



Oregon Institute of Occupational Health Sciences

2014
Annual Report

Our Mission

Your health doesn't exist in isolation from your work. The air you breathe, the food you eat, the quality of your sleep, your access to exercise, the likelihood of you succumbing to illness or injury—are all affected by your working life.

That's why we are here. Since 1988 we have stood firmly at the intersection of the workplace and wellbeing. We are a nationally recognized team of scientists, and our work stretches from molecular-level research, to clinical studies, to programs in the workplace. We are dedicated to making a significant contribution to human safety, health and wellbeing.

At Occupational Health Sciences, we are applying research discoveries, integrating workplace safety, health and wellness programs, and we're creating actionable strategies to support the whole health of every worker.

Together with our network of partners, we are setting the stage for a thriving workforce and better health in Oregon and beyond.



TABLE OF CONTENTS

<i>Our mission</i>	2
<i>A message from the Director</i>	3
<i>Occupational Health Sciences: A Resource for Oregon</i>	4
<i>Our areas of emphasis</i>	5
<i>Highlights</i>	6
• <i>Total Worker Health.....</i>	6
• <i>Sleep and shift work.....</i>	10
• <i>Exposure: consequences and prevention.....</i>	14
• <i>Summer internships.....</i>	18
• <i>Injury, treatment, recovery and prevention.....</i>	19
• <i>Outreach and education.....</i>	21
<i>Conferences & events</i>	23
<i>Faculty presentations</i>	24
<i>2014 Publications</i>	26
<i>Grants funded 2014</i>	28
<i>Financial statement</i>	29
<i>About us</i>	30

A Message from our Director



Steven A. Shea PhD

At the Oregon Institute of Occupational Health Sciences we strive to promote health and reduce disease and disability among workers. To this end, 2014 has been a successful year. We perform research in laboratories and the workplace, perform interventions in the workplace, and provide outreach and education to the community, and we continue to increase collaborations with partners across campus, across Oregon, and across the country.

For many years a driving force in American industry has been the desire for ever-increasing productivity. This attitude may lead to increased short-term profits, but a person's workday activities and stresses often spill over into home life, and vice versa. This can lead to substantial long-term personal costs associated with stress, poor health and reduced safety. Nowadays, it is becoming more and more recognized that a healthy workforce contributes to a happier, safer and more productive workforce, and with the added benefit of reduced absenteeism, reduced workers' compensation claims and reduced health care costs. Thus, there are clear opportunities to benefit employees and employers by focusing on combined healthy and safe practices at work. All of our activities are directed towards the goal of not only avoiding disease and accidents but to actually improve health. These activities range from performing basic and applied research, training health and safety professionals, and offering the public information on all of these programs. Our endeavors are aligned into problem-based thematic areas including: (1) Total worker health (2) Sleep and shiftwork (3) Exposure: consequences and prevention; (4) Injury, treatment, recovery and prevention; and (5) Outreach and education. The highlights from these activities are presented throughout the annual report and supplemented by details of our publications, presentations and funding successes.

I would like to mention other highpoints from 2014 that do not appear in the formal report but which also exemplify the impact of our work: (i) The Oregon Healthy Workforce Center successfully renewed a multi-million dollar '*Center of Excellence*' grant from the National Institute for Occupational Safety and Health to perform research on the effectiveness of workplace interventions aimed at improving both safety and health; (ii) Our faculty have a growing national and global impact as exemplified by over 50 invited presentations across 15 states and 8 countries; (iii) Our Institute organized a symposium on the adverse health consequences of sedentary work. Based on the research presented, our Institute's own faculty and staff now are given the option to install standing desks at work to help improve or maintain health; (iv) Our Institute partnered with the American Heart Association to promote a national Worksite Wellness summit that was attended by hundreds of workplace safety and health professionals; and (v) Dr. W. Kent Anger, Associate Director of Applied Research at the Institute won OHSU's Faculty Senate Collaboration Award for his long history of successful collaborations across Oregon.

The Institute's faculty and staff are devoted and successful professionals. I commend them all for their hard work. Their main activities and accomplishments are described in the following pages of this annual report.

Respectfully submitted,

A handwritten signature in blue ink that reads "Steven A. Shea Ph.D.".

Steven A. Shea, PhD
Director

Occupational Health Sciences: A Resource for Oregon

The need for complementary basic and applied science has been an underlying tenet of the Oregon Institute of Occupational Health Sciences since its establishment as CROET in 1988.

The Oregon Institute of Occupational Health Sciences performs research at many levels, including basic laboratory science, human laboratory science, workplace interventions and outreach plus education. Current areas of research include: occupational exposures, their adverse effects and prevention; treatment, recovery and prevention of workplace injuries; total worker health; and the effects of sleep and shiftwork on health, safety and productivity. The Institute also participates in doctoral and postdoctoral educational programs to train the next generation of scientists.

Outreach is an important complement to research, because no research is worthwhile if the results are not published, announced or disseminated in a form useable in the workplace by working people. Through its outreach efforts, the Oregon Institute of



Occupational Health Sciences serves as an information conduit to Oregon workers, employers, labor, and the general public, providing the latest in scientific advances for enhanced workplace safety.

Our Areas of Emphasis

Education and Outreach

Our Education and Outreach Programs have four goals:

- Provide scientifically accurate information about Oregon's occupational safety & health issues — continuously on the internet and through the Toxicology Information Center (TIC)
- Offer educational programs on Oregon's occupational needs to health and safety specialists, government, and medical providers
- Train health professionals who will investigate and resolve Oregon's occupational safety and health issues in the future
- Provide scientific expertise to help Oregon industry and labor evaluate occupational safety and health issues

Research

Total Worker Health

Faculty members in the Institute of Occupational Health Sciences are developing, testing, and disseminating workplace intervention programs that integrate safety, health and wellbeing into single or associated programs that reduce injuries and improve wellbeing by reducing smoking, weight gain and work stress.

Sleep and Shiftwork: Impact on Health, Safety, and Productivity

Adequate sleep is not only essential for safety and productivity but also for our overall wellbeing and health. Our research program is designed to study basic questions about how our body clock works and how it affects health, and to study common sleep problems. The goal is to implement solutions, ranging from screening for and treating sleep disorders, educating communities about 'sleep health', to implementing interventions that improve sleep, safety, productivity and overall health in the workplace.

Exposure: Consequences and Prevention

Researchers at the Oregon Institute of Occupational Health Sciences are using cutting edge science to characterize the adverse effects of occupational exposures, to determine the mechanisms by which these exposures produce adverse effects, and are applying that information to develop specific worker training and other innovative strategies to prevent exposures and reduce adverse consequences of exposures.

Injury, Treatment, Recovery, and Prevention

Physical injury is the largest contributor to workers' compensation costs in Oregon. To reduce this burden on worker wellbeing and productivity, Institute scientists are conducting innovative research on the causes, treatment, recovery, and prevention of workplace injuries.

2014 Highlights

The Oregon Institute of Occupational Health Sciences brings federal dollars into the Oregon economy

We receive base operations funding from the Oregon Workers' Compensation System, and we leverage these funds to obtain federal and other research dollars. For every dollar invested by the State's Workers' Benefit Fund in 2014, our scientists brought an average \$1.60 of grant funding into the Oregon economy. Federal dollars for

research in Oregon have a significant positive impact on the state's economy. Expenditures for goods and services, as well as the salaries of scientific and support personnel, produce a multiplier effect on the state's economy. In addition, research coming out of the Institute can lead to new technologies and jobs as spin-offs from productive research.

Total Worker Health™: Improving Workforce Safety, Health, Wellness and Wellbeing

The Oregon Healthy Workforce Center (OHWC), a National Institute of Occupational Safety and Health-funded Center of Excellence, is a collaboration of:

- Oregon Health & Science University's Oregon Institute of Occupational Health Sciences
- Portland State University's Occupational Health Psychology program
- The Center for Health Research, Kaiser Permanente
- The University of Oregon's Labor Education Research Center.

The OHWC's theme is Intervention Effectiveness, focused on:

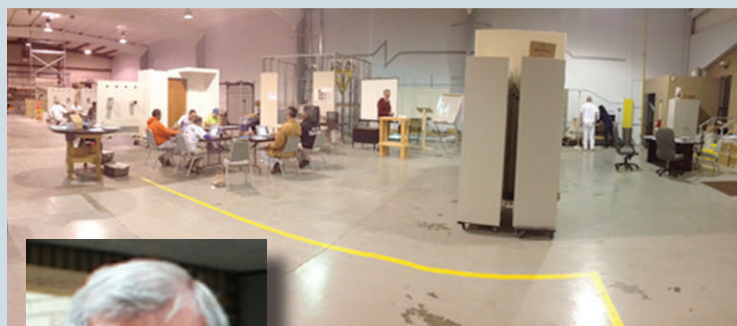
- Team- and technology-based interventions to promote and protect health, all crafted with attention to translating research to practice.
- Improved social support and reduced job stress--that will in turn produce improved lifestyle choices, safer work practices, and better psychological and physical health.



