

Hazardous Substances

Special Interest Articles:

- [Vaping](#)
- [Smart Phone App](#)
- [Sea Traffic](#)
- [Dangerous Jobs](#)
- [Professional Pathways](#)

DOEHRS Super Star

Researchers Conclude that OSHA Citations, Penalties Reduce Workplace Injuries

A new study from the Institute for Work and Health concludes that citations with penalties from inspections reduce workplace injuries.

Researchers performed a systematic review to determine the effectiveness of the enforcement of occupational safety and health regulation in creating incentives for firms to focus on safety and health issues. While mixed evidence was found on the effectiveness of the general threat of an inspection, the study found strong evidence that actual citations and penalties reduce the frequency or severity of injuries.

Read more:

<https://osha.gov/as/opa/quicktakes/qt110215.html>

Read more:

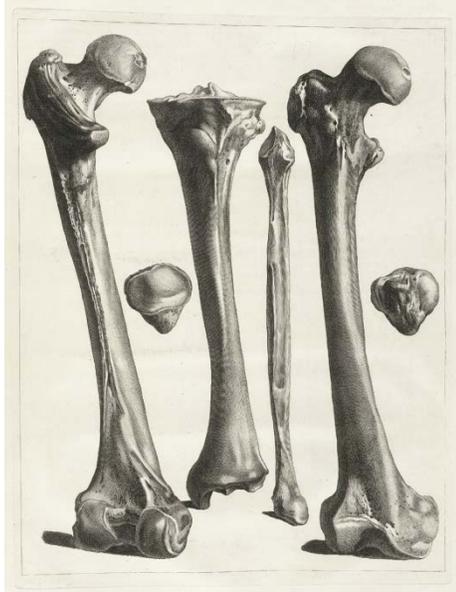


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Bias in Environmental Cohort Studies: The Example of Bone Lead and Mortality



Unrecognized biases in prospective environmental cohort studies may result in under- or overestimating the health effects of the exposure under investigation. In this issue of EHP, researchers examine the problem of bias using data on lead exposure and mortality in men and directed acyclic graphs (DAGs) to illustrate causal

relationships between variables that could bias results.¹

The study data came from 835 white male participants, average age 67 years, who were part of the Normative Aging Study (NAS), which began in 1963. Between 1991 and 1999, the men had undergone measurement of lead in their patellas. For the current analysis, the researchers looked at associations between patella lead and mortality from all causes, from cardiovascular disease, and from ischemic heart disease. Bone lead, rather than blood lead, is a better biomarker for cumulative environmental exposure,² and patella lead in particular has been associated in past studies with risk of ischemic heart disease death.³

Read more:
<http://ehp.niehs.nih.gov/123-A288/>



NIOSH Looks at Precautionary Practices of Respiratory Care Practitioners Who Administer Aerosolized Medications

A recent article from NIOSH found that safe handling of aerosolized medications is not always universally practiced in healthcare settings, placing workers, co-workers and even family members at risk. This article was published in the October issue of the *Respiratory Care* and is available online.

Results are derived from the 2011 Health and Safety Practices Survey of Healthcare Workers, the largest federally-sponsored survey of healthcare workers in the U.S. which addresses safety and health practices relative to chemical agents routinely used or present in healthcare settings. This paper describes current exposure control practices and barriers to using personal protective equipment (PPE) during administration of selected aerosolized medications among respiratory care

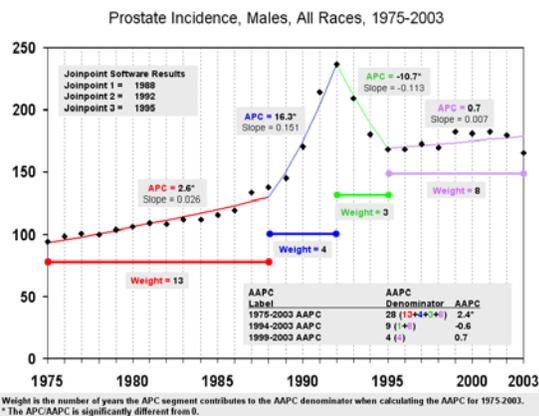


practitioners including respiratory therapists (RTs), nurses, and other healthcare practitioners.

Read more:

<http://www.cdc.gov/niosh/updates/upd-11-18-15.html>

Retrospective Exposure Assessment for Occupational Disease of an Individual Worker Using an Exposure Database and Trend Analysis



This article outlines a hierarchy of data required for retrospective exposure assessment for occupational disease of an individual worker. It then outlines in a step-wise manner how trend analysis using a relatively large exposure database can be used to estimate such exposure. The process of how a large database containing exposure measurements can be prepared for estimating historic occupational exposures of individual workers in relation

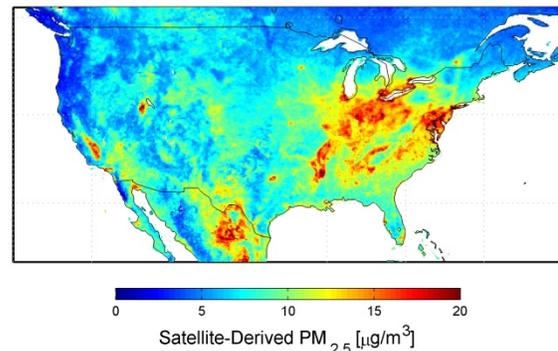
to their illnesses is described. The asbestos subset from a large government collected air monitoring database called Medical Surveillance (MESU) was selected to illustrate the cleaning and analysis processes. After unidentifiable values were removed, the cleaned dataset was examined for possible sources of variability such as changes to sampling protocol. Limit of detection (LOD) values were substituted for all non-detectable values prior to the calculation of descriptive statistic using left censored analysis methods (i.e., maximum likelihood estimation (MLE), Kaplan Meier (KM), and simple substitution). The JoinPoint Regression Program was used to perform trend analysis and calculate an annual percentage change (APC) value for the available sampling period. An asbestos case study is presented to illustrate how the APC can then be combined with more recent job and/or process specific exposure data to estimate historic levels. The MESU

asbestos dataset contained 1,610 samples from 1984–1995. An average of 17% of this data was left censored. The asbestos air sampling methods in Ontario changed around 1990. LOD values of 0.06 f/cc and 0.02 f/cc were substituted for LOD values pre- and post-1990, respectively. The annual mean fiber levels for the MLE method were an average of 44% lower than KM and substitution methods. The corresponding APC for MLE method was -6.5% and -7.7% for KM and simple substitution. The findings of this paper illustrate how the temporal trend of an exposure databases can be used to efficiently estimate historic contaminant levels in the presence of limited historical information.

Read more: Journal of Occupational and Environmental Hygiene Volume 12, Issue 12, 2015 (Available with AIHA membership)

Particulate Pollutant Source Evaluation Using an Inverse Method under Steady-State Conditions

This article presents a method to enable the generation rate from one or more particle sources to be estimated, using far-field concentration measurements. The method is made up of two distinct steps; a calibration phase, followed by an estimation phase. The calibration phase makes it possible to create a transfer relationship between a known source (“reference source”) and the measurement of the far-field concentration. The second step consists of estimating unknown source generation rates by inverting the transfer



relationship and using measurements of far-field concentrations resulting from these unknown sources. In addition, this

article presents a technique to improve the positioning of the sensors in the room in which the sources are situated.

