

NIOSH Science and Service Awards 2022



Alice Hamilton Award for Occupational Safety and Health



Bullard-Sherwood Research to Practice (r2p) Award



The Director's Intramural Award for Extraordinary Science



James P. Keogh Award

This document is in the public domain and may be freely copied or reprinted.

Disclaimer

Mention of any company or product does not constitute endorsement by the National Institute for Occupational Safety and Health (NIOSH). In addition, citations to websites external to NIOSH do not constitute NIOSH endorsement of the sponsoring organizations or their programs or products. Furthermore, NIOSH is not responsible for the content of these websites. All Web addresses referenced in this document were accessible as of the publication date.

Get more information

Find NIOSH products and get answers to workplace safety and health questions:

1-800-CDC-INFO (1-800-232-4636) | TTY: 1-888-232-6348

CDC/NIOSH INFO: cdc.gov/info | cdc.gov/niosh

Monthly NIOSH eNews: cdc.gov/niosh/eNews

April 2022

NIOSH Science and Service Awards 2022

DEPARTMENT OF HEALTH AND HUMAN SERVICES
Centers for Disease Control and Prevention
National Institute for Occupational Safety and Health

Table of Contents

James P. Keough Award for Outstanding Service in Occupational Safety and Health	1
James P. Keough Awardee	2
Previous James P. Keough Awardees	3
Alice Hamilton Award for Occupational Safety and Health	4
Alice Hamilton Award Finalists	5
Alice Hamilton Awardees and Honorable Mentions.	10
Alice Hamilton Awards 2021 Updates.	25
Bullard-Sherwood Research to Practice Award	36
Bullard-Sherwood Research to Practice Finalists	37
Bullard-Sherwood Research to Practice Awardees and Honorable Mentions.	38
Plain Language Award.	43
Plain Language Award Finalists	44
Plain Language Awardees and Honorable Mentions.	45
Service Excellence Award	49
Service Excellence Award Finalists	50
Service Excellence Awardees	52
Director’s Intramural Award for Extraordinary Science.	57
Director’s Intramural Award for Extraordinary Science Finalists	58
Director’s Intramural Award for Extraordinary Science Awardees.	59
2022 NIOSH Nominations for the Charles C. Shepard Science Award	65
2022 NIOSH Nominee for the Shepard Lifetime Scientific Achievement Award.	67



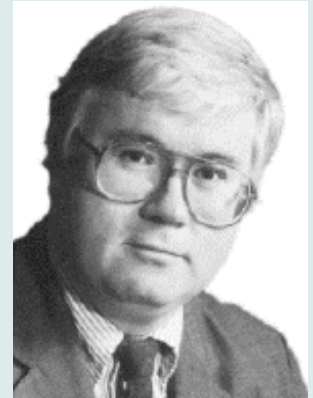
James P. Keogh Award for Outstanding Service in Occupational Safety and Health

James P. Keogh Award for Outstanding Service in Occupational Safety and Health

This award recognizes a current or former NIOSH employee for exceptional service in the field of occupational safety and health.

James P. Keogh, MD, worked throughout his life for peace and social change. He sought to safeguard workers through education about hazards, and he advocated workplace protections.

Dr. Keogh's earliest work in academic medicine identified dimethylaminopropionitrile as the causal agent in an outbreak of bladder neuropathy in the 1970s. Dr. Keogh could determine this because—unlike many of the clinicians initially contacted by the workers—he took their complaints seriously and applied clear public health principles to his investigation. Throughout his life, he listened carefully to workers, characterized hazards and diseases, and then fearlessly worked to identify compensation for the individual and prevention strategies for others. Dr. Keogh was instrumental in including construction workers in the Maryland Occupational Safety and Health lead standard, a full decade before the federal standard included them. He was a leading medical educator who always focused on the need to incorporate clinical compassion with public health prevention. His most outstanding legacy, however, was his fierce determination to put knowledge into practice to benefit the worker.



James P. Keogh Awardee

Dr. Alan Echt



Throughout his 30-year career at CDC/NIOSH, Dr. Alan Echt engaged in many difficult and exceptionally challenging research projects to address scientific problems in the field of occupational safety and health. While assigned to the Engineering and Physical Hazards Branch in the (what is now) Division of Field Studies and Engineering, he embarked on a career-defining line of research to reduce respirable crystalline silica exposures and prevent construction workers from developing silicosis, a progressive and often fatal lung disease marked by scarring and thickening of the lung tissue.

