

Center for Research on Occupational and Environmental Toxicology

NEWSLETTER

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This issue features the works of Mary Jo Vaughan Ten Pas, an artist and teacher who resides on Oregon's Luckiamute River.

CROET Research Tackles Musculoskeletal Injuries

Good news! The rate of disabling Workers' Compensation injury claims in Oregon dropped to a record low in 2001 (2002 data are not yet compiled). The bad news is that there were still 1.5 claims per 100 workers. And about 60% of those were musculoskeletal injuries—sprains, strains, tears, and fractures.

There is more good news – something can be done about preventing disability or minimizing extensive recovery from these injuries, and CROET is playing a role in that effort. CROET's role includes discovery of previously unknown statistics about musculoskeletal injuries in Oregon, neuroprotection strategies, reconnecting recovering nerves to muscles, nanoprotheses, and new training programs in ergonomics, all of which will help to reduce work force injury and disability in Oregon.

Workers' Comp Surveillance

Medical-only Claims Allow New Prevention Priorities

Drs. Linda McCauley, Joan Rothlein and Gary Rischitelli are engaged in a collaborative project with the Oregon Department of Health and Human Services and Oregon workers' compensation (WC) insurers to identify injury trends and opportunities for injury prevention. Currently, Oregon WC data only includes work-related injuries and illnesses that result in more than three days of work loss ("time-loss" injuries). WC insurers, however, also maintain databases of employees who are injured but return to work within three days ("medical-only" cases). This project has now merged WC claims data, from multiple insurers and employment information from the Oregon Department of Employment, into a single database that contains both "time-loss" and "medical-only" claims involving ergonomic injuries, stress-related claims, neck and spinal injuries, and dermatitis. Ergonomic injuries, often described as "musculoskeletal disorders", include sprains, strains, carpal tunnel and other disorders involving repetitive motion, overexertion, bending, twisting and related bodily actions. More than one-quarter of the claims from 2000 and 2001 in this database were identified as "ergonomic disorders", and more than 65% of these were medical-only claims. Furthermore, the industries with the largest numbers and the highest rates of "medical-only" claims differ from those industries with the highest numbers and rates of "time-loss" claims. These findings allow new priorities for injury prevention programs based on both time-loss and medical-only claims.

(<http://www.ohsu.edu/croet/outreach/>)

Neuroprotection

Protecting nerves and skeletal muscle function

Nerve degeneration is produced by mechanical injury (as in carpal tunnel syndrome), following exposure to a variety of occupational and environmental chemicals (such as pesticides and the industrial chemical acrylamide), and by metabolic and inheritable factors. When nerves that connect to skeletal muscle are lost, deterioration of skeletal muscle mass and impaired muscle function can also result. Acrylamide is a well-established synthetic neurotoxic chemical that has been used in industry

(paper and water purification) since the early 1950s. Interest in human exposure to acrylamide has recently regained notoriety due to its formation in carbohydrate-rich foods, such as French fries and potato chips, when cooked at high temperatures. While the levels of human exposure from consumption of these food sources appear to be well below that which causes neurotoxicity, repeated exposure to acrylamide in laboratory animals produces a well-established model of nerve injury that is seen in humans. CROET's Dr. Bruce Gold has recently found that daily injections of the immunosuppressant drug FK506 (tacrolimus) to rats also exposed to acrylamide, dramatically reduces nerve degeneration. Moreover, FK506-treated animals do not develop the functional signs of neurotoxicity. Dr. Gold's laboratory was the first to discover that FK506 accelerates recovery of nerve function by increasing the rate of nerve regeneration following injury in rats. These results may lead to the development of new drugs to protect against nerve loss and preserve skeletal muscle function in people experiencing nerve injury.

