RUSH

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Walbert Endowed Chair in Orthopedic Surgery

Advancement of Medicine

Over the past year, our research team has worked to advance sports medicine by integrating emerging technologies into patient care, rehabilitation, and athletic performance. A central focus of our work has been the development and clinical application of a novel brain-computer interface designed to improve recovery following orthopedic surgery. This technology involves wearing a lightweight brain-monitoring cap that tracks brainwave activity while patients perform guided visualization exercises, providing real-time feedback to reinforce proper neural activation and movement patterns. By combining two well-established rehabilitation strategies — motor imagery and biofeedback — this approach has the potential to enhance recovery, improve functional outcomes and shorten the time needed for patients to safely return to activity. A large-scale clinical trial is currently underway to evaluate the effectiveness of this innovative rehabilitation platform.

In addition to its clinical applications, this technology has been adopted to study and enhance athletic performance in sports such as soccer and basketball. This work is conducted in a newly established, state-of-the-art athletic facility featuring professional-grade soccer fields, basketball and volleyball courts, and a fully equipped motion analysis research laboratory. This environment allows for advanced biomechanical testing and real-world performance evaluation. The laboratory has also enabled collaborative partnerships to evaluate newly developed soccer cleats aimed at reducing lower-extremity injury risk while maintaining elite performance demands.

Over the past year, this body of work has received both national and international recognition, with presentations at leading scientific meetings including the Arthroscopy Association of North America, the American Academy of Orthopaedic Surgeons, the American Orthopaedic Society for Sports Medicine, the Global Knee Summit and the International Society of Arthroscopy, Knee Surgery and Orthopaedic Sports Medicine. In addition, this research and its broader implications for the future of sports medicine and rehabilitation are expected to be featured in an upcoming Amazon Prime series,

The Futurist. Collectively, these efforts contribute to the advancement of medicine by introducing innovative, evidence-based technologies that have the potential to improve patient outcomes, enhance athlete safety, performance and shape the future of orthopedic rehabilitation.

Research and Clinical Trials

The funds associated with the endowed faculty position have been essential to the growth, stability and impact of our research and clinical programs. Most importantly, this support has enabled the creation and maintenance of a full-time research team composed of individuals from diverse educational, professional and cultural backgrounds. This dedicated team allows our work to move forward efficiently and enables collaboration that transcends disciplines.

Endowed funding has directly supported the execution of ongoing clinical trials. This stable financial support has been critical for sustaining large-scale studies that would otherwise be difficult to maintain through short-term or external funding mechanisms alone. As a result, we have been able to pursue innovative research initiatives that aim to improve patient rehabilitation, athletic performance and injury prevention.

In addition, these funds have allowed us to cover publication-related costs, ensuring that our findings are disseminated widely through peer-reviewed journals and across national and international conferences.

Finally, the endowed support has provided us with flexibility to pursue new ventures and emerging opportunities, including pilot studies, novel collaborations and early-stage technology development. In doing so, we keep our program at the forefront of sports medicine research while simultaneously advancing evidence-based clinical care. Collectively, the endowed funds have been instrumental in advancing our mission to improve patient outcomes and shape the future of orthopedics and sports medicine.

Podium Presentations

- **Forsythe B**, Berlinberg E, Bohn C, Hand C, Khazi-Syed D, Chang J, Lavoie-Gagne O, Chahla J, Yanke A, Verma N, Cole B. “BMAC Augmentation of Allograft Anterior Cruciate Ligament Reconstruction Improves Patient Reported Outcomes in the Presence of Intra-Articular Pathology.” AAOS. March 2025. San Diego, CA.

- Bohn C, Hand C, Gornbein C, Khazi-Syed D, Chang J, Berlinberg E, Hevesi M, **Forsythe B.** "Effects of Coronary Artery Disease and Peripheral Arterial Disease in Arthroscopic Rotator Cuff Repair: A Matched Cohort Analysis." ISAKOS. June 2025. Munich, Germany.
- Chang J, Khazi-Syed D, Bohn C, Hand C, Inoue N, **Forsythe B.** "Lateral Extra-Articular Tenodesis: A Dynamic 3D Analysis of Tissue Isometry Comparing 4 Techniques." ISAKOS. June 2025. Munich Germany.
- Alexander R, Ollora J, **Forsythe B**, Sonkin K. "Visualization and Neurofeedback: A Case Report in a Professional Football Club." Isokinetic Conference Football Medicine. May 2025. Madrid, Spain.