A numerical study using computational fluid dynamics (CFD) was first conducted to theoretically validate the estimation method and assist with choosing the sensor positions in the experimental rig. The study established that, with ideal sensors, the difference between the real and estimated generation rates can be accurate to within 0.1%. The method was then deployed on an

experimental case. The results confirmed that it is possible to estimate an isolated source. However, the quality of the estimation deteriorated when the source to be estimated was significantly different from the reference source, from an aerodynamic perspective.

Read more: Journal of Occupational and Environmental Hygiene: Accepted author version posted online: 10 Nov 2015 (Available with AIHA membership)

Insights from Two Industrial Hygiene Pilot E-Cigarette Passive Vaping Studies



While several reports have been published using research methods of estimating exposure risk to e-cigarette vapors in non-users, only two have directly measured indoor air concentrations from vaping

using validated industrial hygiene sampling methodology. Our first study was designed to measure indoor air concentrations of nicotine, menthol, propylene glycol, glycerol, and total particulates during the use of multiple e-cigarettes in a well-characterized room over a period of time.

Our second study was a repeat of the first study, and it also evaluated levels of formaldehyde. Measurements were collected using active sampling, near real-time and direct measurement techniques. Air sampling incorporated industrial hygiene sampling methodology using analytical methods established by the NIOSH and the OSHA. Active samples were collected over a 12-hour period, for 4 days. Background measurements were taken in the same room the day before and the day after vaping. Panelists (n = 185 Study 1; n = 145 Study 2) used menthol and non-menthol MarkTen® prototype e-cigarettes. Vaping sessions (six, 1-hour) included 3 prototypes, with total number of puffs ranging from 36 to 216 per session. Results of the active samples were below the limit of quantitation of the analytical methods. Near real-time data were below the lowest concentration on the established calibration

curves. Data from this study indicate that the majority of chemical constituents sampled were below quantifiable levels. Formaldehyde was detected at consistent levels during all sampling periods. These two studies found that indoor vaping of MarkTen® prototype e-cigarette does not produce chemical constituents at

quantifiable levels or background levels using standard industrial hygiene collection techniques and analytical methods.

Read more: Journal of Occupational and Environmental Hygiene Volume 12, Issue 12, 2015 (Available with AIHA membership)

Characterization of Emissions from a Desktop 3D Printer and Indoor Air Measurements in Office Settings

Emissions from a desktop 3D printer based on fused deposition modeling (FDM) technology were measured in a test chamber and indoor air was monitored in office settings. Ultrafine aerosol (UFA) emissions were higher while printing a standard object with polylactic acid (PLA) than with acrylonitrile butadiene styrene (ABS) polymer (2.1×10^9 vs. 2.4×10^8 particles/min). Prolonged use of the printer led to higher emission rates (factor 2 with PLA and 4 with ABS, measured after seven months of occasional use). UFA consisted mainly of volatile droplets, and some small (100 – 300 nm diameter) iron containing and soot-like particles were found. Emissions of inhalable and respirable dust were below the limit of detection (LOD) when measured gravimetrically, and only slightly higher than background when measured with an aerosol spectrometer. Emissions of volatile organic compounds (VOC) were in the range of 10 $\mu\text{g}/\text{min}$. Styrene accounted for more than 50% of total VOC emitted when printing with ABS; for PLA, methyl methacrylate (MMA, 37% of TVOC) was detected as the predominant compound.

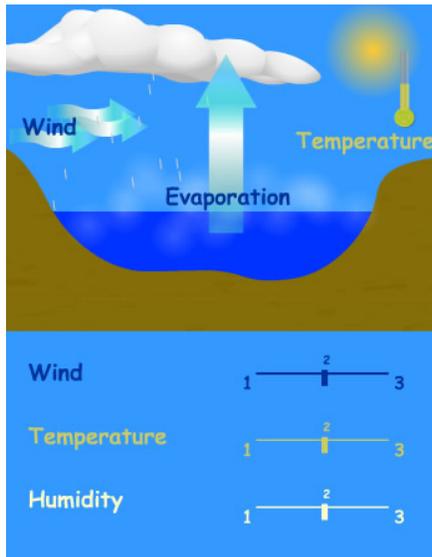


Two polycyclic aromatic hydrocarbons (PAH), fluoranthene and pyrene, were observed in very low amounts. All other analyzed PAH, as well as inorganic gases and metal emissions except iron (Fe) and zinc (Zn), were below the LOD or did not differ from background without printing. A single 3D print (165 min) in a large, well-ventilated office did not significantly increase the UFA and VOC concentrations, whereas these were readily detectable in a small, unventilated room, with UFA concentrations increasing by 2,000 particles/cm³ and MMA reaching a peak of 21 $\mu\text{g}/\text{m}^3$ and still being detectable in the room even 20 h after printing.

Read more: *Journal of Occupational and Environmental Hygiene: Accepted author*

version posted online 09 Nov 2015
(Available with AIHA membership)

The Simultaneous Mass and Energy Evaporation (SM2E) Model



Energy Evaporation (SM2E) model is presented. The SM2E model is based on theoretical models for mass and energy transfer. The theoretical models systematically under or over predicted at various flow conditions: laminar, transition, turbulent. These models were harmonized with experimental measurements to

eliminate systematic under or over predictions; a total of 113 measured evaporation rates were used. The SM2E model can be used to estimate evaporation rates for pure liquids as well as liquid mixtures at laminar, transition, and turbulent flow conditions. However, due to limited availability of evaporation data, the model has so far only been tested against data for pure liquids and binary mixtures. The model can take evaporative cooling into account and when the temperature of the evaporating liquid or liquid mixture is known (e.g., isothermal evaporation), the SM2E model reduces to a mass transfer-only model.

Read more: *Journal of Occupational and Environmental Hygiene Volume 12, Issue 12, 2015 (Available with AIHA membership)*

Air Sampling with Remote Control: Telematics for Personal Exposure Assessment

Exposure monitoring for hazardous gases, vapors, and particulates using personal air sampling pumps is the tried-and-true method for quantifying personal exposure and maintaining compliance with regulatory limits. Because many toxic and carcinogenic compounds still cannot be accurately

measured with a wearable direct-reading instrument due to cross interferences or other environmental influences, laboratory analysis of a physically collected sample is necessary to comply with OSHA requirements using NIOSH-approved

methods and satisfy multiple compliance directives.