(<http://www.ohsu.edu/croet/faculty/gold/>)

Reconnecting severed nerves to muscles

Muscle protein controls synapse formation after injury

Neuromuscular injuries typically disconnect motor nerves from the muscles they innervate. Recovery requires the regeneration of the injured nerve and the re-establishment of its connections with the denervated muscle at synapses. This capacity for functional regeneration is impressive when one considers that, in an analogy of scale, the growing tip of the nerve's axon (the pre-synapse) is able to find a spot the size of a dime (the post-synapse) in the middle of a football field, stop precisely on that dime, and form a new connection to the muscle (the synapse). However, in the case of injury to the muscle, re-innervation can be impaired by disintegration of the muscle's original synaptic site (or, loss of the "dime"). Researchers, therefore, are working to identify the molecular mechanisms muscles employ to control synapse formation by motor nerves. While signals from nerves that provoke postsynaptic development in the muscle have been identified, little is known about how signals originating from muscles regulate pre-synaptic de-

velopment in the nerve. CROET's Dr. Bruce Patton identified a muscle surface protein that contains two components not present in the rest of the muscle. To study the function of this protein, mice were genetically engineered to lack these components to see what happens in their absence. In the first mutant strain, synapses formed correctly during muscle development in embryos. However, after injury in adults, motor nerves were not able to stop and re-connect to synaptic sites in the muscle. In the second strain, synapses were unable to form correctly, even during embryologic development, leading to an inability to survive after birth. Together, these discoveries pinpoint an essential biochemical signal normally used by a muscle to promote its connection to nerves. This information will guide efforts to improve recovery from neuromuscular injury and disease, perhaps by leading to molecular treatments to stimulate and improve recovery following nerve and muscle injury.

(<http://www.ohsu.edu/croet/faculty/patton/>)

Nanotechnology

Guidance proteins control growth of neurons

Drs. Gary Banker and Bruce Patton are exploring the application of nanotechnology—the technology used in the semiconductor industry to make computer chips—to study how growing nerve fibers interact with physical and chemical features in their environment. The goal is to produce interactions between living nerve cells and silicon chips bearing microelectronic circuits, which in turn will lead to the development of neural prosthetic devices that could restore function of damaged nerves or damaged brain tissue. One of the key challenges in this work is to adapt nanofabrication methods to create a pattern of proteins, including proteins that guide growing nerve cell axons on a surface where nerves can grow, without destroying their biological activity. Recently, these investigators developed a novel two-step approach that allows formation of specific patterns of proteins while preserving their function. They have gone on to show that by preparing patterns combining two different guidance proteins, the growth of a nerve cell's axons and dendrites can be guided independently to follow the pattern. This project,



which involves collaborations with scientists at Cornell University, is one component of ten Science and Technology Centers in the country, funded by the National Science Foundation to encourage technology transfer and innovative approaches to interdisciplinary research.

(<http://www.ohsu.edu/croet/faculty/banker/> and <http://www.ohsu.edu/croet/faculty/patton/>)

Musculoskeletal Injury Prevention

cTRAIN - Ergonomics training for drywall finishers and food service workers

CROET has an ongoing program to develop effective individual training methods for occupational safety and health. Associate Director Dr. Kent Anger and Dr. Diane Rohlman have developed a computerized training method, named cTRAIN, in collaboration with Mr. John Kirkpatrick of the Painters' District Council. Research on the basic principles underlying training, an area almost devoid of research in working adults, is demonstrating the value of this interactive self-paced training method, which quizzes participants during training and provides immediate feedback on answer accuracy. These researchers have found that, depending on the subject matter, the frequency with which quizzes are given can be optimized to maximize the retention of information that is presented. Interestingly, open-book test formats were shown to produce slightly better recall than closed-book tests when testing was repeated some time after the original training. New programs for drywall finishing (ergonomic and other issues), lab safety and food handling have been developed and have entered the field-testing phase. So far, in one application for food services safety and health content, correct answers to questions about overall knowledge increased from 75% to 95%, while correct at-work questions increased by 33% after training.

(<http://www.ohsu.edu/croet/faculty/anger/>)

So there it is—CROET is playing an important role in efforts to prevent disability and reduce the time of recovery from musculoskeletal injuries—a major contributor to Oregon workers' compensation claims. This is good news for all Oregonians!