Dr. Echt led an extensive portfolio of research projects aimed at reducing worker exposure to respirable crystalline silica in the construction industry. He focused his research in the construction industry since many construction materials, such as brick, block, mortar, and concrete contain crystalline silica. Construction tasks that cut, break, grind, abrade, or drill those materials have been associated with overexposure to dust containing respirable crystalline silica.

One exceptionally difficult area where Dr. Echt focused his research was in tuckpointing (repointing) where workers use tools to remove damaged mortar from joints in masonry walls and replace it with new mortar to restore the wall. The use of grinders to remove mortar results in worker exposure to respirable crystalline silica 2 to 1,500 times higher than current occupational exposure limits. The tuckpointing issue is significant since it remains one of the highest occupational exposures to respirable crystalline silica today. Even with engineering controls (i.e., on-tool local exhaust ventilation) the use of a respirator with an assigned protection factor of 10 is still required.

To address this difficult problem, Dr. Echt partnered with the International Union of Bricklayers and Allied Craftworkers (BAC), International Council of Employers of Bricklayers and Allied Craftworkers, and International Masonry Institute, to establish the Masonry r2p (research to practice) Partnership in collaboration with the Center for Construction Research and Training. The Partnership made it possible for Dr. Echt to research tuckpointing at the BAC Southern Ohio-Kentucky Regional Training Center in Batavia, Ohio.

Dr. Echt led NIOSH teams in evaluating several new tools and technologies, including a die grinder with on-tool exhaust, a powered saw with a modified on-tool hood, a powered mortar-raking chisel with on-tool local exhaust ventilation, and a powered chisel with on-tool local exhaust ventilation and a higher-flow vacuum cleaner. Several of the tools tested by Dr. Echt and his team resulted in lower respirable crystalline exposures compared to grinders when evaluated under similar test parameters. Many of his solutions also removed mortar with similar speed and quality to that required by contractors and acceptable to workers. Dr. Echt's research resulted in alternatives to the use of grinders and addressed the significant occupational safety and health problem of worker exposure to respirable crystalline silica.

Previous James P. Keogh Awardees

2021: Maryann D'Alessandro

2020: Christopher Coffey

2019: Leslie Nickels

2018: Pete Kovalchik

2017: Diane Porter

2016: Thomas R. Waters

2015: Kathleen Kreiss

2014: Albert E. Munson

2013: Michael Attfield

2012: Alice Suter

2011: Linda Rosenstock

2010: James W. Collins

2009: John Howard

2008: Mitch Singal

2007: Steven Sauter

2006: Marilyn Fingerhut

2005: Rosemary Sokas

2004: Dawn Castillo

2003: James A. Merchant

2002: Philip J. Landrigan

2001: William Edward Halperin

2000: Richard A. Lemen

Alice Hamilton Award for Occupational Safety and Health

This award recognizes the scientific excellence of NIOSH technical and instructional materials. Categories include Behavioral and Social Science, Communication and Guidance, Engineering and Control, Epidemiology and Surveillance, Exposure and Risk Assessment, Methods and Laboratory Science, and Research Service. The annual award honors Dr. Alice Hamilton (1869–1970), a pioneering researcher and occupational physician.

Many early laws to improve workers' health derived from the work of one talented researcher—Alice Hamilton, MD. Born into a prominent Indiana family (her sister was the well-known classicist, Edith Hamilton), Dr. Hamilton graduated from the University of Michigan Medical School in 1893. After joining the Women's Medical School of Northwestern University in 1897, she moved into Jane Addams' Hull House in Chicago and opened a well-baby clinic for poor families in the neighborhood. There she began to study the underlying social problems related to their pains, strange deaths, lead palsy, "wrist drop," and many widowed women.

In 1908, Dr. Hamilton published one of the first articles on occupational health in the United States. Two years later, she began exploring occupational toxic disorders. Relying primarily on "shoe leather epidemiology," and the emerging science of toxicology, she pioneered occupational epidemiology and industrial hygiene in the United States. Her scientifically persuasive findings caused sweeping reforms to improve the health of workers.

In 1919, Dr. Hamilton became assistant professor of industrial medicine at Harvard Medical School and the school's first female faculty member. While there, she served two terms on the Health Committee of the League of Nations. Upon retiring from Harvard at age 66, she became a consultant to the U.S. Division of Labor Standards and president of the National Consumers League.

