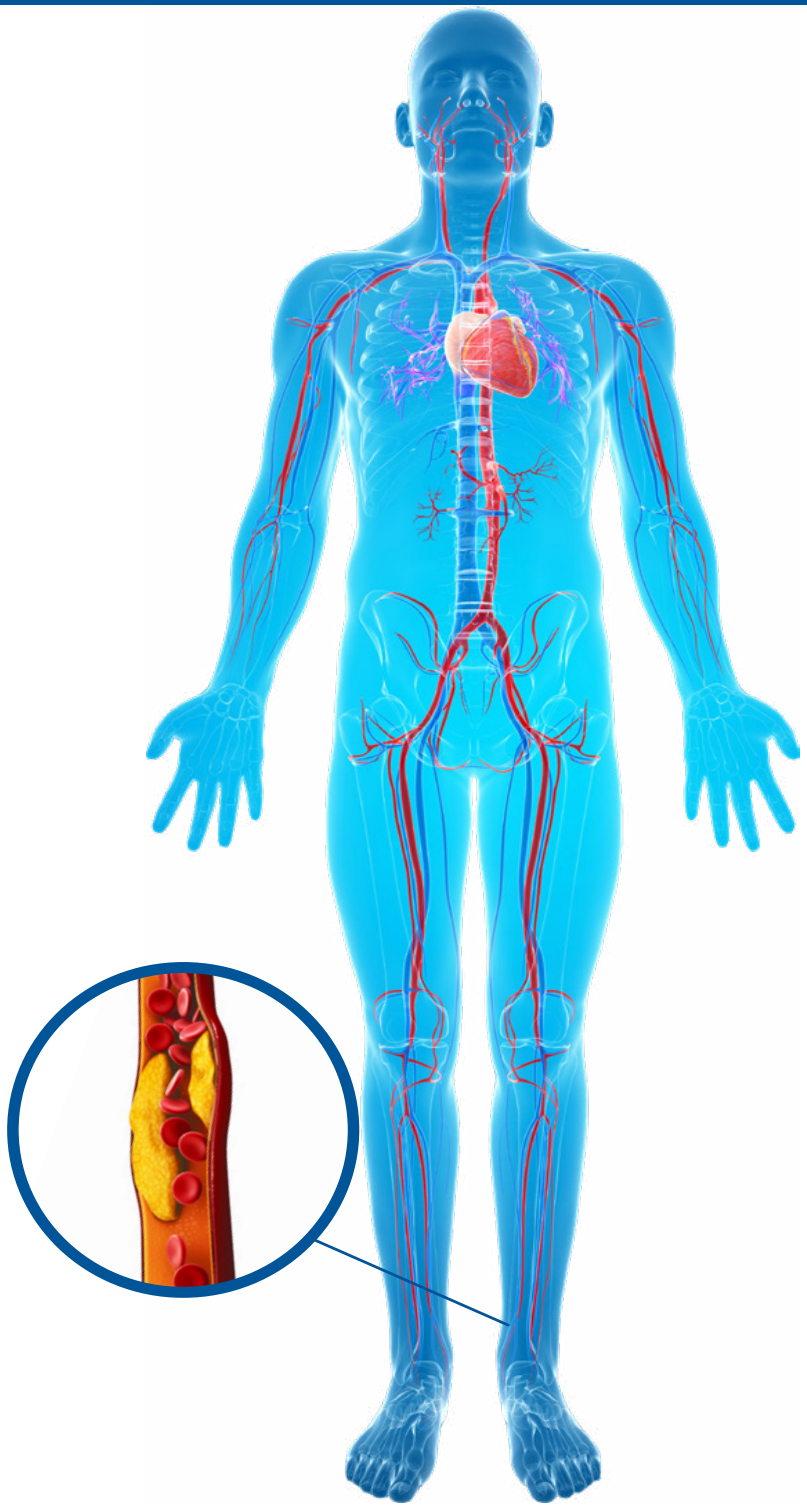
Peripheral Artery Disease

Peripheral Artery Disease (PAD) is a deadly chronic condition that can lead to heart attack, stroke, or amputation.

1 in 3

- Diabetics age 50+
- Smokers age 50+
- Everyone age 70+

Have PAD



$390 billion

annual US healthcare costs attributable to PAD

100,000 amputations

of lower extremities in the US annually, due to vascular disease

Market-Tested
Over One Million Tests Performed
Market-Trusted

Biomedix is a market leader in PAD diagnostics, delivering products and services that feature a cloud-based platform enabling community-based collaborative care.

Visit **biomedix.com** to discover more about how we can help you cost-effectively save limbs and save lives.

Continued from page 39

so you want to familiarize yourself so that once you have done the biopsy, your specimen is staying viable and getting to the lab in a timely manner–most labs want the samples overnighted. They don't want it to be in the fixative, but sometimes when you do that wash process it does allow your specimen to survive for a while longer, so you definitely want to familiarize yourself with what your lab requires.

I like to excise with 1% lidocaine and epinephrine just to control bleeding. This is proximal enough where you're not worrying about vasoconstriction or causing any kind of an issue with that site. Doing this controls the bleeding, especially after the procedure when they get up and drive away.

Also, you want to be gentle with this specimen. Remember, all of those nerve endings are in that superficial epidermal layer. So when you're using the pickups, it's important not to press that epidermal layer so you don't crush those nerve endings. So you always want to pick up the specimen from below the epidermal layer. (There is a video of the procedure within the talk on lerEXPO.com)

There are different kinds of punches available, 2 or 3 millimeters works fine. I found that using one with a plunger really helps. It's not absolutely necessary, but it does help when that specimen gets stuck in the punch. You're not trying to pull it out and crushing the specimen. Having that plunger helps better preserve the specimen. So remember to handle the tissue at the subcutaneous level to avoid pressing the epidermis with your pickups which will crush the epidermal layers and cause false lab results.

I do like doing these procedures first thing in the morning because we like to get them out before noon so that it gets there overnight and our specimen is viable.

Results and Treatments

The small nerve fibers are visualized by immunohistochemistry using an antibody to an external protein called PGP 9.5. This picks up the structure of the nerves and allows us to see the degree of disease severity. Patients with small fiber neuropathy show a reduction in the number of nerves or structural abnormalities, such as external swellings, that are indicative of neuropathy. In Figure 4, you can a degenerated nerve. Compared to Figure 2, where you saw healthy nerves that were very linear and the same width across the whole nerve, here you can see swollen nerve endings and axonal swellings in that epidermal layer, which show degeneration and can cause symptoms.

Contrary to what many believe, we have lots of treatment options available Figure 5. First and foremost, if a patient is pre diabetic or already has diabetes, we want to incorporate blood sugar level management, diet, and lifestyle modifications, so getting them exercising, having a healthy diet. Plus, there are certain vitamins that are important for health of the nerve: alpha lipoic acid, benfotiamine, and vitamins B6, and B12. The next level of treatment is topical creams or compounded creams/medications, and lidocaine patches. Those are, of course, always an option for daily pain management. The next level is opioid management, ideally on a temporary basis as it can lead to dependence. And then finally, MLS laser therapy combined with nutritional management. As a last resort, nerve stimulators where you're referring patients out to a pain specialist. Once you get the patient's results, you can see how much you need to do based on the severity of their disease and the results.

