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Editorial

Advances in Foot Biomechanics and Gait Analysis

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As we conclude this Special Issue dedicated to the '**Advances in Foot Biomechanics and Gait Analysis**', we reflect on the significant strides made in understanding the complexities of foot mechanics and their impact on human movement. The articles featured in this collection represent a diverse range of research efforts, from innovative biomechanical modeling techniques to clinical applications that enhance our understanding of gait abnormalities [1].

This Special Issue underscores the importance of interdisciplinary collaboration in advancing foot biomechanics. Researchers from various fields, including podiatry, biomechanics, rehabilitation, and engineering, have contributed invaluable insights that not only deepen our scientific knowledge, but also have the potential to improve patient care. The integration of advanced technologies, such as motion capture and force plate analysis [2], alongside traditional assessment methods, has enriched our understanding of dynamic foot function and gait patterns.

We have seen how the application of these advances can lead to more effective interventions for different conditions of foot injuries and several postural instabilities [3]. Moreover, the exploration of footwear design [4] and its influence on gait has opened new avenues for innovation in preventive care and rehabilitation strategies.

The integration of foot science is clearly demonstrated in this collection, as readers will observe through the included papers. Studies exploring improvements in foot strength [5], muscle activation, and the role of muscles in gait, ankle stability, and lower limb balance [6] exemplify the critical role of biomechanics in this Special Issue. Additionally, research addressing broader parameters such as ataxia, sclerosis, kinematics, the relationship between arms and foot, global posture disorders, deep learning, and even the interactions between the technical architecture of urban structures and the human body, offers essential insights into how we should interpret treatments for our patients, often extending beyond the foot. Looking ahead, we encourage continued research in this field, emphasizing the need for longitudinal studies that can assess the long-term effects of biomechanical interventions. Additionally, as we further explore the relationship between foot mechanics and various pathologies [7], it is essential to maintain a patient-centered approach that considers individual variability and functional outcomes.

In closing, we would like to extend our gratitude to all authors, reviewers, and contributors who have made this Special Issue possible. Your commitment to advancing the field of foot biomechanics and gait analysis is commendable. We look forward to witnessing the continued evolution of this discipline and its impact on improving human health and mobility.

Thank you for your engagement and support.

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References

1. Tran, J.; Ayers, E.; Verghese, J.; Abramowitz, M.K. Gait Abnormalities and the Risk of Falls in CKD. *Clin. J. Am. Soc. Nephrol.* **2019**, *14*, 983–993. [CrossRef] [PubMed]
2. Manzi, J.E.; Dowling, B.; Wang, Z.; Sudah, S.Y.; Quan, T.; Moran, J.; McElheny, K.L.; Carr, J.B., 2nd; Gulotta, L.V.; Dines, J. Forearm Pronation at Foot Contact: A Biomechanical Motion-Capture Analysis in High School and Professional Pitchers. *Orthop. J. Sports Med.* **2023**, *11*, 23259671221145233. [CrossRef] [PubMed]
3. Tang, Y.; Liang, P.; Pan, J.; Zhang, C.; Ren, H.; Cheng, S.; Kong, P.W. Effects of Ankle Orthoses, Taping, and Insoles on Postural Stability of Individuals with Chronic Ankle Instability: A Systematic Review. *Healthcare* **2023**, *11*, 2570. [CrossRef] [PubMed]
4. Pangan, A.M.; Leineweber, M. Footwear and Elevated Heel Influence on Barbell Back Squat: A Review. *J. Biomech. Eng.* **2021**, *143*, 090801. [CrossRef]
5. Nunes, J.P.; Costa, B.D.V.; Kassiano, W.; Kunevaliki, G.; Castro-E-Souza, P.; Rodacki, A.L.F.; Fortes, L.S.; Cyrino, E.S. Different Foot Positioning During Calf Training to Induce Portion-Specific Gastrocnemius Muscle Hypertrophy. *J. Strength Cond. Res.* **2020**, *34*, 2347–2351. [CrossRef]
6. Nolff, M.R.; Conner, N.O.; Haworth, J.L.; Goble, D.J. Lower Limb Asymmetry Evaluation Using the Balance Tracking System (BTrackS) Single Leg Stance Protocol. *J. Mot. Behav.* **2023**, *55*, 493–498. [CrossRef]
7. Kodithuwakku Arachchige, S.N.K.; Chander, H.; Knight, A. Flatfeet: Biomechanical implications, assessment and management. *Foot* **2019**, *38*, 81–85. [CrossRef] [PubMed]