National Institute for Occupational Safety and Health (NIOSH)-supported Education and Research Center (ERC)

10th Annual

2009 Pilot Research Project (PRP) Symposium

October 1—2, 2009
Kehoe Auditorium
Located in Kettering Laboratory
Department of Environmental Health
University of Cincinnati College of Medicine
Thursday, October 1st 1:00 pm—5:00 pm
Friday, October 2nd 8:00 am—12:00 pm

Keynote Speakers

John M. Dement, PhD, CIH
Duke University Medical Center
And
Ronald E. Shaffer, PhD,
National Personal Protective Technology Laboratory
NIOSH

Podium and Poster Presentations by PRP Awardees

UNIVERSITY OF Cincinnati

Supported by NIOSH grant #T42-OH008432

Pilot Research Training Program & Symposium

October 1–2, 2009 marks the University of Cincinnati Education and Research Center's (ERC) **10th Annual Pilot Research Project (PRP) Symposium** here at the University's Kehoe Auditorium (located in the Kettering Lab Complex). The purpose of the PRP is to increase the research capacity of research trainees and young investigators in occupational health and safety and to encourage those in related disciplines to pursue occupational health and safety research.

Under the administrative direction of Dr. Amit Bhattacharya, research proposals are solicited and peer-reviewed annually from qualifying faculty and graduate students from the **University of Cincinnati and the following PRP partnering institutions – Air Force Institute of Technology, Bowling Green State University, University of Toledo – Medical Science Campus, Central State University, Purdue University, University of Kentucky, Western Kentucky University, Eastern Kentucky University, Murray State University, Ohio University and Kentucky State University.**

At this symposium, the 2008-09 awardees will be presenting results of their research and the 2009-10 awardees will make poster presentations of their proposed work. This year's keynote speakers will be **Dr. John M. Dement,** Professor at Duke University Medical Center**,** who will deliver his keynote address on, ***"COPD among Workers at Department of Energy Sites"*** on **Thursday, October 1, 2009 at 1 pm. Dr. Ronald E. Shaffer,** Research Branch Chief of the National Personal Protective Technology Lab (NPPTL) at the National Institute for Occupational Safety and Health (NIOSH)/Centers for Disease Control and Prevention (CDC), will deliver his keynote address on ***"Respiratory Protection Against Emerging Hazards: Nanotechnology and H1N1 Flu Virus"*** on **Friday, October 2, 2009 at 8 am.** Both presentations will be given in the Kehoe Auditorium in the Department of Environmental Health's Kettering Lab Complex at the University of Cincinnati's College of Medicine campus. There will also be opportunities to speak with all of the presenters individually.

The University of Cincinnati's Education and Research Center is one of 17 such centers funded by the National Institute for Occupational Safety and Health (NIOSH) nationally. Dr. Carol Rice serves as the director of the ERC, which is based in the university's Department of Environmental Health within the College of Medicine. The purpose of the ERC is to train professionals in the didactic and research skills necessary to lead the occupational safety and health disciplines. Results of research are translated into action through an outreach program and shared with professionals and practitioners in the region via continuing education.

Since 1999, the PRP program has allocated over $780 thousand dollars to support pilot research projects. These projects have served as a catalyst in bringing over $26.2 million in additional research support to the region from sources independent of the PRP program, such as, the National Institute for Occupational Safety and Health (NIOSH), United States Department of Agriculture (USDA), National Science Foundation (NSF), and the Centers for Disease Control and Prevention (CDC). Additionally, the PRP has also brought 24 new investigators from other fields of expertise to the area of occupational safety and health research.

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Symposium attendees are eligible for:

- ◊ **.92 ABIH (IH) CM Point Approval #09-3319**
- ◊ **Meets BCSP criteria for continuation of certification credit**
- ◊ **5.4 Continuing Education Contact hours for nurses are approved by the Ohio Board of Nursing through the OBN Approver Unit at the University of Cincinnati College of Nursing, Continuing Education Program (OBN-09100-1). Contact hours are valid in most states.**

The 10th Annual PRP Symposium is free and open to the public.
For more information about the PRP program, please contact
Dr. Amit Bhattacharya, PRP Program Director, at (513) 558-0503 or Amit.Bhattacharya@uc.edu

Keynote Speaker, Thursday, October 1, 2009

John M. Dement, PhD, CIH

Professor
Division of Occupational & Environmental Medicine
Duke University Medical Center

Dr. John M. Dement is a Professor in the Division of Occupational and Environmental Medicine, Duke University Medical Center. Prior to joining the Duke University faculty in 1993, Dr. Dement served in the U.S. Public Health Service for 22 years where he was employed in various research and management positions by the National Institute for Occupational Safety and Health (NIOSH) and the National Institute of Environmental Health Sciences (NIEHS).

Dr. Dement is certified in the Comprehensive Practice of Industrial Hygiene and holds a B.S. in Mechanical Engineering, an M.S. in Industrial Hygiene, and a Ph.D. in Industrial Hygiene/Epidemiology. His research interests include occupational lung diseases, occupational cancers and exposure assessment for occupational epidemiology, surveillance systems for occupational diseases and injuries. Dr. Dement has published numerous articles in each of these areas and has served on expert panels convened by the National Academy of sciences and the World Health Organization. Dr. Dement served as a member of the Board of Scientific Counselors for the National Institute for Occupational Safety and Health from1994 until 2003.

Keynote Speaker, Friday, October 2, 2009

Ronald E. Shaffer, PhD

Chief, Research Branch
National Personal Protective Technology Lab (NPPTL)
National Institute for Occupational Safety and Health (NIOSH)

Dr. Ron Shaffer is the Chief of the Research Branch at the National Personal Protective Technology Laboratory (NPPTL), which is a division of the National Institute for Occupational Safety and Health (NIOSH). As Branch Chief, he is responsible for the management and supervision of a diverse laboratory of 25+ scientific and administrative staff. Dr. Shaffer provides overall technical leadership for the Branch's research on personal protective equipment (PPE) including respirators and protective clothing.

Dr. Shaffer is a member of NIOSH's nanotechnology research steering committee and conducts research on the performance of PPE against emerging health hazards (including engineered nanomaterials and infectious aerosols). Dr. Shaffer received a Ph.D. in Chemistry in 1995 from Ohio University and worked as a Research Scientist and Project Leader for the Naval Research Laboratory and General Electric Global Research prior to joining NIOSH in 2003. Dr. Shaffer is author or co-author of 40 publications in peer-reviewed journals and has been issued 7 U.S. patents.