Medication use in the workplace

With so much focus these days on the fight against illicit drugs, it is important to realize that when it comes to job-related injuries and death, illegal drugs are not the only problem. Medications we receive from doctors and pharmacies are so widely used and so easily misused that they, too, present a major risk for deaths and injuries on the job.

With the advent of allergy season, antihistamines present a timely example of medications that can be hazardous in the workplace. A fundamental problem with the most widely used, older class of antihistamines is that they cause drowsiness. This undesirable side effect has been associated with an increased risk for traumatic occupational injuries and an overall loss of workplace productivity.

The severity of hazard associated with the sedation-producing antihistamines becomes apparent when one realizes that seasonal allergy or, “hay fever”, is a condition that affects as many as one in three Americans. Moreover, the use of sedating antihistamines has actually been shown to reduce an already impaired worker’s productivity by a further 8 percent. This overall loss of productivity translates into huge financial costs, and underscores the risk to workers engaged in potentially hazardous occupations. New and improved antihistamines that do not produce sedation are available — however, most are prescription drugs, cost twice as much as their older cousins, and therefore may not be the first drugs of choice among cold and allergy sufferers and medical plans. This is unfortunate because workers taking non-sedating antihistamines are 4 to 6 percent more productive than those not on medications, and 12 percent more productive overall (and much safer) than allergy sufferers taking sedation-producing drugs. This increased productivity more than offsets the higher cost of these safer, non-sedating medications.

A few simple guidelines

Since medication use on the job is a necessary fact of life, a few simple guidelines should always be

observed so that a safe work environment is maintained. Always read warnings and instructions on labels or in package inserts that come with the medication you are taking. It is important to know how much medicine to take and what the possible side effects may be.

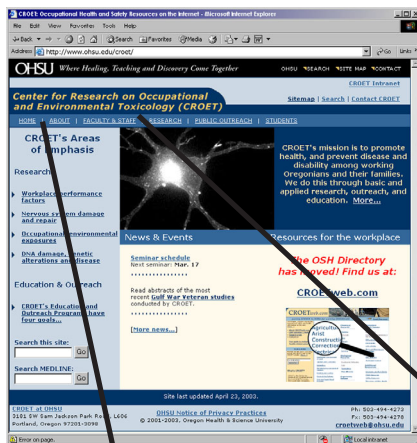
Other important points to consider include:

- With pain medications, both your physical condition and the prescribed medication may limit your mobility and increase your reaction time.
- If you have a fever, you should not operate or use hazardous machinery.
- If you are having trouble sleeping, you are more likely to end up fatigued at work.
- Sleep medications and stimulants, including coffee, can mask symptoms of fatigue.
- Many people are susceptible to the amount of antihistamine in cold pills. The side effects include lowered alertness and slowed responses. If you exceed the maximum recommended dose, of course, the effects will be worse.
- The hazardous effects of antihistamines, tranquilizers, mild sedatives and pain relievers are greatly magnified when combined with alcohol.
- The side effects of medications may be worse when taken to relieve a physically stressful illness like the flu.
- Avoid medication if you have to drive vehicles or use power tools, unless approved by your doctor. Be sure that your doctor knows what you do at work.
- Don’t refill prescriptions without checking with your doctor, and never take someone else’s prescription medication.
- If you have an illness that could keep you from working, play it safe and don’t try to treat it yourself - see your doctor. It is better to miss work or handle other duties for the day than to risk injury to yourself or a co-worker.