[/air-sampling-with-remote-control.aspx?admgarea=ht.IndustrialHygiene](#)

Read more:

<https://ohsonline.com/articles/2015/10/01>

Identification of *Microcystis aeruginosa* Peptides Responsible for Allergic Sensitization and Characterization of Functional Interactions between Cyanobacterial Toxins and Immunogenic Peptides

Cyanobacteria (formerly known as blue-green algae) are ubiquitous photosynthetic bacteria that have the potential to produce toxins. Cyanobacteria are primarily found in freshwater systems worldwide. In nutrient-rich water, cyanobacteria cells proliferate to form a mass called a bloom. During the past decade, cyanobacteria blooms have been of increasing concern to public health and water management officials as their potential health effects are being better recognized. Global climate change, resulting in increases in water temperatures and severe droughts in combination with increases in nutrient load, has led to massive and prolonged cyanobacteria blooms in many large bodies of freshwater in the United States, further threatening human health and the environment (O'Neil et al. 2012). Specifically, individuals living in close proximity to these bodies of water and/or those who use them for recreational activities are at risk for increased exposure to cyanobacteria. However, recent reports have found cyanobacteria species in homes remote from outdoor water sources (Konya et al. 2014). Exposure to cyanobacteria is primarily from accidental ingestion of



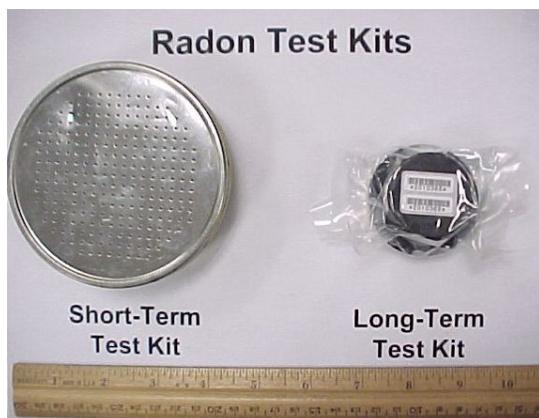
contaminated water while engaging in recreational activities or consuming food supplements containing cyanobacteria (Gilroy et al. 2000; Rellán et al. 2009; Vichi et al. 2012). In addition, exposure can also occur through direct skin contact (Codd et al. 1999) with contaminated water or by inhalation when cyanobacteria become aerosolized (Wood and Dietrich 2011). Because the number of reported cyanobacteria blooms appears to be increasing each year, there is greater risk of human exposure to these organisms.

Read more:

<http://ehp.niehs.nih.gov/1409065/>

Radiation

30 Chest X-Rays per Year: The Amount of Radiation Exposure from Radon Gas Received by 7% of Canadian Households



RadonKit.ca, a provider of radon testing kits in Canada, revealed today that government research indicates that 7% of Canadian

homes have dangerously high levels of radon gas. This finding comes from a Health Canada survey that checked radon gas levels in Canadian homes and found that about 7% of them had levels above the 200 Becquerels per cubic metre (Bq/m³) Canadian safe limit.

Read more:

<http://www.marketwatch.com/story/30-chest-x-rays-per-year-the-amount-of-radiation-exposure-from-radon-gas-received-by-7-of-canadian-households-2015-11-12>

Ventilation

Fan Performance and Efficiency for Animal Ventilation Systems

Fans are a necessary component in a mechanical ventilation system. They are the driving force that provides needed air exchange in facilities housing poultry and livestock. Fan selection is the important first step in designing a mechanical ventilation system, and it is very important to choose fans that are performance-tested and energy efficient.



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The amount of air a fan moves depends on the diameter of the blades, shape of the blades, speed at which the blades turn (revolutions per minute or rpm), horsepower (hp) of the motor, design of the shroud, and other attachments such as louvers. These combined factors establish the air moving capacity of a fan. Fan capacity is measured in terms of the cubic

feet, or volume, of air moved per minute (cfm).

Read more:

<http://www.extension.umn.edu/agriculture/manure-management-and-air-quality/air-quality/fan-performance-and-efficiency-for-animal-ventilation-systems/>

PPE

Determination of Pressure Drop across Activated Carbon Fiber Respirator Cartridges



Activated carbon fiber (ACF) is considered as an alternative adsorbent to granular activated carbon (GAC) for the development of thinner, lighter and efficient respirators because of their larger surface area and adsorption capacities, thinner critical bed depth, lighter weight and fabric form. This study aims to measure the pressure drop across different types of commercially available ACFs in respirator cartridges to determine the ACF composition and density that will result in acceptably breathable respirators. Seven

ACF types in cloth (ACFC) and felt (ACFF) forms were tested. ACFs in cartridges were challenged with pre-conditioned constant air flow (43 LPM, 23°C, 50% RH) at different compositions (single- or combination-ACF type) in a test chamber. Pressure drop across ACF cartridges were obtained using a micromanometer, and compared among different cartridge configurations, to those of the GAC cartridge, and to the NIOSH breathing resistance requirements for respirator cartridges. Single-ACF type cartridges filled with any ACFF had pressure drop measurements (23.71–39.93 mmH₂O) within the NIOSH inhalation resistance requirement of 40 mmH₂O, while those of the ACFC cartridges (85.47±3.67 mmH₂O) exceeded twice the limit due possibly to the denser weaving of ACFC fibers. All single-ACFF type cartridges had higher pressure drop compared to the GAC cartridge (23.13±1.14 mmH₂O). Certain ACF combinations (2 ACFF or ACFC/ACFF types) resulted to pressure drop (26.39–32.81

mmH2O) below the NIOSH limit. All single-ACFF type and all combination-ACF type cartridges with acceptable pressure drop had much lower adsorbent weights than GAC ($\leq 15.2\%$ of GAC weight), showing potential for light-weight respirator cartridges. 100% ACFC in cartridges may result to respirators with high breathing resistance and, thus, is not recommended. The more dense ACFF and ACFC types may still be possibly used in respirators by combining them with less dense ACFF

materials and/or by reducing cartridge bed depth to reduce pressure drop to acceptable levels. ACFF by itself may be more appropriate as adsorbent materials in ACF respirator cartridges in terms of acceptable breathing resistance.

Read more: Journal of Occupational and Environmental Hygiene: Accepted author version posted online 29 Oct 2015 (Available with AIHA membership)

Face Shields for Infection Control: A Review

Face shields are personal protective equipment devices that are used by many workers (e.g., medical, dental, veterinary) for protection of the facial area and associated mucous membranes (eyes, nose, mouth) from splashes, sprays and spatter of body fluids. Face shields are generally not used alone, but in conjunction with other protective equipment and are therefore classified as adjunctive personal protective equipment. Although there are millions of potential users of face shields, guidelines for their use vary between governmental agencies and professional societies and little research is available regarding their efficacy.



Read more: Journal of Occupational and Environmental Hygiene Volume 12, Issue 12, 2015 (Available with AIHA membership)

Temperature Measurement inside Protective Headgear: Comparison with Core Temperatures and Indicators of Physiological Strain during Exercise in a Hot Environment

Non-invasive temperature monitoring with a sensor inside protective headgear may be effective in detecting temperatures that are

associated with heat illness. The purpose was to establish the relationship between in-hardhat temperatures (T_{ih}) and core

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percentile FSL \leq 5% and at least one fit factor \geq 100. An unacceptable fit was observed for 14, 10, 7, 12, 15, and 16% of subjects on Visits 2 through 7, respectively. The predicted risk of an unacceptable fit increased with increasing length of time between fit tests, from 10% at Year 1 to 20% at Year 2 and to 25% at Year 3. Twenty-four percent of subjects who lost \geq 20 lb had an unacceptable fit; these percentages ranged from 7 to 17% for subjects with

lower weight losses or any degree of weight gain. Results support the current OSHA requirement for annual fit testing and suggest that respirator users who lose more than 20 lb should be re-tested for respirator fit.

