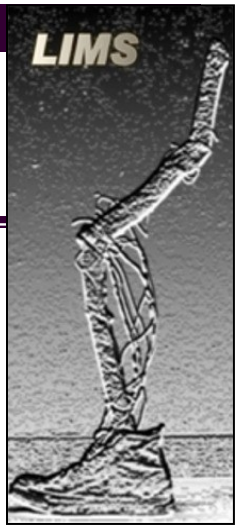
La Crosse Institute For Movement Science (LIMS)

Thomas Kernozek, PhD, FACSM, Director



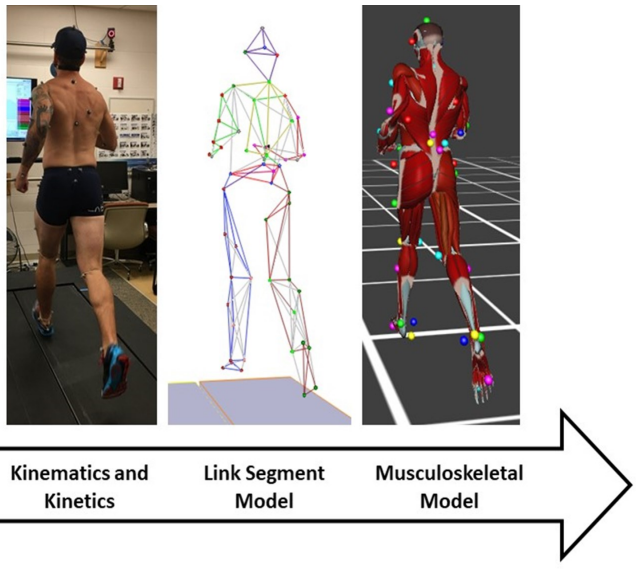
The Institute was created in 2005 at the University of Wisconsin—La Crosse in the Department of Health Professions, Physical Therapy Program. Dr. Tom Kernozek is the founding director.

LIMS brings together scientists and clinicians from various disciplines seeking applied knowledge related to human movement, factors related to injury, and in the foundations of therapeutic exercise used in the treatment and rehabilitation of injury.

Annually over 40 students from graduate and undergraduate programs from the UW-L campus are involved in laboratory research from Physical Therapy, Physics, Exercise and Sport Science, and Biology. High-technology funding from the State of Wisconsin supports Physics Biomedical student internships in the laboratory. Gundersen Medical Foundation annually supports Sports Medicine researcher Nate Vannatta as a clinical research collaborator. We also have an active research partnerships with Gundersen Health System and the Mayo Clinic (La Crosse).

Due to the many publications from the clinical biomechanics laboratory, LIMS has developed a national/international reputation.

The Health Science Center is home to the La Crosse Medical Health Science Consortium, a unique partnership between Gundersen Health System, Mayo Clinic Healthcare La Crosse, Western Technical College and Viterbo University. The building serves as the core of many educational, community partnerships/programs, and research activities. LIMS and the Physical Therapy program has grown along with the HSC into one of central research hubs at UW-La Crosse. Faculty and student research outcomes have distinguished UWL and the doctoral program in Physical Therapy Program.



LIMS group secures UWL/Mayo Seed Grant to study Pelvic Floor Dysfunction

Pat Grabowski, Drew Rutherford, Tom Kernozek (UWL) and Denise Grabowski and Angela Imhoff (Mayo Clinic La Crosse) were awarded a research grant to study pelvic floor dysfunction using portable ultrasound Imaging. Portable ultrasound has the potential to influence physical therapy interventions associated with Women's Health. UWL LIMS researchers developed a novel way to non-invasively measure bladder deformation associated with muscle contraction to gain insight to muscle function.

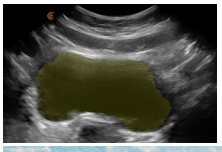
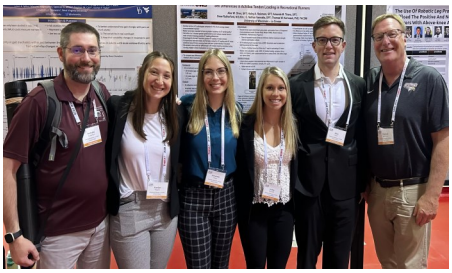


Figure left shows bladder ultrasound imaging where researchers can measure changes in the image associated with muscle contraction.