One question I often get is, who do you choose to test? I reserve this for patients who are newly diagnosed with diabetes and are starting to have symptoms. Or patients like we talked about, post-chemo patients or patients that come in and they have no idea what's happening – those patients where you can't find a reason like idiopathic, HIV, or alcohol abuse. These are the patients you want to test. You don't want to do it on a patient with diabetes whose had neuropathy for over 20 years, because you're not going to be able to reverse any of those nerves or make them healthier. But, if it's a patient with newly diagnosed diabetes who's starting to have symptoms and anybody with new onset of neuropathy is a fantastic candidate for this. That way you can prevent disease progression and limit their symptoms so that they're more comfortable living a daily life and don't have the risk of things worsening to where they'll need opioid management That's really the goal: You want to prevent the nerves from progressively getting worse.

> ...a patient with newly diagnosed diabetes who's starting to have symptoms or anybody with new onset of neuropathy is a fantastic candidate for this test.

First line of treatment for me at the office (Figure 6), when it's a mild to moderate small fiber neuropathy, is to start with vitamins as discussed earlier: alpha lipoic acid, benfotiamine, vitamins B6 and B12. Make sure that they're not already taking B12; if they are, you need to tell them not to take any more. And the reason is B12's toxicity. If they're taking too much B12, it can actually worsen neuropathy symptoms. The supplement that I have at the office suggests 1 tablet twice daily for optimal nerve health. There are many supplements out there that can be office dispensed, so just make sure you're looking at the dosage as well as all the ingredients. I found that the alpha lipoic acid and benfotiamine make a huge difference. Even my patients who have been on the supplement for months and months and decide to do something over-the-counter, as long as we keep them on the alpha lipoic acid and benfotiamine, their symptoms are well managed and they're well controlled.

Lilly Khavari, DPM, DABPM, FACPM, is a board certified, surgically trained foot & ankle specialist focusing on pediatric and diabetic foot care, sports injuries, as well as acute and chronic conditions of the foot and ankle. She owns the Carrollton (Texas) Foot Center. She is also a consultant for Bako Diagnostics.

O&P Solutions

Cutting Edge Technology from a name you can Trust.

Dynamic, Floor Reaction, Carbon AFO

- Clinically designed and tested in conjunction with certified orthotists at Atlanta Prosthetics & Orthotics (APO) (call for details)
- Anterior and Tuberosity relief
- Fully lined calf-band
- Designed for non-contact in critical, pressure point areas
- Does not excessively push out the shoe
- Structurally reinforced in high stress junctions
- Non-obtrusive brace design
- Forefoot Dorsi-assist
- Optional leather valgus/varus strap
- One Year Warranty

PDAC Approved L1932

NOW AVAILABLE ...as low as $195

Call for details.

Ez stride APO

FITTING SAMPLES AVAILABLE FOR $95!

2020 DESIGN UPGRADES

- New manufacturing process increases strength 5X
- Trimmable Footplate
- Deep, High Gloss Luster Finish
- Top/Bottom Footplate Non-Skid Surface
- Removable/Washable liner
- Customizable strap length

O&P Solutions

1625 Rock Mountain Boulevard, Suite H-J
Stone Mountain, Georgia 30083

800-922-5155 | 800-813-8139 Fax

www.oandp.solutions

Formerly Spinal Solutions

SOCIAL MEDIA IN REAL LIFE

Milk crate-related lower extremity injuries treated at United States emergency departments

By Mathias B. Forrester, BS

Background: Milk crates can be found in many homes and are used for a variety of purposes. While milk crates may result in injuries, the literature on such injuries is limited. This study described milk crate-related lower extremity injuries treated at United States (US) emergency departments (EDs).

Methods: An analysis was performed of milk crate-related lower extremity injuries using data from the National Electronic Injury Surveillance System of the US Consumer Product Safety Commission during 2000-2021.

Results: An estimated 8,107 milk crate-related lower extremity injuries treated at US hospital EDs during 2000-2021 were identified. The most common circumstance leading to injury was 34.4% fell off milk crate, 23.0% struck milk crate (didn't fall), and 12.9% tripped over milk crate. The most common types of injuries were contusion or abrasion (26.5%), strain or sprain (23.0%), fracture (13.3%), and laceration (10.1%). The affected body part was 27.5% lower leg, 22.8% ankle, 18.8% foot, 16.2% toe, 12.7% knee, and 3.0% upper leg. The patient was treated or examined at the ED and then released in 98.1% of cases.

Conclusions: The highest proportion of milk crate-related lower extremity injuries involved the patient falling off a milk crate followed by being struck by a milk crate and tripping over a milk crate. The most common type of lower extremity injury was contusion or abrasion. The lower leg was the most frequently affected part followed by the ankle. The majority of patients were treated or examined in the ED and released.

Milk crates are square or rectangular boxes usually made of plastic with holes on the sides and bottom. Their exterior is designed so the crates interlock, allowing them to be easily stacked. Although they may vary in size, milk crates in the United States (US) are usually 12-13 inches wide and 10.5-11 inches tall. Originally designed to more easily transport milk containers,[1-3] milk crates can be found in many homes and are used for a variety of purposes, such as to store other items like files, vinyl records, and clothes; bicycle basket; TV stand; planter; shelving; and stepstool.[4]

Although videos of people walking across a stack of milk crates date back to at least 2011, on August 1, 2021, a Facebook post initiated the Milk Crate Challenge.[5] Promoted on social media outlets such as TikTok, Instagram, Facebook, and Twitter, the Milk Crate Challenge involves stacking milk crates upside-down into a pyramid-shaped set of stairs that reach up to 7 milk crates high, then attempting to walk or run up and down the structure without destroying the structure or falling. However, because of the milk crates' design, the structure is not very stable, and many Milk Crate Challenge posts

Continued on page 44

Continued from page 43

Table 1. Time period and patient demographics of milk crate-related lower extremity injuries treated in United States emergency departments, National Electronic Injury Surveillance System, 2000-2021

Variable	No.		Est.		
	No.	%	No.	%	95% CI
Treatment 3-month period					
December-February	46	26.4	2,043	25.2	1,171-2,915
March-May	35	20.1	1,.643	20.3	879-2,407
June-August	52	29.9	2,594	32.0	1,578-3,609
September-November	41	23.6	1,827	22.5	1,013-2,642
Patient age (years)					
0-5	8	4.6	257	3.2	-
6-12	14	8.0	549	6.8	-
13-19	9	5.2	385	4.8	-
20-29	23	13.2	1,190	14.7	-
30-39	22	12.6	1,125	13.9	-
40-49	40	23.0	1,860	22.9	1,037-2,682
50-59	27	15.5	1,435	17.7	728-2,141
60+	31	17.8	1,306	16.1	635-1,976
Patient sex					
Male	78	44.8	3,699	45.6	2,410-4,988
Female	96	55.2	4,407	54.4	2,950-5,865
Total	**174**		**8,107**		**5,832-10,381**

No. = Number

Est. = 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. The Consumer Product Safety Commission considers an estimate unstable and potentially unreliable when the number of records used is <20 or the estimate is <1,200.

