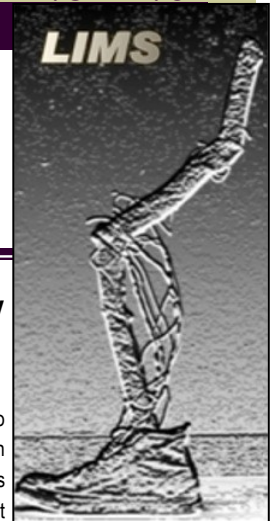


La Crosse Institute For Movement Science (LIMS)

Thomas Kernozek, PhD, FACSM, Director

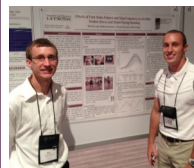


The Institute was created in 2005 at the University of Wisconsin-La Crosse in the Department of Health Professions, Physical Therapy Program. LIMS brings together scientists and clinicians from various disciplines seeking applied knowledge related to human movement, factors related to injury, and in the foundations of therapeutic exercise used in the treatment and rehabilitation of injury.

Each year over 40 students from graduate and undergraduate programs from the UW-L campus are involved in laboratory research including Physical Therapy, Exercise and Sport Science, Physics, and Biology. High technology funding from the State of Wisconsin supports 8 Physics Biomedical student internships in the laboratory.

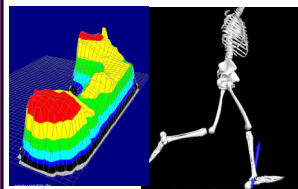
Due to the many publications from the clinical biomechanics laboratory, LIMS has developed an international reputation.

LIMS presents at the American Society of Biomechanics Meeting

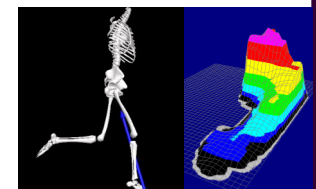


Michael Lyght, Matthew Nockerts, (photo left), Tom Kernozek and Robert Ragan presented on the Effects of Achilles Tendon Stress with Changes in Foot Strike Pattern and Step Rate. Michael and Matthew are graduate students in the Doctoral Program in

Physical Therapy. This paper showed that rearfoot striking and increases in step rate in running results in less Achilles Tendon Stress, Strain and Force than forefoot running and running with lower step rates or running cadence.



Rearfoot Strike

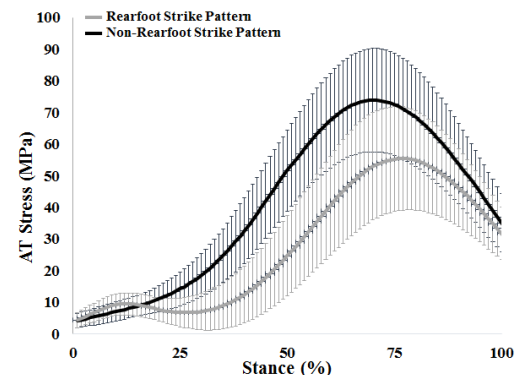


Forefoot Strike

LIMS welcomes Drew Rutherford!

Drew Rutherford, MS joined the UW-L Physical Therapy program and the LIMS in the Summer of 2015. Drew has centered his previous research on motor behavior in the upper extremity within both natural vision environments and immersive 3D environments generated by computer simulations. His work focused on how individuals control complex movement sequences and how vision and proprioception are incorporated into accurate corrections for sudden changes in movement goals. Recently, Drew has been a researcher with the Department of Surgery at the UW Hospital in Madison investigating advanced methods of measuring and assessing technical performance in general surgery residents using clinical simulations. A mechanical engineer by trade, he will continue to focus on implementing novel technology for measuring human performance.

Achilles Tendon Stress was 24% greater with Forefoot Strike Pattern during Running



AMERICAN SOCIETY OF BIOMECHANICS 39TH ANNUAL MEETING

August 5-8, 2015 | Columbus, Ohio



Interested in being a participant in a LIMS study?



Current research projects

Achilles Tendon Loading in Habitual Forefoot and Rearfoot Runners

Effects of Heel Lifts on Achilles Tendon Loading in Runners

Use of Performance Based Feedback in Reducing Patellofemoral Joint Stress in Landing

LIMS Scientists

Chris Durall, DPT, ATC, MSPT (UW-La Crosse Health Center)

John Greany, PT, PhD, Exercise Physiologist, (Health Professions)

Thomas Greiner, PhD, Biological Anthropologist, (Health Professions)

Naghmeh Gheidi, PhD, Biomechanist, (Visiting Professor, Health Professions)

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

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

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

Robert Ragan, PhD, Computational Physicist (Physics)



Recently Published or In Press Research

Kernozek TW, Vannatta CN, van den Bogert AJ. [Comparison of two methods of determining patellofemoral joint stress during dynamic activities](#). Gait Posture. 2015 May 29. pii: S0966-6362(15)00477-4. doi: 10.1016/j.gaitpost.2015.05.017. [Epub ahead of print]

Condello G, Kernozek TW, Tessitore A, Foster C. [Biomechanical Analysis of a Change of Direction Task in Collegiate Soccer Players](#). Int J Sports Physiol Perform. 2015 May 26. [Epub ahead of print]

Peng HT, Chen WC, Kernozek TW, Kim K, Song CY. [Influences of Patellofemoral Pain and Fatigue in Female Dancers during Ballet Jump-Landing](#). Int J Sports Med. 2015 Mar 25. [Epub ahead of print]

Cooper DM, Leissring SK, Kernozek TW. [Plantar loading and foot-strike pattern changes with speed during barefoot running in those with a natural rearfoot strike pattern while shod](#). Foot (Edinb). 2015 Jun;25(2):89-96.