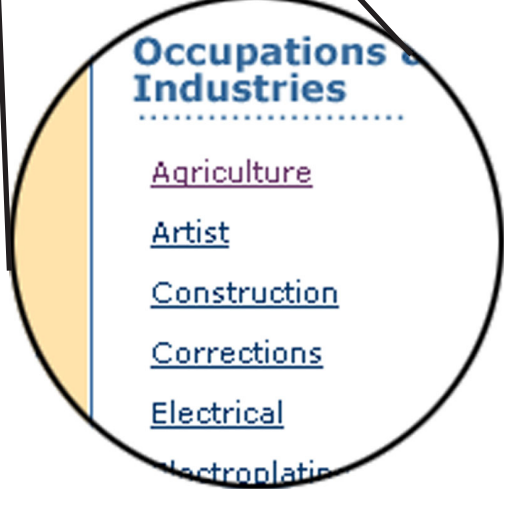
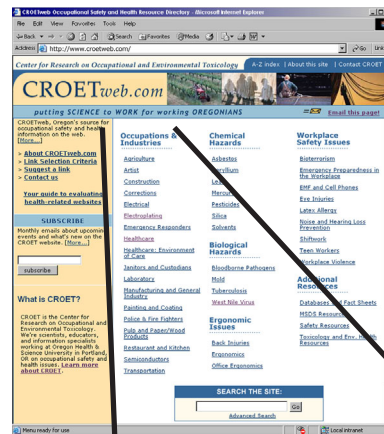
CROET's website is growing – into two sites!

CROET's website has grown to include so much information, it is branching into two sites! In the future you will find the occupational safety and health resource directory at the web address: <http://www.croetweb.com/> You can continue to find information about CROET's research, outreach and education programs at: <http://www.ohsu.edu/croet/>

Official CROET website <http://www.ohsu.edu/croet/>



CROET's Occupational Safety & Health Resource Directory <http://www.croetweb.com/>



The CROET website contains everything you want to know about CROET. The new site will be easier to navigate and contain more information about CROET's faculty and staff, research, outreach and education programs. Visit the site and learn how CROET's research helps working Oregonians and their families.

In the new directory, you will be able to:

- sort each topic (e.g. agriculture, healthcare, mold, ergonomics, etc.) for **Oregon-specific** information and **Spanish language** materials
- conduct specialized searches for information from specific agencies (e.g. OR-OSHA, etc.)

To find out what new links are added to the OSH directory each month, subscribe to our monthly email newsletter at <http://www.croetweb.com/>

Grants and Awards

The Oregon Fatality Assessment and Control Evaluation Program (OR-FACE)

OR-FACE is a National Institute of Occupational Safety and Health (NIOSH)-sponsored research program designed to identify and study fatal occupational injuries. Each day, on average, 16 U.S. workers die as a result of a traumatic injury on the job. Investigations conducted through the FACE program allow the identification of factors that contribute to fatal occupational injuries. This information is used to develop comprehensive recommendations for preventing similar deaths.

Oregon's FACE program is a collaborative effort among CROET researchers at OHSU, the Oregon Department of Human Services' Public Health Services, and Oregon State University. Cooperating agencies include OR-OSHA and the Oregon Department of Consumer and Business Services' (DCBS) Information Management Division. Key personnel in the Oregon FACE program are: Michael Heumann, MPH, (primary investigator) from Oregon's Public Health Services; CROET's Gary Rischitelli, MD, JD, MPH (co-primary investigator), Joan Rothlein, PhD, and Linda McCauley, RN, PhD; and Jeffrey Woldstad, PhD, from Oregon State University's Department of Industrial Engineering.

OR-FACE aims to identify traumatic occupational fatalities by developing a statewide surveillance network to investigate selected traumatic occupational fatalities. A multidisciplinary team will analyze the surveillance and investigation data, develop and disseminate intervention strategies to prevent these injuries, and collaborate with other states and NIOSH to decrease the rate of occupational injuries and fatalities in the United States. Accident fatality data will be obtained from OR-OSHA reports, DCBS census of fatal occupational injuries, worker's compensation claims, death certificates, media reports, and from trade, labor and community associations. Onsite investigations will be conducted by the OR-FACE team in order to observe sites where fatalities have occurred, to gather facts and data from company officials, witnesses, and co-workers, and to provide a factual basis for writing investigative reports. Investigative data will include the type of industry involved; number of employees in the company; the company safety program; the victim's age, sex and occupation; the working environment; tasks the victim was performing; tools or equipment used by the victim; and the role of management in controlling how these factors interact. The identity of the decedent, employer and witnesses will **not** be included in FACE reports or alerts.