On February 27, 1987, NIOSH dedicated the Alice Hamilton Laboratory for Occupational Safety and Health, in Cincinnati, Ohio, in her honor.



Alice Hamilton Award Finalists

Finalists are listed alphabetically by nomination title.

Behavioral and Social Science

Heart Attacks, Bloody Noses, and Other “Emotional Problems”: Cultural and Conceptual Issues with the Spanish Translation of Self-Report Emotional Health Items

Flynn MA, Eggerth DE, Jacobson CJ Jr, Lyon SM [2021]. Heart attacks, bloody noses, and other “emotional problems”: cultural and conceptual issues with the Spanish translation of self-report emotional health items. *Fam Commun Health* 44(1):1-9.

Poor-Quality Employment and Health: How a Welfare Regime Typology with a Gender Lens Illuminates a Different Work-Health Relationship for Men and Women

Fujishiro K, Ahonen EQ, Winkler M [2021]. Poor-quality employment and health: how a welfare regime typology with a gender lens illuminates a different work-health relationship for men and women. *Soc Sci Med* 291:114484.

Precarious Work, Job Stress, and Health-Related Quality of Life

Bhattacharya A, Ray T [2021]. Precarious work, job stress, and health-related quality of life. *Am J Ind Med* 64(4):310-319.

Communication and Guidance

NIOSH at 50: A Special Report

Novakovich J, Lechliter J, Hamilton C, Collins S [2021]. NIOSH at 50: a special report. In: NIOSH bibliography of communication and research products 2020. By Lechliter J, Novakovich J, Collins S, Hamilton C, Fendinger S, Hornback D, Bennett W, Gran M, North K, Reuss V. Cincinnati, OH: U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health. DHHS (NIOSH) Publication No. 2021-114, pp. vii-liii.

Opioids in Construction – Part 3: Pathways to Recovery

NIOSH [2021]. Opioids in construction – part 3: pathways to recovery. Video. By Garza E, Magnafichi D, McCleery T, Earnest GS, Coop B, Novakovich J. Cincinnati, OH: U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health, <https://youtu.be/gsgbUQ2nKsE>.

Reaching “Hard to Reach” Workers: Evaluating Approaches to Disseminate Worker Safety Information via the Mexican Consular Network

Flynn MA, Eggerth DE, Keller BM, Check P [2021]. Reaching “hard to reach” workers: evaluating approaches to disseminate worker safety information via the Mexican consular network. *J Occup Environ Hyg* 18(4-5):180-191.

Engineering and Control

Application of Polyethylene Air-Bubble Cushions to Improve the Shock Absorption Performance of Type I Construction Helmets for Repeated Impacts

Wu JZ, Pan CS, Ronaghi M, Wimer BM, Reischl U [2021]. Application of polyethylene air-bubble cushions to improve the shock absorption performance of Type I construction helmets for repeated impacts. *Bio-Med Mater Eng* 32(1):1-14.

Efficacy of Portable Air Cleaners and Masking for Reducing Indoor Exposure to Simulated Exhaled SARS-CoV-2 Aerosols —United States, 2021

Lindsley WG, Derk RC, Coyle JP, Martin SB Jr, Mead KR, Blachere FM, Beezhold DH, Brooks JT, Boots T, Noti JD [2021]. Efficacy of portable air cleaners and masking for reducing indoor exposure to simulated exhaled SARS-CoV-2 aerosols — United States, 2021. *MMWR* 70(27):972–976.

New Technique to Evaluate Decontamination Methods for Filtering Facepiece Respirators

Vo E, Rengasamy S, Xu S, Horvatin M, Zhuang Z [2021]. New technique to evaluate decontamination methods for filtering facepiece respirators. *Am J Infect Control* 49(4):416-423.

Epidemiology and Surveillance

American Frontline Healthcare Personnel’s Access to and Use of Personal Protective Equipment Early in the COVID-19 Pandemic

Rich-Edwards JW, Ding M, Rocheleau CM, Boiano JM, Kang JH, Becene I, Nguyen LH, Chan AT, Hart JE, Chavarro JE, Lawson CC [2021]. American frontline healthcare personnel’s access to and use of personal protective equipment early in the COVID-19 pandemic. *J Occup Environ Med* 63(11):913-920.

Lessons Learned from the Development and Demonstration of a PPE Inventory Monitoring System for US Hospitals

Haas EJ, Casey ML, Furek A, Aldrich K, Ragsdale T, Crosswy S, Moore SM [2021]. Lessons learned from the development and demonstration of a PPE inventory monitoring system for US hospitals. *Health Secur* 19(6):582-591.

