

New Directions in Research Lead to a New Commitment to Doctoral Students

by Linda Fitzgerald



Photography by Heather Thorne

In the few years since coming to the University of Michigan in 2000, **Jeff Horowitz** has put together an ambitious research agenda. Jeff is increasingly drawing attention from scientists and the media alike because of the research results in Kinesiology's Substrate Metabolism Laboratory (SML) that he directs. His laboratory studies the regulation of fat, carbohydrate, and protein metabolism in humans, with particular interest in how exercise and diet affect energy metabolism.

The overall goals of his research are to gain a better understanding about metabolic factors that contribute weight-gain and obesity, and to provide information that will be used to treat and prevent obesity-related diseases. Work in the SML has drawn attention and support from the National Institutes of Health, the American Diabetes Association, and the Robert & Veronica Atkins Foundation (of Atkins Diet fame).

While this exciting research is generated in his lab, under his guidance, Jeff explains that much of the credit has to go to his doctoral students. "I view my graduate students as collaborators in my lab," explains Jeff. "They are here to learn to become strong independent research scientists."

Typically, during their first year in the lab, graduate students largely assist others with research projects that are already underway. As they develop a deeper understanding of the complexities of the research questions being addressed, and acquire the lab skills necessary to address these questions, doctoral students take on more independence and take on a much larger role in the design of research studies being performed. They also take the leading role in writing many of the manuscripts describing the lab's research findings. The overall goal is that by the time the student graduates they have the foundation to develop a career as an independent researcher.

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What if there were no doctoral students in Kinesiology? Jeff is quick to respond, "The bottom line is that it would be very difficult to accomplish my lab's research goals without graduate students." It is often a misconception that graduate students are an inexpensive source of labor in the labs and classrooms. "It may be surprising," he continues, "but the cost of hiring lab technicians is often less expensive than supporting graduate students at the University of Michigan." Jeff goes on to explain that although hiring skilled technicians may help to accomplish a set of laboratory tasks, this is very different than having graduate students working on the same projects. Graduate students are truly passionate about the research questions and these projects are forming the foundation for their own research careers. He adds, "Graduate students are far more than just technicians, they are colleagues and a major driving force in the lab." Graduate students learn to troubleshoot problems, provide their own insight to interpret findings, and contribute ideas to what the next steps should be. Perhaps most importantly, graduate

students are the next generation of researchers who will continue to address important research questions, develop novel therapeutic and/or preventative treatments, etc... They also will be the ones who will teach future generations of students in the classroom as well as the lab. Without graduate students the flow of teachers and of new scientific discoveries will eventually cease.

Research That Makes a Difference

Today, kinesiology researchers and their graduate students conduct basic and clinical research, and because of their expertise in exercise, movement and health, colleagues in areas such as medicine, engineering and psychology are eager to collaborate. The profound impact physical activity in disease prevention and treatment, as well as improving quality of life is well recognized. Yet, HOW physical activity works to promote these health benefits and HOW we can improve movement capabilities in people with physical disabilities is poorly understood. Research in Kinesiology address these questions directly. Learning the underlying mechanisms for the beneficial effects of physical activity and discovering the root causes for movement disabilities allows for the development of improved treatments and therapies to further enhance human health. In addition, although "traditional" medical/health-care training, education, and research may acknowledge the importance of increased physical activity and movement, often little is done in terms of training and



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Cheryl Drenning and Brian Cousino test an infant subject in the Motor Development Laboratory.

educating health care professionals regarding the complexities of physical activity and movement to improve health. This is a primary focus of Kinesiology at the University of Michigan.

Dean Beverly Ulrich couldn't agree more. As she points out, “the cutting edge research in Kinesiology has shifted to broad societal concerns related to mobility and health. Movement—that is our routine activities of daily living, from walking to climbing stairs

to exercising—is essential to defining the quality of life we have. The impact activity can have on health is known at some levels, but has not been well understood or applied to daily living. As a result, our work has never been more relevant, more valuable or more important. Achieving these goals and serving society requires that we bring the very best doctoral students to campus to learn, assist in our research and become the future scholars, educators and researchers in Kinesiology.”

In Kinesiology, groups of researchers pays special attention to learning about special populations such as victims of spinal cord injuries, people with cerebral palsy, spina bifida, Down syndrome, and obesity—and how this can have applications for healthy individuals as well. Examples abound:

Dan Ferris, Riann Palmieri-Smith, and Scott McLean whose research findings hold promise for patients with spinal cord injuries and sport-related disorders. In addition to providing therapies for those with injuries, they are studying training and conditioning regimens in order to prevent injuries and that lead to chronic conditions as they grow older such as osteoarthritis and health issues related to inactivity because of pain and reduced mobility.