PODIUM PRESENTATION SCHEDULE

	Thursday, October 1, 2009		
	Moderator: Emmanuel Iyiegbuniwe, PhD		
Time	**Title**	**Speaker**	**Affiliation**
1:00-1:30 pm	Welcome and Opening Remarks	Carol Rice, PhD, CIH ERC Director Amit Bhattacharya, PhD, CPE, PRP Program Director	Environmental Health University of Cincinnati Environmental Health University of Cincinnati
1:30-1:35 pm	Introduction of Keynote Lecturer: John M. Dement, Ph.D., CIH, Professor Division of Occupational & Environmental Medicine, Duke University Medical Center	Amit Bhattacharya, PhD, CPE PRP Program Director	Environmental Health University of Cincinnati
1:35—2:20 pm	Keynote Address: "COPD among Workers at Department of Energy Sites"	John M. Dement, Ph.D., CIH, Professor	Duke University Medical Center
2:20-2:30 pm	Keynote Q & A		
2:30-2:50 pm	Identifying Environmental Influences on Obesity Risk Factors of Commercial Truckers	Lisa M. Turner, RN, APRN-BC	College of Nursing University of Kentucky
2:50– 3:10 pm	Tracking Toxic Gases Penetration Through Firefighter's Garment	Ge Li on behalf of Vesselin Shanov, PhD	College of Engineering University of Cincinnati
3:10—4:10 pm	Poster Session I and Break		
4:10—4:30 pm	Immunoregulatory Responses in Trimelitic Anhydride Occupational Sensitization	Debajyoti Ghosh, PhD	College of Medicine University of Cincinnati
4:30-4:50 pm	Evaluation and Development of a Silica Scavenging System for Cut-Off Saws	Bryan Hubbard, PhD, PE	College of Technology Purdue University
5:00—7:00 pm	PRP Networking Picnic Sponsored by the Academy of Kettering Fellows		Kettering Laboratory Front Lawn & Atrium

PODIUM PRESENTATION SCHEDULE

	Friday, October 2, 2009		
	Moderator: Jeremy Slagley, Maj, USAF, BSC, PhD, CIH		
Time	**Title**	**Speaker**	**Affiliation**
8:00-8:10 am	**Opening Remarks**	**Amit Bhattacharya, PhD, CPE PRP Program Director**	**Environmental Health University of Cincinnati**
8:10—8:15 am	**Introduction of Keynote Lecturer: Ronald E. Shaffer, PhD, Chief, Research Branch, National Personal Protective Technology Lab (NPPTL)**	**Amit Bhattacharya, PhD, CPE PRP Program Director**	**Environmental Health University of Cincinnati**
8:15– 9:00 am	**Keynote Address: "Respiratory Protection Against Emerging Hazards: Nanotechnology and H1N1 Flu Virus"**	**Ronald E. Shaffer, PhD, Chief, Research Branch National Personal Protective Technology Lab (NPPTL)**	**National Institute for Occupational Safety and Health/Centers for Disease Control and Prevention**
9:00—9:10 am	**Keynote Q & A**		
9:10-9:30 am	**Transport of Pollutants through Liquid-Gas Interfaces - A Numerical Approach**	**Urmila Ghia, PhD**	**College of Engineering University of Cincinnati**
9:30—9:50 am	**Work Survey Instrument Revision for Case Management Work**	**Jane Christianson**	**College of Nursing University of Cincinnati**
9:50—10:10 am	**Effect of Mean Inspiratory Flow, Heart Rate and Breath Rate on the Efficiency of Respirators**	**Kyungmin J. Cho, PhD**	**Environmental Health University of Cincinnati**
10:10—11:10 am	**Poster Session II and Break**		
11:10- 11:30 am	**Is Manganese Exposure A Risk Factor for Hearing Loss?**	**Anthony Almazan, MD**	**Environmental Health University of Cincinnati**
11:30—11:50 am	**Lab-On-A-Chip Sensor for on-site Detection and Sizing of Nanoparticles**	**Ian Papautsky, PhD on behalf of Ali Asgar Bhagat**	**College of Engineering University of Cincinnati**
11:50 am–Noon	**Closing Remarks and Program Evaluation**		

POSTER PRESENTATION LIST

No.	Title	Author	University
1	Daily Workplace Barriers and Facilitators to Proper Nutrition and Exercise	Katherine Alexander	Psychology Bowling Green State University
2	Improved Assessment of Frequency Dependence on Vibration-induced Vascular Damage	Rupak K. Banerjee, PhD, PE	Mechanical Engineering University of Cincinnati
3	Firefighters' Exposure to Fine Particles and Polycyclic Aromatic Hydrocarbons	Erin Haynes, PhD	Environmental Health University of Cincinnati
4	Modeling Teacher Exposure to Mercury at Schools	Pamela Funderburg Heckel, PhD	Environmental Health University of Cincinnati
5	Exposure Assessment and Real-time Evaluation of Road Surface Planer Dust Control Technology for Highway Construction Applications	Bryan Hubbard, PhD, PE	College of Technology Purdue University
6	Profiling of the Actinobacteria Commu-nity in Moisture-damaged Buildings	Elisabet Johansson, PhD	Environmental Health University of Cincinnati
7	PAH Exposure in Municipal Firefighters	Michael Knipp, MD	Environmental Health University of Cincinnati
8	Vibration Analysis of Finger Using Non-linear FEM to Understand HAV Syndrome	Shrikant P. Pattnaik	College of Engineering University of Cincinnati
9	The Effect of the Organization and Nursing Leadership on the Staff Nurse	Yvette M. Pryse, MSN, RN	College of Nursing University of Cincinnati
10	The Role of Workplace Hostility in Employee Well-being and Performance	Shuang Yueh Pui	Psychology Bowling Green State University
11	Usability Study of Area Agency on Aging Websites in the State of Ohio	Diana Jo Schwerha, PhD	Industrial and Systems Engineering Ohio University
12	Exploring Adolescent Employees' Perceptions of Safety from Workplace Violence	Carolyn Ross Smith, MSN, RN	College of Nursing University of Cincinnati
13	Blood DNA Markers for Breast Cancer Associated with Heavy Metal Exposure	Xiang Zhang, PhD	Environmental Health University of Cincinnati
14	Workplace Incivility as a Threat to Safety Behaviors among Nurses	YoungAh Park	Psychology Bowling Green State University

Poster Sessions are held in the Atrium (down the hall from Kehoe Auditorium in Kettering Lab)

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2008-09 PRP Awardees
PODIUM PRESENTATION ABSTRACTS

Identifying Environmental Influences on Obesity Risk Factors of Commercial Truckers

Turner, L., Reed, D.
Advanced Practice Nursing, College of Nursing
University of Kentucky

