

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 Department of Health Professions. It brings together scientists and clinicians from various disciplines seeking new knowledge related to human movement, factors related to injury, and in the foundations of therapeutic exercise used in the treatment and rehabilitation of injury.

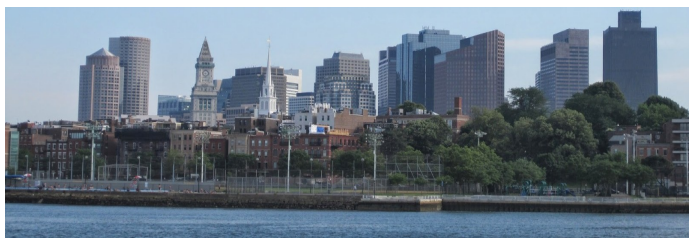
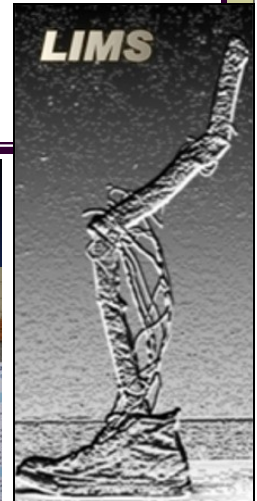
Each year over 40 students from graduate and undergraduate programs from the UW-L campus are involved in laboratory research including Physical Therapy, Exercise and Sport Science, Physics, and Biology. High technology funding from the State of Wisconsin supports 8 Physics Biomedical student internships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

Due to the many publications from the clinical biomechanics laboratory has developed a national reputation from published and presented work.

7th World Congress of Biomechanics



Tom Kernozek, Sarah Leissing, and Stephanie Lopez presented a poster on the landing mechanics after ACL reconstruction in Boston at the World Congress of Biomechanics. Bob Ragan (Physics), Di-An Hong (Health Professions) and Becky Heinert (Gundersen Lutheran) were co-authors. The LIMS group had 3 presentations at this international conference.



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)

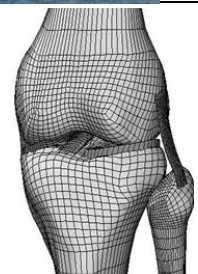
Di-An Hong, PhD, Biomechanist, (Laboratory Manager, Health Professions)

Barb Johnson, PT, PhD (Pediatric Physical Therapy, Gait Analysis)

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

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

Robert Ragan, PhD, Computational Physicist (Physics)



LIMS welcomes Barbara Johnson!

Barbara Johnson, PT, MSPH, PhD will join the UW-L Physical Therapy faculty and the LIMS in the fall of 2014. Dr. Johnson has practiced in Pediatrics. Her research has focused on measurement of body structure and function (gait kinematics, postural control, muscle/bone architecture) and activity (gross motor abilities, fitness, and walking speed), in children with musculoskeletal and neuromotor impairments. Dr. Johnson most recently worked in the Motion Analysis Laboratory at Shriners Hospital for Children and in the Pediatric Neuromotor Research Program at the University of Utah in Salt Lake City. She was an investigator on two grants evaluating the effects of physical training on bone architecture, muscle strength, and motor coordination in children with neurofibromatosis type 1 and for improving gross motor abilities in children with cerebral palsy. Dr. Johnson will continue to pursue her research on the measurement of strength and coordination in children with neuromotor disorders in the LIMS.

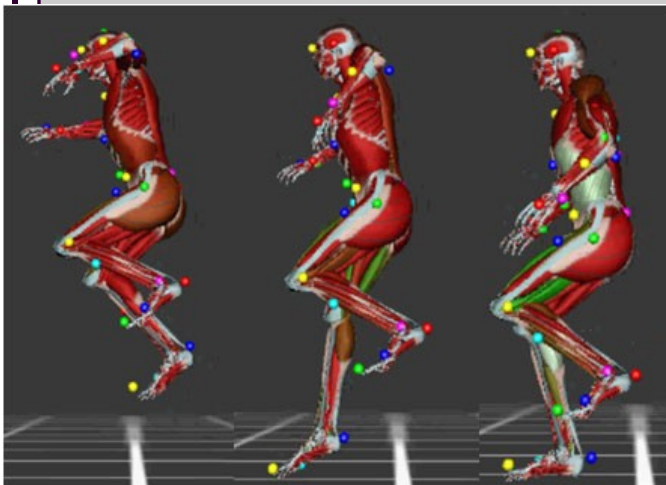
Interested in being a participant in a LIMS study?