Dale Ulrich, Beverly Ulrich, Susan Brown and Rosa Angulo-Barroso who focus their research on developing therapeutic interventions for people of all ages with disabilities ranging from Parkinson's to spina bifida.

Doctoral Student Advancing Movement Science

The hard work in the Substrate Metabolism Laboratory in the Division of Kinesiology does pay off as Jeff Horowitz's doctoral students are quickly becoming stars in movement science. One of those “rising stars” is Simon Schenk (PhD. '06) who was the 2006 recipient of the “National Research Student Award” by the American College of Sports Medicine (ACSM); among the world's highest honors for a graduate student in Exercise Physiology.

It was a long road to Ann Arbor for Simon who hails from his native Australia. While earning his doctorate in Kinesiology at UM, he spent time lecturing undergraduates and mentoring students in the SML. He also completed a series of studies aimed at understanding the importance of exercise in improving insulin resistance, which is a major symptom of type 2 diabetes. Some of Simon's findings indicated that even a single session of exercise can protect against insulin resistance by altering how muscle processes fat during the several hours after exercise. Simon found that the exercise session had diverted fatty acids away from developing into harmful metabolites in muscle that are known to induce insulin resistance. Horowitz says, “We believe this describes a primary mechanism for how exercise improves insulin sensitivity in obesity.”

Simon's study also highlights the important metabolic health benefits of EACH exercise session. From studies like Simon's it is becoming increasingly evident that many of the key health benefits of exercise are not related to improved fitness but instead, the residual effects from the most recent exercise sessions are most important. These effects wear-off after only a few days (or less), so it is essential to get your regular “dose” of exercise.

Simon continues his research and training as a Post-doctoral Fellow in Dr. Jerrold Olefsky's laboratory at the University of California-San Diego; one of the top labs in the world investigating cellular and molecular regulation of insulin action.

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Kathy Babiak and Jason Winfree are being joined by two internationally recognized sport business scholars to who will be involved in evaluating the professional sport industry, and entertainment enterprises and how these activities shape our views on how we spend our leisure time and discretionary income.

Greg Cartee, Jeff and Katarina Borer collaborate to study the effects of exercise on human physiology particularly as it relates to the effects of exercise on metabolic and cardiovascular health. Their research is helping to determine how to manage or prevent such health problems as cardiovascular disease, obesity and type 2 diabetes.

Building from Strength

Improving—and redefining—mobility, health and the sport industry include a vast array of multi-dimensional tasks far beyond the scope of any single discipline or institution. However, given the remarkable breadth and depth of its academic resources, the University of Michigan is poised to assume a leading role in meeting the challenge. As part of a rich intellectual mix that includes medicine, public health, business, law, and public policy, Kinesiology is uniquely positioned to make large, far-reaching contributions.

The strength of Kinesiology can be traced to various factors. Among them is an impressive legacy of research dating back to multiple generations of faculty and doctoral students combined with outstanding research facilities that have been developed in the Central Campus Recreation Building (CCRB) and the Kinesiology Building through the years. This now will be complemented by addition of the new academic facilities in Observatory Lodge, this fall. The most valuable factor remains the human capital, the ability



Photograph by Heather Thorne

Dr. Riann Palmieri-Smith tests a subject in the Neuromuscular Research Laboratory.

to attract and retain the superb faculty and graduate students who drive the new discoveries and keep Kinesiology at the forefront of research, teaching and outreach.

The PhD Priority

“The task now is to reinforce our leadership position, increase our international visibility, and foster our future,” says Dean Ulrich. “Our future means focusing intently on funding for the PhD program.”

She goes on to explain: “Without a strong doctoral program, we cannot have strong faculty for the next generation. To date, we’ve been extremely fortunate in being able to attract serious, energetic and intellectually curious PhD students to our programs. Dedication to their studies and research requires today’s graduate students to pursue their doctoral degrees on a full-time ‘plus’ basis. We require them to enroll as full-time students with a meager salary leaving them limited opportunities for outside income to supplement their income. Financial support available to doctoral students is severely limited thus limiting the number of students overall. Our next funding priority must be endowment funds to provide support for top PhD students.”