Effective Interventions to Improve Worker Health

We're improving the health, safety, wellness and wellbeing of workers through research on the effectiveness of workplace interventions, collaboration with partner organizations, and dissemination of evidence-based programs.

Computer-based training...



Dr. Kent Anger and an example of a TWH session with surveys (left) and health data collection (right).

Dr. Kent Anger, OHWC Director and Associate Director for Applied Research, Oregon Institute of Occupational Health Sciences, is creating effective Total Worker Health (TWH) interventions to improve safety, health and well-being in the Oregon Workforce. The Anger lab develops computer-based training that is based on behavioral education principles for hazard prevention, skills acquisition, and wellbeing. The training is supported with practices that create new habits or patterns of behavior, and reinforce desired changes in behavior.

In 2014, Dr. Anger and OHWC Principal Investigators published a review of the TWH literature that revealed TWH to be at least as effective in improving safety, health and wellbeing as less ambitious interventions that focus on single outcomes. TWH interventions are capable of changing 10 or more outcomes or risk factors in a single intervention and are thus more efficient.

The Neurobehavioral Core Test Battery (NCTB) is a series of behavioral tests used to evaluate the performance of the central nervous system in individuals who are potentially exposed to neurotoxic chemicals. Test batteries consist of tasks that measure performance of particular neurologic function, such as ability to learn, reaction time, memory, and coordination. Dr. Anger recommended reconsideration of the World Health Organization (WHO)-recommended NCTB, because alternative non-copyrighted tests are also sensitive to the effects of neurotoxic chemicals.

Workplace interventions...



Dr. Ryan Olson

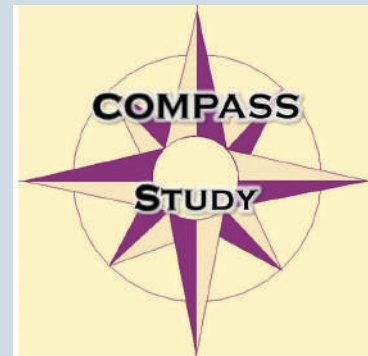
Dr. Ryan Olson's research is focused on the application of behavioral science to reduce injuries and promote health among isolated workers in dangerous and demanding occupations.



SHIFT (Safety & Health Involvement For Truckers) is a National Heart, Lung, and Blood Institute (NHLBI)-funded weight loss and health promotion intervention for truck drivers. The intervention is supported with computer-based training, weekly weight and behavior logging, and motivational interviewing.

The SHIFT intervention was shown to produce clinically significant weight loss among truck drivers in the initial pilot study. Results from the NHLBI randomized controlled trial will be available in 2015.

Dr. Olson obtained a “safety and health improvement grant” from the Washington Department of Labor and Industries for cab environment interventions to improve the sleep and health of truck drivers (Peter Johnson UW, PI).



COMPASS (Community of Practice and Safety Support) is a NIOSH-supported study testing a Total Worker Health intervention that is being developed and studied as part of the Oregon Healthy Workforce Center. COMPASS uses a peer-led curriculum to organize home care workers into neighborhood-based teams that provide education and social support for improving lifestyle (e.g., diet, exercise) and safety behaviors.

A pilot study has shown that the COMPASS intervention improved the use of lifting tools and improves both safety and health behaviors among home care workers. Randomized trial results will be available in 2015.



Dr. Diane Rohlman

PUSH (Promoting U through Safety and Health), headed by Dr. Diane Rohlman, is a program that is improving the health and reducing the incidence of workplace injury among young workers through an online, age-appropriate safety and wellness training.

With limited job experience, young workers may not recognize workplace hazards. Lifestyle and behavioral factors, such as risk-taking, substance use, and distracted behaviors, as well as fatigue or sleep deprivation that can be more prevalent in young workers, can also impact safety on the job.

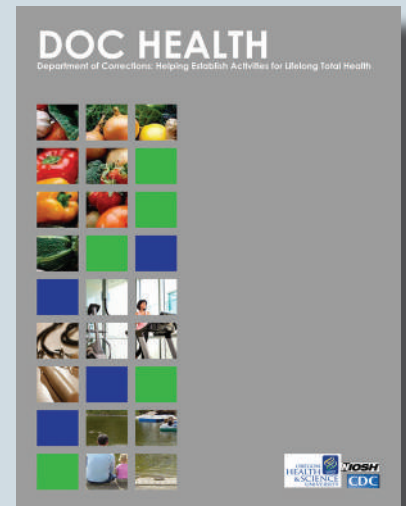


This year, Portland Parks and Recreation Aquatics Department and Youth Conservation Corp adopted the PUSH Training for all new summer hires.



Dr. Kerry Kuehl

Prison work is regarded as one of the most difficult occupations with correctional officers having one of the highest nonfatal injury rates of all U.S. occupations. As part of a collaboration with the Oregon Healthy Workforce Center, the Division of Health Promotion & Sports Medicine investigators, headed by Kerry Kuehl, MD, DrPH, have studied a scripted peer-taught program for public safety workers including firefighters and police officers. This approach has proven to reduce injuries and illness while at the same time being cost-effective.



The Safety & Health Improvement Program (SHIP), led by Dr. Leslie Hammer, is testing the effectiveness of an intervention that combines supervisor training and team effectiveness training

designed to increase work-life support and improve safety among construction workers in the City of Portland. Using a randomized experimental design, a total of 528 employees participated in the initial intervention or in follow-up control groups, and a total of 388 employees participated in the evaluation of the intervention between August 2012-March 2014. Initial analysis revealed group blood pressure improvements in the intervention group.



Dr. Leslie Hammer

Sleep and Shift Work: Impact on Health, Safety, and Productivity

It is well known that a tired person is more prone to accidents, to suffer reduced motivation, poor mood and strained relationships at home and work. Chronic sleep loss is also a major factor in diseases such as obesity, diabetes, hypertension and stroke.

Getting adequate sleep in today's world can be challenging. Sleep can be disrupted by home and workplace stress, lifestyle choices, shift work, and by sleep disorders, including sleep apnea and insomnia.

But sleep habits can be improved, sleep disorders can be treated, and workplace schedules and the internal body clock can be manipulated to improve the health and productivity of shift workers.

Our sleep research program covers all aspects of sleep — from basic biological processes at the cellular level, to actual high-tech laboratory studies on human volunteers — all motivated by the desire to improve safety and prevent disease associated with chronic sleep disruption.

Cellular studies...



Dr Charles Allen and a photomicrograph of a neuron that has been “patch-clamped”, a technique that measures the movement of ions across a small patch of isolated cell membrane.

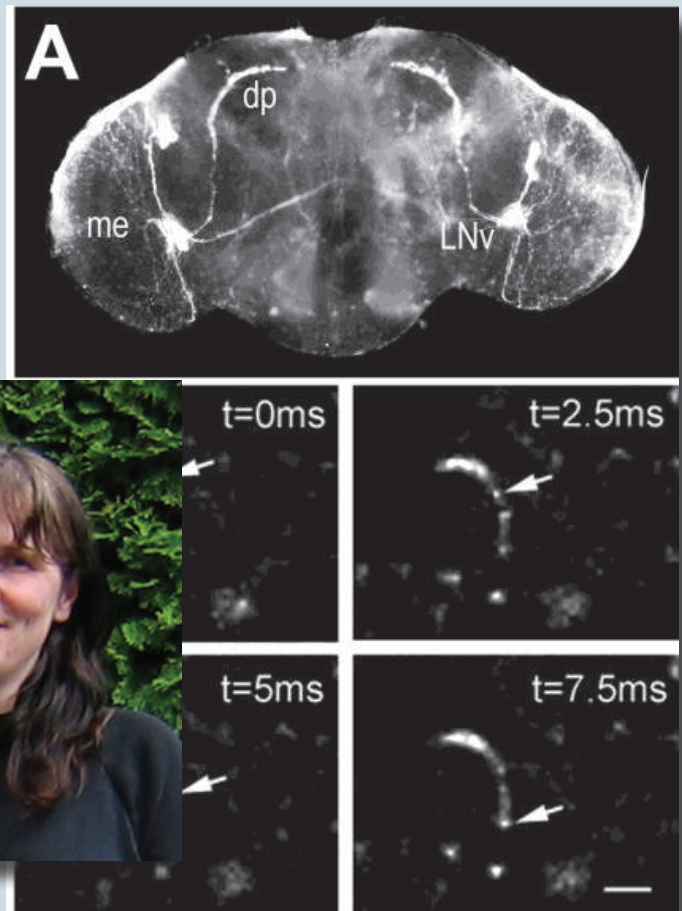


To devise better treatments for circadian-based sleep disorders, those related to the 24-hour body clock, Dr. Charles Allen's lab is examining the cellular components that comprise the suprachiasmatic nucleus, the brain region that generates circadian rhythms. His lab recently found that both neurons and non-neuronal cells, called astrocytes, work together to generate circadian timing signals. These findings may some day enable us to manipulate circadian rhythms to improve human health.