Occupational Physical Activity and Cardiovascular Disease in the United States

Quinn TD, Yorio PL, Smith PM, Seo Y, Whitfield GP, Gibbs BB [2021]. Occupational physical activity and cardiovascular disease in the United States. *Occup Environ Med* 78(10):724-730.

Workers' Compensation Claim Counts and Rates by Injury Event/Exposure among State-Insured Private Employers in Ohio, 2007–2017

Wurzelbacher SJ, Meyers AR, Lampl MP, Bushnell PT, Bertke SJ, Robins DC, Tseng C-Y, Naber SJ [2021]. Workers' compensation claim counts and rates by injury event/exposure among state-insured private employers in Ohio, 2007-2017. *J Saf Res* 79:148-167.

Exposure and Risk Assessment

Biomechanical Assessment while Using Production Tables on Mast Climbing Work Platforms

Pan CS, Ning X, Wimer B, Zwiener J, Kau T-Y [2021]. Biomechanical assessment while using production tables on mast climbing work platforms. *Appl Ergon* 90:103276.

Characterizing Exposures to Flame Retardants, Dioxins, and Furans among Firefighters Responding to Controlled Residential Fires

Mayer AC, Fent KW, Chen I-C, Sammons D, Toennis C, Robertson S, Kerber S, Horn GP, Smith DL, Calafat AM, Ospina M, Sjodin A [2021]. Characterizing exposures to flame retardants, dioxins, and furans among firefighters responding to controlled residential fires. *Int J Hyg Environ Health* 236:113782.

Maximizing Fit for Cloth and Medical Procedure Masks to Improve Performance and Reduce SARS-CoV-2 Transmission and Exposure, 2021

Brooks JT, Beezhold DH, Noti JD, Coyle JP, Derk RC, Blachere FM, Lindsley WG [2021]. Maximizing fit for cloth and medical procedure masks to improve performance and reduce SARS-CoV-2 transmission and exposure, 2021. *MMWR* 70(7):254–257.

New Metrics Needed in the Evaluation of Hearing Hazard Associated with Industrial Noise Exposure

Zhang M, Xie H, Zhou J, Sun X, Hu W, Zou H, Zhou L, Li J, Zhang M, Kardous CA, Morata TC, Murphy WJ, Zhang JH, Qiu W [2021]. New metrics needed in the evaluation of hearing hazard associated with industrial noise exposure. *Ear Hear* 42(2):290-300.

Methods and Laboratory Science

***Aspergillus versicolor* Inhalation Triggers Neuroimmune, Glial, and Neuropeptide Transcriptional Changes**

Ladd TB, Johnson JA Jr, Mumaw CL, Greve HJ, Xuei X, Simpson E, Barnes MA, Green BJ, Croston TL, Ahmed C, Lemons A, Beezhold DH, Block ML [2021]. *Aspergillus versicolor* inhalation triggers neuroimmune, glial, and neuropeptide transcriptional changes. *ASN Neuro* 13:1-20.

Histopathology of the Broad Class of Carbon Nanotubes and Nanofibers Used or Produced in U.S. Facilities in a Murine Model

Fraser K, Hubbs A, Yanamala N, Mercer RR, Stueckle TA, Jensen J, Eye T, Battelli L, Clingerman S, Fluharty K, Dodd T, Casuccio G, Bunker K, Lersch TL, Kashon ML, Orandle M, Dahm M, Schubauer-Berigan MK, Kodali V, Erdely A [2021]. Histopathology of the broad class of carbon nanotubes and nanofibers used or produced in U.S. facilities in a murine model. *Part Fibre Toxicol* 18:47.

Influenza Virus-Induced Novel miRNAs Regulate the STAT Pathway

Othumpangat S, Beezhold DH, Umbricht CM, Noti JD [2021]. Influenza virus-induced novel miRNAs regulate the STAT pathway. *Viruses* 13(6):967.

Research Service

Career Firefighter Killed, a Police Officer and a Civilian Wounded when They Were Shot during EMS Incident—Wisconsin

NIOSH [2021]. Career firefighter killed, a police officer and a civilian wounded when they were shot during EMS incident—Wisconsin. By Miles ST, Bowyer M, Chiu S, Hornsby-Myers J. Morgantown, WV: U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health, Fire Fighter Fatality Investigation and Prevention Report No. FACE-F2019-13.