Current projects

Estimates of Achilles Tendon Loading during Running and with Different Therapeutic Exercises

Patellofemoral Joint Stress with Different Squat Techniques

Knee Mechanics post Anterior Cruciate Ligament Reconstruction during Hopping Tasks



Recently Published or In Press ResearchIn-Shoe Loading in Rearfoot and Non-Rearfoot Strikers during Running Using Minimalist Footwear.

Kernozek TW, Meardon S, Vannatta CN.

Int J Sports Med. 2014 Jun 30. [Epub ahead of print]

Differences in Joint Position Sense and Vibratory Threshold in Runners With and Without a History of Over-Use Injury.

Switlick T, Kernozek TW, Meardon S.

J Sport Rehabil. 2014 Jun 23. [Epub ahead of print]

The effects of running cadence manipulation on plantar loading in healthy runners.

Wellenkotter J, Kernozek TW, Meardon S, Suchomel T.

Int J Sports Med. 2014 Aug;35(9):779-84.

Effects of step length on patellofemoral joint stress in female runners with and without patellofemoral pain.

Willson JD, Sharpee R, Meardon SA, Kernozek TW.

Clin Biomech (Bristol, Avon). 2014 Mar;29(3):243-7.

Short-term changes in running mechanics and foot strike pattern after introduction to minimalistic footwear.

Willson JD, Bjorhus JS, Williams DS 3rd, Butler RJ, Porcari J, Kernozek TW.

PM R. 2014 Jan;6(1):34-43.

Kinetic comparison of the power development between power clean variations.

Suchomel TJ, Wright GA, Kernozek TW, Kline DE.

J Strength Cond Res. 2014 Feb;28(2):350-60.

The effect of foot strike pattern on achilles tendon load during running.

Almonroeder T, Willson JD, Kernozek TW.

Ann Biomed Eng. 2013 Aug;41(8):1758-66.

LIMS publications continue to have national/international impact in Movement Science

Figure 1 below shows the number of citations (this is an estimate of the scientific impact of the research) since 1997. In 2013, LIMS research manuscripts were cited a record 261 times based on data tabulated by Google Scholar. Since 2009, our research papers were cited over 1186 times.

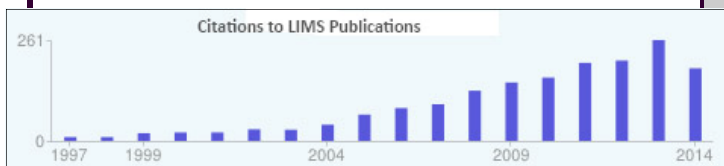


Figure 1. Number of citations since 1997 by LIMS research.

Did you know that 3 former LIMS students are pursuing their PhD in Biomechanics/Movement Science?

Tom Almonroeder (UW Milwaukee), Brian Wallace (University of Kentucky) and Tim Suchomel (East Tennessee State)

The Runner's Corner

What should I consider switching to "minimalist" running shoes?

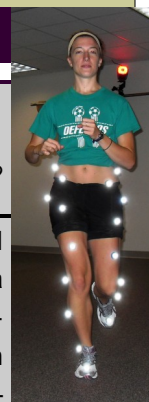
A recent publication by LIMS in the Int. J. Sport. Med. showed that metatarsal loading is considerably higher when using a forefoot running pattern compared to a heel strike running pattern when wearing minimalist shoes. If transitioning to such running shoes it may be wise to do it slowly with greatly reduced mileage.

Should I change my running cadence (shorten my stride while keeping my speed constant) to reduce loading between my foot and the shoe?

Maybe! Plantar loads appear reduced in some regions of the foot, in particular the heel when running with a faster cadence at the same running speed.

Should I change my step length or foot strike pattern to alleviate patellofemoral joint loads (associated with knee pain behind the knee cap)?

Maybe! A recent study to be published by LIMS researchers in Med Sci Sport Exerc shows a reduction in patellofemoral joint loads with a forefoot running pattern compared to using a rearfoot strike pattern. Also, a reduction in loading occurs when runners reduce their step length while keeping the same running speed. However, Achilles tendon loads and metatarsal stresses (shown in other LIMS studies) appear higher for forefoot runners.

For more information contact:

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Biomechanics

The mechanics of a living body, especially of the forces exerted by muscles and gravity on the skeletal structure.