Animal studies...

Dr. Doris Kretzschmar uses fruit flies to model human neurodegenerative diseases such as Alzheimer's disease (AD). Her team recently discovered that proteins involved in AD can alter circadian rhythms, and such disruptions in the body clock can, in turn, aggravate the neurodegeneration of AD.

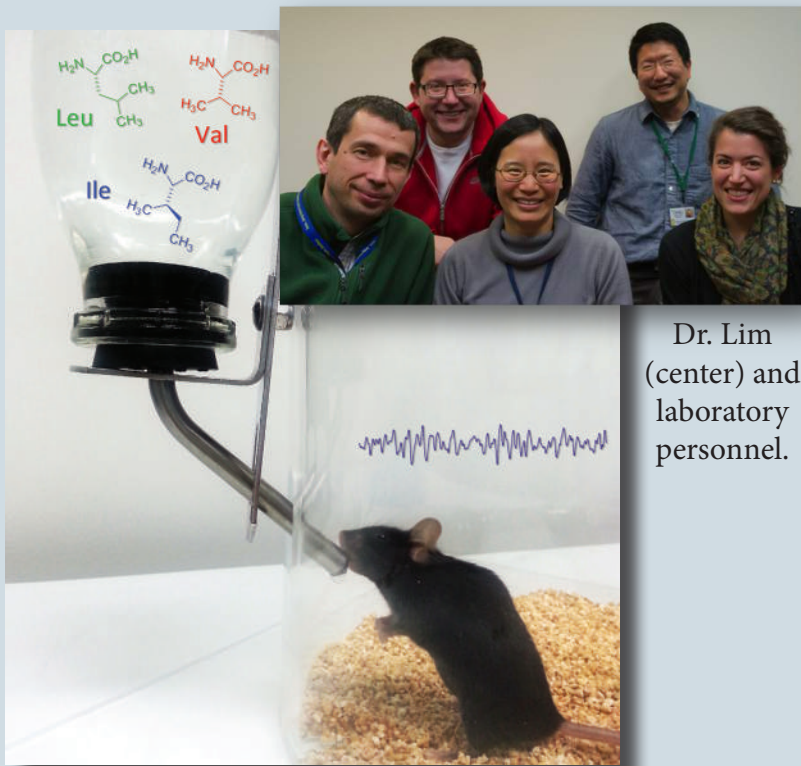
Dr. Kretzschmar and a photomicrograph of a section of fruit fly brain.



Dr. Matthew Butler has established a new physiology and behavior laboratory to study animal models of shift work with the goal of understanding how body clocks are synchronized by light and food, and how clock disruptions, such as those caused by shift work, produce disease. He is collaborating with Drs. Steven Shea, Charles Allen and Mitch Turker to understand basic mechanisms by which shift work affects physiological function. Their goal is to identify new methods to rapidly shift the clock, which would have the potential to improve health in shift workers. In a separate collaboration with Dr. Shea, he seeks to determine if the body clock affects cardiovascular function differently in those with sleep apnea, which might explain the different day/night patterns in the timing of adverse cardiovascular events in people with this common disorder.



Matthew Butler and Research Assistant 2 Haley Gillham.

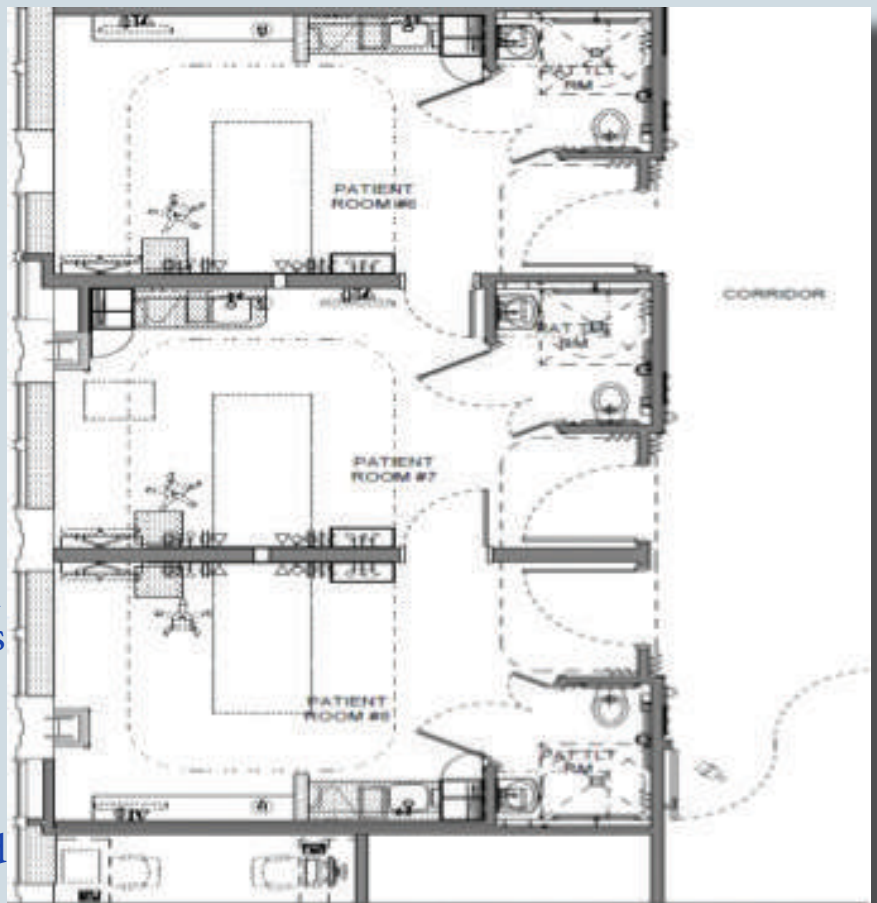


Dr. Lim
(center) and
laboratory
personnel.

Dr. Miranda Lim studies sleep in disease states, including traumatic brain injury (TBI) and neurodegenerative disorders, in both mice and humans. She studies the role of sleep in maintaining brain health. Her lab is also working to discover objective neuromarkers of sleepiness and impaired performance using the brain encephalogram. In a recent collaboration with Dr. Butler, she tested whether the circadian clock affects outcomes after TBI in rats, and found that, while time-of-day did not alter recovery from TBI, it did affect pain threshold sensitivity.

Human studies....

Dr. Steven Shea's team utilizes the Oregon Clinical & Translational Research Institute (OCTRI) in-patient labs at OHSU to perform studies in which sleep-wake cycles are altered, as in shiftwork. The labs opened in May of 2014 and were specially designed to perform these studies. They include blackout shades and precise lighting control to allow studies to be performed in a dim light environment free of time cues. Using this technique, the internal body clock rhythm of various physiological measures can be separated from behavioral factors. Understanding these clock-dependent physiological changes may lead to a better understanding of what countermeasures and treatments could be used to reduce the adverse health effects of shift work, especially in vulnerable populations.

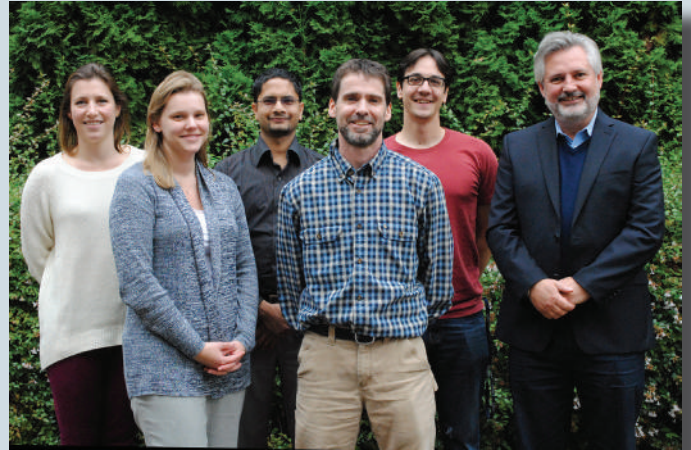


Floor plan of laboratories recently opened and designed specifically for circadian studies in humans.

Individuals with Obstructive Sleep Apnea (OSA) are at increased risk of cardiovascular disease and show different day/night patterns in the timing of adverse cardiovascular events. The Shea Lab is working to determine the role of the internal circadian clock in modulating cardiovascular risk variables - independent of behavioral influences in participants with and without OSA. This ongoing study measures cardiovascular risk variables at rest and during mild stress challenges across the 24-hour circadian day.



One of the specifically built sleep study rooms.