Evaluation of Indoor Environmental Quality and Health Concerns among Employees of a Public Elementary School

NIOSH [2021]. Evaluation of indoor environmental quality and health concerns among employees of a public elementary school. By Feldmann KD, Rinsky J, Reynolds L. Cincinnati, OH: U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health, NIOSH Report No. HHE 2019-0156-3382.

Scientific Considerations for Potential Addition of Uterine Cancer to the List of Covered Conditions by the World Trade Center Health Program

World Trade Center Health Program [2021]. Scientific considerations for potential addition of uterine cancer to the list of covered conditions by the World Trade Center Health Program. By Carreón-Valencia T, Calvert G. Washington, DC: U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health, https://www.cdc.gov/wtc/pdfs/stac/ScientificConsiderationsUterineCancer_STAC.pdf.

Alice Hamilton Awardees and Honorable Mentions

Behavioral and Social Science Awardee

Precarious Work, Job Stress, and Health-Related Quality of Life

Bhattacharya A, Ray T [2021]. Precarious work, job stress, and health-related quality of life. *Am J Ind Med* 64(4):310-319.

Recent technological and work organization changes have resulted in an increased prevalence of nonstandard work arrangement types. One of the consequences has been an increased prevalence of precarious work. Our objective was to generate a scale to measure work precariousness in the United States and examine the associations between this study precariousness scale with job stress, unhealthy days, and days with activity limitations among U.S. workers from 2002 to 2014, to determine if precarious work adversely affects worker health. Our scale was inspired by the Employment Precariousness Scale that measures work precariousness reported by salaried workers and developed for the U.S. workforce. We used pooled cross-sectional data from 22 representative items from the General Social Survey, Quality of Work Life survey for the years 2002, 2006, 2010, and 2014. These data included 4,534 observations for analysis. We used regression models to examine associations between work precariousness and job stress, unhealthy days, and days with activity limitations. Statistically significant positive association existed between job stress and work precariousness. Workers reporting work precariousness were more likely to experience more days in poor physical and mental health and more days with activity limitations due to health problems. The results of our study provide support for our precariousness scale and its suitability for assessing the health-related quality of life of workers in different work arrangements.

Behavioral and Social Science Honorable Mention

Poor-Quality Employment and Health: How a Welfare Regime Typology with a Gender Lens Illuminates a Different Work-Health Relationship for Men and Women

Fujishiro K, Ahonen EQ, Winkler M [2021]. Poor-quality employment and health: how a welfare regime typology with a gender lens illuminates a different work-health relationship for men and women. *Soc Sci Med* 291:114484.

In the growing literature on employment quality and health, poor quality of employment is generally associated with poor health. This association may not be uniform for men and women if unpaid caregiving labor is taken into consideration. How paid and unpaid labor are performed varies across societies because of differences in both state support for families and labor market penalties for women. Applying a gender lens to a welfare regime typology, we investigated the relationship between poor-quality employment and poor health for men and women. For each of five welfare regime types, we hypothesized if men or women would be more strongly affected by poor-quality employment based on the regime's family support policies and labor practices. Our analysis of 18 countries using the 2015 European and American Working Conditions Surveys data supported our hypotheses. In countries that support traditional gender roles with high state expenditure and have labor markets that penalize women, the association between poor-quality employment and health was stronger for men. The association was stronger for women in countries that rely on women to provide unpaid caregiving without substantial state support. In countries with apparently gender-neutral expectations for both paid work and unpaid caregiving work, no difference was found between men and women in the association of poor-quality employment with poor health. We discuss the importance of institutional perspectives to understand work as a gendered experience that impacts health. We suggest more comprehensive welfare regime typologies that recognize women both as caregivers and workers. Expanding the scope of research on work and health to include this integrated view of life could make a stride toward gender health equity.



Communication and Guidance Awardee

Reaching “Hard to Reach” Workers: Evaluating Approaches to Disseminate Worker Safety Information via the Mexican Consular Network

Flynn MA, Eggerth DE, Keller BM, Check P [2021]. Reaching “hard to reach” workers: evaluating approaches to disseminate worker safety information via the Mexican consular network. *J Occup Environ Hyg* 18(4-5):180-191.