According to recent statistics, over half of adults in the United States are either overweight or obese. Previous studies involving commercial truck drivers have noted high prevalence rates of obesity in this population. The National Occupational Research Agenda (NORA), a research framework for the National Institute for Occupational Safety and Health (NIOSH), has identified truck driver health as a priority area of research. Being overweight or obese potentially influences a truck driver's ability to safely perform their job, which in turn could influence the safety of all those who share the road. The proposed study provides baseline data for obesity risk factors in commercial truck drivers and for developing appropriate nursing interventions to reduce commercial truck drivers' risk for obesity. The purpose of this study was to examine the exercise and dietary habits in a sample of commercial truck drivers and to examine various components of the work environment of commercial truck drivers in relation to their risk for obesity. The specific aims of this study were (1) to identify the key obesity risk factors for a convenience sample of commercial truck drivers, (2) to describe the feasibility of regular exercise and healthy eating based on the opinions and experiences of a convenience sample of commercial truck drivers, and (3) to compare the availability of exercise rooms at truck stops by geographic regions of the country. This study surveyed a convenience sample (N=300) of commercial truck drivers about their obesity risks while traveling for their job. The variables that were measured were the obesity risk factor questionnaire, body mass index, body fat percentage, and waist circumference. This study found that commercial truck drivers work in an environment that does not promote a healthy lifestyle. Drivers reported not exercising regularly and not eating the recommended amounts of fruits, vegetables, and whole grains. Unless a driver packs his or her own exercise equipment and food, accessing a place to exercise and eat healthy food on the road is not easily accomplished. Living in an environment that does not support a healthy lifestyle is affecting the health of truck drivers. This is reflected by the high prevalence of obesity among drivers in this population (93.3% of study participants had a BMI >25) and the obesity-related health conditions that drivers reported having. This study adds to the limited knowledge of the health and lifestyle behaviors of commercial truck drivers.

Tracking Toxic Gases Penetration Through Firefighter's Garment

Shanov, V.[1], Schultz, M.[1], Li, G.[1], Jetter, W.[2], Schwartz, A.[3]
[1]College of Engineering , University of Cincinnati,
[2]Sycamore Township Fire Department, [3]LION Apparel, Inc.

In this report, a series of experiments have been conducted to analyze the toxic elements absorbed on different layers of garment which have been exposed for different lengths of time during fire events. The results provide a preliminary guidance of kinds of toxic gases which have been attached to the layers, and how they penetrate through the whole garment. The surface of the used garment fiber had peel-offs, split-like worn-out morphology, and some foreign particles attached on, showed by SEM images. EDS, IGA and XRF results revealed that the concentration of sulfur, nitrogen, and chlorine elements which represent possible toxic substances are much high in used garment fiber. Other elements such as K, Ca, Ti were also found. TGA confirmed that 5.8% residual substances remain at 900^{o}C. This results in lower strength of the fibers obtained from old garment. The analysis also demonstrated that the exposed garment absorbed harmful chemical species into the fabric, and gradually accumulated them within the inner layers. The outer shell layer could block most of toxic elements on the surface. The concentrations of toxic elements are decreasing within the inner layers. The exposed fabric revealed declined mechanical strength and wear.

Immunoregulatory Responses in Trimellitic Anhydride Occupational Sensitization

Ghosh, D., Bernstein, J.A.
Internal Medicine, College of Medicine,
University of Cincinnati

Organic acid anhydrides, such as Trimellitic Anhydrides (TMA) are widely used in the plastic and paint industries. Occupational exposure to air-borne TMA is known to cause health hazards. Exposure occurs as dust or fumes during its production phase. It has been demonstrated that TMA binds to larger carrier proteins like Human Serum Albumin (HSA), often through lysine residues. The TMA-HSA conjugate is capable of eliciting IgG and IgE-mediated immune responses in susceptible individuals, leading to several immune-mediated disorders, including asthma.

Previous studies have found inconsistent correlations between TMA specific IgG and IgE antibody responses to ambient exposure concentrations and the development of clinical symptoms. A major limitation of obtaining serum specific IgG and IgE levels is the need to draw blood on a regular basis on hundreds of employees and the delay in obtaining results which are necessary for making clinical decisions regarding the disposition of the worker. In order to address this issue, we previously synthesized a TMA-HSA conjugate and evaluated its efficacy as a skin test reagent for rapid screening of exposed workers for TMA sensitization. We found excellent correlation between TMA-HSA prick skin testing (1mg/ml) and serum specific IgE.

However, the immunological basis of TMA-mediated sensitization is still not very well understood. In general, allergen sensitization and subsequent disease for non-occupational asthma are thought to be due to a Th1/TH2 imbalance and a deficiency in $CD4^{+}CD25^{+hi}$ Treg cell activation. In order to investigate whether Treg deficiency was associated with occupational sensitization to TMA, we proposed collecting blood samples from TMA exposed/non-sensitized, TMA exposed/IgG sensitized, TMA exposed/IgG and IgE sensitized and TMA non-exposed/non-sensitized workers to assess the percentages of CD4+CD25+Fox p3 cells in their peripheral blood. Ten subjects from each group are being recruited. Our preliminary data shows that IgE sensitized workers have diminished Treg

activation compared to the non-exposed/non-sensitized control group. This analysis is ongoing as patient blood samples are obtained over time. If differential expression of Treg cells is observed between groups, this approach might be regarded as a useful biomarker for identifying TMA-workers prone to develop TMA-induced occupational sensitization.

Assessment of Cut-off Saw Control Methods for Respirable Particulate and Crystalline Silica during Highway Construction Applications

Hubbard, B.J.[1], Middaugh, B.[2] , Zimmerman, N.[2], McGlothlin J.D.[2]
[1]College of Technology, [2]School of Health Sciences
Purdue University

The purpose of the study was to investigate the dust reduction capabilities of currently available wet suppression and local exhaust ventilation (LEV) methods for gas-powered cut-off saws during the sawing of concrete curb on highway construction worksites to aid in the development of more effective LEV technology. Dust control efficiency (e.g. concrete displacement rate) and weather conditions (e.g. wind) were also monitored to determine their effects on dust reduction. Personal filter cassette sampling revealed a median percent reduction in respirable (RSP) dust concentrations of 87.7 percent for the wet sawing method (WSM) and 87.0 percent for the LEV sawing method (LSM) compared to the traditional dry sawing method (DSM). A statistically significant difference ($p<0.001$) was seen between both the WSM and LSM compared to the DSM; however, no significant difference ($p=0.118$) was seen between the WSM and LSM. Based on estimated values of percent quartz, the RSP quartz reduction was approximately 84.4 percent for the WSM and 77.1 for the LSM. If workers are only exposed to RSP silica during the normal two hour cutting duration, the WSM and LSM would reduce RSP silica concentrations below the National Institute for Occupational Safety and Health (NIOSH) Recommended Exposure Limit (REL).

