

Center for
Research on
Occupational and
Environmental
Toxicology



Photo by Brizz Meddings

NEWSLETTER

CROET Researcher’s Goal: to Develop Effective Occupational Safety & Health Interventions

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What is CROET doing to promote health and prevent disease and disability among working Oregonians and their families? This is a question often asked at our exhibit booth during regional occupational safety and health conferences. The answer – we employ the talents of excellent scientists like CROET faculty member Dr. Ryan Olson. Dr. Olson’s goal is to develop effective occupational safety and health interventions, with a particular focus on developing self-management tools that isolated workers can use to keep their work practices safe. He has extensive experience with the transportation industry, and two of his current research programs are focused on the commercial trucking industry.

According to the US Bureau of Labor Statistics, commercial truck drivers account for 10% of all workplace fatalities and consistently rank among the top three occupations in total non-fatal injuries and illnesses in the US. Heavy and light commercial truck drivers rank 3rd and 4th in total

work-related musculoskeletal disorders (MSDs), but when considered together, account for 8% of all workplace MSDs in the US, with total annual work-related costs estimated at approximately \$4 billion. Truck drivers who perform frequent manual material handling are especially vulnerable to low back pain and MSDs. Among the most vulnerable of drivers are those working in the highly demanding less-than-truckload (LTL) industry sub-sector. LTL work involves hauling partially loaded trailers, making multiple daily stops, and performing frequent and demanding material handling work in a variety of customer environments. Dr. Olson is trying to find ways to reduce the risk of injury as drivers conduct these types of activities.

To address the ergonomic challenges that LTL truckers face, Dr. Olson teamed up with Daniel Hahn and Aubrey Buckert of Portland State University to focus on how often drivers perform duties that involve extreme body postures while working. The isolated nature of truck driving work makes ergonomic hazard assessment difficult. To address these difficulties, the researchers employed two data collection methods: (1) intensive video monitoring, in which direct observation of work habits and environments were achieved through the use of a customized camera system installed in a working trailer and (2) behavioral self-monitoring, in which individuals repeatedly observed, evaluated, and recorded aspects of their own behavior and environmental conditions. The study recruited three drivers who were observed on 711 stops and who provided self-assessments on 385 of those stops.

The research team found that each instance of manual material handling increases the potential for severe body postures by 7%, whereas obtaining customer forklift assistance and preventing manual materials handling by palletizing transported materials decreased this potential by 12% and 20% respectively. Comparisons between

experimenter video observations and driver self-observations showed that drivers are quite accurate at self-assessing hazards that are environmental, frequent, and easy to discriminate, but less accurate at assessing potentially harmful body postures and rare work-related events or environments. These discoveries suggest some areas in which positive interventions could reduce risk, including organizational management of ground stops (e.g. facilitating the use of forklifts), re-engineering handles and steps that lead into trailers, and having workers self-assess the prevalence of certain work exposures. The results of the current project are an important step forward in understanding and preventing MSDs among isolated workers and in advancing our knowledge about the reliability of ergonomic self-assessments.

Another aspect of Dr. Olson's research of the trucking industry involves lifestyle factors such as diet, exercise and safety habits. Long and unusual work hours, combined with limited diet and exercise options, make living a healthy lifestyle very challenging in trucking. Obesity and smoking, two of the most significant lifestyle risk factors for diabetes, heart disease and cancer, are highly prevalent among truck drivers; 55% to 73% of drivers are overweight, and 49-54% are smokers. In the second of two research programs involving the trucking industry, Dr. Olson has developed a safety and health promotion intervention model for commercial truck drivers called SHIFT (Safety and Health Involvement For Truck drivers), which will begin a 6-month trial this Fall. SHIFT is an educational program and team competition that is focused on diet, exercise, and safety. Drivers compete in teams to achieve the biggest improvements in health and safety measures, and are rewarded for both participation and high achievement. To help drivers accomplish health and safety goals, the program includes computer-based training, self-management activities, and individualized health coaching. CROET will be loaning each SHIFT team a

laptop computer with wireless internet access so drivers can obtain training and additional information on the study website (www.ohsushift.com). SHIFT has a practical focus on daily behavioral goals, such as eating 5 fruits and vegetables a day, engaging in 30 minutes of moderate exercise on most days, and driving within speed limits.

Another research interest of Dr. Olson's relates to work tasks that require sustained attention and vigilance to prevent accidents or disasters. Occupational driving is a good example of a sustained attention task where human error can lead to fatalities. Other examples include aviation security workers searching for unusual passenger behaviors and prohibited items in luggage; radiologists searching for tumors or other abnormalities in sophisticated body images; and manufacturing workers searching for potentially dangerous and costly deviations in high-tech production processes.