Mexican immigrants suffer a disproportionately large number of work-related injuries and deaths given their share of the workforce. Barriers of language, culture, and mistrust are often cited as factors that complicate efforts to reach these workers with occupational safety and health (OSH) interventions. By partnering with the Mexican government and its consulate network in the United States, researchers from NIOSH were able to assess the impact of four different information dissemination approaches (posters, passively distributed brochures, actively distributed brochures, and video kiosks) in Spanish in a five-phase study. Exit interviews conducted with Mexican immigrants seeking consular services indicated that, while nearly all respondents considered OSH to be important, significant differences in impact measures, such as noticing the materials and liking content, were found when comparing the different approaches. Despite these differences, even the least effective approaches were noticed by large numbers of individuals and significantly increased their stated behavioral intentions regarding OSH. Considering all materials together, significantly more participants reported liking the materials ($p < 0.001$) than did not, learning something new ($p < 0.01$), trusting the information ($p < 0.05$), intending to seek out additional OSH information ($p < 0.01$), and intending to speak to their bosses about OSH ($p < 0.05$). These findings contribute to building an evidence base for moving research knowledge into practice, which is an essential, but often overlooked, element of OSH research, particularly among workers from underserved communities.

Communication and Guidance Honorable Mention

Opioids in Construction – Part 3: Pathways to Recovery

NIOSH [2021]. Opioids in construction – part 3: pathways to recovery. Video. By Garza E, Magnafichi D, McCleery T, Earnest GS, Coop B, Novakovich J. Cincinnati, OH: U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health, <https://youtu.be/gsgbUQ2nKsE>.

Construction employers are overwhelmed with the spike in opioid overdoses. The industry is looking for ways to solve the problem. You need to learn what the resources are. The CDC has a lot of resources. Substance use disorder is manageable and treatable. It should not mean a lost job. The two things you need to do to get ahead of the crisis is to talk about it and get educated. NIOSH is developing workplace recovery programs. Employers and workers together can solve this problem.

Engineering and Control Awardee

New Technique to Evaluate Decontamination Methods for Filtering Facepiece Respirators

Vo E, Rengasamy S, Xu S, Horvatin M, Zhuang Z [2021]. New technique to evaluate decontamination methods for filtering facepiece respirators. *Am J Infect Control* 49(4):416-423.

A major concern among health care experts is a shortage of N95 filtering facepiece respirators (FFRs) during a pandemic. One option for mitigating an FFR shortage is to decontaminate and reuse the devices. The focus of this study was to develop a new evaluation technique based on three major decontamination requirements: (1) inactivating viruses, (2) not altering the respirator properties, and (3) not leaving any toxic byproduct on the FFR. Hydrophilic and hydrophobic FFRs were contaminated with *Escherichia coli* bacteriophage MS2 virus. In the solution-based deposition, the virus-containing liquid droplets were spiked directly onto FFRs, while in the vapor-based and aerosol-based depositions, the viral particles were loaded onto FFRs using a bio-aerosol testing system. Ultraviolet germicidal irradiation (UVGI) and moist heat (MH) decontamination methods were used for inactivation of viruses applied to FFRs. Both UVGI and MH methods inactivated viruses (>5-log reduction of MS2 virus; in 92% of both method experiments, the virus was reduced to levels below the detection limit), did not alter the respirator properties, and did not leave any toxic byproduct on the FFRs. Both UVGI and MH methods could be considered as promising decontamination candidates for inactivation of viruses for respirator reuse during shortages.

Engineering and Control Honorable Mention (1 of 2)

Application of Polyethylene Air-Bubble Cushions to Improve the Shock Absorption Performance of Type I Construction Helmets for Repeated Impacts

Wu JZ, Pan CS, Ronaghi M, Wimer BM, Reischl U [2021]. Application of polyethylene air-bubble cushions to improve the shock absorption performance of Type I construction helmets for repeated impacts. *Bio-Med Mater Eng* 32(1):1-14.

Helmet use was considered to be one of the important prevention strategies employed on construction sites. The shock absorption performance of a construction (or industrial) helmet is its most important performance parameter. Industrial helmets will experience cumulative structural damage when impacted repeatedly with impact magnitudes greater than its endurance limit. The current study is to test if the shock absorption performance of Type I construction helmets subjected to repeated impacts can be improved by applying polyethylene air-bubble cushions to the helmet suspension system. Drop impact tests were performed following the ANSI Z89.1 Type I drop impact protocol. Typical off-the-shelf Type I construction helmets were evaluated. A 5mm thick air-bubble cushioning liner was placed between the headform and the helmet to be tested. Helmets were impacted 10 times at different drop heights from 0.61 to 1.73m. The effects of the air-bubble cushioning liner on the helmets' shock absorption performance were evaluated by comparing the peak transmitted forces collected from the original off-the-shelf helmet samples to the helmets equipped with air-bubble cushioning liners. Results showed that a typical Type I construction helmet can be subjected to repeated impacts with a magnitude less than 22J (corresponding to a drop height 0.61m) without compromising its shock absorption performance. In comparison, the same construction helmet, when equipped with an air-bubble cushioning liner, can be subjected to repeated impacts of a magnitude of 54J (corresponding to a drop height 1.52m) without compromising its shock absorption performance. The results indicate that the helmet's shock absorbing endurance limit has been increased by 145% with addition of an air-bubble cushioning liner.