95% CI = 95% confidence interval. Not calculated if the estimate is <1,200.

show people falling.[1,5,6] Injuries such as fractures, dislocations, and spinal cord injuries have been reported with the Milk Crate Challenge, and doctors have warned against the activity.[5,6] TikTok deleted Milk Crate Challenge videos because of the potential dangers involved in the activity.[5]

A review of PubMed failed to identify articles on injuries involving milk crates. The objective of this study was to characterize milk crate-related lower extremity injuries in general treated at US emergency departments (EDs). In addition, injuries related to the Milk Crate Challenge were identified and described.

Methods

The source of data for this retrospective epidemiologic study was the National Electronic Injury Surveillance System (NEISS) website (https://www.cpsc.gov/cgibin/NEISSQuery/home.aspx). Operated by the US Consumer Product Safety Commission (CPSC), the NEISS

Continued on page 47

Footmaxx Orthotics

Completely custom in every detail, for every patient.

Get started today!

1.800.779.3668

Footmaxx

Footmaxx.com/get-started

RESOURCES TO HELP YOU HELP PATIENTS FACING DIFFICULT DECISIONS ABOUT PARTIAL FOOT AMPUTATION

- **Amputation Decision Aid**—written for people facing partial foot amputation due to peripheral arterial disease. Includes unbiased information about different options, likely outcomes, and risks of complications. Information is presented in simple terms to facilitate understanding.

- **Amputation Discussion Guide**—companion resource for healthcare professionals that includes up-to-date research evidence and example conversation starters to facilitate meaningful conversations tailored to the needs of each individual patient.

- **Training Videos**—series of 5 short, animated videos to help healthcare providers learn more about shared decision-making and how to use Amputation Decision Aid resources.

AVAILABLE FOR FREE AT AMPUTATIONDECISIONAID.COM

Continued from page 44

Table 2. Circumstances of milk crate-related lower extremity injuries treated in United States emergency departments, National Electronic Injury Surveillance System, 2000-2021

Variable	No.		Est.		
	No.	%	No.	%	95% CI
Location of incident					
Home	80	46.0	3,927	48.4	2,583-5,270
Other public property	7	4.0	285	3.5	-
School	2	1.1	132	1.6	-
Street or highway	1	0.6	70	0.9	-
Place of recreation or sports	1	0.6	70	0.9	-
Not recorded	83	47.7	3,622	44.7	2,351-4,892
Number of milk crates					
1	163	93.7	7,599	93.7	5,433-9,766
More than 1	11	6.3	507	6.3	-
Circumstances of injury					
Fell off milk crate	58	33.3	2,793	34.4	1,727-3,858
Struck milk crate (didn't fall)	44	25.3	1,868	23.0	1,043-2,693
Tripped over milk crate	22	12.6	1,045	12.9	-
Struck by milk crate	20	11.5	856	10.6	-
Jumping off/over milk crate	3	1.7	224	2.8	-
Fell and struck milk crate	6	3.4	182	2.2	-
Lifting/carrying milk crate	2	1.1	90	1.1	-
Caught in/between milk crate	2	1.1	86	1.1	-
Fell while carrying crate	1	0.6	79	1.0	-
Other	9	5.2	569	7.0	-
Unknown	7	4.0	316	3.9	-
Total	**174**		**8,107**		**5,832-10,381**

Please see full footnote on Table 1.

Continued on page 48

Continued from page 47

collects data on consumer product-related injuries from the EDs of a stratified random sample of 100 hospitals from the more than 5,000 hospitals in the US. The random sample is stratified by hospital size, geographic location, and hospital type (general and pediatric hospitals). Professional NEISS coders view the medical charts at participating hospitals and, for patients with injuries that meet NEISS inclusion criteria, collect and code information such as treatment date; patient age, sex, and race; injury diagnosis and body part injured; discharge disposition; consumer product(s) involved in the injury; location where the incident occurred; and a brief narrative describing the incident.[7,8] Data are publicly available and de-identified; thus, the study is exempt from institutional review board approval.

Cases were milk crate-related lower extremity injuries reported to the NEISS database during 2000-2021. The publicly available NEISS database contains 3 numeric fields for coding the product involved in the injury (Product_1, Product_2, Product_3). However, there is no product code specific to milk crates. The NEISS database contains a text field (field name Narrative) that provides a brief summary of the circumstances of the injury. The NEISS database was searched for all records that included the letter groups "mil" and "crat" in the Narrative field. The Narrative fields of the resulting records were individually examined, and any records that involved an injury involving a milk crate were included in the study. That the injury involved a lower extremity was based on either the Body_Part or Body_Part_2 numeric fields containing codes for a lower extremity (upper leg, knee, lower leg, ankle, foot, toe). For records received during 2021, the Narrative fields were reviewed, and any records that specifically mentioned the Milk Crate Challenge or described a scenario consistent with the Milk Crate Challenge were designated Milk Crate Challenge cases.

The variables examined were treatment year and month (grouped into 3-month periods), patient age and sex, location where the incident occurred, number of milk crates involved in the injury, circumstances of the injury, type of injury (diagnosis), affected body part, and disposition. In order to identify the number of milk crates involved in the injury and the circumstances of the injury, the Narrative field for each record was reviewed. The circumstances of the injury were assigned to the following groups: fell off milk crate, fell and struck milk crate, tripped over milk crate, struck by milk crate, struck milk crate (but no mention of fall, e.g., someone threw a milk crate at the patient), lifting or carrying milk crate, caught in or between milk crate (e.g., caught finger in milk crate hole), jumping off or over milk crate, fell while carrying milk crate, other, and unknown. For the fell off milk crate group, further note was made as to whether the person was standing on, sitting on, or climbing off or on the milk crate when they fell. The NEISS database has 2 coded fields for documenting the diagnosis and 2 coded fields for documenting the affected body part. The NEISS Coding Manual indicates that the Diagnosis_2 and Body_Part_2 fields were added in 2018,[8] although these fields do not appear to have been used until 2019. Diagnoses and body parts docu-

mented in these second sets of fields during 2019-2021 were included in the analysis.

Analyses were performed using Office Professional 2007 Access and Excel (Microsoft Corporation, Redmond, Washington, US). For all milk crated-related lower extremity injuries, the distribution of cases and national injury estimates were determined for the variables. National injury estimates were calculated by summing the values in the Weight numeric field in the publicly available NEISS database, and 95% confidence intervals (CIs) were calculated for the estimates. The CPSC considers an estimate unstable and potentially unreliable when the number of records used is <20 or the estimate is <1,200.[7] For those variable subgroups where the estimate was <1,200, 95% CIs were not calculated. Due to the small number of Milk Crate Challenge records, injuries involving body parts other than the lower extremity were included and only the distribution of cases was determined for the variables.