Read more: Journal of Occupational and Environmental Hygiene Volume 12, Issue 12, 2015 (Available with AIHA membership)

Noise

Evaluation of Mobile Smartphones App as a Screening Tool for Environmental Noise Monitoring

Background: Noise is a global occupational and environmental health hazard with considerable social and physiological impact and therefore, the need for regular measurements to boost monitoring and regulations of environmental noise levels in our communities. This necessitates a readily available, inexpensive and easy to use noise measuring device. Objective/Aim: We aimed to test the sensitivity and validity of mobile “smart” phones for this purpose. Methods: This was a comparative analysis of a cross sectional study done between January 2014 and February 2015. Noise levels were measured simultaneously at different locations within Abuja Nigeria at day and night hours in real time environments. A sound level meter (SLM) [Extech407730 Digital Soundmeter, Serial no:2310135, calibration no:91037] and three smartphones (Samsung Galaxy note3; Nokia S and Techno Phantom Z running on



Android “Apps” Androidboy1) were used. Statistical calculations were done with Pearson correlation, T-test and Consistency within American National Standards Institute (ANSI) acceptable standard errors. Results: Noise level readings for both daytime and night with the Sound Level Meter and mobile phone showed equivalent values. All level meters measured were <100 dB. The daytime readings were nearly identical in six (6) locations and the maximum difference in

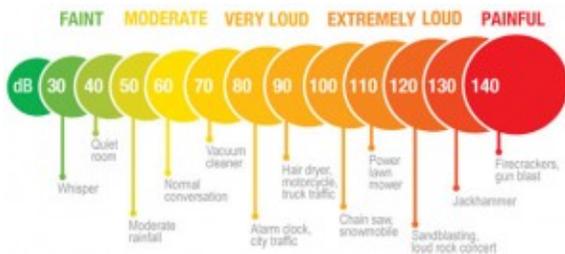
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values between the two instruments was 3db, noted in two (2) locations. Readings in dBA showed strong correlation($r = 0.9$) within acceptable error limits for Type 2 SLM devices and no significant difference in the values ($p > 0.12$ & 0.58) for both day and night. Sensitivity of the instrument yielded 92.9%. Conclusion: The androidboy1 “app” performance in this study showed a good correlation and comparative high

sensitivity to the Standard Sound Level Meter (type 2 SLM device). However there is the need for further studies.

Read more: Journal of Occupational and Environmental Hygiene: Accepted author version posted online 29 Sep 2015 (Available with AIHA membership)

Systematic Evaluation of the Relationship between Physical and Psychoacoustical Measurements of Hearing Protectors’ Attenuation



The most commonly used methods to measure hearing protectors attenuation can be divided into two categories: psychoacoustical (subjective) and physical (objective) methods. In order to better understand the relationship between these methods, this article presents various factors relating attenuation values obtained with these methods through a series of tests. Experiments on human subjects were carried out where the subjects were instrumented on both ears with miniature microphones outside and underneath the protector. The subjects were then asked to go through a series of hearing threshold measurements (psychoacoustical method)

followed by microphone sound recordings using high-level diffuse field broadband noises (physical method). The proposed test protocol allowed obtaining various factors relating the test methods as well as attenuation values and ratings for different protection conditions (open ear, earmuffs, earplugs, and dual protection). Results are presented for three models of passive earmuffs, three models of earplugs and all their combinations as dual hearing protectors. The validity and the relative importance of various terms used to correct the physical attenuation values when comparing with psychoacoustical attenuation values are examined.

Read more: Journal of Occupational and Environmental Hygiene Volume 12, Issue 12, 2015 (Available with AIHA membership)

Noise Exposure Assessment among Groundskeepers in a University Setting: A Pilot Study

Approximately 870,000 U.S. workers are employed as landscaping and groundskeeping workers who perform various tasks and use a variety of tools that expose them to high noise levels, increasing their risk to noise-induced hearing loss (NIHL). Several studies on noise exposure and NIHL in other job sectors have been published, but those on groundskeepers are very limited. This study aims to characterize the noise exposure of groundskeepers. Participants were monitored over their entire work shift for personal noise exposure by wearing noise dosimeters at shoulder level, four inches from the ear. Using two different dosimeter settings (OSHA and NIOSH), the time-weighted averages (TWAs) and 1-minute averages of noise exposure levels in decibels (dBA) were obtained. The participants were also asked to fill out an activity card daily to document their tasks, tools used, location and noise perception. Sound pressure levels (SPLs) produced by various groundskeeping equipment and tools were measured at full throttle near the ear of the operator using a sound level meter. These measurements were used to obtain worker noise exposure profiles, particularly the contributing source of noise. The overall mean OSHA and NIOSH TWA noise exposures were 82.2 ± 9.2 (range of 50.9–100 dBA) and 87.8 ± 6.6 dBA (range of 67.2–102.9 dBA), respectively.



Approximately 46% of the OSHA TWAs exceeded the OSHA action limit of 85 dBA. About 76% of the NIOSH TWAs exceeded 85 dBA, and 42% exceeded 90 dBA. The SPLs of equipment and tools measured ranged from 75– 106 dBA, most of which were at above 85 dBA and within the 90-100 dBA range. Hand-held power tools and ride-on equipment without enclosed cab may have contributed significantly to worker noise exposure. This study demonstrates that groundskeepers may be routinely exposed to noise levels above the OSHA and NIOSH exposure limits, and that the implementation of effective hearing conservation programs is necessary to reduce their risk to NIHL.

Read more: Journal of Occupational and Environmental Hygiene: Accepted author version posted online 10 Nov 2015 (Available with AIHA membership)

Preventive Medicine

How Fast You Move Can Predict How Healthy You'll Be



Instead of focusing on drawing out the length of life, South Korea's IBS Center for Plant Aging Research and the research group led by Coleen

Murphy, a professor at Princeton University have created a tool that can be used for accurately predicting lifespan as well as assessing the current health state, and discovered the regulatory mechanism that extends "healthspan," the time in which an organism is at its optimal health.

Read more:

<http://www.sciencedaily.com/releases/2015/11/151120094115.htm>

OSHA and Red Cross Renew Alliance to Protect the Safety and Health of Employees

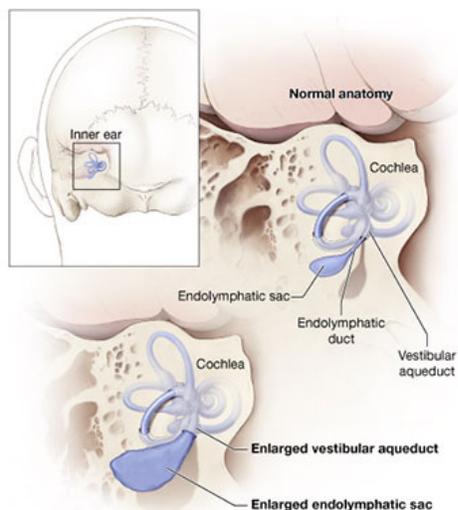
OSHA has renewed its alliance with the American Red Cross to help reduce workplace incidents and protect workers from hazardous exposures. Through the alliance, OSHA and the Red Cross will provide training and information on emergency preparedness, disease prevention and first aid. This agreement will remain in effect for five years.

Read more:

<https://www.osha.gov/as/opa/quicktakes/qt111615.html>



Sound Deprivation Leads to Irreversible Hearing Loss



Massachusetts Eye and Ear investigators have shown that sound deprivation in adult mice causes irreversible damage to the inner ear. The findings, published in PLOS ONE, suggest that chronic conductive hearing loss, such as that caused by recurrent ear infections, leads to permanent hearing impairment if it remains untreated.