Engineering and Control Honorable Mention (2 of 2)

Efficacy of Portable Air Cleaners and Masking for Reducing Indoor Exposure to Simulated Exhaled SARS-CoV-2 Aerosols — United States, 2021

Lindsley WG, Derk RC, Coyle JP, Martin SB Jr, Mead KR, Blachere FM, Beezhold DH, Brooks JT, Boots T, Noti JD [2021]. Efficacy of portable air cleaners and masking for reducing indoor exposure to simulated exhaled SARS-CoV-2 aerosols — United States, 2021. *MMWR* 70(27):972–976.

Ventilation systems can be supplemented with portable high efficiency particulate air (HEPA) cleaners to reduce the number of airborne infectious particles. A simulated infected meeting participant who was exhaling aerosols was placed in a room with two simulated uninfected participants and a simulated uninfected speaker. Using two HEPA air cleaners close to the aerosol source reduced the aerosol exposure of the uninfected participants and speaker by up to 65%. A combination of HEPA air cleaners and universal masking reduced exposure by up to 90%. Portable HEPA air cleaners can reduce exposure to simulated SARS-CoV-2 aerosols in indoor environments, especially when combined with universal masking.

Epidemiology and Surveillance Awardee

Workers' Compensation Claim Counts and Rates by Injury Event/Exposure among State-Insured Private Employers in Ohio, 2007–2017

Wurzelbacher SJ, Meyers AR, Lampl MP, Bushnell PT, Bertke SJ, Robins DC, Tseng C-Y, Naber SJ [2021]. Workers' compensation claim counts and rates by injury event/exposure among state-insured private employers in Ohio, 2007-2017. *J Saf Res* 79:148-167.

This study analyzed workers' compensation (WC) claims among private employers insured by an Ohio state-based WC carrier to identify high-risk industries by detailed cause of injury. A machine-learning algorithm coded each claim by US Bureau of Labor Statistics (BLS) event/exposure. Codes assigned to lost-time (LT) claims with lower algorithm probabilities of accurate classification or LT claims with high costs were manually reviewed. WC data were linked with state unemployment insurance data to identify employer's industry and number of employees. BLS hours worked/employee data were used to estimate full-time equivalents (FTE) and calculate WC claims rates per 100 FTE. 140,780 LT claims and 633,373 medical-only claims were analyzed. Although counts and rates of LT WC claims declined from 2007 to 2017, shares of leading LT injury event/exposures remained largely unchanged. LT claims due to Overexertion and Bodily Reaction (33.0%) were most common, followed by Falls, Slips, and Trips (31.4%), Contact with Objects and Equipment (22.5%), Transportation Incidents (7.0%), Exposure to Harmful Substances or Environments (2.8%), Violence and Other Injuries by Persons or Animals (2.5%), and Fires and Explosions (0.4%). Findings are consistent with other reported data. Proportions of injury event/exposures varied by industry, and high-risk industries were identified. Injuries have been reduced, but prevention challenges remain in certain industries. Available evidence on intervention effectiveness was summarized and mapped to analysis results to demonstrate how results can guide prevention efforts. Employers, safety/health practitioners, researchers, WC insurers, and bureaus can use these data and machine-learning methods to understand industry differences in level and mix of risks, and industry trends, and to tailor safety, health, and disability prevention services and research.

Epidemiology and Surveillance Honorable Mention

American Frontline Healthcare Personnel's Access to and Use of Personal Protective Equipment Early in the COVID-19 Pandemic

Rich-Edwards JW, Ding M, Rocheleau CM, Boiano JM, Kang JH, Becene I, Nguyen LH, Chan AT, Hart JE, Chavarro JE, Lawson CC [2021]. American frontline healthcare personnel's access to and use of personal protective equipment early in the COVID-19 pandemic. *J Occup Environ Med* 63(11):913-920.