Results

There were 174 milk crate-related lower extremity injuries identified at a sample of US hospital EDs during 2000-2021, resulting in a national estimate of 8,107 (95% CI 5,832-10,381) milk crate-related lower extremity injuries. This represents 27.6% of the 29,322 total milk crate-related injuries affecting any body part. The mean annual estimated number of lower extremity injuries was 379 during 2000-2005, 398 during 2006-2011, 384 during 2012-2016, and 305 during 2017-2021. Table 1 shows milk crate-related lower extremity injuries by 3-month period and patient demographics. The highest proportion of injuries was reported during June-August. Patients age 20 years and older accounted for 143 (82.2%) of the injuries and 6,915 (85.3%) of the estimated injuries. A higher proportion of the patients were female.

When the circumstances of milk crate-related lower extremity injuries were examined (Table 2), most of the injuries with a known incident location occurred at home. The majority of injuries involved a single milk crate. In the highest proportion of injuries, the patient fell off the milk crate followed by struck milk crate (did not fall) and tripped over milk crate. Of the 2,793 estimated injuries where the patient fell off the milk crate, the patient was standing on the milk crate in 1,400 (50.1%) of the estimated injuries, sitting on the milk crate in 71 (2.5%), climbing on or off the milk crate in 31 (1.1%), and what the patient was doing was not documented in 1,291 (46.2%).

Table 3 presents milk crate-related lower extremity injuries by type of injury (diagnosis) and patient disposition. The most common type of injury was contusion or abrasion followed by strain or sprain, fracture, and laceration. The lower leg was the most frequently affected body part followed by the ankle. The majority of patients were treated or examined in the ED and released.

Of the 40 total milk crate-related injuries identified in 2021, 9 specifically mentioned the Milk Crate Challenge and 3 described a scenario consistent with the Milk Crate Challenge, resulting in 12 identifiable

Continued on page 51

CELIARUIZ®

Diabetic & Therapeutic Wellness Footwear

We have developed an innovative footwear collection, which combines functional footwear designs for various types of pathologies with clinically tested materials.Our current collection uses COOLMAX® fabric lining with Carbon threads.
COOLMAX® polyester fibers are known for their high breathability due to their hollow fiber design and aeration channels, which helps to release moisture quickly and efficiently.
By combining COOLMAX® fibers with Carbon fibers we have created a one of a kind fabric with the ability to create a dry, and airy environment while maintaining freshness.
In a test for Staphylococcus aureus and Klebsiella pneumoniae, two bacteria that can proliferate under normal conditions of humidity and temperature caused by sweating our Coolmax-Carbon fabric has demonstrated bacteriostatic properties. Preventing bacterial reproduction, reducing odors and the risk of allergies.

Unlike other fabrics, Coolmax-Carbon fabric does not receive any chemical treatments such as microencapsulation, or ion application. These treatments degrade over time resulting in the fabric losing its properties.

Our innovative footwear collection that combines functional designs and advanced Coolmax-Carbon fabric ensures the general comfort and safety of the wearers.

Franki T

Wallaby T

Marc T

Bacteriostatic
Prevents bacterial reproduction, reducing odors and the risk of allergies.

Free of harmful chemical agents
OEKO-Tex Standard 100 certified fabric according to REACH regulations.

Biocompatibility
Tested by the ISO EN10993 approved standard, guaranteeing perfect skin compatibility.

A5500

MEDICARE APPROVED

MADE IN SPAIN

ISO 13485
BUREAU VERITAS Certification

Contact: Jerry Friedman Email: jfshooze@comast.net Website: www.celiaruizusa.com Phone: (410) 206-8890

Continued from page 49

Table 3. Type of injury and disposition of milk crate-related lower extremity injuries treated in United States emergency departments, National Electronic Injury Surveillance System, 2000-2021

Variable	No.		Est.		
	No.	%	No.	%	95% CI
Type of injury (most commonly reported)*					
Contusion or abrasion	50	28.7	2,144	26.5	1,246-3,043
Strain or sprain	39	22.4	1,869	23.0	1,043-2,694
Fracture	24	13.8	1,082	13.3	-
Laceration	15	8.6	818	10.1	-
Body part affected*					
Lower leg	51	29.3	2,226	27.5	1,306-3,145
Ankle	35	20.1	1,844	22.8	1,026-2,663
Foot	30	17.2	1,520	18.8	790-2,251
Toe	32	18.4	1,316	16.2	642-1,990
Knee	22	12.6	1,027	12.7	-
Upper leg	5	2.9	244	3.0	-
Disposition					
Treated or examined and					
released	170	97.7	7,955	98.1	5,713-10,197
Treated and admitted for	9	1.0	394	0.7	-
hospitalization	2	1.1	79	1.0	-
Left without being seen/against	1	0.1	16	0.0	-
medical advice	2	1.1	73	0.9	-
Total	**174**		**8,107**		**5,832-10,381**

*A case in 2019-2021 may have two coded diagnoses or two coded affected body parts.

Please see full footnote on Table 1

Milk Crate Challenge-related injuries (30.0% of total milk crate-related injuries for the year). 7 (58.3%) of the injuries were treated in August, 3 (25.0%) in September, 1 (8.3%) in October, and 1 (8.3%) in November. The mean patient age was 27 years (range 7-50 years); 6 (50.0%) of the patients were age 7-19 years and 6 (50.0%) were age 20-50 years. Eleven (91.7%) of the patients were male and 1 (8.3%) was female. 4 (33.3%) of the patients had a fracture, 3 (25.0%) internal organ injury, 2 (16.7%) contusion or abrasion, 2 (16.7%) strain or sprain, and 1 (8.3%) each concussion, laceration, and other/not stated injury. The affected body part was 6 (50.0%) head and neck, 5 (41.7%) upper extremity, 2 (16.7%) lower extremity, and 1 (8.3%) trunk. Ten (83.3%) of the patients were treated or examined and released from the ED, 1 (8.3%) treated and admitted for hospitalization, and 1 (8.3%) left without being seen or against medical advice.

Discussion

This study examined an estimated 8,107 milk

Continued on page 53

ProtoKinetics

The **New** Standard in Gait Analysis

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

Managing and synthesizing accurate gait and balance data are vital to **Optimizing Patient-Centered Mobility Performance** and understanding the effectiveness of interventions that portray patients' mobility in, and capacity for, daily activities.

Contact us today to learn how quickly and easily you can integrate the **Zeno Walkway Powered by PKMAS Software** into your operations!

www.protokinetics.com **610.449.4879** **info@protokinetics.com**

Continued from page 51

crate-related lower extremity injuries treated at US hospital EDs over a 22-year period. There is little published information on such injuries. The majority of patients were adults, particularly age 40-59 years, who accounted for 40% of the estimated lower extremity injuries. This age group may have been more likely to engage in activities that resulted in milk crate-related lower extremity injuries or more likely to have sought treatment for such an injury at a hospital ED.

