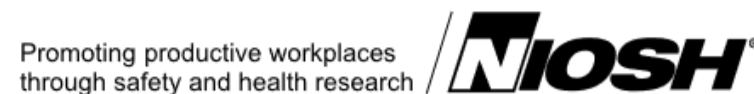




The National Institute for Occupational Safety and Health (NIOSH)



Alice B. Hamilton Awards 2005

Educational Materials Category

Winner:

- **Title:** Worker Health Chartbook, 2004
- **Authors:** Sestito JP, Lunsford RA, Hamilton AC, and Rosa RR, eds.
- **Source:** U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health, DHHS (NIOSH) Publication No. 2004-146
- **Description:** This publication consolidates and presents an integrated view of occupational safety and health surveillance data and information from 19 surveillance programs and surveys of occupational injury and illness in the United States. The Chartbook is a resource for technical and nontechnical audiences, including agencies, organizations, employers, researchers, workers, and others who have a need to know about occupational injury, illness, and death. The Chartbook includes more than 400 figures and tables. Contributors include Federal, State, and nonprofit organizations. The Chartbook provides baseline and trend data to support researchers, program development, and the evaluation of impact measures.



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Honorable Mention:

- **Title:** Make it Safer with Roof Screen: video training module with instructional booklet
- **Authors:** Robertson SB, Mark C, Urban CW, and Caruso D
- **Source:** US Dept. of Health and Human Services, Public Health Service, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health (TN 508), 2004
- **Description:** The facts about roof screen are documented in the new NIOSH video entitled "Make it Safer with Roof Screen. Using extensive underground footage, the 7-minute video shows how well screen controls loose rock in difficult roof conditions. Techniques for installing screen from both outside-controlled and walk-through roof bolting machines are illustrated. The video also provides safe handling tips, best practices, and information about machine technology that can greatly improve material handling. Throughout the video, a coal mine safety manager and a shift foreman talk about the tremendous difference roof screen has made at their mines. The instructional booklet supplements the video with additional information. It presents compelling data from mines that have practically eliminated rock fall injuries with a roof screening program. Other sections of the booklet discuss in greater detail roof screen installation, tips for manual screen handling, a material handling system for roof screen, and the use of the Personal Bolter Screen (PBS). Screen specification and custom ordering are described, including the sizes of screen, grid sizes, reinforcing (indicator) wires, edge cut options, and screen strength. A list of further sources of information is also provided.

[View full for information on the video and booklet](#)

[PDF](#)

Biological Science Category

Winner:

- **Title:** Development of a sensitivity enhanced multiplexed fluorescence covalent microbead immunosorbent assay (FCMIA) for the measurement of glyphosate, atrazine and metolachlor mercapturate in water and urine
- **Authors:** Biagini RE, Smith JP, Sammons DL, MacKenzie BA, Striley CAF, Robertson SK, and Snawder JE
- **Source:** Anal Bioanal Chem, 379: 368-374, 2004
- **Abstract:** Body burdens from exposures to pesticides may be estimated from urinary analyses of pesticide parent/metabolite concentrations. Pesticide applicators and others are often exposed to numerous unrelated pesticides, either sequentially or simultaneously. Classically, body burdens of pesticides are analyzed using chemical/instrumental analysis (CIM) or enzyme immunoassays (EIAs). Both of these technologies can usually be used to quantitate one analyte (or closely related groups of analytes) per analysis. Alternatively, multiple analytes can be measured simultaneously using a multiplexed fluorescence covalent microbead immunoassay (FCMIA). We developed a multiplexed FCMIA to simultaneously measure glyphosate (Gly), atrazine (Atz), and metolachlor mercapturate (MM) in water and urine. The assay had least detectable doses (LDDs) in water/diluted urine of 0.11/0.09 ng/ml (Gly, water/urine LDD), 0.10/0.07 ng/ml (Atz), and 0.09/0.03 ng/ml (MM). The sensitivity for the measurement of Gly was enhanced by derivatization. All assays gave linear responses from the LDDs for each respective pesticide to 300 ng/ml. There was no cross-reactivity between the three analytes. Using a 96-well microplate and an autosampler, as many as 288 separate analyses can be completed in ~120 min with precision, sensitivity, and specificity equivalent to, if not better, than that found when these same analytes are measured by CIM or EIA.
- **Keywords:** Biomonitoring, Luminex, Glyphosate, Atrazine, Metolachlor mercapturate