L-R: Sally Roberts, Christine Swanson, Saurabh Thosar, Noal Clemons, Matthew Butler, Steven A. Shea.



At right: Dr. Thosar performing Flow Mediated Dilation, which measures an artery's ability to dilate.

Dr. Thosar performing Flow Mediated Dilation and Sally Roberts monitoring beat-by-beat blood pressure reading.



Left and right: Example of a participant performing cognitive testing while brain waves, heart rate, body temperature, blood pressure and breathing are recorded.



Exposures: Consequences and Prevention

To reduce risks associated with occupational exposures to things such as pesticides, sunlight and stress, Institute researchers are using cutting-edge science to:

- Characterize the adverse effects of exposure.
- Determine the mechanisms by which such exposures produce disease.
- Apply that information to develop specific worker training and other strategies to prevent the exposures and to reduce the adverse consequences if exposures do occur.

Many occupational exposures that lead to adverse health effects are preventable or can be minimized. For example, we know that prolonged unprotected exposure to sunlight causes skin cancer, and chronic exposure to toxic chemicals can adversely affect a variety of organs within the body.

Studies at the molecular level...



Dr. Mitch Turker PhD, JD

Dr. Mitchell Turker studies the role of environmental exposures in disease processes. He wants to learn how such exposures cause long-standing changes in gene expression that lead to changes in cellular functions.

Dr. Turker co-authored a paper showing that low oxygen conditions can inactivate a gene that, once inactivated, alters colon cancer progression.

In another study sponsored by NASA, he showed that exposure to high-energy protons, which are present in the space environment and used in cancer therapy, cause important genome-wide effects on cell function.

Dr. Turker also has collaborations with Drs. Allen and Butler to study how perturbations of circadian rhythms leads to changes in gene expression and disease.

He was recently appointed to the Institute of Medicine's "Veterans and Agent Orange" Committee, which reviews all information on health issues related to Agent Orange exposure and recommends remedial or other actions when appropriate.

Dr. Amanda McCullough is focused on understanding the mechanisms that cells use to maintain the integrity of DNA. These DNA repair pathways are especially important following common occupational/environmental exposures, including, sunlight, chemicals, heavy metals, diet and oxidative stress.

Her work has focused on mechanisms of cellular and genetic injury associated with exposure to formaldehyde, ultraviolet radiation, oxidative stress and chemotherapeutic drugs. Dr. McCullough showed that a human DNA helicase, an enzyme that unwinds DNA strands, is involved in protecting cells from formaldehyde toxicity.



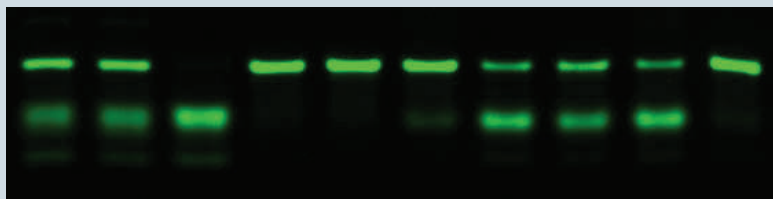
Amanda McCullough, PhD



Stephen Lloyd, PhD

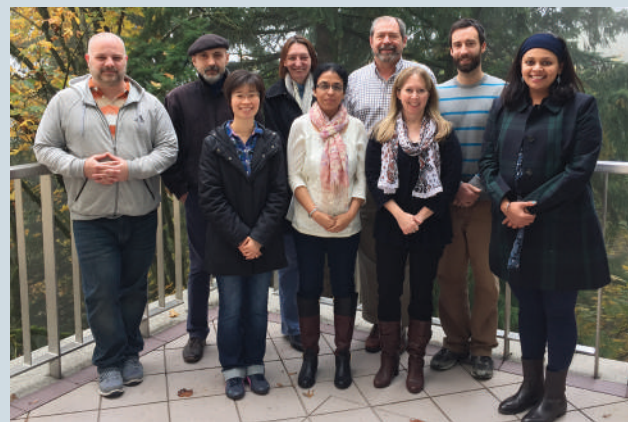
Dr. Stephen Lloyd studies occupational exposures to disease-causing chemicals and radiation. His research investigations focus on the mechanisms through which these exposures lead to disease. He is also developing intervention and prevention strategies to minimize disease incidence. These investigations have even led to the discovery of a new family of chemotherapeutic drugs that show promise to treat human solid tumors.

Dr. Lloyd also investigates fundamental cellular processes that alter susceptibility to obesity and how intervention strategies can be designed to limit weight gain, even on a relatively high fat diet. His team discovered that enhancement of DNA repair of oxidative damage in mitochondria (the energy-producing organelle in cells) dramatically reduces weight gain in model organisms when placed on a high fat diet in which greater than 60% of ingested calories are from fat.



DNA separation gel, in which DNA (or RNA) fragments are separated based on size and charge characteristics.

In collaboration, Drs. Lloyd and McCullough are carrying out preclinical studies on a drug developed and patented within their labs that may significantly reduce nonmelanoma and melanoma skin cancers.

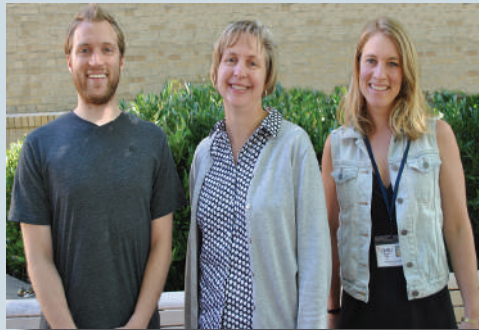


The laboratories of Drs. Lloyd and McCullough. L to R: Richard Kleinschmidt, Vlad Vartanian, Irina Minko, Stacy Lin, Anu Kumari, R. Stephen Lloyd, Amanda McCullough, Nate Donley, and Harini Sampath.

Studies at the population level...

Diane Rohlman, PhD, conducts basic and applied research to identify, characterize, and prevent occupational and environmental illness and injury in high-risk populations, including children, young workers, and those working in hazardous industries, such as agriculture.

Agricultural families represent a high-risk population due to their exposure to physical and chemical hazards, their limited resources, and limited access to medical care. Dr. Rohlman is currently



Diane Rohlman (center) and (L-R) summer intern Colin Boehnlein and staff scientist Megan Parish.

conducting a farmworker stress study to characterize the risk factors and basic health parameters in agricultural families and to examine changes in these factors

due to workplace activities.

Dr. Rohlman is also working with the Oregon Bureau of Labor and Industry (BOLI) and Oregon Department of Transportation on a nutrition training study for pre-apprentices in the highway and transportation construction trades. The study is designed to educate new workers about fundamental nutrition concepts, including healthy snacking, foods to fuel the workday, and making good choices about food. Based on the success of the randomized control trial, she has initiated an evaluation of the BOLI

nutrition training in at-risk youth between the ages of 16-24 enrolled in Portland Youth Builders Pre-Apprenticeship Program.

The central nervous system is a major exposure concern of Institute scientists. Peter Spencer, PhD, FANA, FRCPath, professor of neurology, OHSU School of Medicine, is studying the role of occupational and environmental factors in the genesis of neurological diseases, with a view to uncovering molecular mechanisms of cause and effect.

Dr. Spencer is working globally in support of occupational health in China, a major trading partner of Oregon. Through this work, Dr. Spencer has gained increased recognition in Chinese occupational and environmental medicine, and was recently appointed to the Advisory Boards of the Chinese Journal of Preventive Medicine and the Shenzhen Center for Disease Control and Prevention.



Peter Spencer, PhD, FANA, FRCPath

Recent research accomplishments include advances in our understanding of the links between toxic exposures and development of an African seizure disorder and an Asian encephalopathy.

Dr. Spencer recently published his highly recognized textbook on experimental and clinical neurotoxicology in Chinese and Russian.

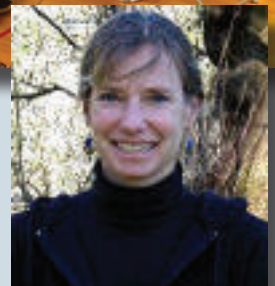
OHSU Let's Get Healthy! Program...



Let's Get Healthy!, headed by Dr. Jackilen Shannon, is a popular education and research exhibit that travels around the state (and nation) to help the public learn about their health and to collect data that is available for group analysis. Participants receive personalized, multi-lingual health feedback while their anonymous health information becomes part of a population database available for use in support of school projects, community and workplace wellness policy decisions, and research opportunities. The program accomplishes this by providing an interactive, scientifically-based educational and research experience to schools, communities and workplace partnerships.

In 2014, Let's Get Healthy!