Read more:

<http://www.sciencedaily.com/releases/2015/11/151118180507.htm>

Ebola Vaccine Is Safe, Stimulates Strong Immune Response, Study Shows

A clinical trial of a new Ebola vaccine (ChAd3-EBO-Z) that resulted from an unprecedented global consortium assembled at the behest of the World Health Organization has found that it is well tolerated and stimulates strong immune responses in adults in Mali, West Africa and in the US, according to a study published in the latest issue of the journal *Lancet Infectious Disease*. If the vaccine is ultimately found to be safe and effective, it could offer crucial protection for contacts (family members, neighbors, etc.) of patients with confirmed Ebola disease in future epidemics, thereby helping to interrupt transmission. Larger trials of the



vaccine sponsored, by GSK Biologicals, have already begun.

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Read more:

<http://www.sciencedaily.com/releases/2015/11/151118155316.htm>

Focus on Well-Being Improves Worker Health While Lowering Costs



One company's program to improve employee well-being led to improvements in worker health and productivity while decreasing health care costs, according to a

case study published in the Journal of Occupational and Environmental Medicine. The study evaluated the long-term impact of a plan offering employees a range of benefits to promote well-being: for example, on-site fitness activities and intensive smoking cessation and weight loss programs.

Read more:

<http://ehstoday.com/health/focus-well-being-improves-worker-health-while-lowering-costs>

Environmental Health

Interweaving Knowledge Resources to Address Complex Environmental Health Challenges

Background: Complex problems do not respect academic disciplinary boundaries. Environmental health research is complex and often moves beyond these boundaries, integrating diverse knowledge resources to solve such challenges. Here we describe an evolving paradigm for interweaving approaches that integrates widely diverse resources outside of traditional academic environments in full partnerships of mutual respect and understanding. We demonstrate that scientists, social scientists, and engineers can work with



government agencies, industry, and communities to interweave their expertise into metaphorical knowledge fabrics to

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share understanding, resources, and enthusiasm.

Objective: Our goal is to acknowledge and validate how interweaving research approaches can contribute to research-driven, solution-oriented problem solving in environmental health, and to inspire more members of the environmental health community to consider this approach.

Discussion: The National Institutes of Health's National Institute of Environmental Health Sciences Superfund Research Program (SRP), as mandated by Congress, has evolved to become a program that reaches across a wide range of knowledge resources. SRP fosters interweaving multiple knowledge resources to develop innovative multidirectional partnerships for

research and training. Here we describe examples of how motivation, ideas, knowledge, and expertise from different people, institutions, and agencies can integrate to tackle challenges that can be as complex as the resources they bring to bear on it.

Conclusions: By providing structure for interweaving science with its stakeholders, we are better able to leverage resources, increase potential for innovation, and proactively ensure a more fully developed spectrum of beneficial outcomes of research investments.

Read more:

<http://ehp.niehs.nih.gov/1409525/>

Sea Traffic Pollutes Our Lungs More than Previously Thought



New data presented by researchers at Lund University and others in the journal *Oceanologia*, show that the air along the

coasts is full of hazardous nanoparticles from sea traffic. Almost half of the measured particles stem from sea traffic emissions, while the rest is deemed to be mainly from cars but also industries and natural particles from the sea.

Read more

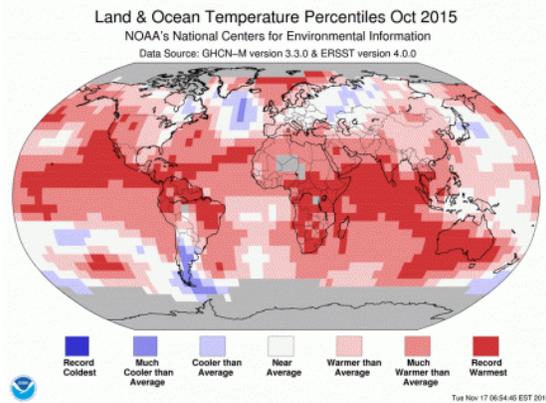
<http://www.sciencedaily.com/releases/2015/11/151120094118.htm>

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NOAA: Last Month Was the Warmest October in History

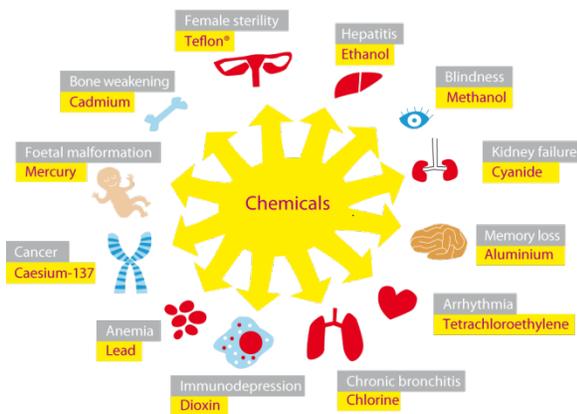
With just days until the United Nations climate conference in Paris, where world leaders are expected to agree on a universal, legally-binding pact to limit climate change, U.S. scientists said October 2015 was the warmest October since recordkeeping began in 1880.

The combined average temperature over global land and ocean surfaces for October 2015 was the highest for October in the 136-year period of record, at 0.98°Celsius (1.76°Fahrenheit) above the 20th century average of 14.0°C (57.1°F), said scientists with the National Oceanic and Atmospheric Administration, NOAA.



Read more: <http://enr.com/news/2015/11/19/noaa-last-month-was-the-warmest-october-in-history/>

Identification and Prioritization of Relationships between Environmental Stressors and Adverse Human Health Impacts



There are very few human health or exposure data for the majority of the > 80,000 chemicals in commerce (Egeghy et

al. 2012; Judson et al. 2009). The lack of data poses challenges to those looking to mitigate the potential risks or evaluate impacts in a comprehensive manner. The National Health and Nutrition Examination Survey (NHANES) [Centers for Disease Control and Prevention National Center for Health Statistics (CDC NCHS) 2010] provides a snapshot of the current health status of a representative U.S. population. Numerous studies using the NHANES and similar data sets have been used to extract possible associations between markers of exposure to environmental chemicals and possible health effects (Patel and Ioannidis 2014). The nature of the data sets and the models

used makes it a challenge to compare the studies in a systematic way, and consequently leads to an iterative process involving multiple individual hypotheses being tested over the course of the analysis (Patel and Ioannidis 2014). This results in a complicated design in which it is impossible to account for multiple individual a priori

hypothesis tests (Patel and Ioannidis 2014). The consequence of this is more false positive relationships and an overall lack of transparency.

Read more

<http://ehp.niehs.nih.gov/1409138/>

Ergonomics

Individualized Prediction of Heat Stress in Firefighters: A Data-Driven Approach Using Classification and Regression Trees

The purpose of this study was to explore data-driven models, based on decision trees, to develop practical and easy to use predictive models for early identification of firefighters who are likely to cross the threshold of hyperthermia during live-fire training. Predictive models were created for three consecutive live-fire training scenarios. The final predicted outcome was a categorical variable: will a firefighter cross the upper threshold of hyperthermia – Yes/No. Two tiers of models were built, one with and one without taking into account the outcome (whether a firefighter crossed hyperthermia or not) from the previous training scenario. First tier of models included age, baseline heart rate and core body temperature, body mass index, and duration of training scenario as predictors.