Concrete displacement rates revealed a 63.1 percent reduction in productivity for the WSM and 40.0 percent reduction in productivity for the LSM compared to the DSM. After adjusting the traditional two hour cutting time for reductions in productivity, exposure was shown to increase by 33 percent for the WSM and 29 percent for the LSM. Although both the WSM and LSM were still below the Occupational Safety and Health Administration (OSHA) Permissible Exposure Limit (PEL), they were no longer below the NIOSH REL after this adjustment. A combination of wind speed and wind direction was also shown to be a significant predictor ($p=0.02$) of exposure during the DSM. Video exposure monitoring revealed the WSM was more consistent in reducing peak RSP dust concentrations, but overall reductions were still similar between the WSM and LSM. With current overall LSM reductions approximately equivalent to the WSM, visible point source releases for the LSM provides evidence that the dust reduction capabilities of the LEV methods can be improved, providing additional promise for even more effective designs in the future. Based on these findings, it was also determined that standardized methods of quantifying dust control effectiveness should be implemented by manufacturers to ensure proper use and appropriate comparisons between engineering controls.

Transport of Pollutants through Liquid-Gas Interfaces – A Numerical Approach

Ghia, U., Kishore, A., Konangi, S.
Mechanical Engineering, College of Engineering
University of Cincinnati

Carbon monoxide (CO) ejected in the exhaust of combustion-based systems such as automobiles, watercraft, etc., can lead to CO poisoning on houseboats and recreational watercraft. Marine workers employed on watercrafts endure long periods of CO exposure and, hence, run serious risks to health and life. The present investigation numerically predicts the dispersal of CO across an air-water interface by considering a vertical column with water in the lower part of the column, and air in the remainder of the column. A mixture of water and CO bubbles is injected at the base of the column. This configuration includes all the basic physical and numerical characteristics representative of the actual flow situation, and constitutes a valid model problem. A Computational Fluid Dynamics (CFD) analysis is carried out to simulate the multiphase flow physics involved in the transport of the pollutant, treating the flow as unsteady, turbulent and incompressible. The Eulerian multiphase approach is used, treating water as the primary phase, and air and CO as the secondary phases. Interfacial momentum exchange terms are included in the momentum conservation equations for each phase. These terms consist of the Schiller-Naumann drag coefficient and the virtual mass force term. The governing equations are discretized over a 30x300 grid (in the radial and axial directions, respectively) using the control-volume approach. A second-order accurate upwind scheme is employed to treat the convection terms. Turbulence is modeled using the mixture k-ε equations. All the governing equations are then solved numerically, along with the appropriate boundary conditions, using a phase-coupled pressure-linked algorithm.

The numerical results are analyzed to determine the temporal behavior of CO volume fraction in the vertical column. The results show that the CO gas, in the form of small bubbles, driven by an initial momentum and a large density difference, quickly progresses upward through the water domain. On reaching the air-water interface, the CO bubbles rupture, and the CO gas disperses rather slowly into the air, owing to the smaller density difference between CO and air, and loss of initial momentum due to liquid drag. The results suggest that the air-water interface needs to be better resolved. Also, the movement of the air-water interface needs to be tracked, in order to model its effect on the gas crossing it.

Although the current study involves the watercraft problem, the fundamental methodology is applicable in a variety of situations with multiphase flows. Numerical models developed through this pilot research project can be used in other problems of similar class where gathering experimental data is difficult, and determining design changes in response to real-world issues is expensive experimentally as compared to simulating multiple scenarios using CFD.

Work Survey Instrument Revision for Case Management Work

Christianson, J., Davis, L.S.
Occupational Health Nursing, College of Nursing
University of Cincinnati

"Chronic diseases are the #1 cause of death and disability in the U.S. and patients with chronic diseases account for 75% of the nation's health care spending" (Thorpe, 2008). Case management for individuals with chronic illness has the potential to decrease these cost significantly. Case management roles and functions have changed dramatically in the last five years. This study addressed the revision and pilot testing of a work analysis instrument that will be used to study case management roles and functions. Data on work tasks, skills, knowledge and competencies was obtained through a

series of focus groups of nurses and social workers performing case management functions. Data was qualitatively analyzed for tasks, skills, and knowledge and compared to national norms reported by the Case Managers Society of America to identify any missing domains of work. The results from the focus group analysis were within a 90% agreement of national rankings (Tahan, Downey & Huber, 2006); therefore, the characteristics that were identified in from the focus group study will be used for revising the WSI. The tasks reported by the case managers' reported additional assessment factors not reported in the WSI. These factors were related to the patients' growth and development, social and environmental factors, family lifestyle and needs, and the availability and accessibility of human and material resources to achieve the goals and expected outcomes of the case management plan. Also identified were clerical duties which often impede the case management work. These duties include scheduling appointments, making copies, and obtaining lab results. The case managers wished they were able to present at conferences to disseminate their groundbreaking work, innate program development, attend more hospital sponsored activities, and participate in research opportunities. Currently the researchers are revising the WSI that will be pilot tested through a convenient sample of nurses and social workers upon completion. Tasks will then be developed for the Work Survey Instrument (WSI). The revised instrument will be pilot tested using ten case managers to assess reliability and validity.

Effect of Mean Inspiratory Flow, Heart Rate and Breath Rate on the Efficiency of Respirators

Cho,K.[1], Reponen, T.[1], Jones, S.[2]
[1]Department of Environmental Health, University of Cincinnati
[2]School of Nursing, Western Kentucky University

The aim of this study was to investigate the effects of mean inspiratory flow (MIF), breath rate, and heart rate on respirator penetration of particles ranging from 0.7 to 5.0 μm. Eight human subjects were recruited. Protection factors for a typical N95 elastomeric respirator (ER) and N95 filtering facepiece respirator (FFR) were determined for 10 min at three different activity levels (standing, walking and stepping up & down) with simultaneous measurement of MIF, heart rate and breath rate using a LifeShirt system (RAE Systems Inc., USA). Three different activities were standardized to have similar work conditions for the eight human subjects. MIF ($p=0.016$: ER, $p<0.001$: FFR), heart rate ($p<0.001$: ER, $p<0.001$: FFR) and breath rate ($p=0.013$: ER, $p=0.003$: FFR) were significantly different at the three different activities. Penetrations for N95 ER ($p=0.989$) and N95 FFR ($p=0.919$) were not significantly different at three different activities. However, different trends were observed for the two types of respirators. For N95 FFR, the lowest total penetration (mean of 3.8 %) was observed at standing. For N95 ER, the lowest penetration (mean of 2.4 %) was observed at stepping up & down.. This study gives valuable pilot data: based on these pilot data, we need a sample size of 87 subjects for the full-scale study.

Is Manganese Exposure A Risk Factor for Hearing Loss?

Almazan, A.[1], Haynes, E.[1], Genter, M.[1], Themann, C.[2]
[1]Department of Environmental Health, University of Cincinnati,
[2]The DeSales Group

Manganese (Mn) is an essential metal that is neurotoxic with overexposure. Hearing loss has been associated with Mn exposure but the relationship is uncertain. Animal and human studies sug-

gest that Mn is ototoxic. We hypothesized that children living in a community with high ambient Mn will have decreased hearing function compared to age matched children living in a community with low ambient Mn. Extended high frequency audiometry was performed on children seven to nine years old from Marietta, Ohio, a community with elevated air Mn levels, and Cambridge, Ohio, which has low air Mn levels. Independent variables are air Mn, blood, hair, and nail Mn levels. Preliminary findings showed no significant difference in hearing function between the two groups. Further analysis will control for confounders such as noise exposure, examine the relationship of hearing function with Mn biomarkers, and examine the effects of gender and age.