- Held 16 events throughout Oregon, Washington, and California where 2,091 people participated in the research study. Approximately 150 volunteers were trained to run the research study in their own communities.
- Over 99% of the student volunteers reported that they were aspiring to a health career and that Let's Get Healthy! served as a unique opportunity to get experience in their field of interest.
- Launched a new interactive educational game about epigenetics that won a 2014 International Serious Play Award silver medal.
- Published a paper in a national journal for middle school science teachers about how to teach developmental origins of health and disease to adolescents.
- Launched a new partnership with Bangkok Dusit Hospital System in Thailand to integrate Let's Get Healthy! with their worksite wellness program.
- The Let's Get Healthy! website (www.letsgethealthy.org) continues to be a great resource for the public to visualize results from communities around the state, explore teacher-developed lessons, and play interactive games!



Dr. Jackilen Shannon

Dr. Desire Tshala-Katumbay has worked internationally with academic institutions to address issues related to biomedical research in resource-limited sub-Saharan Africa. Through the International Brain Research Organization, Dr. Tshala-Katumbay lectures on neurotoxicology topics and mentors students who are interested in global neurosciences.



His current lines of research focus on:

- Elucidating mechanisms of neurodegeneration using chemical probes.
- Discovering how toxins in the diet influence gene function to produce neurological disease.
- Developing techniques for neuron-specific delivery of small, potentially protective molecules to the nervous system.

Dr. Tshala-Katumbay won funding to elucidate risks of epilepsy and neurodevelopmental deficits associated with cyanogenic plant exposure and toxicity from ivermectin (a deworming agent). He published several articles on the effects of cyanogenic plant consumption on children in sub-Saharan Africa.

Summer Internships...

Summer Student Research Awards are three-month paid summer internships designed to introduce undergraduate students to biomedical and occupational health research.

In 2014, the Oregon Institute of Occupational Health Sciences provided intensive research opportunities across a range of basic and applied research areas to 14 undergraduates. Whether studying molecules, cells, organ systems, non-human organisms, or out gathering data in the community, students gained valuable experience conducting a specific project in their host faculty member's research program.



2014 Summer interns

Front row (L-R)-Grace Recht, Aviva Browning, Krista Leonard, Michael Jacobson. Middle row-Madison Trowbridge, Jeana Yee, Tiffany Nguyen, Colleen Hunter, Jami Cheng. Back row-Leanne Hicks, Devin Christiansen, Ryan Stadnik, Hilary Nichols.

Injury, Treatment, Recovery, and Prevention

A major area of concern to workplace productivity is the incidence of chronic or recurrent pain. About forty percent of Americans report that pain interferes with their mood, physical activities, sleep, ability to work or to enjoy life. A recent report by the Institute of Medicine indicated the annual value of lost productivity due to pain is over \$300 billion in the U.S.

Physical injury is the largest contributor to workers' compensation costs in Oregon. To reduce this burden on worker wellness and productivity, Institute scientists are conducting innovative research on the causes, treatment, recovery, and prevention of workplace injuries.

Best practices research...

Back pain is a leading cause of recurrent or persistent pain affecting Americans, and Dr. Richard Deyo's goal is to identify best practices in the diagnosis and treatment of back pain with a focus on reducing unnecessary care. His research has resulted in the publication of a series of articles on how Oregon's Prescription Drug Monitoring Program is helping to reduce inappropriate opioid prescribing for chronic pain. His work has also been used in the



Dr. Richard Deyo (center) and research team.

development of new NIH standards for research on low back pain.

Within OHSU, Dr. Deyo is working with the Evidence-based Practice Center on systematic reviews of opioid therapy for non-cancer pain and non-surgical treatments for low back pain. He has also teamed with Portland VA/OHSU investigators on projects related to the prescribing of opioids for chronic pain and collaborates with orthopedists on issues related to back pain and the risk of falls.

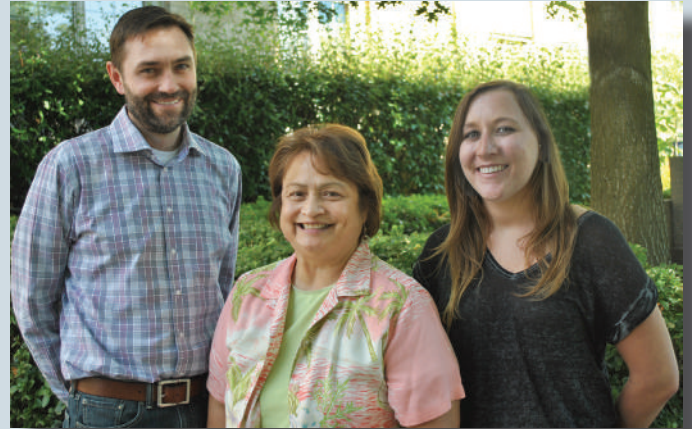
Outside OHSU, Dr. Deyo is collaborating with University of Washington investigators on projects related to back pain in older adults and with Kaiser Portland Center for Health Research on the re-organization of chronic pain management in primary care and on projects concerning chiropractic and acupuncture services.

Fatality Surveillance, Investigation, and Prevention....

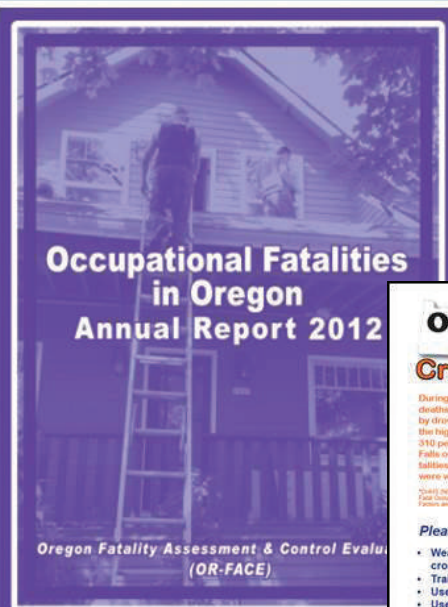
Dr. Ryan Olson heads the Oregon Fatality Assessment and Control Evaluation (OR-FACE) program, a National Institute for Occupational Safety and Health sponsored program designed to prevent occupational fatalities through surveillance, targeted investigations, assessment and outreach associated with traumatic work-related deaths.

In 2014, Dr. Olson and OR-FACE staff:

- Published an Annual Report of fatality trends and abstracts.
- Published four in-depth fatality investigation reports and a crab fishing hazard alert.
- Produced and published 3 construction, 3 logging, and 1 transportation toolbox talk guides.
- Collaborated with SAIF Corporation in the Agricultural seminar series where OR-FACE data and cases were used.
- Presented at the Associated Oregon Loggers Annual Safety Conference and SAIF Corporation's Serious Losses Webinar.



OR-FACE personnel: director Ryan Olson PhD, research associate Illa Gilbert-Jones CIH, CSP and summer intern Ashley Chase.



Examples of OR-FACE fatality reports, hazard alerts and toolbox talk materials.



Outreach and Education

The Oregon Institute of Occupational Health Sciences is proactively engaged in providing timely occupational health and safety information to employees, employers, health and safety professionals, doctors, nurses, and the public.

Social media....

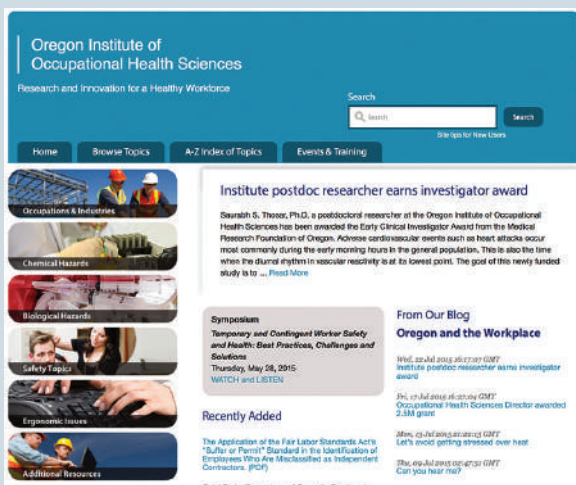
We use the full range of available web technologies to provide the public with the latest in health and safety information.



Oregon and the Workplace
 normalcy GHS GOSH green
 chemistry hair hair smoothing products health
 and safety training health fair health promotion
 hearing industrial hygiene Interns Let's Get
 Healthy! mold nail salons neurobehavioral noise
 occupational health psychology older
 workers Oregon Healthy WorkForce
 Center O[yes] research safety salons
 seminar seminars Sleep summer interns Sun
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 Worker Health toxicology
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The Web....

Occhealthsci.org, the Institute's widely respected health & safety resource webpage, links to over 1,200 occupational safety & health resources.



Continuing education....

We provide two health and safety symposia per year, one sponsored jointly with the Portland State University Occupational Health Psychology program.

2014 symposia* included:

- Healthy Workplace Solutions: From Research to Practice, November 7, 2014
- Sedentary, Stationary and Physically Demanding Work: Health Consequences and Workplace Solutions, June 5, 2014

*All symposia are available online as recorded webinar presentations.