In over 30% of the estimated lower extremity injuries, the patient fell off the milk crate. Furthermore, of these injuries sustained when the patient fell off the milk crate and the action of the patient was known, the majority of patients were standing on the milk crate when they fell. However, the majority of lower extremity injuries occurred in other circumstances, with the next most common circumstances being the patient struck the milk crate (did not fall) and the patient tripped over the milk crate. This suggests that while prevention activities should emphasize that people should not stand on milk crates, the public should be warned that most milk crate-related lower extremity injuries may occur in other ways.

The most frequent diagnoses were contusion or abrasion followed by strain or sprain, fracture, and laceration. Most of these injuries might be considered to be relatively minor and not require hospitalization. This study did find that 98% of the patients were treated or examined and released from the ED.

Twelve (30%) of the total milk crate-related injuries reported in 2021 were related to the Milk Crate Challenge. This suggests that the NEISS database may serve as a useful source of data on injuries related to certain social media challenges. Although the majority of Milk Crate Challenge-related injuries were treated in August 2021, when the social media trend first started, injuries continued to be treated in the 3 following months. The patient age ranged from 7 years to 50 years with half being children and half adults. The majority of patients were male. A variety of injuries were reported with the most common being fracture and internal organ injury. The most commonly affected body part was the head and neck followed by the upper extremity. The majority of patients were treated or examined and released from the ED.

This study is subject to limitations. Cases were initially identified by searching for all records that included the letter groups "mil" and "crat" in the Narrative field. Milk crate-related lower extremity injuries where these letter groups were not documented in the Narrative field would not have been included in this study. In addition, the selection of records to be included in the study, identification of the number of milk crates involved in an injury, and assignment of an injury to a particular circumstance was performed by a single person and used the Narrative field, which contains a limited amount of information. Errors in the selection and classification of records may have resulted in records being included or excluded erroneously or misclassified. Furthermore, the NEISS database only includes injuries treated at an ED. Studies that include information on injuries not evaluated at hospital EDs would provide a more complete view of milk crate-related lower extremity injuries.

In conclusion, the highest proportion of milk crate-related lower extremity injuries involved the patient falling off a milk crate followed by striking a milk crate (did not fall) and tripping over a milk crate. The most common type of injury was contusion or abrasion followed by strain or sprain, fracture, and laceration. The lower leg was the most frequently affected body part followed by the ankle. The majority of patients were treated or examined in the ED and released. ler

Mathias B. Forrester, BS, is an independent researcher in Austin, Texas. Now retired, he previously performed public health research for various university and government programs for 34 years.

References

1. Delbert C. How to conquer the viral milk crate challenge. Popular Mechanics. August 24, 2021. Available at https://www.popularmechanics.com/science/a37384750/conquer-milk-crate-challenge-with-science/. Accessed January 31, 2023.
2. Meares J. A tall order for the humble milk crate amuses its inventor. The Sydney Morning Herald. August 3, 2014. Available at https://www.smh.com.au/entertainment/art-and-design/a-tall-order-for-the-humble-milk-crate-amuses-its-inventor-20140803-zzxn7.html. Accessed January 31, 2023.
3. Smith E. Why milk crates are the perfect container. Dairycrates.com. Available at https://dairycrates.com/milk-crate-history/. Accessed January 31, 2023.
4. Rox M. 20 awesome uses for milk crates. Wise Bread. February 4, 2013. Available at https://www.wisebread.com/20-awesome-uses-for-milk-crates. Accessed January 31, 2023.
5. Rennex M. Junk explained: What is the milk crate challenge and why are so many doctors against it? Junkee. August 27, 2021. Available at https://junkee.com/milk-crate-challenge-explainer/306622. Accessed January 31, 2023.
6. Yang M. Milk crate challenge has doctors warning it's 'worse than falling from a ladder.' The Guardian. August 25, 2021. Available at https://www.theguardian.com/technology/2021/aug/25/milk-crate-challenge-tiktok-doctors-warnings. Accessed January 31, 2023.
7. United States Consumer Product Safety Commission. National Electronic Injury Surveillance System (NEISS). Available at https://www.cpsc.gov/Research--Statistics/NEISS-Injury-Data/Explanation-Of-NEISS-Estimates-Obtained-Through-The-CPSC-Website. Accessed January 31, 2023.
8. United States Consumer Product Safety Commission. NEISS Coding Manual. January 2021. Available at https://www.cpsc.gov/s3fs-public/January-2021-NT-CPSC-only-NEISS-Coding-Manual.pdf?xa_nMM1kB4SGpuSMOwf0NHkkkIqNcn8F. Accessed January 31, 2023.

Prevent Falls & Gain

Stability

THE STABILIZER

DEVELOPED BY surestep

A GAIT STABILIZING ORTHOSIS FOR ADULTS

The Surestep Stabilizer is a device that provides mediolateral stability, as well as stabilizing the foot/ankle in the sagittal plane, facilitating clearance during swing phase for patients with dropfoot. With the carbon fiber insert on the posterior strut, the Stabilizer helps to bring the foot up as the leg swings across, but also helps to assists with deceleration of the foot after heel strike. This makes for a much more normal, natural gait.

Visit our website for resources including our **fall risk assessment** and **measurement order form**.

17530 Dugdale Drive | South Bend, IN 46635 | 877.462.0711 | surestep.net

What does Economic Uncertainty Mean for Selling Your Orthotics & Prosthetics Business?

By David Fergusson

It should come as no surprise that the process of buying and selling businesses is affected by the general health of the economy. More expensive borrowing, market uncertainty, and shifts in consumer demand are all factors that can make both buyers and sellers wary about pursuing transactions. After an unprecedented flood of mergers & acquisitions (M&A) in 2021, M&A activity in 2022 was less stable.

As we move forward in 2023, business owners in the orthotics and prosthetics industry who are contemplating the sale of their company will benefit most from having a 360-degree view of the demand for and value of their business. After all, economic uncertainty does not mean that these business owners should put their head down and try to weather the storm without creating and maintaining an exit plan.

Being unprepared and uninformed will almost certainly come back to haunt you when it's time for you to hand your company off to new leadership. The right advisor will help you develop a successful exit strategy regardless of the current economic backdrop, and will help you maintain that plan through unstable times.

Buying and selling in the orthotics and prosthetics (O&P) space is particular in a few ways. Due to the industry being highly niche, the typical transaction takes a minimum of 5 years to be completed. During that time, the focus is on identifying the risks that might worry potential buyers and affect valuation.

Many of the sellers we have worked with have done a nice job of eliminating those risks by providing specifics that minimize the liabilities in the buyer's mind. To that end, it is crucial to begin careful documentation years before the start of a potential sale. Without extensive documentation, you won't get the best buyers, or any buyers at all.

Buyers won't miss much while they conduct the due diligence process, so you have to be thoroughly prepared with detailed documentation of your patient base for any potential concerns that are raised. This has helped our clients in this industry avoid any nasty surprises when working with potential buyers and it provides patients with a seamless transition with the new leadership.

