# La Crosse Institute For Movement Science (LIMS)

Thomas Kernozek, PhD, Director

The Institute was created in 2005 at the University of Wisconsin-La Crosse in the Department of Health Professions in the Health Science Center. The Institute brings together scientists and clinicians of various disciplines in the quest for new knowledge related to human movement, the identification of factors related to injury, the foundations of therapeutic exercise and injury prevention.

Each year over 40 students from graduate and undergraduate programs across 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 undergraduate student internships in the lab. A graduate assistant from Exercise and Sport Science is also assigned to the lab. Faculty, graduate and undergraduate students annually present research at professional meetings in physical therapy, biomechanics and sports medicine.



# **LIMS Lab Facilities**

LIMS labs in the Health Science Center include the 2,250 square foot biomechanics and 1,900 square foot exercise physiology laboratory. The biomechanics laboratory includes an 8 camera motion analysis system and three force platforms, electromyography, seating, barefoot and in-shoe pressure measurement technology, an isokinetic machine and an electromagnetic tracking system. The exercise physiology laboratory includes metabolic and gas analysis systems for bike or treadmill use.



### **Current Projects**

- Modeling the knee to better understand mechanisms of non-contact ACL injuries in females.
- Evaluating running mechanics of females with patellofemoral pain compared to healthy controls.
- Examining the effects of multifrequency vibration on blood flow and muscle activation.
- Evaluating changes in bone stresses during running in those with a previous history of stress fracture.



#### **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)

Tom Kernozek, PhD, Biomechanist, (Health Professions)

Stacey Meardon, PT, ATC, PhD, Biomechanist/Motor Control, (Health Professions)

Robert Ragan, PhD, Computational Physicist (Physics)

John Willson, MSPT, PhD, Biomechanist, (Health Professions)

#### 2011-2012

# Recently Published or In Press Studies

Wirtz, A., Willson, J.D., Kernozek, T.W., Hong, D. (in press). Patellofemoral Joint Stress During Running in Females with and without Patellofemoral Pain. The Knee.

Ball KA, Greiner TM. (in press) A procedure to refine joint kinematic assessments: Functional Alignment. Comput Methods Biomech Biomed Engin.

Durall, C., Kernozek, T.W. (in press). Association between single-leg postural control and drop-landing mechanics in healthy females. Journal of Sports Rehabilitation.

Rogatzki, M.J., Kernozek, T.W., Willson, J.D., Greany, J.F., Hong, D., Porcari, J.P. (in press). Differences in peak muscle activation, joint kinematics and kinetics during an elliptical and a stepping movement pattern while using the precor amt trainer. Research Quarterly in Exercise and Sport.

Meardon SA, Hamill J, Derrick TR. (2011) Running injury and stride time variability over a prolonged run. Gait Posture. 2011 Jan;33(1):36-40

Peng, H., Kernozek, T.W., Song, C. (2011). Quadricep and hamstring activation levels with changes in drop height. Physical Therapy in Sport. 12 (3):127-32.

Lubahn, A.J., Kernozek, T.W., Tyson, T.L., Merkitch, K.W., Reutemann, P., Chestnut, J.M. (2011) Hip muscle activation and knee frontal plane motion during weight bearing therapeutic exercises. The International Journal of Sports Physical Therapy. 6(2): 92-103.

Laughlin, W.A., Weinhandl, J.T., Kernozek, T.W., Cobb, S.C., Keenan, K.G., O'Connor, K.M. (2011). The effects of single-let landing technique on ACL loading. Journal of Biomechanics. 44(10)-1845-1851.

Willson, J.D., Kernozek, T.W., Reznichek, D., Arndt, B. (2011). Gluteal muscle activation during running in females with patellofemoral pain. Clinical Biomechanics. 26(7): 735-740.

Lyon, R., Liu, XC., Hung, J., Kernozek, T.W. (2011). Dynamic assessment in patients following bone-patellar tendon-bone autograft anterior cruciate ligament reconstruction. Open Orthopedics Journal, 5: 160-164.

Olson, T.J., Chebny, C., Willson, J.D., Kernozek, T.W., Straker, J.S. (2011). Comparison of 2D and 3D kinematic changes during a single leg step down following neuromuscular training. Physical Therapy in Sport. 12(2): 93-99.

Porcari, J., Hackbarth, J., Kernozek, T.W., Doberstein, S., Foster, C. (2011). Does the shake weight live up to its hype? Journal of Sports Science and Medicine, 10, 598-599.

Patrek, M., Kernozek, T.W., Willson, J., Wright, G.A., Doberstein, S. (2011). The effects of hip abductor fatigue on single leg landing mechanics. Journal of Athletic Training.46:31-42.

Fedie, R., Carlstedt, K., Kernozek, T.W., Willson, J. (2010). Effects of gender and attention to a ball on lower extremity biomechanics of a side cut maneuver. Sports Biomechanics. 9(3): 165-177.

Gillette JC, Stevermer CA, Miller RH, Meardon SA, Schwab CV. (2010) The effects of age and type of carrying task on lower extremity kinematics. Ergonomics. 2010 Mar;53(3):355-64.

Smith, J.P., Kernozek, T.W., Kline, D.E., Wright, G.A. (2010). Kinematic and kinetic variations between three depth jump conditions in male ncaa division III athletes. Journal of Strength and Conditioning Research.

Wallace, B.J., Kernozek, T.W., Kline, D.E., White, J., Peng, H., Huang, C., Wright, G.A. (2010). Quantification of vertical ground reaction forces of popular bilateral plyometric exercises. Journal of Strength and Conditioning Research. 24(1):207-12.



## LIMS Citations Continue to Rise

In medicine and science, one index of the quality of research is the number of times papers are being cited by other authors.

LIMS author citations during 2011 has reached a record number (over 160 times) as of September 2011.

Congratulations to the faculty and students that have made this possible!



#### For more information contact:





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