Dr. Olson is collaborating with Lindsey Hogan and Matthew Bell of Santa Clara University (Santa Clara, California) to study vigilant performance with a simulated airport luggage-screening task. It is known that observers in visual search tasks miss threats at increasing rates as threats become less frequent (i.e. anomalous objects such as weapons in luggage are relatively rare). Research in behavioral psychology suggests that some of these errors may be due to a learning process where important search behaviors are actually rewarded or reinforced by the chance to detect threats. The prediction is that when threats are really rare, the lack of reinforcement (i.e., seeing a threat) causes our visual search behaviors to weaken and become less intense. The basic prediction is that we naturally match our level of search effort to the level of threats present in a work task. Dr. Olson has named the predictions associated with this learning process the Vigilance Reinforcement Hypothesis (VRH). Initial experiments with the

simulated luggage screening task have supported the VRH. If this finding is confirmed, it suggests that an important aspect of preventing human error in sustained attention tasks is providing workers with abundant chances to detect and respond to threats. In a recent invited symposium address in San Diego, the researchers argued that managing signal-frequency should complement other performance-maximizing strategies in security work, such as personnel selection and placement, training, goal-setting and feedback, display and workstation design, job design, and work-rest cycles.

So there it is, just one of perhaps hundreds of examples of people at CROET working to enhance safety and prevent injury and disability in the Oregon workplace.



Dr. Olson joined the CROET faculty as Assistant Scientist in July 2005, and he serves as a faculty affiliate in the Occupational Health Psychology Program at Portland State University. Dr. Olson earned his bachelors degree in Psychology at Utah State University and advanced degrees in Industrial and Organizational Psychology and Applied Behavior Analysis at Western Michigan University. He is a member of the editorial board for the Journal of Organizational Behavior Management and a research committee member for the Society of Occupational Health Psychology.

CROET Sponsors Occupational Health Nursing Worksite Award

For the past four years, the Center for Research on Occupational and Environmental Toxicology, in alliance with the Oregon State Association of Occupational Health Nurses (OSAOHN), has sponsored the Oregon Occupational Health Nursing Worksite Award. Its purpose is to recognize Oregon occupational health nurses who are involved with healthful workplace innovations and to provide funding, as much as \$1500 per awardee, for projects that have made or will make a positive difference in workplace health. Previous recipients of this award are Karin Drake (2003), Lisa Rodruquez (2004) and Mitzi Williams (2005).



Patty Crawford (Employee Wellness Coordinator, Samaritan Health Services), Kim Schlessinger, Fred Berman (CROET), Linda Meuleveld (AAOHN, SAIF Corporation)

This last year, the 2006 Oregon Occupational Nursing Worksite Award was presented to Kim Schlessinger, Director of Employee Health & Safety for Samaritan Health Services in Corvallis, Oregon. Her ongoing project, titled the Oregon Health Worksite Initiative, is testing the effectiveness of a phased-in worksite wellness pilot program using as test subjects the population of workers employed at Good Samaritan Regional Medical Center in Corvallis, and Samaritan

Lebanon Community Hospital in Lebanon. Kim's project addresses a fundamental need for effective employee wellness programs that improve the health status of workers, increase productivity and reduce medical claim costs to the employers. Her overall goal is to develop strategies that increase worker participation in employee wellness programs and thereby improve overall employee health status at the Samaritan Health Services' Hospitals. Studies have shown that workplace health promotion programs that target risk factors such as excess weight, poor nutrition, tobacco use, high cholesterol and stress are associated with lower health care costs and absenteeism, resulting in decreased health care costs to employers.

The award was presented to Ms. Schlessinger during the Good Samaritan Regional Management quarterly meeting, held December 14, 2006. Presenting the award were Fred Berman, CROET Toxicology Information Center Director, Linda Meuleveld, AOHN, SAIF Corporation, and Patty Crawford, Employee Wellness Coordinator, Samaritan Health Services.

CROET Welcomes Three New Scientists

Federal agencies that fund health research are increasingly emphasizing the need to translate research findings into applications that benefit humankind. In response to this call for increased "bench-to-bedside" health research, CROET has brought three new scientists on board: Dr. Harvey Mohrenweiser, Dr. Elena Herrero Hernandez and Dr. Jackilen Shannon. Each brings a unique wealth of knowledge and experience in epidemiological and other population-based research that will help further the call to bring research findings at CROET into practical use.

Dr. Harvey Mohrenweiser, Ph.D., CROET Senior Scientist, joined the CROET faculty in April of 2006. He has over 30 years' experience directing studies to identify and characterize the genetic variation that exists in human populations, with the ultimate goal of understanding how genetic variation relates to environmental exposures and the risk of common diseases. His work at CROET will expand our efforts to understand the interaction of genetic susceptibility and exposure as risk factors for neurotoxicity and development of neurodegenerative disease.

Dr. Mohrenweiser obtained his Ph.D. in Biochemistry from Michigan State University and completed

postdoctoral training at the McArdle Laboratory for Cancer Research at the University of Wisconsin. After several years at the National Center for Toxicological Research, he joined the Department of Human Genetics at the University of



Michigan where his laboratory developed methods for identifying gene mutations. These methods were employed by the Radiation Effects Research Foundation in Japan to study the mutation rate in children of atomic bomb survivors, and in genetic anthropology studies of the indigenous populations of the Amazon River basin of South America.