Lab-On-A-Chip Sensor for on-site Detection and Sizing of Nanoparticles

Bhagat, A.[1], Papautsky, I.[1], Dionysiou, D.[2]
[1]Electrical and Computer Engineering,
[2]Civil and Environmental Engineering, College of Engineering,
University of Cincinnati

Nanoparticles are playing an increasingly important role in nanomanufacturing. New manufacturing methods are being developed, with focus on high yields and low costs. As the use of nanoparticles in manufacturing increases, a growing need is anticipated to detect and measure particles of nanometer scale dimensions in fluids. This is needed to control emissions of possible toxic nanoparticles and protect the workers and the industrial workplace during the production/ manufacturing of nanoparticles or nanoparticle-enhanced materials. Recent studies have indicated that nanoparticles can enter the human metabolic system though inhaling, drinking, and digesting nanoparticle-containing air, water, and foods. As the prevalence of nanoparticles in manufacturing increases, new approaches need to be developed to evaluating worksite safety and occupational exposure. The *long-term* goal of this work is to demonstrate effective sensor technology for on-site separation and monitoring of nanoparticles. The overreaching hypothesis is that a spirally-shaped microfluidic lab-on-a-chip can separate mixtures of nanoparticles by exploiting differences in the hydrodynamic and inertial forces acting on particles of different size flowing through the microchannel. Ultimately, we expect to develop a portable device with arrays of spiral microchannels capable of separating nanoparticle mixtures over a wide dynamic range.

The *objective of the seed grant application*, which is critical to attaining our long-term goal, was to develop an understanding of small particle behavior in spiral microfluidic devices and demonstrate a multi-particle separation. These initial investigations can be accomplished using fluorescently labeled microparticles.

The seed grant has led to the development of a simple inertial microfluidic device that achieves continuous multi-particle separation using the principle of Dean-coupled inertial migration in spiral microchannels. The dominant inertial forces coupled with the Dean rotational force due to the curvilinear microchannel geometry cause particles to occupy a single equilibrium position near the inner microchannel wall. The position at which particles equilibrate is dependent on the ratio of the inertial lift to Dean drag forces. Using this concept, a spiral lab-on-a-chip design for focusing particles at distinct equilibrium positions across the microchannel cross-section was demonstrated. Specifically, a 5-loop Archimedean spiral microchannel with a fixed width of 500 μm and a height of 130 μm was used to simultaneously and continuously separate 10 μm, 15 μm, and 20 μm polystyrene particles. The device exhibited 90% separation efficiency. Based on these results, the device can be scaled down which will ultimately lead to the development of a nanoparticle separation system. Overall, the simple planar structure and high throughput offered by this passive microfluidic approach makes it attractive for on-site/job-site operation.

2009-10 PRP Awardees
POSTER PRESENTATION ABSTRACTS

Daily Workplace Barriers and Facilitators to Proper Nutrition and Exercise

Alexander, K.[1], Jex, S.[1], Mazzola, J.[2], Moore, T.[3]
Department of Psychology, [1]Bowling Green State University,
[2]University of South Florida,
[3]Colorado State University

The purpose of this project is to determine what the main organizational barriers and facilitators are to employee healthy behaviors, namely regular exercising and proper nutrition. This information is important because it can help individuals and organizations understand what factors in the workplace prevent people from engaging in healthy behaviors that promote weight control. Research shows that individuals who maintain a healthy weight live longer and are happier overall.

Data will be collected from each participant every day for 5 working days. We will recruit participants from grocery stores who will be provided with a gift card as compensation for their participation. Participants will be asked about their health behaviors (i.e. exercise and nutritional habits) and the organizational barriers and facilitators to healthy behaviors they encountered (including stressors at work). Participants will also take pre-test and post-test surveys to measure important individual variables, such as body mass index and chronic health problems, and also to investigate what effect their views on exercise, eating, and health have on paying closer attention to the health environment around them.

The daily nature of this study will allow us to look at day-level variation in these events and behaviors and their relationships. For example, does a higher number of reported barriers relate to less daily exercise or poorer eating choices. The relationships between these barriers and facilitators and a number of variables, such as body mass index, will be examined. We expect a wide variety of different organizational barriers and facilitators to healthy behaviors to be experienced and recorded, and further expect that these will be related to the exercise and eating habits of participants.

Improved Assessment of Frequency Dependence on Vibration-induced Vascular Damage

Banerjee, R.
Mechanical Engineering, College of Engineering,
University of Cincinnati

Exposure to excessive vibration causes the work-related musculoskeletal disorder (MSD), which is one of the most costly occupational diseases. Estimated cost associated with work-related MSD range from $13 - $54 billion annually. Hand-arm vibration syndrome (HAVS) is a major MSD that occurs to construction workers and miners. Present guidelines on HAVS are developed from statistical data of population study and results from empirical tests, which have been limited because testing for high level exposure is complex. Further, current guidelines on the HAVS limit the exposure time based on the frequency-weighted vibration amplitude which assumes frequency weighting and time-averaging. Validity of assumptions has been questioned by researchers. Hence, there is a need for developing an improved experimental method that can provide better assessment of HAVS.

Our long-term goal is to improve characterization of vibration-induced tissue damage for developing a better guideline and evaluation of HAVS. The objective of this pilot application is to de-

velop a testing method that can evaluate the vibration-frequency dependent tissue response. The central hypothesis of this research is that vibration-induced displacement within the wall of the artificial blood vessel, embedded in tissue mimicking material, can be measured and correlated to bioeffects observed in animal models. The rationale for this research is that quantification of accurate tissue damage will aid in improved HAVS treatment procedure and therapeutic outcome. The PI is currently not working in the area of occupational health and safety (OHS), but is interested in expanding into the OHS field. The PI has significant expertise in the area of both in vitro and in vivo experiments in the filed of physiological systems and plans to synergistically augment an on-going numerical study, which is being conducted in Professor Jay Kim's lab in the Mechanical Engineering department of UC. We plan to test the central hypothesis and accomplish the objective by pursuing the following two specific aims:

1. To assess influence of externally imposed different vibration frequencies on pulsatile pressure in wall of artificial blood vessel.
2. To determine the frequency dependence of vibration-induced vascular damage in rat ventral tail arteries.

This experimental study incorporates an innovative approach to engineering and biological knowledge based on fundamental acoustic-fluid dynamics principles in conjunction with in-vivo experimental data. Through the experiments on the frequency dependence of vibration-induced vascular tissue damage, the expected outcome is that assessment of HAVS can be improved. Such results are expected to have an important positive impact by providing improved guidelines for evaluating and treating HAVS.