Tom Kernozek, Drew Rutherford (UWL), Nate Vannatta (Gundersen Health System) and Physical Therapy graduate students Alex Olver, Amanda Thiers, Haley Reierson, and Kaelyn Wagner presented two papers at the American Society of Biomechanics in Madison, WI. The papers examined sex differences in Achilles Tendon Loading in Running and the Symmetry in Achilles Tendon Loading during Running. Students received funding from UWL Graduate Studies to attend.

Shown Left to Right: Drew Rutherford, Kaelyn Wagner, Amanda Thiers, Haley Reierson, Alex Olver, and Tom Kernozek.

LIMS Scientists

Hanni Cowley, DPT, Clinical Research Partner (Health Professions)

Patrick Grabowski, PT, PhD, OCS, CSCS, Motor Control/Biomechanics, (Health Professions)

Naghmeh Gheidi, PhD, Biomechanist, (Health Professions)

Becky Heinert, MSPT, SCS, (Winona State University)

Tom Kernozek, PhD, FACSM, Biomechanist, (Health Professions)

Shane Murphy, ATC, PhD, Motor Control/Biomechanics (Health Professions)

Drew Rutherford, MS, Laboratory Manager/Engineer (Health Professions)

Nate Vannatta, DPT, SCS, (Gundersen Sports Medicine)

Robert Ragan, PhD, Computational Physicist (Physics)

Kanikkai "Steni" Sakiriyas, PT, DSc, Clinical Biomechanics (Health Professions)

Physical therapy doctoral student Callie Pohlman recognized for Achilles research

Callie Pohlman, a doctoral student in the Physical Therapy program, was featured by Thieme Publishers in their #Women in Medicine campaign based on her research published in the International Journal of Sports Medicine.

Pohlman was the lead author with other researchers from the La Crosse Institute for Movement Science (LIMS) research group. Her paper examined how body weight support can be used to reduce Achilles tendon loading in running.

Runners were examined with and without being affixed into the Lightspeed Lift in Duluth, Minnesota. This system uses elastic bands attached to the runner's pelvis to "offload" the runner as they run. Data indicated that using this system reduced ground impact by 9% and load to the Achilles tendon by nearly 9.5%.

"This was an interesting project that can have a potential influence on rehabilitation efforts relative to running-related injury" says Tom Kernozek, Pohlman's advisor and co-author. "These projects require a lot of effort to collect, process and analyze data, but oftentimes, the writing and presentation requires the most critical thought. Callie did a wonderful job describing our findings in her writing, and I am glad to see her honored this way."

In addition, Pohlman had the opportunity to present to other professionals in sports medicine at the American College of Sports Medicine Meeting in Denver last spring.

Recently Published or In Press Research (2023-2024)

Pohlman, C., Pardee, A., Friedman, M., Rutherford, A. D., Vannatta, C. N., Kernozek, T. W. (2023). Effects of Body Weight Support in Running on Achilles Tendon Loading. *International Journal of Sports Medicine, 44*(12), 913-918. (Accepted: July 2023, Published: November 2023). https://pubmed.ncbi.nlm.nih.gov/37336504/

Sackiriyas, S., Heinert, B., Rutherford, A. D., Fritz, G. M., Kernozek, T. W. (2023). Concurrent Force Feedback on Load Symmetry in Total Knee Arthroplasty Patients. *International Journal of Sports Physical Therapy, 18*(4). (Accepted: July 2023, Published: August 1, 2023).

Zavala, P., Rutherford, A. D., Vannatta, C. N., Kernozek, T. W. (2023). Dynamic Postural Control in Injured Collegiate Cross-Country Runners is Not Associated with Running-Related Injury. *Gait and Posture, 104*, 77-82. (Submitted: January 1, 2023, Accepted: June 2023, Published: July (3rd Quarter/Summer) 2023).