The second tier of models included the outcome of the previous scenario in the prediction space, in addition to all the predictors from the first tier of models. Classification and regression trees were



used independently for prediction. The response variable for the regression tree was the quantitative variable: core body temperature at the end of each scenario. The predicted quantitative variable from regression trees was compared to the upper threshold of hyperthermia (38°C) to predict whether a firefighter would enter hyperthermia. The performance of classification and regression tree models was satisfactory for the second (success rate = 79%) and third (success rate = 89%) training scenarios but not for the first (success rate = 43%). Data-driven models based on decision trees can be a useful tool

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for predicting physiological response without modeling the underlying physiological systems. Early prediction of heat stress coupled with proactive interventions, such as pre-cooling, can help reduce heat stress in firefighters.

Read more: Journal of Occupational and Environmental Hygiene Volume 12, Issue 12, 2015 (Available with AIHA membership)

Safety

New Data Show Rate of Most Serious Work Injuries Unchanged; Overall Rate Drops Slightly

BLS
BUREAU OF LABOR STATISTICS
U.S. DEPARTMENT OF LABOR

NEWS RELEASE

For release 10:00 a.m. (EDT) Thursday, October 29, 2015 USDL-15-2086

Technical information: (202) 691-6170 • IIFSTAFF@bls.gov • www.bls.gov/info/osh.htm
Media contact: (202) 691-5902 • PressOffice@bls.gov

EMPLOYER-REPORTED WORKPLACE INJURIES AND ILLNESSES – 2014

The nearly 3.0 million nonfatal workplace injuries and illnesses reported by private industry employers in 2014 occurred at a rate of 3.2 cases per 100 equivalent full-time workers, according to estimates from the Survey of Occupational Injuries and Illnesses (SOI) conducted by the U.S. Bureau of Labor Statistics. (See tables 1 and 2.) The rate reported for 2014 continues a pattern of declines that, with the exception of 2012, occurred annually for the last 12 years.

Private industry employers reported nearly 54,000 fewer nonfatal injury and illness cases in 2014 compared to a year earlier. Because of this decline combined with an increase in reported hours worked, the total recordable cases (TRC) incidence rate fell 0.1 cases per 100 full-time workers. The fall in the TRC rate was driven by a decline in the rate of other recordable cases, as rates for both cases involving days away from work (DAFW) and for cases of job transfer or restriction only (DJTR) were unchanged in 2014.

Chart 1. Nonfatal occupational injury and illness incidence rates by case type, private industry, 2003-2014

Year	TRC - total recordable cases	TRC - cases involving days away from work, job transfer, or restriction only	DAFW - days away from work only	DJTR - job transfer or restriction only	Other recordable cases
2003	4.8	2.4	1.1	1.3	2.4
2004	4.6	2.3	1.0	1.3	2.3
2005	4.5	2.2	1.0	1.2	2.2
2006	4.4	2.1	0.9	1.2	2.1
2007	4.2	2.0	0.9	1.1	2.0
2008	3.9	1.9	0.8	1.1	1.9
2009	3.6	1.8	0.7	1.1	1.8
2010	3.5	1.8	0.7	1.1	1.8
2011	3.4	1.8	0.7	1.1	1.8
2012	3.4	1.8	0.7	1.1	1.8
2013	3.3	1.8	0.7	1.1	1.8
2014	3.2	1.8	0.7	1.1	1.8

Change in Industry Classifications
Beginning with the 2014 reference year, the SOI began using the 2012 North American Industry Classification System (NAICS). Comparison of SOI estimates for 2014 to prior years is not advised below the sector level due to this change. For more detailed information regarding NAICS revisions, visit <http://www.bls.gov/naics>.

The Bureau of Labor Statistics' Survey of Occupational Injuries and Illnesses, released Oct. 29, shows that private industry employers reported nearly 3 million non-fatal workplace injuries and illnesses in 2014. While the incidence rate of total recordable cases fell slightly, the rates for cases involving days away from work and for cases of job transfer or restriction were unchanged. After reviewing the report, Assistant Secretary of Labor for Occupational Safety and Health Dr. David Michaels issued a statement on the need to better protect workers:

Read more:
<https://www.osha.gov/as/opa/quicktakes/qt110215.html>

Predictors of Adherence to Safe Handling Practices for Antineoplastic Drugs: A Survey of Hospital Nurses

Background: Despite growing awareness of the hazards of exposure to antineoplastic drugs (ADs), surveys continue to find incomplete adherence to recommended

safe handling guidelines. A 2011 survey of healthcare workers presents an opportunity to examine factors associated with

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adherence among 1094 hospital nurses who administered ADs.

Methods: Data for these hypothesis-generating analyses were taken from an anonymous, web-based survey of healthcare workers. Regression modeling was used to examine associations between a number of predictors (engineering controls, work practices, nurse perceptions, and nurse and hospital characteristics) and three outcomes reported by nurses: use of personal protective equipment (PPE); activities performed with gloves previously worn to administer ADs; and spills of ADs.

Results: Adherence to safe handling guidelines was not universal, and AD spills were reported by 9.5% of nurses during the week prior to the survey. Familiarity with safe handling guidelines and training in safe handling were associated with more reported PPE use. Nurse-perceived availability of PPE was associated with more reported PPE use and lower odds of reported spills. Use of closed system drug-transfer devices and luer-lock fittings also decreased the odds of self-reported AD spills, while more frequent AD administration increased the risk. AD administration frequency was also associated with performing more activities with gloves previously worn to administer

ADs, and nurse perception of having adequate time for taking safety precautions with fewer such activities.

Conclusions: The results suggest that training and familiarity with guidelines for safe handling of ADs, adequate time to adhere to guidelines, and availability of PPE and certain engineering controls are key to ensuring adherence to safe handling practices. Further assessment of training components and engineering controls would be useful for tailoring interventions targeting these areas.



Read more: Journal of Occupational and Environmental Hygiene: Accepted author version posted online 10 Nov 2015 (Available with AIHA membership)

Evaluation of a Strapless Heart Rate Monitor during Simulated Flight Tasks



Pilots are under high task demands during flight. Monitoring pilot's physiological status is very important in the evaluation of pilot's workload and flight safety. Recently, physiological status monitor (PSM) has been

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embedded into a watch that can be used without a conventional chest strap. This makes it possible to unobtrusively monitor, log and transmit pilot's physiological measurements such as heart rate (HR) during flight tasks. The purpose of this study is to validate HR recorded by a strapless heart rate watch against criterion ECG-derived HR. Ten commercial pilots (mean \pm SD : age: 39.1 \pm 7.8 years; total flight hours 7173.2 \pm 5270.9 hours) performed three routinely trained flight tasks in a full flight simulator: wind shear go-around (WG), takeoff and climb (TC) and hydraulic failure (HF). For all tasks combined (overall) and for each task, differences between the heart rate watch measurements and the criterion data were small (mean difference [95% CI]: overall: -0.71 beats/min [-0.85, -0.57]; WG:

-0.90 beats/min [-1.15, -0.65]; TC: -0.69 beats/min [-0.98, -0.40]; HF: -0.61 beats/min [-0.80, -0.42]). There were high correlations between the heart rate watch measurements and the ECG-derived HR for all tasks ($r \geq 0.97$, SEE < 3). Bland-Altman plots also show high agreements between the watch measurements and the criterion HR. These results suggest that the strapless heart rate watch provides valid measurements of HR during simulated flight tasks and could be a useful tool for pilot workload evaluation.