Firefighters' Exposure to Fine Particles and Polycyclic Aromatic Hydrocarbons

Haynes, E., Baxter, C. S., Hoffman, J., Reponen, T.
Department of Environmental Health
University of Cincinnati

Firefighting continues to be one of the most hazardous and yet least studied occupations in terms of mechanisms of occupationally-induced disease. Firefighters are exposed to a complex mixture of agents, including find particles and a range of chemicals, among which are polycyclic aromatic hydrocarbons (PAHs). Effects of exposures related to firefighting include adverse cardiovascular health outcomes, and epidemiological studies have in addition revealed an excess incidence of several types of cancer. The aim of this pilot study is to characterize firefighters' exposures in the firehouse and in the overhaul stage of fire suppression activities to fine particles, exposure to which has been associated with cardiovascular disease, and PAHs, many of which are carcinogenic. Firefighters' exposures will be compared to those of administrative employees in the same facility. The fine particulate samples will be collected using PMI-samplers (Personal Modular Impactor, SKC Inc. Eighty Four, PA) equipped with 37-mm diameter Teflon filters. The pumps will be calibrated to 3.0 ± 0.1 liters per minute (LPM) using personal sampling pumps. The filters will be weighed before and after the sampling by a commercial laboratory (Research Triangle Institute, NC). Air sampling and analysis for the PAHs will be conducted following NIOSH method 5506. The P-Trak fine particle counter measures number concentration of particles in the size range of 0.02 – 1 μm with 1-minute resolution. Two P-Trak units will be available for this study, and these will be operated side-by-side with the stationary samplers. If it is determined through this study that a significant risk exists to firefighters from exposure to fine particles and/or PAHs during overhaul procedures or from soiled turnout gear stored in living quarters of the firehouse, an exposure control plan will be suggested. The results from this pilot study will be critical in the preparation of a full-scale multidisciplinary study on firefighters' exposures and adverse health effects.

Modeling Teacher Exposure to Mercury at Schools

Heckel, P., LeMasters, G.
Department of Environmental Health,
University of Cincinnati

A national survey of mobile source pollution exposure of public schools conducted by our laboratory indicated that nationwide about 30% of all schools are located within 400m of highways and 10% are within 100m. In Cincinnati, 11.3% of the primary and secondary schools downtown, 18.3% of urban fringe schools, and 25.4 % of rural schools were located within 100m of an Interstate, US or State highway. The focus of research related to ambient air pollution is often children. Teachers, however, spend most of their careers at the same school or school district and work on average 29 years. This chronic exposure can result in high life-time cumulative exposures to air toxicants including metallic constituents of traffic exhaust such as mercury (Hg), the focus of this study. Atmospheric conditions facilitate several different chemical reactions between gaseous mercury vapor (HgII) and suspended soot particles. HgII transported with these particles through the nasal mucosal passages affects the central nervous system and can lead to permanent neurologic disabilities. Studies have shown a progressive increase in the number of sick days of teachers and findings from our lab indicate that teachers have a higher fall rate than jobs in manufacturing and retail. There has been no investigation, to our knowledge, on exposures of teachers to air pollutants and the potential for long term cumulative exposures to metals found in traffic exhaust. Characterizing long-term cumulative exposure to Hg is challenging. The detection limit of available hand-held mercury analyzers is too high to reliably measure ambient Hg. The most common biomarkers of exposure – urine, hair and blood – reflect a dose-response relationship between an acute exposure to Hg but inform less on a life-time cumulative exposure. An air pollution dispersion model can estimate ambient Hg at each school. In the absence of long term accumulative biomarkers such as teeth and bones, a bioindicator such as periodical cicadas collected at the schools provides an indication of chronic, low-level ambient exposures. The correlation between the Hg in cicadas, the distance from a school to a highway, and predicted ambient exposures will provide an estimate of long-term exposure of teachers to mobile sources of pollution.

Exposure Assessment and Real-time Evaluation of Roadway Surface Planer Dust Control Technology for Highway Construction Applications

Hubbard, B.J.[1], Middaugh, B.[2] , Zimmerman, N.[2], McGlothlin J.D.[2]
[1]College of Technology,
[2] School of Health Sciences
Purdue University

The overall aim of the study is to evaluate existing wet method technology to decrease exposure to respirable dust and crystalline silica for operators of road surface planers. Although dust control technology is available for this application, it is not commonly used in highway construction. The proposed evaluation will include an assessment of exposure to determine the percent silica reduction between wet method technology and standard practice dry methods. The proposed evaluation will also address additional factors that impact the potential for widespread implementation, including an evaluation of productivity, highway construction usability, and worker preference of the wet method technology compared to the current standard practice.

The research objectives of the study will be to 1) determine the percent dust reduction between wet and dry methods over a defined length of asphalt pavement, 2) compare measures of pro-

ductivity such as the time it takes to mill the defined length of pavement, 3) qualitatively determine the usability of the system for roadway construction (i.e. whether or not water sources are accessible and readily available and whether or not the system is easily transportable), and 4) analyze a questionnaire of worker preference for the dust control method. All of these objectives will compare the wet method technology relative to the traditional dry method.

Profiling of the Actinobacteria Community in Moisture-damaged Buildings

Johansson E.[1], Yadav J.[1], Vesper S.[2], Grinshpun S.[1]
[1]Department of Environmental Health, University of Cincinnati,
[2]Environmental Protection Agency, Cincinnati, OH

Moisture damage and mold growth in buildings is usually accompanied by bacterial growth as well. The bacterial community in moisture damaged buildings and its contribution to associated health problems has been much less studied than mold. The aim of the proposed project is to investigate bacterial communities in indoor environments and how they differ between moisture damaged buildings and reference buildings. Denaturing gradient gel electrophoresis (DGGE) will be used to explore bacterial diversity in dust samples from moisture damaged buildings and reference buildings in the Cincinnati area. The study will focus on Actinobacteria, of which a number of species have been implicated in respiratory health in previous studies. The use of the culture-independent method DGGE is expected to result in a comprehensive profile of the Actinobacteria community normally inaccessible by culture-based methods. The method is based on the PCR amplification of hypervariable regions in the bacterial genome, in this case the 16S rRNA gene, using primers located in conserved areas. Positive identification of major species, and species with differing prevalence in moisture damaged homes and reference homes, will be performed by extraction of DNA from DGGE gels, followed by cloning and sequencing. The results are expected to be broadly applicable to a wide range of buildings occupied by humans, including non-industrial workplaces such as schools and office buildings, where moisture damage have been shown to be associated with respiratory health problems. The proposed study is expected to lead to improved methodology for recognizing microbial problems in water-damaged buildings.