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Honorable Mention:

- **Title:** Progression of lung inflammation and damage in rats after cessation of silica inhalation.
- **Authors:** Porter DW, Hubbs AF, Mercer R, Robinson VA, Ramsey D, McLaurin J, Khan A, Battelli, L, Brumbaugh K, Teass, A and Castranova V
- **Source:** Toxicological Sciences, Vol. 79, pp. 370-380, 2004
- **Abstract:** Human epidemiologic studies have found that silicosis may develop or progress even after occupational exposure has ended, suggesting that there is a threshold lung burden above which silica-induced pulmonary disease progresses without further exposure. We previously described the time course of rat pulmonary responses to silica inhalation as biphasic, the initial phase characterized by increased but controlled pulmonary inflammation and damage. However, after a threshold lung burden was exceeded, rapid progression of silica-induced pulmonary disease occurred. To test the hypothesis that there is a threshold lung burden above which silica-induced pulmonary disease progresses without further exposure we initiated a study to investigate the relationship between silica exposure, the initiation and progression of silica-induced pulmonary disease, and recovery. Rats were exposed to silica (15 mg/m³, 6 h/day) for either 20, 40, or 60 days. A portion of the rats from each exposure were maintained without further exposure for 36 days to examine recovery. The major findings of this study are: (1) silica-exposed rats were not in pulmonary overload, and lung silica burden decreased with recovery; (2) pulmonary inflammation, damage and lipodosis increased with recovery for rats exposed to silica for 40 and 60 days, but not 20 days; (3) histopathology revealed changes in silica-induced alveolitis, epithelial hypertrophy and hyperplasia, and alveolar lipoproteinosis consistent with bronchoalveolar lavage (BAL) endpoints; and (4) pulmonary fibrosis developed even when exposure was stopped prior to its initial development.



Engineering and Physical Sciences Category

Winner:

- **Title:** Vibration Energy Absorption (VEA) in Human Fingers-Hand-Arm System
- **Authors:** Dong RG, Schopper AW, McDowell TW, Welcome DE, Wu JZ, Smutz WP, Warren C, and Rakheja S
- **Source:** Medical Engineering & Physics, 26(7): 483-492, 2004.
- **Abstract:** A methodology for measuring the vibration energy absorbed into the fingers and the palm exposed to vibration is proposed to study the distribution of the vibration energy absorption (VEA) in the fingers-hand-arm system and to explore its potential association with vibration-induced white finger (VWF). The study involved 12 adult male subjects, constant-velocity sinusoidal excitations at 10 different discrete frequencies in the range of 16-1000 Hz, and four different hand-handle coupling conditions (finger pull-only, hand grip-only, palm push-only, and combined grip and push). The results of the study suggest that the VEA into the fingers is considerably less than that into the palm at low frequencies (<25 Hz). They are, however, comparable under the excitations in the 250-1000 Hz frequency range. The finger VEA at high frequencies (>100 Hz) is practically independent of the hand-handle coupling condition. The coupling conditions affect the VEA into the fingers and the palm very differently. The finger VEA results suggest that the ISO standardized frequency weighting (ISO 5349-1, 2001) may underestimate the effect of high frequency vibration on vibration-induced finger disorders. The proposed method may provide new opportunities to examine VEA and its association with VWF and other types of vibration-induced disorders in the hand-arm system.
- **Keywords:** Hand-arm vibration syndrome, Vibration-induced white fingers, Energy absorption, Human fingers and hand

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Honorable Mention:

- **Title:** Development of a Personal Sampler for Collecting Fungal Spores
- **Authors:** Chen, B. T., G. A. Feather, A. Maynard, and C. Rao
- **Source:** Aerosol Science and Technology 38:926-937, 2004
- **Abstract:** Exposure to fungal aerosols is of concern in indoor environments. However, sampling limitations have previously made it difficult to assess exposures accurately, especially long-term exposures. A prototype personal aerosol sampler, based on cyclone principles and using a 1.5 ml microcentrifuge tube as a particle collection receptacle has been designed and fabricated. Collection efficiency for aerosol particles in the size range of fungal spores has been evaluated for different types of microcentrifuge tubes, together with the effect of a polyethylene glycol coating on the inside of the tube and the effect of adding water to the tube. Monodisperse, fluorescently tagged polymer microspheres with median diameters of 0.5, 1, 2, 3, 6, 11, and 16 μm were used to evaluate sampler performance with particle diameter. The microcentrifuge-tube sampler was tested at flow rates of 2 and 4 liters per minute (l/min). Experimental results indicate that the microcentrifuge-tube sampler has an aspiration efficiency of 100% in calm air for particles up to 16 μm . At 4 l/min, the microcentrifuge-tube sampler is able to collect nearly 100% of particles greater than 3 μm and >90% of particles between 2.5 and 3 μm . The 50% cutoff size is 1.5 μm . The performance of the sampler did not vary with the different brands of tubes tested or with the presence or absence of a coating on the tube surface. Furthermore, the addition of water to the tube resulted in a slight increase in collection efficiency. A sampling time of 5 h was feasible at 45-50% relative humidity before evaporation led to significant water loss. The cutoff size of 1.5 μm is comparable to many commercially available bioaerosol samplers. Besides being easy to use, simple to fabricate, and inexpensive, this novel sampler has several advantages over conventional samplers: long-term samples are possible (the limitation of impaction methods); there is no sample transfer loss since the transfer step has been eliminated (the limitation of filter cassettes); laboratory analyses are not dependent solely upon a single analysis method (the limitation of impaction methods), and there is no sampler adherence loss (the limitation of trying to wash microorganisms from filters). In addition, use of the sampler would be applicable in a variety of occupational settings from low bioaerosol concentrations (i.e., indoor environments) to high bioaerosol concentrations (i.e., agricultural setting) by varying sampling time periods and using sensitive analytical methods.

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Human Studies Category

Winner:

- **Title:** An evaluation of a "best practices" musculoskeletal injury prevention program in nursing homes
- **Authors:** Collins JW, Wolf L, Bell J, and Evanoff B
- **Source:** Injury Prevention, 10:206-211, 2004
- **Abstract:** **Objective** To conduct an intervention trial of a "best practices" musculoskeletal injury prevention program designed to safely lift physically dependent nursing home residents. **Design** A pre-post intervention trial and cost benefit analysis at six nursing homes from January 1995 through December 2000. The intervention was established in January 1998 and injury rates, injury related costs and benefits, and severity are compared for 36 months pre-intervention and 36 months postintervention. **Participants** A dynamic cohort of all nursing staff (n = 1728) in six nursing homes during a six year study period. **Intervention** "Best practices" musculoskeletal injury prevention program consisting of mechanical lifts and repositioning aids, a zero lift policy, and employee training on lift usage. **Main outcome measures** Injury incidence rates, workers' compensation costs, lost work day injury rates, restricted work day rates, and resident assaults on caregivers, annually from January 1995 through December 2000. **Results** There was a significant reduction in resident handling injury incidence, workers' compensation costs, and lost workday injuries after the intervention. Adjusted rate ratios were 0.39 (95% confidence interval (CI) 0.29 to 0.55) for workers' compensation claims, 0.54 (95% CI 0.40 to 0.73) for Occupational Safety and Health Administration (OSHA) 200 logs, and 0.65 (95% CI 0.50 to 0.86) for first reports of employee injury. The initial investment of \$158 556 for lifting equipment and worker training was recovered in less than three years based on post-intervention savings of \$55 000 annually in workers' compensation costs. The rate of post-intervention assaults on caregivers during resident transfers was down 72%, 50%, and 30% based on workers' compensation, OSHA, and first reports of injury data, respectively.

Conclusions The "best practices" prevention program significantly reduced injuries for full time and part time nurses in all age groups, all lengths of experience in all study sites.

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