Willson JD, Ellis ED, Kernozek TW. [Plantar loading characteristics during walking in females with and without patellofemoral pain](#). J Am Podiatr Med Assoc. 2015 Jan-Feb;105(1):1-7.

Sorenson B, Kernozek TW, Willson JD, Ragan R, Hove J. [2D and 3D Relationships Between Knee and Hip Kinematic Motion Analysis: Single Leg Drop Jump Landings](#). J Sport Rehabil. 2015 Feb 6. [Epub ahead of print]

Vannatta CN, Kernozek TW. [Patellofemoral joint stress during running with alterations in foot strike pattern](#). Med Sci Sports Exerc. 2015 May;47(5):1001-8.

Kernozek TW, Meardon S, Vannatta CN. [In-shoe loading in rearfoot and non-rearfoot strikers during running using minimalist footwear](#). Int J Sports Med. 2014 Dec;35(13):1112-7.

Switlick T, Kernozek TW, Meardon S. [Differences in joint-position sense and vibratory threshold in runners with and without a history of overuse injury](#). J Sport Rehabil. 2015 Feb;24(1):6-12.

Willson JD, Sharpee R, Meardon SA, Kernozek TW. [Effects of step length on patellofemoral joint stress in female runners with and without patellofemoral pain](#). Clin Biomech (Bristol, Avon). 2014 Mar;29(3):243-7.

LIMS publications have a national/international impact in Movement Science

Below shows the number of citations (this is an estimate of the scientific impact of the research) since 1997. In 2014 LIMS research manuscripts were cited a record 346 times based on data tabulated by Google Scholar. Since 2010, our research papers were cited over 1400 times by other authors.

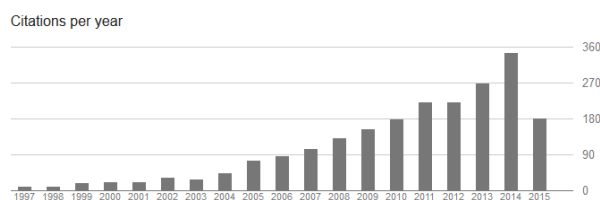


Figure 1. Number of citations since 1997 by LIMS research.

Fast Facts:

Over 60 students have been co-authors on LIMS publications since 2010! Greater than 90% have been students in the UWL doctoral program in Physical Therapy.

Most cited paper (227 times)

[Gender differences in frontal and sagittal plane biomechanics during drop landings](#). Kernozek, TW, Torry, MR, Van Hoof, H, Cowley, H, Tanner S Med Sci Sports Exerc. 2005 Jun;37(6):1003-12.

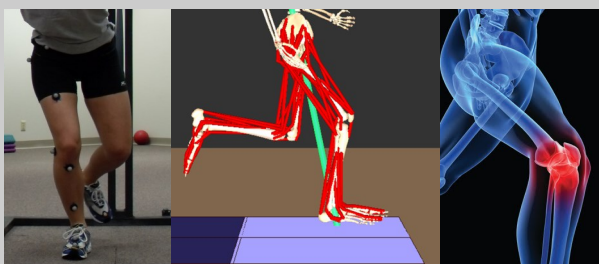


We measure movement performance!

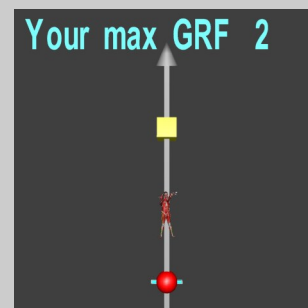
Our laboratories have sophisticated equipment to measure motion, impact forces, pressures on the feet or in seating, muscle activation, energy cost and heart rate, or for the imaging of tendons or soft tissue.

These data can be used to determine the loading on joints and muscles to give insight to how and why injuries occur or in the improvement of performance to keep you active. Below are some examples from current projects.

Musculoskeletal models are used to determine loading on bone, joints, ligaments and tendons



Computer displays are used to give movement performance feedback to athletes in a video game-like environment.



For more information contact:

Tom Kernozek, PhD, Director of LIMS

4071 Health Science Center

University of Wisconsin—La Crosse

1300 Badger Street

La Crosse, WI 54601

608-785-8468

tkernozek@uwlax.edu



Check out our lab on your smartphone!