PAH Exposure in Municipal Firefighters

Knipp, M., Baxter, C.S., Haynes, E.. Ross, C.S.
Department of Environmental Health,
University of Cincinnati

Municipal firefighters are exposed daily to multiple hazards with potentially deleterious health effects. They remain one of the least studied occupation populations, specifically regarding cancer risk. Recent epidemiological work revealed an excess of cancer risk in firefighters of several different types including melanoma, prostate, and testicular. As a consequence of their exposure to multiple carcinogens such as polycyclic aromatic hydrocarbons (PAH), benzene, styrene, and others the World Health Organization has classified the occupational exposure of a firefighter as "possibly carcinogenic to humans."

Genotoxicity, deleterious alteration of genetic material, is a major proposed mechanism by which external agents may cause carcinogenesis. In firefighters, exposure to PAH is a major source of genotoxicity. This exposure has been monitored through measurement of 1-hydroxypyrene, a metabolite of PAH, in urine. We hypothesize that experienced firefighters with at least 10 years of fire-

fighting experience will have significantly higher levels of urinary 1-hydroxypyrene compared to newly recruited firefighters. This pilot study is being conducted as a joint partnership between the Cincinnati Fire Department and the University Of Cincinnati Department Of Environmental Health. To address this hypothesis, the following specific aims will be addressed.

Specific Aim 1: Determine the 1-hydroxypyrene concentration in urine in a cohort of newly recruited firefighters before and after a fire event.

Specific Aim 2: Determine the 1-hydroxypyrene concentration in urine in a cohort of experienced firefighters.

Specific Aim 3: Determine relationship between occupational exposure to PAH during a firefighting event and urinary 1-hydroxypyrene concentration in newly recruited firefighters.

Vibration Analysis of Finger Using Non-linear FEM to Understand HAV Syndrome

Pattnaik, S., Kim, J.
Mechanical Engineering, College of Engineering
University of Cincinnati

Exposure to excessive vibration causes Musculoskeletal Disorders (MSD). It is one of the most costly occupational diseases that cost ranging $13-$52 billion annually [1]. Hand-arm vibration syndrome (HAVS) is one of the major MSD which affects constructions workers and miners. Reduction of blood flow and blanching of the skin are a few of many direct effects of vibration induced injuries. Epidemiological studies show onset of vibration white finger (VWF) disease, which is mostly initiated at the tips of the index and middle fingers of affected worker, is associated with mechanical vibration [2]. Although the precise injury mechanism is not yet clear, it is known that remodeling of peripheral nerves to nerve tear can be caused by exposure to a high level dynamics shear load. [3]. Current HAVS guidelines have been developed mainly relying on population studies and empirical tests. Such studies have been very limited because high-level exposure test of human subjects is very difficult. Especially for hand and fingers, a direct animal test is not a practical option. A technique for a detailed numerical modeling is very useful for this reason in HAVS research. This research is to develop an advanced procedure and related techniques for computational analysis of hand and arm vibration responses. Purpose of this study is to investigate characteristics of static and dynamic responses of the fingertip (with soft tissue). Both static and dynamic motions will be considered with a special attention to the effects of static deformation on the vibration responses of fingertips. The numerical model will be developed as a two-dimensional (2-D) in-plane stress finite element model. A special modeling technique will be used to reflect the three-dimensional anatomical structure in the 2-D model. Nonlinear material behavior of soft tissue will also be considered. Sensitivity of the response of the main components of the finger, the fingertip tissue, tendon and bone to vibration will be studied. Frequencies characteristics in relation with natural modes in conjunction with vibration energy absorption at the fingertip will be studied. This study will lead to better understanding of the epidemiology of HAVS.

The Effect of the Organization and Nursing Leadership on the Staff Nurse

Pryse, Y.[1], McDaniel, A.[2]
[1]College of Nursing, University of Cincinnati,
[2]School of Nursing, Indiana University

This study is designed to explore the perceived facilitators, barriers and organizational dynamics that influence the staff nurse's ability to meet the demands of evidence-based practice. This study will inform our understanding of role ambiguity and role conflict that the staff nurse experiences due to additional responsibilities that are related to evidence based practice.

It will be shown that nurse managers are "assumed" to hold as high priority evidence based practice and are knowledgeable about the time restraints and complexity associated with implementation of new knowledge from the position of the staff nurse. The research on the barriers from the staff nurse's perspective suggests that is not the case. Exploration of the relationship between nursing leadership and the individual nurse in regards to EBP will support NIOSH's interest in identifying factors that may contribute to work related illnesses and empirically support a continued push for a healthy workplace for the already overworked and overtaxed nurse.

Three questionnaires will be used to address the research question in this study, which includes the *Evidence Based Practice Beliefs Scale (*EBP Beliefs Scale), the *Evidence Based Practice Implementation* Scale (EBP Implementation Scale) (B. Melnyk et al., 2008) and the *Evidence Based Practice Culture and Leadership Scale* (EBP Culture and Leadership Scale) created by this researcher. The EBP Beliefs Scale and the EBP Culture and Leadership Scale will be utilized to measure the independent variables (beliefs, culture and leadership). The dependent variable, implementation of EBP will be assessed using the EBP Implementation Scale. Three large urban hospitals will serve as sampling site for respondents. Multiple regression analysis will be used to address the research questions.

The Role of Workplace Hostility in Employee Well-being and Performance

Pui, S., Sliter, M., Wolford, K., Jex, S.
Department of Psychology,
Bowling Green State University

Workplace hostility (aggression and incivility) in the customer service industry is an important issue. In the occupational health and safety literature, no research has studied the joint effects of aggression and incivility. In addition, only a few studies have examined two sources of hostility, from coworker and customer, at the same time. This study seeks to examine the incremental impact of workplace hostility from multiple sources, coworker and customer, on several outcomes: burnout, physical well-being, and performance. Further, this study will examine possible moderators (i.e., trait anger, negative affectivity, social support, and task engagement) of the relationship between incivility and aggression on these outcome variables. A mid-sized Midwestern bank has agreed for us to survey approximately 100 of their call center employees. Participants will be asked to respond to surveys collected at two time points, across a three month period. We expect to find that high levels of workplace hostility will lead to negative outcomes, such as increased burnout, reduced physical well-being, and decrease in performance. We also expect to find that trait anger, negative affectivity, social support, and task engagement will moderate the relationship between workplace hostility, and those negative outcomes. The results from this study would contribute to our understanding of the negative effects of workplace hostility and variables that could alleviate those negative effects. These

moderators could assist both researchers and companies to find solutions to prevent or deal with the effects of workplace hostility.

Usability Study of Area Agency on Aging Websites in the State of Ohio

Schwerha, D.
Industrial and Systems Engineering,
Ohio University

Older adults age 50 and older are the fastest growing segment of the computer using population (Russell, 1998). This cohort of adults may or may not have used the computer for work, but they understand its use in such applications as email, word processing, shopping, and search for health and services. Because of increasing amounts of information that are delivered over the web, a term "the digital divide" has been coined for those people who use the web and those who don't. Although the digital divide may result from users not having a computer, it may also result from users not wanting to use the computer. This desire to not use it may be more a function of poor design than inability on the part of the user.