The Oregon Healthy Workforce Center also sponsors a luncheon that includes talks by authorities in the Health and Safety/Wellness field.

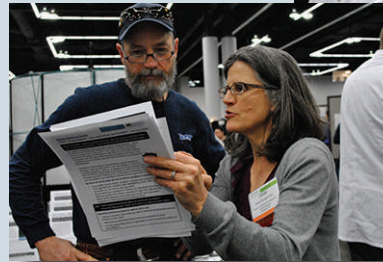


Conferences....

Oregon OSHA-sponsored Conferences are an important means by which we reach out to working Oregonians. In addition, we are frequently asked to provide health & safety training.

Members of the Institute also attend conferences sponsored by other organizations, including the American Society of Safety Engineers and the American Heart Association.

Overall, conferences allow us to meet Oregonians in all corners of the state.



Toxicology and Occupational Health Information Center...

The Toxicology Information Center (TIC), directed by Dr. Fred Berman, and the Occupational Health Resource Center, directed by Dede Montgomery, CIH, answer citizen and professional inquiries about workplace safety issues and hazards of exposure to chemicals and other agents.

Dr. Berman (left) and Ms. Montgomery (right) handle hundreds of requests from occupational safety and health professionals, business owners, government agencies, physicians and nurses, the media, and the general working public. The TIC is open to calls from 7:30 a.m. to 5:00 p.m., Monday through Friday.

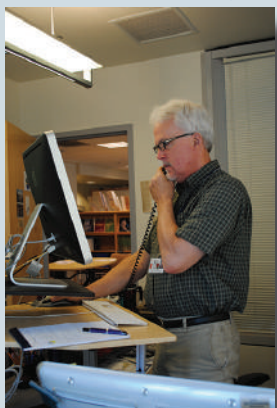
In addition to the TIC, Dr. Berman serves as consultant to the Oregon Department of Agriculture's Pesticide Analytical and Response Center and is a

co-investigator with the National Pesticide Information Center, a U.S. Environmental Protection Agency-sponsored project operated cooperatively with Oregon State University.

Ms. Montgomery also partners with a variety of organizations, including O[yes] (Oregon young employee safety), SAIF, Oregon OSHA, and the Oregon Health Authority.

The Information Center also publishes various online and paper newsletters designed to

provide up-to-date information about the Institute, as well as a series of Health Impact Safety Guides available online for use as health education tools in the workplace.



2014 Conferences and Events

January

Oregon Institute of Occupational Health Sciences Seminar: **“Designing and Engineering Trucks for Driver Health - Challenges and Opportunities”**

Oregon Institute of Occupational Health Sciences Seminar: **“Circadian Rhythms in Sleep Apnea”**

Mid-Oregon Construction Safety Summit

The Riverhouse Resort and Convention Center, Bend, Oregon

February

Youth@Work: Talking Safety Train-the-Trainer for Occupational Safety & Health Professionals, Wilsonville Training Center, Clackamas Community College

Oregon Institute of Occupational Health Sciences Seminar: **“Getting old is a dirty business: Failure of paravascular amyloid β clearance from the aging brain”**

March

Oregon Institute of Occupational Health Sciences Seminar: **“DNA Repair in Chromatin: Searching for the key to get in”**

Oregon Healthy Workforce Center Partners’ Luncheon
Jantzen Beach Red Lion, Portland, Oregon

Oregon School Employee Wellness Education Conference
The Riverhouse, Bend, Oregon

April

Cascade Occupational Safety & Health Conference
Valley River, Inn, Eugene, Oregon

Northwest Environmental Health Conference
Portland State University, Smith Memorial Student Union

Staying Safe at Work Train-the-Trainer Course
Wilsonville Training Center, Wilsonville, Oregon

Oregon Institute of Occupational Health Sciences Seminar: **“Adapting Circadian Clocks for Shift-Work and Time-Zone Travel: Insights from Rodent Models”**

May

Oregon Institute of Occupational Health Sciences Seminar: **“From Fur-Trapping to High Tech: The evolving Oregon workplace and its impact on workforce safety and health”**

Oregon Institute of Occupational Health Sciences Seminar: **“Biomedical and Health Informatics: Improving Health, Healthcare, and Biomedical Research with Information and Technology”**

June

Blue Mountain Occupational Safety & Health Conference, Pendleton Convention Center, Pendleton, Oregon

Oregon Institute of Occupational Health Sciences Seminar: **“Addressing Prolonged Sitting Time at Work: Connecting Practice and Research”**

Spring Symposium - Sedentary, Stationary and Physically Demanding Work: Health Consequences and Workplace Solutions
McMenamins - Kennedy School, Portland, Oregon

Oregon Institute of Occupational Health Sciences Seminar: **“Multiscale regulation of the circadian system”**

Oregon Institute of Occupational Health Sciences Seminar: **“A network of clocks: health, drug action, and dark matter”**

July

2014 National Symposium for Corrections Worker Health
Portland State University

Occupational Health Psychology Summer Institute: Advancing Theory and Practice in the Context of Total Worker Health
Portland State University - Portland, Oregon

August

Oregon Institute of Occupational Health Sciences Seminar: **“Using Dynamic Analyses of Sleep to Explore Physiology”**

September

5th National HealthCare Ergonomics Conference
Oregon Convention Center - Portland, Oregon

American Heart Association’s 6th Annual Worksite Wellness Summit
Oregon Convention Center

Central Oregon Occupational Safety & Health Conference
Riverhouse Hotel & Convention Center, Bend, OR

October

Oregon Institute of Occupational Health Sciences Seminar: **“Protecting the Health and Safety of Agricultural Youth: Lessons from around the World”**

1st International Symposium to Advance Total Worker Health™
Natcher Conference Center, National Institutes of Health, Bethesda, MD

Southern Oregon Occupational Safety & Health Conference
Smullin Center - Medford, Oregon

2014 Northwest Occupational Health Conference
Red Lion Hotel Richland Hanford House- Richland, WA

Oregon Institute of Occupational Health Sciences Seminar: **“Space Radiation Mutagenesis in Mouse Kidney Cells In Vivo”**

November

Occupational Health Sciences Fall Symposium: **Healthy Workplace Solutions - From Research to Practice All Day**
University Place & Conference Center, Portland, Oregon

Oregon Institute of Occupational Health Sciences Seminar: **“Modeling epigenetic diseases with *Neurospora crassa*”**

Oregon Workers’ Compensation Educational Conference
Embassy Suites, Portland-Washington Square, Tigard, Oregon

December

Western Pulp, Paper, & Forest Products Safety & Health Conference
Red Lion Hotel on the River- Jantzen Beach, Portland, Oregon

Oregon Institute of Occupational Health Sciences Seminar: **“Role of the Circadian Clock in Skin Cancer Prevention and Sunburn Erythema”**

Oregon Institute of Occupational Health Sciences Seminar: **“Using light to improve health, performance and well being: from science to applications”**

2014 Faculty Presentations

Allen, Charles

The Role of GABAergic Synapses in Generating Circadian Rhythms. Department of Integrative Physiology and Neuroscience, Washington State University, Pullman, WA

The Role of GABAergic Synapses in the Generation of Circadian Rhythms. University of Michigan, Ann Arbor, MI

Anger, W. Kent

Frontiers in Total Worker Health™: Unique Perspectives from the NIOSH TWH Centers of Excellence. (Cherniack M, Merchant JA, Anger WK, Sorensen, G. Research) 1st International Symposium to Advance Total Worker Health. Bethesda, MD

Evidence-Based TWH Programs: What Does the Evidence Tell Us? Occupational Health Psychology Summer Institute: Advancing Theory and Practice in the context of Total Worker Health. Portland, OR

Building a TWH Center: From Nuts and Bolts to Politics. (Anger WK, Dennerlein J, Rohlman DS, Punnett L, Hammer L.) Occupational Health Psychology Summer Institute: Advancing Theory and Practice in the context of Total Worker Health. Portland, OR.

What is Total Worker Health and why does it matter to you? OHSU Institute of Environmental Health Seminar Series. Portland, OR.