When selling an O&P business, it's important to remember that the buying pool is extremely limited, because owners have stringent requirements for potential buyers. That's because, unlike other industries, O&P is patient-focused. O&P sellers we have worked with want to make sure that the buyer possesses a high level of knowledge of the field and is acclimated in the industry, making it impossible to sell to an organization that is not in the space. As we saw with one of our own O&P clients in their recent sale, most sellers in this industry are looking for a seasoned buyer who understands their business and puts an emphasis on their patients' interests and well-being.

Like most business owners, O&P sellers are cognizant that people

are the cornerstone of their operation. With that in mind, it's important to consider not only on the price a buyer proposes, but also how the new company ownership will fit in with their former employees, suppliers, and customers. Of course, this is especially important if the seller means to stay at the company after a sale, but even if they have no such intention, it's important to keep in mind the needs of all stakeholders.

And the work doesn't end once you've identified a buyer. During the transition period, it is essential for an O&P business to continue to show robust activity, or they run the risk of a sharp decline in patient retention. A buyer will hire a third-party accounting firm to assemble a quality-of-earnings report to validate the data that underpins financial performance. It's a very thorough document, and that's why documentation, and identifying potential risks ahead of a deal, is absolutely essential.

The prosthetics industry is no less susceptible to the ebbs and flows of the economy than any other industry. But understanding how transactions affect businesses and consumers is crucial for preparedness in an industry with a lot of moving parts. Through it all, it's important to have a trusted advisor in your corner who will help you develop an exit strategy, identify potential risks, and make the right decisions for your stakeholders. ler

David Fergusson is Executive Managing Director of M& A and Technology Practice Leader for Generational Equity, the leading middle market investment bank for privately held businesses. Find David at https://www.genequityco.com/our-people/david-fergusson

EVENup® by OPED

Shoe Lift for Leg Length Discrepency

MAKES WALKING MORE BALANCED!

Available in 7 Sizes and 3 Height Adjustment Capabilities

Size	Child	Ladies	Mens	Height
XXXS	9-12			8mm, 13mm or 25mm
XXS	13-2			
XS	3-5			
SMALL		5.5-8.5	6-8	1/2", 3/4" or 1-1/4"
MEDIUM		9-11	8.5-10	
LARGE		11.5-13.5	10.5-13	
X-LARGE		14+	13.5+	

OPED
Keeps you going.

OPED Medical, Inc.
5212 Belle Wood Ct
Buford, GA 30518
(800) 334-1906

www.opedmedical.com

ad index

Please Support our Advertisers…
Visit us online at lermagazine.com

Because of them, we are able to provide you with this unique, informative and invaluable magazine!

New & Noteworthy

Noteworthy products, association news, and market updates

PCR TEST FOR DETECTION OF INTERDIGITAL INFECTIONS

BakoDx's Web Space PCR test helps identify the infectious agents involved in web space dermatitis. This highly sensitive and highly specific test provides podiatric clinicians with ease of use, rapid results, and an accurate diagnostic method. The test utilizes real-time polymerase chain reaction (RT-PCR) technology to detect the causative agent within the web space keratin when present, resulting in the clinically identified dermatitis. The panel tests for fungi, dermatophytes, Candida SPP bacteria, *Corynebacterium minutissimum*, gram-negative bacteria, and *Staphylococcus aureus*. Interdigital infectious dermatitis may be due to a variety of organisms that look similar, but their treatment differs. Differential diagnosis may include *Corynebacterium minutissimum* in erythrasma, tinea pedis, candidal intertrigo, primary or secondary bacterial infections, and non-infectious etiologies including web space eczema or psoriasis. There is also a growing awareness of gram-negative bacterial web space infections.

BakoDX
855/422-5628
bakodx.com

ACSM'S CLINICAL EXERCISE PHYSIOLOGY NOW ENDORSED

The Clinical Exercise Physiology Association (CEPA), the Canadian Society for Exercise Physiology (CSEP), the British Association of Sport and Exercise Science (BASES), and Clinical Exercise Physiology UK (CEP-UK) have recently endorsed the American College of Sports Medicine® (ACSM) textbook *ACSM's Clinical Exercise Physiology*.

ACSM's Clinical Exercise Physiology provides research-based coverage of more than 35 conditions commonly seen in practice—from a host of cardiovascular disorders to immunological/hematological issues. Chapters that cover medical conditions are organized by disease type, then divided into sections that cover specific conditions from pathological and etiological perspectives. To provide a complete view of clinical exercise physiology, the book also covers important considerations and foundational elements such as screening, pharmacology, genetics, and electrocardiography.

Individual resources include an interactive question bank, videos, and animations on select conditions, and additional linked resources to ACSM journal articles. Instructor resources include PowerPoint lecture outlines, a test bank, and image banks.

AMPUTEE COALITION PARTNERS WITH ADA ON AMPUTATION PREVENTION ALLIANCE

The Amputee Coalition, the only federally funded organization dedicated to serving the limb loss and limb difference community, announced it is partnering with the American Diabetes Association (ADA) to support the Amputation Prevention Alliance. Complications from diabetes, including peripheral artery disease, increase the risk of amputation. This risk is even more pronounced among communities historically underserved by healthcare in the United States. Through policy change advocacy, raising awareness, and community empowerment, the Amputee Coalition in cooperation with the ADA will vigorously pursue all avenues toward a reduction in the number of Americans who lose a limb due to diabetes complications each year.

Ashlie White, chief programs officer of the Amputee Coalition, will provide strategic vision, energy, leadership, and accountability for all of the program's strategies, plans, goals, and outcomes, with a focus on continual improvement and development to meet the needs of the limb loss and limb difference community.

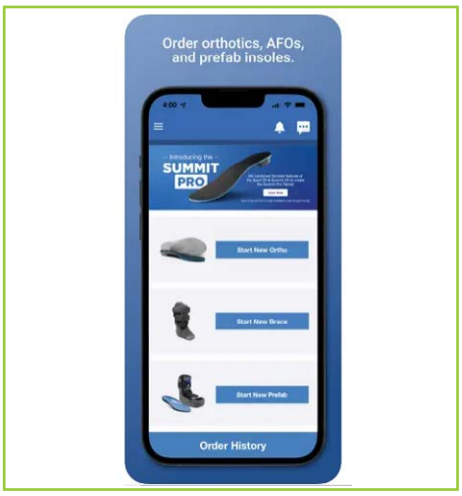
CREW-FIT COMPRESSION SOCKS

The crew-fit compression sock from Comrad is built with a stay-in-place fit at the ankle and the calf, which helps keep the sock from sliding. Additionally, there's a supportive band of compression that wraps around the arch of the foot. This helps support the natural arch and makes for an extra comfortable fit all day long. The sock is stitched to be seamless at the toe, which makes for a smooth feel and eliminates any chance of rigid seams rubbing against the wearer's toes. It also features full padding across the heel and toe and other foot-impact zones, creating a comfortable, well-cushioned, supportive, and durable sock. The company is so dedicated to quality and durability that

if their socks get holes in them within the first month of being worn, Comrad will send out a brand new pair for free.