OR-FACE program is a research program only; it will not enforce compliance with State or Federal occupational safety and health standards nor determine fault or blame. FACE data are protected from disclosure under Oregon law. Data collected by the Oregon Department of Human Services in connection with special morbidity or mortality studies are confidential and may be used solely for the purpose of this study. (O.R.S. 432.060)

For more information: <http://www.ohsu.edu/croet/face/>

CROET Advisory Committee Member Retires

Sheldon ("Shag") Wagner, MD, clinical toxicologist and director of the National Pesticide Medical Monitoring Program (NPMMP), has retired after a long and productive career. Dr. Wagner is a founding member of OHSU President Kohler's Advisory Committee on CROET. His strong support and excellent guidance have been instrumental in insuring that the mission of CROET remains responsive to the evolving needs of working Oregonians. CROET is forever in Dr. Wagner's debt for his unfailing support. While officially "retired", Dr. Wagner will continue to follow his interest in immune system diseases of mast cells and their numerous variations and clinical presentations. All of us at CROET wish Dr. Wagner continued success in his current pursuits.

Center for Research on Occupational and Environmental Toxicology

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 includes approximately 100 scientists and research staff exploring 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.

How to Contact Us

MAIL ADDRESS

CROET
Oregon Health & Science University
3181 SW Sam Jackson Park Rd, L606
Portland, OR 97239-3098

Web site

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

TELEPHONE

Main CROET number
(503) 494-4273
Facsimile
(503) 494-4278
Toxicology Information Center
(800) 457-8627

E-MAIL

Toxicology Information Center
croettic@ohsu.edu

You may share your comments regarding this publication by calling (503) 494-2514, by e-mailing us at brownjo@ohsu.edu or by faxing us at (503) 494-4278

Directors and Scientists

DIRECTOR AND SENIOR SCIENTIST

Peter S. Spencer, PhD, FRCPath

ASSOCIATE DIRECTOR AND SENIOR SCIENTIST

W. Kent Anger, PhD

ASSOCIATE DIRECTOR FOR FINANCE AND PLANNING

J. Robert Williams, MBA

ASSISTANT DIRECTORS

Janice Fisher, BS
Gregory Higgins, PhD

FACULTY

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Gary Banker, PhD
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Bruce Patton, PhD
Gary Rischitelli, MD, JD, MPH, FACOEM
Show-Ling Shyng, PhD
Peter S. Spencer, PhD, FRCPath
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INVESTIGATORS

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SCIENTIFIC STAFF

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Artwork by Mary Jo
Vaughan Ten Pas

OUTREACH

CROET will provide exhibits at the following conferences.

**Annual Oregon Self Insurers Association (OSIA)
Meeting**

July 16-18, 2003
Wilsonville, Oregon

AFL-CIO Convention

Sept. 8-9, 2003
Linn County Fairgrounds
Albany, Oregon

**Central Oregon Occupational Safety & Health
Conference**

September 23-26, 2003
Eagle Crest Resort
Redmond, Oregon

**Southern Oregon Occupational Safety & Health
Conference**

October 22 & 23, 2003
Smullin Center
Medford, Oregon

**Western Pulp & Paper Workers Safety & Health
Conference**

December 2-5, 2003
DoubleTree Hotel - Jantzen Beach
Portland, Oregon

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Join CROET's e-mail list for monthly updates about what's new on the CROET Web site, news and upcoming events. To subscribe or read past updates, go to <http://www.ohsu.edu/croet/about/croetml/>.

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Oregon Health & Science University includes the Schools of Dentistry, Medicine, Nursing and Science and Engineering; 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.

Oregon Health & Science University
CROET, the Center for Research on Occupational
and Environmental Toxicology
3181 SW Sam Jackson Park Rd., L606
Portland, OR 97239-3098



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