Daniel Ferris, chair of the Kinesiology Graduate Committee, reinforces Dean Ulrich’s view. As he notes, “Doctoral students benefit Kinesiology in a multitude of ways. They teach undergraduates in key courses and in laboratories. In addition, doctoral students in research labs often serve as mentors for undergraduate research assistants. Our

PhD students help faculty members carry out research projects, publish papers and write grant applications, which advances the research productivity of the Division and factors into the rankings of Kinesiology programs by various agencies. And, finally, our doctoral students make a real difference in the world by moving into faculty positions across the globe.”

Is an endowment the best strategy for strengthening the PhD program—and the Division as a whole? “Absolutely,” Ferris says. “Competitive endowed fellowships will give us an advantage in recruiting. They will attract the best students and enable them to dedicate more time to research. Ultimately, top doctoral students will benefit undergraduates, faculty and the entire Division of Kinesiology.” **M**

Making a Difference in the Future of Kinesiology

The \$3 Million PhD Endowment Campaign Supported by the President's Donor Challenge

President Mary Sue Coleman has announced her second President's Donor Challenge, this time focused on graduate and professional student support. Every two dollars committed for graduate student support will be matched by one dollar from President Coleman. A full graduate or professional fellowship can often cost \$40,000 to \$50,000 annually. Individual endowments of \$750,000 earn nearly \$40,000 annually and can make the most difference in attracting the finest graduate students because they can fully fund one student for his or her student years at Michigan.

Alumni and friends of Kinesiology can choose to make a five-year pledge before December 31, 2008 toward Kinesiology's PhD. Endowed Fellowship Fund. In addition to their fellowship endowment commitment, they will receive the match will be credited to their gift records. Corporate matches for an employee's gift are eligible for a match from the President if the money comes in within the designated time frame.

"The strategy behind this final segment of the Michigan Difference Campaign is simple and powerful," notes Jim McIntyre, Director of Development for Kinesiology. "Faculty and students are attracted to the institutions that are best equipped to help them reach their professional goals. A \$3 million endowment fund will enable us to offer competitive fellowships to four PhD students. Annually, the faculty will award a four-year award to the best doctoral candidate entering Kinesiology. The net effect will be a long-term strengthening of our doctoral program, our research, our rankings, and our ability to make a difference in health care."

For more information about the PhD endowment fund and specific giving opportunities—including single-year gifts and multi-year commitments—visit www.kines.umich.edu/alumni/endowments.html or contact the Development Office at (734) 615-4272.

Volleyball Injuries Subject of Palmieri-Smith's Study

Athletic trainers and the NCAA have collaborated for 25 years through the NCAA Injury Surveillance System (ISS) to create the largest ongoing collegiate sports injury database in the world. Annually, the National Athletic Trainers Association (NATA) and the NCAA ask researchers and professional clinicians to review the data collected through ISS by sport to and make recommendations related to rules and policies associated with the policies.

Riann Palmieri Smith, PhD, ATC, assistant professor, Kinesiology and **Ed Wojtys**, MD Director, U-M Medical School's Med Sport, collaborated with **Julie Agel**, University of Minnesota; **Randall Dick**, NCAA; and **Stephen Marshall**, PhD, University of North Carolina at Chapel Hill in conducting an evaluation of epidemiology of injuries incurred by women's volleyball team members. They reviewed 16 years of NCAA injury surveillance data for women's volleyball in order to identify potential areas for injury prevention initiatives.

They found that more than half of all injuries affected the lower extremity with most affecting the ankle and knee. During practices, ankle ligament sprains, knee internal derangement and upper leg muscle strains were the most common injuries. While, in games, ankle ligament sprains, knee internal derangement and muscle strains of the shoulder and low back were most frequent. Women had almost twice the rate of ankle ligament sprains in games than in practice and just over twice the rate of sustaining knee injuries versus practice. "We believe the higher rate of ankle injuries in games suggests that US female collegiate volleyball athletes may be more aggressive during games or subjected to more situations (i.e., player-to-player contact) that may increase the injury risk," observed Riann and colleagues.

Ankle ligament sprains are common in volleyball, most often occurring when a player lands from an attack or a block and comes in contact with another player's foot. Although considered mild in comparison with other injuries, the authors concluded that ankle sprains are a significant problem for volleyball athletes in terms of frequency and severity, accounting for 23 percent of all injuries resulting in 10 days away from activity.

Clinicians and scientists should focus on preventing first-time ankle sprains and acute traumatic knee injuries, as well as reducing the risk of ankle sprain recurrence in the female volleyball athlete. Focus on the type and severity of knee injuries incurred by volleyball athletes is needed to be able to design potential prevention interventions.



The review was published in a special issue of the Journal of Athletic Training compiling and evaluating the epidemiology of athletic injuries by collegiate sport, last summer.