Comrad
comradsocks.com

FORWARD MOTION MEDICAL VERSION 9 OF 3D CASTING APP



Forward Motion Medical has announced that version 9 of its 3D casting app is available for free on iPads and now iPhones. The app, which debuted in 2016, has added features such as start to finish casting and ordering, real-time order tracking, the ability to scan for ankle foot orthoses, desktop database integration, and now scanner-less casting capabilities through the use of the TrueDepth camera by Apple. The new breakthrough TrueDepth casting feature essentially turns every iPhone into a portable scanner. Simply download the app and log into your account to get started. The Forward Motion Medical app is free to download in the Apple App Store. No additional hardware is needed for Apple devices with TrueDepth capabilities (iPhones generation 10 and up and iPad Pros). Standard iPads require additional Structure sensor hardware.

Forward Motion Medical/JM Orthotics
800/301-5835
fdmotion.com

PAIN RELIEF CREAM

Sinoveda's Proflexa pain relief cream was formulated to quickly reduce inflammation and relieve pain. It also boosts blood flow and promotes long-term healing. This is done through the healing properties of 7 distinct herbs. Clove and camphor provide a soothing element for aching muscles. Frankincense relaxes tendons, easing sore spots on the body. Dang gui, chuan xiong, hong hua, and myrrh enhance blood flow, improve circulation, and accelerate the healing process. The Sinoveda team put each ingredient through the company's proprietary PPT® (Pharmaceutical Platform Technology) process, breaking down the botanical elements and discovering what it is that makes each plant and herb so helpful in the fight against pain. This scientific approach allows them to formulate and standardize the product, ensuring fast, effective, and consistent results.

Sinoveda
sinoveda.com

AI SEARCHES EARLY SIGNS OF OA FROM X-RAY IMAGES

Researchers from the University of Jyväskylä, Finland, and the Central Finland Health Care District have developed an artificial intelligence (AI)–based neural network to detect early knee osteoarthritis (OA) from x-ray images. The new AI-based method was trained to detect from x-rays whether there is spiking on the tibial tubercles in the knee joint or not. The finding is not at the moment included in the diagnostic criteria, but orthopedic specialists consider it as an early sign of OA.

"Around 700 x-ray images were used in developing the AI model, after which the model was validated with around 200 x-ray images," said Anri Patron, the researcher responsible for the development of the method. "The model managed to make an estimate of the spiking that was congruent with a doctor's estimate in 87% of the cases, which is a promising result."

AI tries to detect whether there is spiking on the tibial tubercles in the knee joint, which can be a sign of OA. Image courtesy of University of Jyväskylä.

The result is important because x-rays are the primary diagnostic method for early knee OA, and an early diagnosis can save the patient from unnecessary examinations, treatments, and even knee joint replacement surgery. In addition, the patient might be motivated to take the measures to slow down or even stop the progression of the symptomatic OA.

The goal is that in the future, AI would be able to detect early signs of knee OA from x-rays, making it possible for the initial diagnosis to be made more often by general practitioners.

HANGER ANNOUNCES LEADERS FOR PRODUCTS & SERVICES SEGMENT, SPS BUSINESS

Hanger, Inc. has announced the promotion of Dixon LeGrande to the role of president of

the company's Products & Services business segment. Additionally, Coleson Chase has been promoted to vice president and general manager of SPS. In this expanded role he will oversee the SPS business, while reporting to LeGrande. Both promotions were effective January 7, 2023.

LeGrande joined Hanger in 2010, holding leadership positions in sales and marketing for subsidiaries in both the Products & Services and Patient Care business segments, including SPS and Hanger Clinic. Currently, he is the president of Accelerated Care Plus (ACP), Hanger's therapeutic solutions subsidiary. In his new role, LeGrande will maintain his duties as ACP president, while also supporting Chase as he leads SPS.

In Chase's expanded role, he will oversee the SPS business, along with SureFit, including the customer service teams for both organizations. Chase joined SPS 5 years ago as the director of marketing, and most recently served as VP of operations.

CEMENTLESS KNEE REPLACEMENT

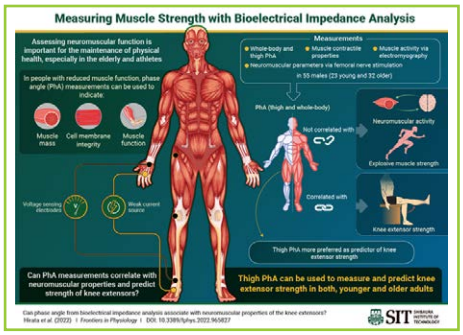
The Persona® OsseoTi® Keel Tibia for cementless knee replacement is the latest addition to Zimmer Biomet's clinically proven Persona Knee System. It features a new porous version of the Persona anatomic tibia with the company's OsseoTi Porous Metal Technology, which uses anatomical data in combination with 3D printing technology to build a structure that directly mimics the architecture of human cancellous—or spongey—bone. This material is combined with a keeled design to deliver stable initial and biological fixation. This system offers the added convenience of a new cemented option with the same bone prep as the cementless option so that surgeons can make an intraoperative decision between a cementless or cemented approach based on bone quality and the unique needs of the patient.

Zimmer Biomet
800/613-6131
zimmerbiomet.com

A BETTER WAY TO EASILY ASSESS KNEE MUSCLE FUNCTION

Scientists from Shibaura Institute of Technology (SIT), Japan, have investigated the usefulness of bioelectrical impedance analysis (BIA) in assessing muscle function and parameters, which can quickly and non-invasively measure tissue resistance (which depends on the amount of water and electrolytes present in the tissue) and reactance (which depends on the integrity of the cell membrane). Phase angle (PhA), a measurement derived via BIA, is calculated using the tissue's resistance and reactance. It is directly proportional to muscle cell mass and function. Many studies have linked whole-body PhA with maximal muscle strength, but there are none associating PhA with knee extension strength or explosive muscle strength in adults.

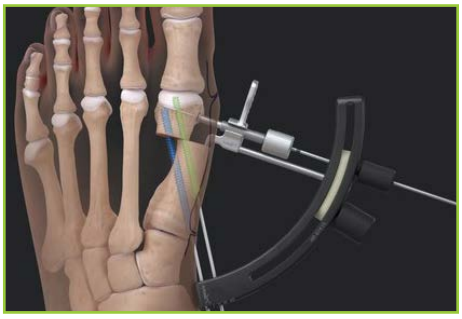
The findings, which show a new avenue of assessing muscle strength, revealed that both whole-body and thigh PhAs are associated with the muscle strength of knee extensors (with thigh PhA being the preferred predictor of knee extensor strength). However, this association was understood to be due to the muscles' contractile properties rather than any neural aspects. Thus, both measurements could not predict neuromuscular activity or the explosive muscle strength (which largely depends on neuromuscular control) of knee extensors.



Researchers from SIT report that thigh phase angle measurements—derived from BIA—can be used to predict knee extensor strength in adults. Image courtesy of Prof. Ryota Akagi from SIT.

Present implications of this work include being able to assess knee muscle strength is very important, especially for the elderly, in whom strong knee muscles mean greater independence to move about, and athletes, who need to maintain knee muscle strength in order to perform better. Future implications include building a system that uses a person's BIA to provide them with advice to promote their health.