Dr. Mohrenweiser continued his research on the genetic effects of ionizing radiation at the Lawrence Livermore National Laboratory, where he studied the families of those involved in the clean-up effort at the Chernobyl nuclear accident site. As a Senior Investigator in the Human Genome Center at Lawrence Livermore, Dr.

Mohrenweiser focused on how gene families, with important roles in modifying disease risk, are organized. His laboratory collaborated in cloning and characterizing genes for genetic diseases, including specific forms of migraine headaches, dwarfism, anemia and cerebral ataxia.

Recent research in Dr. Mohrenweiser's laboratory has focused on establishing a "genotype to phenotype" paradigm for molecular epidemiology studies. His research efforts continue to be directed to the challenge of relating the extensive genetic variation existing in the general population to cancer risk, with a goal of identifying individuals with modestly elevated risk. This group of individuals is believed to contribute substantially to the overall incidence of cancer, and would benefit from enrollment in early detection and prevention trials.

Dr. Mohrenweiser serves on the editorial boards of several journals and is advisor/consultant to a number of academic programs and centers, as well as the "DNA Files" series for National Public Radio.

Elena Herrero Hernandez, M.D., Ph.D., joined CROET in February 2007. Dr. Hernandez graduated in General Medicine and specialized in Occupational Health at the University of Turin, Italy, and obtained her Ph.D. in Pharmacology and social-environmental Toxicology at the University of Palermo, Italy. Prior to coming to CROET, Dr. Hernandez served on the faculty of the doctoral course on Occupational Neurotoxicology at Rovira i Virgili University, Reus, Spain.

Dr. Hernandez is interested in occupational and environmental causes of neurodegenerative disease, with the aim of enhancing prevention and treatment by increasing our understanding of the mechanisms underlying such diseases. Her clinical, neuro-radiological and toxicological research on occupational manganese, a neurological

disease caused by excessive manganese exposure, demonstrated that it is possible to reduce disease progression through specialized treatment.

Dr. Hernandez became interested in amyotrophic lateral sclerosis (Lou Gehrig's disease / ALS) in 1998. In collaboration with Prof. Adriano Chio (Neuroscience, University of Turin), she began a case-control study focused on elucidating occupational and environmental risk factors in ALS. The study includes the collection of whole-



life occupational, clinical and lifestyle histories for all participants, as well as metal determinations (Fe, Mn, Pb, Hg, Al, Cu, Zn, Se, Cd, Cr) on blood and serum in a subgroup of patients and controls. Her results to date

indicate a statistically significant excess of ALS incidence among welders.

The role of metals as possible triggers of neurodegeneration in prion diseases (which includes mad cow disease) and multiple system atrophy are among Dr. Hernandez' most recent research fields, always with the aim of understanding the underlying mechanisms in order to improve prevention and treatment options.

Jackilen Shannon, PhD, CROET Scientist and Assistant Professor in Public Health, Preventive Medicine and Endocrinology, OHSU School of Medicine, joined OHSU in 2000 and CROET in 2006. Dr. Shannon is a nutritional epidemiologist with a strong track record of investigation into the role that diet and nutrition play in cancer. She completed a doctoral degree program in Nutrition with a minor in Epidemiology at The University of North Carolina, Chapel Hill, and a National

Institutes of Health-National Cancer Institute post-doctoral training fellowship in cancer

epidemiology at the Fred Hutchinson Cancer Research Center in Seattle.



In 2003, Dr. Shannon received funding for a National Cancer Institute (NCI) Career Transition Development Award. This award is designed to support the development of new investigators in cancer

prevention. A primary focus of her work is to understand how nutritional factors promote the development and progression of human prostate cancer. Dr. Shannon is investigating the role of fatty acids in prostate cancer prevention using molecular epidemiologic methods. The NCI award has supported Dr. Shannon's on-going case-control study of dietary and red cell omega-3 fatty acids and inflammatory mediators in prostate cancer risk. Dr. Shannon has also received funding through a Department of Defense Idea Grant to support a placebo-controlled trial of the effect of fish oil supplementation on prostate tissue FAS expression in biopsy-negative men undergoing repeat prostate biopsy.



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Center for **R**esearch on **O**ccupational and **E**nvironmental **T**oxicology

CROET, the Center for Research on Occupational and Environmental Toxicology at Oregon Health & Science University, conducts research, provides consultations and offers information on hazardous chemicals and their health effects. CROET's ~100+ scientists and research staff explore a range of questions relating to health and the prevention of injury and disease in the workforce of Oregon and beyond. CROET's Toxicology Information Center is open to the public and is staffed to answer Oregonians' questions about hazardous substances in the workplace and elsewhere. CROET's Web site also provides answers to questions about industries found in Oregon through links on a series of pages devoted to industry-specific topics.

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OUTREACH

CROET will exhibit at the following conferences.

Central Oregon Occupational Safety & Health Conference

Eagle Crest Resort • Redmond, Oregon

September 18 - 21, 2007

Southern Oregon Occupational Safety & Health Conference

Smullin Center • Medford, Oregon

October 17 - 18, 2007

2007 Northwest Occupational Health Conference

Seaside Civic & Convention Center • Seaside, Oregon

October 17 - 19, 2006

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