What the Research Literature Tells us about Total Worker Health™ and what the Oregon Healthy Workforce Center is doing about it. Washington State University School of Nursing. Spokane, WA and Environmental Health Seminar, Department of Environmental and Occupational Health Sciences, School of Public Health, University of Washington. Seattle, WA

Butler, Matthew

Clocks in physiology: synchronizing the hypothalamus and rhythms in sleep apnea. Dept. of Physiology and Pharmacology, Waseda University, Tokyo

Nonstandard light conditions illuminate entrainment. Sapporo Symposium on Biological Rhythms, Sapporo, Japan

Apnea Duration and Inter-Apnea Interval as Predictors of Health Outcomes and Mortality: An Exemplar of NSRR Data Opportunities. American Thoracic Society, San Diego, CA

Unusual lights illuminate the biological clock. Dept. of Behavioral Neuroscience, OHSU, Portland, OR and Dept. of Physiology and Pharmacology, OHSU, Portland, OR

Circadian rhythms in sleep apnea. Oregon Institute of Occupational Health Sciences, OHSU, Portland, OR

Deyo, Richard

State of the Evidence: Key Controversies in the Management of Low Back Pain. William J. Erdman II, MD Lectureship, Annual Meeting of the Association of Academic Physiatrists, Nashville, TN

Manipulating the Pain: Chiropractic and Other 'Alternative' Treatments for Back Pain. Integrative Medicine Research Lecture Series, National Center for Complementary and Alternative Medicine, NIH, Bethesda, MD

Overuse of spine surgery: a public health perspective. American Academy of Neurology Annual Meeting, Philadelphia, PA

Recommendations of the NIH Task Force on Research Standards for Chronic Low Back Pain. American Pain Society Annual Meeting, Tampa, FL and International Research Congress on Integrative Medicine and Health, Miami, FL

Overuse in the Treatment of Low Back Pain: Time to Back Off? T. Evans Wyckoff Lecture in Neuroscience, Virginia Mason Medical Center, Dept. of Neurology, Seattle, WA

Beating back pain: can we improve quality and cut costs at the same time? Combined Neurology/Neurosurgery Grand Rounds, University of Rochester, Rochester, NY

Kretzschmar, Doris

Loss of Tau results in progressive neurodegeneration. (1) Keystone meeting 2014, Keystone, USA and (2) Layton Center for Alzheimer's disease, OHSU, Portland, OR

Lloyd, Stephen

Small Molecule Inhibitors of NEIL1 as a Novel Therapeutic Target. Virogenomics Inc, Portland, OR

Small Molecule Inhibitors of DNA Glycosylases. Glaxo Smith Kline, King of Prussia, PA

DNA Glycosylases and Polymerases as Novel Therapeutic Cancer Drug Targets. Abbie Pharmaceuticals, Chicago, IL

Molecular Basis of Aflatoxin-induced Mutagenesis. Knight Cancer Institute, OHSU, Portland, OR

Genetic Susceptibility to Aflatoxin-induced Carcinogenesis. OHSU Genome Instability Symposium, Portland, OR

McCullough, Amanda

Small molecule inhibitors of DNA Glycosylases. Program Project Meeting, Vanderbilt University Dept. of Chemistry, Nashville, TN

Olson, Ryan

Return on investment of a Work-Family Intervention: Evidence from the Work, Family, and Health Network. (Barbosa, C., Bray, J., Dowd, W., Mills, M., Kelly, E., Moen, P., Wipfli, B., Olson, R., & Durham, M.) Society for Medical Decision Making Conference, Miami, FL

COMPASS teams: Creating health & safety “communities of practice” for home care workers. (Olson, R., Elliot, D.L., Hess, J.A., Thompson, S., Wright, R.R., Luther, K., Mancini, A., & Wipfli, B) Teaming up for Total Worker Health™ (D.L. Elliot, Chair). 1st International Symposium to Advance Total Worker Health, Bethesda, MD

The SHIFT Intervention for truck drivers produces significant weight loss in a randomized trial. (Olson, R., Wipfli, B., Thompson, S., Anger, W.K., Bodner, T., Elliot, D.L., Hammer, L., Perrin, N.) Total trucker health: The drive to improve (M. Theise, Chair). 1st International Symposium to Advance Total Worker Health, Bethesda, MD

A Total Worker Health program for health care workers. (Olson, R., Thompson, S., Hess, J.A.) 5th National Health Care Ergonomics Conference, Portland, OR

Can cab engineering create passive improvements in driver sleep, health, and fuel efficiency? (Loczi, J. & Olson, R.) Fourth International Symposium on Naturalistic Driving Research, Blacksburg, VA

Rohlman, Diane

Promoting Adoption of Total Worker Health: Lessons Learned from Small Businesses. (Rohlman DS, Campo S, Robinson E, Hall JL, Kelly KM) 1st International Symposium to Advance Total Worker Health™, Bethesda, MD

Technology Meets Total Worker Health™: Evaluating an Online Training for Young Workers. (Rohlman DS, Parish M, Elliot D, Jeddeloh L) Bethesda, MD

Focusing the Scope of Young Worker Health and Safety Interventions. (Parish M, Rohlman DS, Elliot DL, Lasarev M) Bethesda, MD

Occupational and Environmental Stress in Latino Agricultural Workers. (Rohlman DS, Shaw M, TePoel M, Huszar S) 7th International Symposium: Safety & Health in Agricultural & Rural Populations: Global Perspectives, Saskatoon, SK, CA

Exposures, Symptoms, and Neurobehavioral Performance: A Longitudinal Study of Adolescent Pesticide Applicators. (Rohlman DS, Abdel Rasoul G, Ismail AA, Bonner M, Hendy O, Khan K, Olson JR) Saskatoon, SK, CA

Agricultural Work Practices Among College Students. (Rudolph JM, Sheridan C, Rohlman DS) 13th Annual Midwest Rural Agricultural Safety & Health Conference, Ankeny IA

Decreased Income and Depression in Rural Women. (Rudolph JM, Ramirez M, Rohlman D) Ankeny IA

Correlates of Mental Health in Seasonal Farmworkers. (TePoel M, Shaw M, Huszar S, Rohlman DS) Ankeny IA

Evaluation of Technology-based Interventions to Increase the Use of Hearing Protection Among Adolescent Farmworkers in Iowa. (Khan K, Winborn A, Rohlman DS) Ankeny IA

Estimate Pesticide Exposure Among Children in Agricultural Communities and Examine the Impact on Neurobehavioral Function in Children. (Butler-Dawson J, Thorne PS, Rohlman DS) Ankeny IA

Shea, Steven

Sleep and 24-Hour Coverage. American Society of Emergency Radiology 2014 Postgraduate Course in Emergency Radiology, Portland, OR
Circadian Rhythms and Human Disease. Cancer and the Circadian Clock: A Symposium on the Current State of the Science. Fred Hutchinson Cancer Research Center, University of Washington, Seattle WA.

Circadian Rhythms and Human Disease. Sleep Medicine Didactic Curriculum Lecture Series, Oregon Health & Science University, Portland, OR
Healthy Sleep, Healthy Brains. Guild Medical Chat, OHSU Foundation, Portland, OR

Involvement of Circadian Rhythms in Human Health. Neurology Grand Rounds, Oregon Health & Science University, Portland, OR

Oregon Institute of Occupational Health Sciences; Focus on Shift Work and Sleep. DMICE Informatics Conference, Oregon Health & Science University, Portland, OR

Circadian Disruption and Health. Sleep Medicine Case Conference, Oregon Health & Science University, Portland, OR

Day-night Patterns of Cardiovascular Risk. Knight Cardiovascular Institute “Try On For Size” Seminar, Oregon Health & Science University, Portland, OR

Cardiometabolic vulnerabilities of sleep loss and circadian misalignment. NASA NSBRI, Houston, TX

Cardiovascular effects of sleep loss and circadian misalignment. NASA NSBRI Human Research Program workshop, Houston, TX

Circadian rhythms in asthma and sleep apnea. NIH circadian and breathing workshop, Bethesda, MD

Circadian rhythms and occupational health. Wahington Occ Safety & Health symposium, Wenatchee, WA

Oregon Institute of Occupational Health Sciences: focus on Total Worker Health. AHA Wellness Summit address Portland, OR

Oregon Institute of Occupational Health Sciences: focus on Total Worker Health. MLAC presentation, Salem, OR

Oregon Institute of Occupational Health Sciences: research opportunities in Thailand. Presentation to Bangkok Hospital (@ OHSU)

Spencer, Peter

Multiple lectures on occupational health topics, with particular focus on solvents with neurotoxic properties, mechanisms of toxicity, and relation to workplace neurological disease (lectures in Bali Indonesia, Berlin Germany, Kuala Lumpur Malaysia, Metz France, Suzhou China, Washington State)

Turker, Mitchell

Potential Mechanisms for the Transfer of Environmental Exposures to Epigenetic Change. Annual Meeting of Environmental Mutagenesis Society, Orlando, FL

Environmental Exposures and Epigenetic Change. Jefferson Science Fellow lecture at Kansas State University, Manhattan, KS

Environmental Exposures and Epigenetic Change. Western Galilee Hospital, Nahariya, Israel

Wipfli, Brad

Self-monitoring and self-management. Occupational Health Psychology Summer Institute, Portland, OR

Andreisek G, Deyo RA, Jarvik JG, Porchet F, Winklhofer SFX, Steurer J. **Consensus conference on core radiological parameters to describe lumber stenosis – an initiative for structured reporting.** Eur. Soc. Radiol. 2014 Jul 31. [Epub]

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Grygoryev D, Dan C, Gauny S, Eckelmann B, Ohlrich AP, Connolly M, Lasarev M, Grossi G, Kronenberg A, Turker MS. **Autosomal mutants of proton-exposed kidney cells display frequent loss of heterozygosity on nonselected chromosomes.** Radiat Res. 2014 May; 181(5): 452-63.