Read more: Journal of Occupational and Environmental Hygiene: Accepted author version posted online 10 Nov 2015 (Available with AIHA membership)

Working Safely with Robot Workers: Recommendations for the New Workplace

The increasing use of robots in performing tasks alongside or together with human co-workers raises novel occupational safety and health issues. The new 21st century workplace will be one in which occupational robotics plays an increasing role. This paper describes the increasing complexity of robots and proposes a number of recommendations for the practice of safe occupational robotics.

Read more: Journal of Occupational and Environmental Hygiene: Accepted author



version posted online 10 Nov 2015 (Available with AIHA membership)

The World's Most Dangerous Jobs: Are They Worth It?



There are people around the world who work in dangerous jobs and the pay often isn't commensurate with the level of risk.

This infographic from the training coordinator at Mission Safety Services, outlines:

- The most dangerous jobs and what they pay.
- The death toll for each job.
- Tips for reducing the number of fatalities in each job.

Read more:

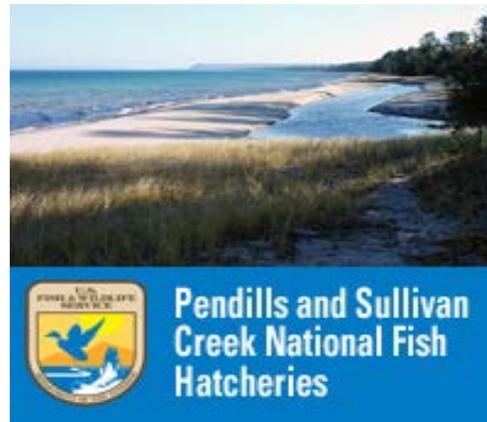
<http://ehstoday.com/safety/world-s-most-dangerous-jobs-are-they-worth-it-infographic>

OSHA Cites Federal Agency for Serious and Repeat Violations

OSHA has issued 11 serious, one repeated and one other-than-serious violation to the U.S. Fish and Wildlife Service after it discovered unsafe and unhealthful working conditions.

While working in tanks and pits, U.S. Fish and Wildlife Service employees at Pendills Creek National Fish Hatchery in Brimley, Mich., faced atmospheric, water, amputation and asbestos hazards.

PedOSHA found that the Fish and Wildlife Service, an agency of the U.S. Department of the Interior, didn't follow federal guidelines for working in confined spaces at the hatchery.

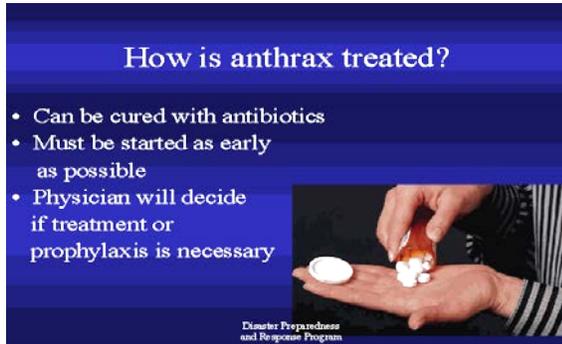


Read more:

<http://ehstoday.com/industrial-hygiene/osha-cites-federal-agency-serious-and-repeat-violations>

Emergency Preparedness & Response

HHS to Procure Two Inhalational Anthrax Treatments for National Supply



To better protect public health in an anthrax attack, the U.S. Department of Health and Human Services' Office of the Assistant Secretary for Preparedness and Response (ASPR) will add two types of anthrax antitoxin drugs for the Strategic National Stockpile (SNS) as options to treat inhalational anthrax.

ASPR's Biomedical Advanced Research and Development Authority (BARDA) will fund these purchases under Project BioShield, the chief mechanism through which the U.S. government supports the advanced development and procurement of new medical countermeasures – drugs, vaccines, diagnostics, and medical supplies – to protect the American public against chemical, biological, radiological and nuclear threats.

Read more:

<http://www.hhs.gov/about/news/2015/11/12/hhs-procure-two-inhalational-anthrax-treatments-for-national-supply.html>

Deployment Health

Army Basic Training PFT

The Army's Basic Training Physical Fitness Test is a three-event physical performance test used to assess endurance. It is used to measure a your physical strengths, abilities, and cardio-respiratory fitness.

You are required to pass the Basic Training APFT to graduate boot camp and continue on to Advance Infantry Training.



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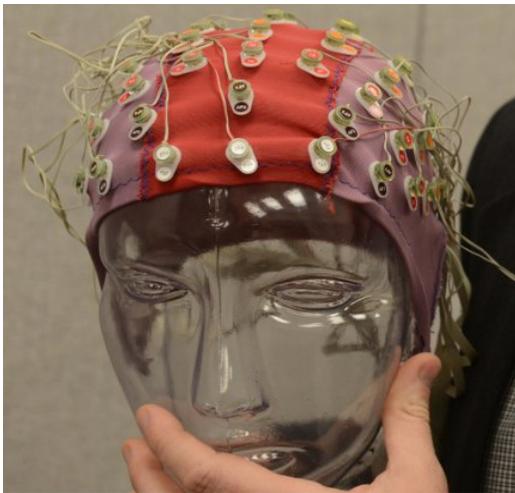
The three PFT events are two minutes of push-ups, two minutes of sit-ups, and a timed 2-mile run. Your results from each event are assigned a score. Your age, gender and the amount of repetitions or time elapsed for each event determines your score. Unlike other military endurance tests the APFT is normally performed in normal workout gear. To graduate boot

camp you must score 150 points or higher with at least 50 points in each event.

Read more:

<http://www.military.com/military-fitness/army-fitness-requirements/army-basic-training-pft>

EEG May Someday Boost Soldiers' Cognitive Ability



New and complex technology for Soldiers can tax their mental ability, since the brain has finite processing capability, said David Hairston, a neuroscientist.

Hairston and his colleagues at the Army Research Lab's Human Research and Engineering Directorate want to someday use electroencephalogram, or EEG, to aid Soldiers in those mental tasks. He's leading

the Real-World Neuroimaging program to make that happen.

The EEG, which has been in use now for more than 60 years in clinical practice, measures and records voltage fluctuations in different parts of the brain to determine a person's neural patterns. Those patterns provide insights into what a person is seeing, hearing, thinking and feeling - like peering into an individual's mental and emotional state, he said.

For instance, if a Soldier is fatigued, a unique EEG pattern will be produced, he said. That sort of information could be useful for a commander, who could rotate in a more rested Soldier for a critical mission requiring alertness.

Read more:

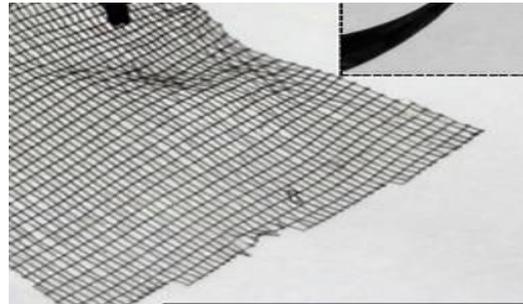
http://www.army.mil/article/158601/EEG_may_someday_boost_Soldiers_cognitive_ability/

Nanotechnology

Graphene-Coated Fabric Makes for a Wearable Gas Sensor

One of graphene's key properties is its surface area—as a two-dimensional material it really is just all surface. This has advantages in a number of applications, one of which is sensors.