The long-term goal of the proposed study is to determine recommendations for good web design for the AAA sites so that the utilization of the sites will increase and the digital divide will be reduced. It is hypothesized that the websites with the most senior friendly design will be determined to be most usable. The objective of this application is to perform a pilot study to determine the usability of several representative AAA sites from the state of Ohio. Unlike other usability studies related to older adults, this study is innovative in that it will first determine what types of information that the older adults would like to learn from the sites, and then the usability testing will involve determining task performances and usability ratings about those very questions. The end result will be recommendations for re-design that are focused on what the older adults need and want to learn from the specific sites. Specific aims are listed below:

Specific Aim 1. Classify the usability of AAA sites in the state of Ohio by using established guidelines.
Specific Aim 2. Survey a group of older adults to determine individual characteristics as well as what they would like to learn from the web, especially health and social services sites.
Specific Aim 3. Test the usability of representative AAA sites using input from Specific Aim 2. Provide recommendations on website re-design based on the results from this data.

Exploring Adolescent Employees' Perceptions of Safety from Workplace Violence

Smith, C., Beery, T., Gates, D., Gillespie, G.
Occupational Health Nursing, College of Nursing
University of Cincinnati

Digital dating violence is on the rise among adolescents in the United States. Digital dating violence is defined as written or photographic messages sent via a text message, electronic mail, and/or instant messaging to one's dating partner that result in the victim feeling controlled, disrespected, and/or harassed by the dating partner (Family Violence Prevention Fund, 2009). Seventy-nine percent (79%) of all adolescents in the United States have a mobile device (Harris Interactive, 2008). In addition, 46% of adolescents ages 13-18 in a recent poll said they use their personal cell phones to make or receive calls and 39% said they use their cell phone to send or receive text messages (Harris Interactive, 2008). The problem has become so significant that the non-profit website That's Not

Cool.com was launched in February 2009 to combat the issue of digital dating violence (Clifford, 2009). Positive and negative consequences of digital communication have received increased media attention in the past year. Eleven articles addressing issues of adolescents and digital communication (e.g., "sexting", harassment via text messages, dating violence) were found in the major Ohio newspapers during the first three months of 2009 alone ("Common sense", 2009; Dissell, 2009; Hutzel, 2009; Kranz, 2009; Kranz, 2009; Mergler, 2009; Moore, 2009; Morse, 2009; Rechel, 2009; Schultz, 2009; Thompson, 2009). Despite the increase in media attention, few research studies have evaluated the use of digital communication by adolescents within a dating relationship. In addition, little data exists about the adolescents' use of digital communication to send controlling, disrespectful or threatening messages to a dating partner. Verbal and psychological abuse, whether spoken or written, has the potential to impact an individual's psychological health (Ackard, Eisenberg, & Neumark-Sztainer, 2007; Ferguson, Horwood, & Ridder, 2005). Consequently, the psychological stress from experiencing digital dating violence has the potential to interfere with engaging in daily activities such as school work or employment. There are no published studies which attempt to understand how digital dating violence affects an adolescent's ability to work. Thus, the purpose of this study is to describe how digital dating violence affects the adolescent's psychological health and their ability to be safe and productive while at work.

Blood DNA Markers for Breast Cancer Associated with Heavy Metal Exposure

Zhang, X., Pinney, S.
Department of Environmental Health,
University of Cincinnati

Breast cancer (BCa) is the second most common cancer among women in the United States. In the early 1950s, a plant for processing uranium (U) was built in Fernald, Ohio, which resulted in a threat of U exposure to the surrounding community. Studies indicated that 33% of the Fernald Medical Monitoring Program (FMMP) cohort was exposed to U, and among the exposed female residents, the incidence of BCa was 71% higher than that of the unexposed residents. However, rarely has an attempt been made to identify biomarkers for general population that have predictive abilities for BCa and heavy metal exposure a few years before diagnosis. In recent years, accumulating evidence indicated that DNA methylation markers with predictive power for BCa can be expected to be found in the blood of at-risk individuals years before the actual diagnosis of the disease. We hypothesize that differentially methylated DNA markers from blood samples can be used as predictors of BCa and heavy metal exposure. Using unique well-characterized FMMP cohort blood samples that are stored prior to the development of BCa, our Specific Aim in this proposal is to conduct CpG Island-Plus-Promoter Arrays (Roche NimbleGen) to identify DNA methylation biomarker candidates associated with BCa, followed by validation through bisulfite sequencing. Based on our proposed study, we expect similar approaches could be applied for the discovery of predictive/diagnostic biomarkers of cancers caused by other exposures such as other heavy metals, dietary carcinogens, and synthetic chemicals. The data will be used for submitting NIH and DoD proposals for BCa Research in the nested case-control cohort study.

Workplace Incivility as a Threat to Safety Behaviors among Nurses

Park, Y. , Gopalkrishman, P., Yugo, J., Jex, S.
Department of Psychology,
Bowling Green State University

Workplace incivility is a form of interpersonal mistreatment at work with the ambiguous intention to harm the target (Andersson & Pearson, 1999), which has been found to have deleterious effects on employees' psychological well-being. This pilot study will extend research efforts to test a model linking workplace incivility to safety behaviors of incivility targets. There are two specific aims of this research initiative; (1) The negative relationship between experiencing workplace incivility and safety compliance and participation behaviors will be examined among nurses, and (2)the underlying mechanism which may explain the negative association between workplace incivility and safety behaviors will be investigated. These goals will be achieved by a cross-sectional survey data collection and Structural Equation Modeling analysis technique, which is suited to a hypothetical model testing and to estimate causal relationship.

Around 1,000 nurses from a pool of Registered Nurses in Ohio State will be invited to the study. Paper-pencil survey packets will be mailed to the nurses along with a cover letter introducing the study. Monetary incentives will be provided for participation and non-respondents will receive reminder post-cards to increase response rate.

The results of this pilot study will contribute to identifying a psychosocial stressor that may pose a threat to employees safety compliance and participation behaviors. The results will also heighten organizational awareness of detrimental effect of uncivil work environment and encourage organizational intervention to promote safe and healthy work environment for nurses. It will also spur future research efforts to investigate factors that can mitigate negative effect of incivility on safety behaviors. This line of research will contribute not only to the theory bridging work stress and safety research but also to enhancing occupational health and safety for the nursing population with a high level of work stress and risks for accidents and injuries.

NOTES:

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University of Cincinnati Education and Research Center
Supported by: National Institute for Occupational Safety and Health (NIOSH)
Grant #: T42/OH008432-05

Department of Environmental Health
Kettering Laboratory, Suite 112
3223 Eden Avenue, ML 0056
Cincinnati, Ohio 45267-0056
Phone: (513) 558-5710 ◇ Fax: (513) 558-2722
Website: www.eh.uc.edu/erc