Select Publications

- Hand C, Bohn C, Sasaki J, Eilen H, **Forsythe B.** "Effects of Obstructive Sleep Apnea on Postoperative Outcomes Following Carpal Tunnel Release: A Matched Cohort Analysis." Journal of Orthopaedic Reports. April 2025. https://doi.org/10.1016/j.jorep.2025.100696.
- Hand C, Bohn C, Angotti M, Eilen H, Varano M, **Forsythe B.** "Effects of Obstructive Sleep Apnea on Postoperative Outcomes Following Total Shoulder Arthroplasty: A Matched Cohort Analysis." Journal of Orthopaedics. June 2025. https://doi.org/10.1016/j.jor.2025.04.009.
- Bohn C, Hand C, Gornbein C, Khazi-Syed D, Chang J, **Forsythe B.** "Outcomes and Complications of Shoulder Arthroplasty in Patients with Arterial Disease: A Large Insurance Claims Matched Cohort Analysis." Journal of Orthopaedic Reports. December 2025. 10.1016/j.jorep.2025.100641.
- Hand C, Bohn C, Tannir S, Ulrich M, Saniei S, Girod-Hoffman M, Lu Y, **Forsythe B.** "American Academy of Orthopedic Surgery OrthoInfo provides more readable information regarding rotator cuff injury than ChatGPT." Journal of ISAKOS. June 2025. 10.1016/j.jisako.2025.100841.
- **Forsythe B**, Knapik DM, Khazi-Syed D, Chang J, Bohn C, Hand C, Korrapati A, Lavoie-Gagne O, Chiampas G, Mandelbaum BR, Chahla J. "Analysis of Injury Epidemiology in Soccer Players in the 2019 Confederation of North, Central America and Caribbean Association Football Gold

Cup as Reported by Team Physicians." Journal of Arthroscopy, Sports Medicine, and Rehabilitation. April 2025. doi: 10.1016/j.asmr.2024.101074.

The Year Ahead: 2026 and Beyond

In the coming year, our primary focus will be to build upon the momentum of our ongoing research initiatives while expanding into new, high-impact areas of rehabilitation science and sports medicine. We anticipate completing one arm of our ongoing lower-extremity rehabilitation randomized controlled trial, which evaluates the use of advanced brain-computer interface technologies to improve recovery following orthopedic surgery. Completion of this phase will provide critical data to inform future clinical adoption and broader implementation.

In parallel, we plan to launch a new randomized controlled trial focused on upper-extremity rehabilitation, applying the same innovative technology platform to conditions involving the shoulder. This work aims to extend the benefits of advanced neuro-based rehabilitation strategies to a wider patient population. Additionally, we intend to further expand our efforts in sports performance by initiating another randomized trial designed to evaluate the impact of these technologies on athletic performance, injury resilience and return-to-play metrics.

We also plan to deepen and advance our partnership related to cleat development and footwear safety, with the goal of refining injury-reduction strategies while maintaining elite athletic performance standards. Beyond equipment-based research, we aim to initiate a new collaborative partnership with Major League Soccer that will focus on tracking player workload, GPS and wearable sensor-based movement data, and injury surveillance metrics. This partnership has the potential to generate large-scale, real-world data that can inform evidence-based injury prevention strategies across professional soccer.

Collectively, these initiatives reflect our continued commitment to advancing rehabilitation science, improving athlete safety and performance, and translating innovative research into meaningful clinical and community impact.

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With Gratitude

I am deeply grateful for your generous investment in our work and in Rush's mission. Your support has been instrumental in allowing our team to pursue innovative research, train the next generation of clinicians and scientists, and develop new approaches that improve patient care, rehabilitation and athlete safety. With your commitment, we can explore bold ideas, sustain impactful clinical trials and translate research into meaningful advances in medicine. Thank you for your trust, partnership and dedication to advancing health care for the communities we serve.