Kernozek, T. W., Vannatta, C.N., ***Blackman, T.*** (2023). Kinematic and muscle force asymmetry in healthy runners: How do different methods measure up?. *Gait & Posture, 103*, 159-165. (Accepted: May 2023, Published: June 2023). https://pubmed.ncbi.nlm.nih.gov/37187155/

Ertman, B., Klaeser, M., Voie, L., Gheidi, N., Vannatta, C. N., Rutherford, A. D., Kernozek, T. W. (2023). Alterations in Achilles Tendon Stress and Strain Across a Range of Running Velocities. *Journal of Sport Sciences, 41*(5), 495-501. (Accepted: June 2023, Published: March 2023). https://www.tandfonline.com/toc/rjsp20/current

Almonroeder, T. G., Friedrich, J. O., Hyoda, H., Grabowski, P., Jagim, A., Dobbs, W., Luedke, J. (2023). Inter-limb kinetic asymmetries during sit-to-stand performance persist following unilateral total knee arthroplasty: A systematic review and meta-analysis. *Clinical Biomechanics, 110*(0268-0033). (Accepted: August 2023, Published: December 2023). https://www.sciencedirect.com/science/article/pii/S0268003323002346

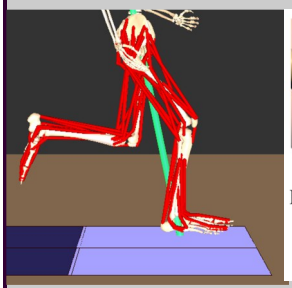
Students or residents are in *italics*

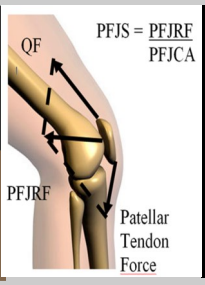
We measure your movement performance!

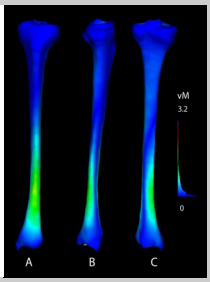
Our laboratories have sophisticated equipment to measure motion, impact forces, pressures on the feet or seat, muscle activation, energy cost, respiration and heart rate, or imaging of tendons or other soft tissues.

These data can be used to determine the loading on joints and muscles to give insight to how and why injuries may occur or for the improvement of performance to keep you active.

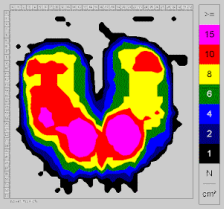
Musculoskeletal models are used to examine loading on bone, joints, ligaments, and tendons (show below).

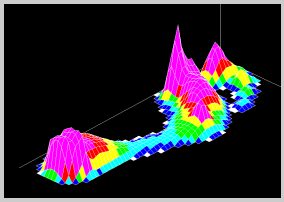


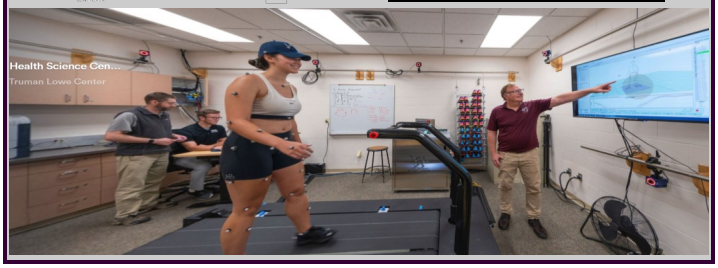




Loading in seating or during walking or running (shown below). Hotter colors depict higher loading in these anatomical areas.







For more information contact:

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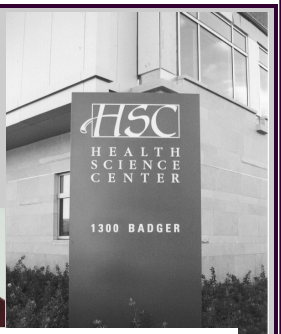

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Check out LIMS on your smartphone!