Hildebran C, Cohen DJ, Irvine JM, Foley C, O'kane N, Beran T, Deyo RA. **How clinicians use prescription drug monitoring programs: a qualitative inquiry.** Pain Med. 2014; 15: 1179-1186

Hsieh WH, Escobar C, Yugay T, Lo MT, Pittman-Polletta B, Salgado-Delgado R, Scheer FA, Shea SA, Buijs RM, Hu K. **Simulated shift work in rats perturbs multiscale regulation of locomotor activity.** J R Soc Interface. 2014 Jul 6;11(96).

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Expenditures Fiscal Year 2013/2014

Workers' Compensation Expenditures		Federal and Other Grant Expenditures	
Salaries		Salaries	
Salaries - research (17% of all salaries)	792,830	Salaries - research (61% of all salaries)	2,759,587
Salaries - outreach (2% of all salaries)	96,234	Salaries - outreach (0% of all salaries)	
Salaries - education (2% of all salaries)	91,159	Salaries - education (3% of all salaries)	149,488
Salaries - administration (11% of all salaries)	509,443	Salaries - administration (3% of all salaries)	127,426
Salaries - core services ¹ (1% of all salaries)	54,771	Salaries - core services (0% of all salaries)	
Supporting Services (includes cores)		Supporting Services (includes cores)	
Supplies and equipment	501,753	Supplies and equipment	1,637,938
Miscellaneous support ²	125,438	Miscellaneous support ²	
Outreach and Education		Outreach and Education	
Services, supplies and equipment	564,501	Services, supplies and equipment	189,287
Other Expenses		Other Expenses	
Bond principal & interest	353,481	Misc. expenses	
OHSU administrative charges	81,871	OHSU administrative charges	1,835,984
Total	\$3,171,481	Total	\$6,699,710

Programs Fiscal Year 2013/2014

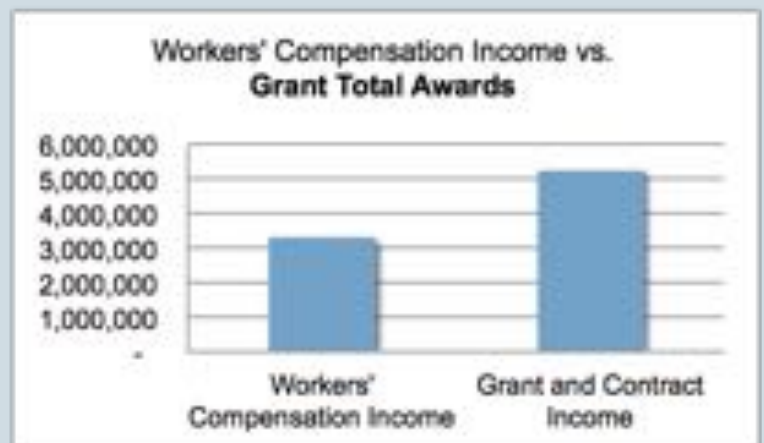
	Amount paid by W/C	Amount paid by grants	Total Cost
Outreach and Education			
Information dissemination (e.g., TIC ³ , website, newsletters, brochures)	548,485	0	548,485
Education & training programs (professional & para-professional)	203,409	338,775	542,184
Basic and Applied Research			
Total Worker Health	101,947	843,140	945,087
Exposure: Consequences and prevention	606,631	1,935,742	2,542,373
Strategies and Solutions for Vulnerable Workers	105,450	728,936	834,386
Sleep and Shiftwork: Impact on Health, Safety, and Productivity	432,708	763,149	1,195,857
Injury, Treatment, Recovery, and Prevention	44,365	126,557	170,922
Non-program-specific expenses ⁴	1,128,486	1,963,410	3,091,896
Total Expenses	\$3,171,481	\$6,699,709	\$9,871,190

¹ core services - centralized graphics, statistics, and imaging

² e.g., equipment maintenance and repair, phone rental and line charges, office supplies

³ Toxicology Information Center

⁴ includes OHSU administrative charges, bond principal and interest, administrative salaries, building operation & maint and supporting services.



Oregon Institute of Occupational Health Sciences

The Oregon Institute of Occupational Health Sciences conducts research, trains health professionals, provides consultation, and offers the public information on hazardous chemicals and their health effects. The Institute includes scientists and research staff exploring a range of questions relating to prevention of injury and disease, and promotion of health, in the workforce of Oregon and beyond. The Toxicology Information Center (TIC) answers Oregonians' questions about chemical and other occupational exposures, and the Institute's resource web page, [Occhealthsci.org](http://occhealthsci.org) makes health and safety information available 24 hours a day.

How to Contact Us

Mail Address

Oregon Institute of Occupational Health Sciences
Oregon Health & Science University
3181 SW Sam Jackson Park Rd, L606
Portland, OR 97239-3098

Web Address

<http://www.ohsu.edu/occhealthsci>

Telephone

Main number: (503) 494-4273
Fax: (503) 494-4278

Toxicology Information Center (TIC):
503-494-7366

E-Mail

General Information
croetweb@ohsu.edu
Toxicology Information Center
croetweb@ohsu.edu

For additional copies of this report, call the Institute at the numbers listed.

Institute Personnel 2014

(Hire-Retire dates in parentheses)

Director and Senior Scientist

Steven A. Shea, PhD (2012-present)

Associate Director of Basic Research and Senior Scientist

R. Stephen Lloyd, PhD (2003-)

Associate Director of Applied Research and Senior Scientist

W. Kent Anger, PhD (1989-)

Assistant Director for Business Affairs

Janice Stewart, BS (1988-)

Faculty

Charles Allen, PhD (1990-)
W. Kent Anger, PhD (1989-)
Matthew Butler, PhD (2013-)
Doris Kretzschmar, PhD (2002-)
R. Stephen Lloyd, PhD (2003-)
Amanda McCullough, PhD (2003-)
Ryan Olson, PhD (2005-)
Bruce Patton, PhD (1998-2014)
Diane Rohlman, PhD (1992-)
Jackilen Shannon, MPH, RD, PhD (2006-2014)
Steven A. Shea, PhD (2012-)
Daniel D. Tshala-Katumbay, MD, PhD (2002-2014)
Mitchell Turker, PhD, JD (1996-)

Affiliated Faculty

Richard Deyo, MD, MPH (2009-)
Miranda Lim, MD, PhD (2014-)
Peter S. Spencer, PhD, FRCPath (1987-)

Investigators

Robert Irwin, MD, MPH (2002-)

Scientific Staff

Daniel Austin, MS (1989-)
Frederick Berman, DVM, PhD (2001-)
Bonnie Bolkan, PhD (2008-2014)
Marcus Calkins, PhD (2011-2014)
Marlene Cassar, PhD (2013-)
Olga Cravetchi, MS (2011-)
Nathan Donley, PhD (2013-)
Sudeshna Dutta, PhD (2012-)
Kendra Evans, MPH (2010-)
Paige Farris, MSW (2006-2014)
Illa Gilbert Jones, MS, CIH, CSP (2013-)
Haley Gillham, MS (2014-)
Dmytro Grygoryev, PhD (2009-)
Scott Holbrook, PhD (2011-2014)
Richard Kleinschmidt, PhD (2012-)
Anuradha Kumari, PhD (2007-)
Naima Laharnar, Dip. Psychology (2009-2014)
Mike Lasarev, MS (1996-)
Lisa Mariott, PhD (2010-2014)
Irina Minko, PhD (2003-)
Michael Moldavan, PhD (2001-)
Dede Montgomery, MS, CIH (2004-)
Amy Palma, RD (2006-2014)
Megan Parish, MPH (2011-)
Harini Sampath, PhD (2009-)
Wesley Stoller, MA (2011-2014)
Sharon Thompson, MS, RD, PhD (2011-)
Saurabh Thosar, MS, PhD (2014-)
Vladimir Vartanian, PhD (2003-)
Brad Wipfli, PhD (2008-)

FRONT COVER

Photo montage depicting some of the many industry sectors we serve.



The OHSU tram with Mt. Hood in the background



Oregon Institute of Occupational Health Sciences
(Our new name in 2014)

Oregon Institute of Occupational Health Sciences

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Portland, OR 97239-3098

Oregon Health & Science University includes the Schools of Dentistry, Medicine and Nursing; OHSU Hospital; numerous primary care and specialty clinics; multiple research institutes and several outreach and public service units. OHSU is an equal opportunity, affirmative action institution.