MINIMALLY INVASIVE BUNIONECTOMY SYSTEM



Arthrex has launched the award-winning Arthrex Minimally Invasive Bunionectomy System to offer patients a better solution to traditional bunion surgery. The system is designed to be an all-inclusive set to facilitate minimally invasive surgical bunion correction. It is clinically proven to achieve the same or better corrective results than traditional surgery with less downtime, pain, and swelling. Performed through tiny incisions, this minimally

invasive procedure means patients can achieve complete bunion correction and get back on their feet faster and experience more cosmetically appealing results as the smaller incisions leave behind almost no visible scars. Studies show Arthrex Bunionectomy System patients' average recovery is up to 8 weeks faster than traditional open procedures, as published in the journal *Foot & Ankle International*.

Arthrex
800934-4404
arthrex.com

PERCUSSION MASSAGER

The Wahl Cordless Percussion Massager uses high-penetration massage to attack muscle tension below the surface and can treat large muscle groups or pin-pointed problem areas through a combination of interchangeable heads and variable intensity control. Designed for full-body massage and spine and pain relief, the massager offers a speed dial to adjust intensity to customize the user's experience from a deep invigorating feeling to a gentle soft massage. Intensity ranges between 2,000 pulses per minute (PPM) up to 3,350 PPM. The powerful motor helps relax and relieve muscle tightness or soreness. The rechargeable lithium ion battery lasts up to 7 hours on a full charge.

Wahl
wahlusa.com

OHI RECEIVES MAJORITY INVESTMENT FROM PRIVATE EQUITY FIRM

Orthotic Holdings, Inc. (OHI), a provider of custom medical devices for healthcare providers who treat conditions associated with the lower extremities, announced that it has secured a majority investment from Summit Partners Credit Advisors. This investment will help support the development of improved customer support and innovative products and technologies. Financial details of the transaction were not disclosed.

OHI is recognized as a pioneer in the field of custom foot orthoses, ankle foot orthoses and therapeutic footwear, socks, and hosiery. The company's product portfolio includes the following brands: Langer Biomechanical, The Orthotic Group (TOG), Pedalign, Apex Foot Health, Roomy Socks, and SafeStep, and provides critical lower leg health solutions to healthcare providers and their patients across North America, Europe, Middle East, and Australia/Asia Pacific.

PEDORS LAUNCHES ONLINE DIRECTORY OF FOOTCARE PROFESSIONALS

Pedors Shoes, Marietta, GA, announced the launch of its new online directory, Let's Walk, which is designed to help patients find a local foot healthcare professional who specializes in foot and ankle care, mobility, and therapy. Participating healthcare professionals include pedorthists, orthotists, podiatrists, orthopedists, physical therapists, and occupational therapists. The service is free for both foot healthcare professionals and patients. To register a facility, visit www.letswalk.com/add-your-facility. To access foot healthcare professionals, visit www.letswalk.com.

IONIC SILVER SOCKS

EMUAID® is taking a step forward with its innovative Ionic Silver Socks, bringing sock wearers anti-microbial protection, relief, performance, and comfort. These socks are woven with natural, broad-spectrum silver fiber for long-lasting moisture and odor control, keeping feet dry, bacteria-free, and fungus-free. Specially designed to inhibit odor and microbes and soothe the discomfort associated with many foot conditions, these socks can be worn alone or combined with EMUAID® First Aid Ointment as a broad spectrum anti-fungal treatment. Whether treating a fungal condition; suffering from corns, calluses, blisters, cracked heels, neuropathy, or foot pain; or preventing smelly feet, Ionic Silver Socks deliver multiple functional benefits in comfortable-to-wear everyday socks. The socks are unisex, no-show, and available in 2 sizes.

EMUAID
800-881-3900
emuaid.com

DO YOU HAVE A NEW PRODUCT OR NEWS?

We want to hear about your new product, news, or innovation! We want to hear from you! Please send information to Laura@LERmagazine.com

'SPRINT' TO REDUCE THE RISK OF HAMSTRING INJURIES

Reference: Fisher et al. Sports 2022

Designed by ©YLMSportScience

KINESPORT

Sprint! prepare/train the athlete to run/sprint at maximal velocity, individually:

- through a loop of evaluation and intervention/ preparation,
- with progressivity (eg, 'form 1st, load 2nd'), diversity/ variation, regularity and periodisation/ recovery,
- including preparation of the structure/system

To sustain the sprinting constraints, drills and technical skills, and regular exposure to maximal sprints

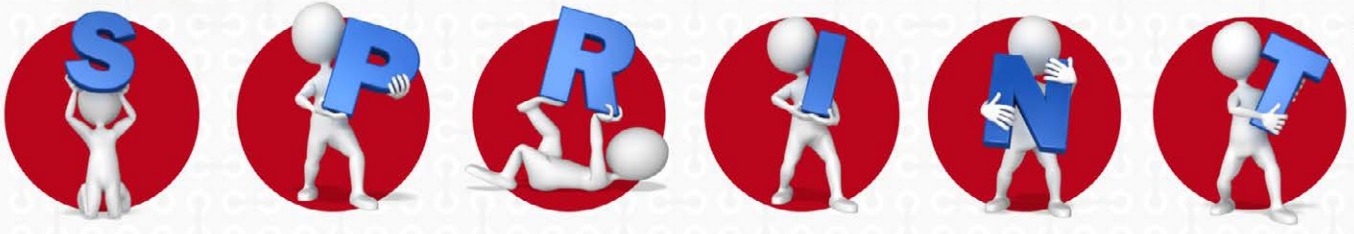
Plurifactorial and plurimodal individualised approach, including physical, psychological and contextual/sociological approaches, including healthy and safe lifestyle, taking into account the context and the facilitators and barriers for intervention implementation, and with education of the athletes and stakeholders around them

Repair/rehabilitate all injuries, with a sprint-oriented strategy, from early stages and until maximal capabilities are recovered and return to sport is permitted, and continue to monitor that there is no sequel deficiency

Increase capacities of tissues by strengthening, stretching and training sensorimotor control, going from isolated/non-functional to functional exercises

Note/pay attention to pain and/or fatigue and take care of it properly, improve athletes' ability to listen to their bodies, know their capabilities and limits, and learn warning signals to better self-efficacy in their daily practice

Train smartly, individually adapt and monitor the load, increase volume and intensity progressively



Images provided by PresenterMedia

Source: Fisher P, Faulkner M, McCann M, Doherty R. The Association between Pre-season Running Loads and Injury during the Subsequent Season in Elite Gaelic Football. Sports. 2022; 10(8):117. https://doi.org/10.3390/sports10080117

OrthoRite orthotics

always a step ahead

Leather Line

Handmade leather laminated devices from the finest inspected leather for patients needing accommodative or functional support with a suggested amount of control and correction.


Walk-Rite


Dress-Rite


Sport-Rite


Graph-Rite


Children's Line

Ortho-Rite INCORPORATED

65 Plain Ave.
New Rochelle, NY 10801
(800)473-6682
(914)235-9697 Fax
info@ortho-rite.com