Now researchers at the Electronics and Telecommunications Research Institute and Konkuk University in South Korea have found that if they coat fabrics with graphene, they can detect dangerous gases and alert the wearer of their presence by triggering an LED light.



Read more:

<http://spectrum.ieee.org/nanoclast/semiconductors/materials/graphenecoated-fabric-makes-for-a-wearable-gas-sensor>

Regulatory Research & Industrial Hygiene Professional News

AIHA

AIHA Announces IH Professional Pathways Program



AIHA announced a new program for industrial hygienists called the IH Professional Pathways Program. Announced during the AIHA Fall Conference in Orlando, the program was created due to a desire to align resources and development

opportunities with the various career stages of the profession. The program will encourage and support those who earn credentials within the industry.

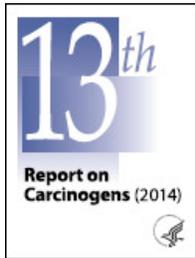
Read more:

<https://ohsonline.com/articles/2015/11/06/aiha-announces-ih-professional-pathways-program.aspx?admgarea=ht.IndustrialHygiene>

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NTP

NTP Requests Information on Substances Nominated for Inclusion in Report on Carcinogens



The National Toxicology Program (NTP) is requesting information on six substances that have been nominated for possible review for future editions of the Report on Carcinogens (RoC). NTP

plans to use this information to identify nominated substances to propose for formal evaluation for the RoC.

The nominated substances include flame retardants tetrabromobisphenol A and pentabromodiphenyl ether mixture; water

disinfection byproducts dibromoacetonitrile and di- and tri-haloacetic acids; fluoride; and vinylidene chloride. The list is available on NTP's website and in a notice in the Federal Register.

Read more:

<https://www.aiha.org/publications-and-resources/TheSynergist/Industry%20News/Pages/NTP-Requests-Information-on-Substances-Nominated-for-Inclusion-in-Report-on-Carcinogens.aspx>

OSHA

OSHA to Update Safety and Health Program Management Guidelines

OSHA seeks public comment on an updated version of its voluntary Safety and Health Program Management Guidelines, which are intended to help employers establish safety and health management plans at their workplaces. The updated guidelines reflect modern technology and practices, including a proactive approach to identifying and addressing hazards before they cause injury, illness, or death, and increasing employee involvement in worker safety and health. For the first time, the document provides information on how



employers can improve communication and coordination on multi-employer worksites to better protect workers.

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Read more:

<https://www.aiha.org/publications-and-resources/TheSynergist/Industry%20News/>

[Pages/OSHA-Chief-Updates-Congress-on-Challenges-of-Changing-Structure-of-Work.aspx](https://www.osha-slc.gov/Pages/OSHA-Chief-Updates-Congress-on-Challenges-of-Changing-Structure-of-Work.aspx)

Congressional Budget Deal Paves Way for Potential Fine Increases for OSHA

Citations and Penalties

VIOLATION TYPE	PENALTY
WILLFUL: A violation that the employer intentionally and knowingly commits or a violation that the employer commits with plain indifference to the law.	OSHA may propose penalties of up to \$70,000 for each willful violation, with a minimum penalty of \$5,000 for each willful violation.
SERIOUS A violation where there is substantial probability that death or serious physical harm could result and that the employer knew, or should have known, of the hazard.	There is a mandatory penalty for serious violations which may be up to \$7,000.
OTHER-THAN-SERIOUS A violation that has a direct relationship to safety and health, but probably would not cause death or serious physical harm.	OSHA may propose a penalty of up to \$7,000 for each other-than-serious violation.
REPEATED A violation that is the same or similar to a previous violation.	OSHA may propose penalties of up to \$70,000 for each repeated violation.



amendment eliminates the exemption made by the Federal Civil Penalties Inflation Adjustment Act of 1990 that has prevented OSHA from increasing its monetary penalties for violations for the last 25 years. Under the new deal, OSHA would also be allowed to make a one-time “catch-up” adjustment that would increase maximum penalty levels by approximately 80 percent to make up for the lack of increases.

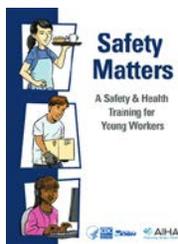
An amendment included in the budget deal that President Obama signed into law earlier this month would allow OSHA to increase its fines annually based on the consumer price index. OSHA fines have not increased since 1990, and the agency is one of few with civil penalties that do not increase with inflation. The new

Read more:

<https://www.aiha.org/publications-and-resources/TheSynergist/Industry%20News/Pages/Congressional-Budget-Deal-Paves-Way-for-Potential-Fine-Increases-for-OSHA.aspx>

NIOSH

NIOSH/AIHA Kick-off ‘Safety Matters’ Initiative



NIOSH and the American Industrial Hygiene Association (AIHA) are launching a new initiative called Safety Matters. The program’s goal is to equip young people with the

skills and knowledge they need to participate in safe and healthy work

environments throughout their working lives. Safety Matters is a free, 1-hour interactive teaching module and slide presentation for students in grades 7 through 12. Volunteers can use the materials to do outreach at schools to build awareness of occupational safety and health.



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Read more:
<http://www.cdc.gov/niosh/enevs/enevsv1>

<3n7.html#NIOSH/AIHA%20Kick-off%20Safety%20Matters%20Initiative>

Training

APHC

Upcoming Training

-  **October 2015**
 - Oct 1-5 APG, MD DOEHRS-IH Initial Army Course
 - Phase 1 Intermediate Industrial Hygiene Course Ongoing at this time (web)
-  **February 2016**
 - February 22-26 APG, MD DOEHRS-IH Initial Army Course
 - February 29-March 4 APG, MD Industrial Ventilation Course
-  **March 2016**
 - March 7-11 APG, MD Industrial Hygiene Intermediate Course (Phase 2)
-  **May 2016**
 - May 16-20 APG, MD DOEHRS-IH Initial Army Course
-  **August 2016**
 - August 1-5 APG, MD DOEHRS-IH Initial Army Course
-  **October 2016**
 - October 24-28 APG, MD DOEHRS-IH Initial Army Course
-  **August 2016**
 - August 1-5 APG, MD DOEHRS-IH Initial Army Course
-  **TBD 2016**
 - Date/Location TBD Indoor Air Quality Course CP12 Sponsored
-  **February 2017**
 - TBD APG, MD Blueprint Reading & Design Review Course

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This monthly summary is published by the Industrial Hygiene and Medical Safety Management Program (IHMSMP) for the U.S. Army Public Health Center (Provisional).



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Transitioning to a New Format!

Please be patient while we transition to a new training format. In the past, the APHC Blackboard courses were dependent on Defense Connect Online recordings; however, DCO is no more, our existing material is being converted to a new format that automatically allows recordings to play within Blackboard. Continue to check the training website as we add course material daily. Some courses are already up and running. So visit <https://aiph-dohs.ellc.learn.army.mil> to check their availability.

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