The purpose of this study was to quantify adequacy of personal protective equipment (PPE) for U.S. healthcare personnel (HCP) at the outset of the COVID-19 pandemic and its association with infection risk. We used data from the March–May 2020 survey of the national Nurses' Health Studies and the Growing Up Today study regarding self-reported PPE access, use, and reuse. COVID-19 endpoints included SARS-CoV-2 tests and COVID-19 status predicted from symptoms. Nearly 22% of 22,232 frontline HCP interacting with COVID-19 patients reported sometimes or always lacking PPE. Fifty percent of HCP reported not needing respirators, including 13% of those working in COVID-19 units. Lack of PPE was cross-sectionally associated with two-fold or greater odds of COVID-19 among those who interacted with infected patients. These data show the need to improve the U.S. infection prevention culture of safety when confronting a novel pathogen.

Exposure and Risk Assessment Awardee

New Metrics Needed in the Evaluation of Hearing Hazard Associated with Industrial Noise Exposure

Zhang M, Xie H, Zhou J, Sun X, Hu W, Zou H, Zhou L, Li J, Zhang M, Kardous CA, Morata TC, Murphy WJ, Zhang JH, Qiu W [2021]. New metrics needed in the evaluation of hearing hazard associated with industrial noise exposure. *Ear Hear* 42(2):290-300.

This study evaluates accuracy of International Organization for Standardization (ISO) standard ISO 1999 accuracy for predictions of noise-induced permanent threshold shift (NIPTS) in workers exposed to various types of high-intensity noise levels, and the role of kurtosis metric in assessing noise-induced hearing loss (NIHL). Audiometric and shift-long noise exposure data were acquired from a population (N = 2,333) of screened workers from 34 industries in China. The cohort was divided into subgroups based on four noise exposure levels, two exposure durations, and four kurtosis categories. Predicted NIPTS was calculated using ISO 1999 model for each participant and actual measured NIPTS was corrected for age and sex using ISO 1999. Prediction accuracy of ISO 1999 model was evaluated by comparing NIPTS predicted by ISO 1999 with actual NIPTS. The relation between kurtosis and NIPTS was investigated. Using average NIPTS value across four audiometric test frequencies, ISO 1999 predictions significantly ($p < 0.001$) underestimated NIPTS by 7.5 dB on average in participants exposed to Gaussian noise and by 13.6 dB on average in participants exposed to non-Gaussian noise with high kurtosis. The extent of underestimation of NIPTS by ISO 1999 increased with increase in noise kurtosis value. For a fixed range of noise exposure level and duration, actual measured NIPTS increased as kurtosis of noise increased. Noise with kurtosis greater than 75 produced highest NIPTS. Applicability of ISO 1999 prediction model to different types of noise exposures needs to be carefully reexamined. A better understanding of the role of kurtosis metric in NIHL may lead to its incorporation into a new and more accurate model of hearing loss due to noise exposure.

Exposure and Risk Assessment Honorable Mention

Biomechanical Assessment while Using Production Tables on Mast Climbing Work Platforms

Pan CS, Ning X, Wimer B, Zwiener J, Kau T-Y [2021]. Biomechanical assessment while using production tables on mast climbing work platforms. *Appl Ergon* 90:103276.

The objective of this study was to assess the impact of using alternative mast climbing work platform (MCWP) designs on trunk motion and postural stability with masonry workers while performing bricklaying and stepping down tasks using a conventional MCWP setting (i.e., with a step deck) as well as two types of production tables (straight- and L-shaped). The trunk angles and postural sway parameters of 25 masonry workers were recorded for the following tasks: (1) standing on a simulated MCWP and laying bricks on an adjacent wall, and (2) stepping down onto the step deck to get into position for doing the bricklaying task. Results indicated that the use of the L-shaped production table resulted in the lowest trunk ranges of motion and significantly reduced the workers' trunk angles in all three planes when compared to both the straight-shaped production table and the conventional approach of not using a production table. Data showed that both body sway velocity and area were significantly reduced when using either one of the production tables. The use of production tables significantly reduced impact sway forces when workers stepped from the main platform to the step deck. The use of production tables on MCWPs improved workers' postures and overall stability, which could reduce the risk of injury.

Methods and Laboratory Science Awardee

***Aspergillus versicolor* Inhalation Triggers Neuroimmune, Glial, and Neuropeptide Transcriptional Changes**

Ladd TB, Johnson JA Jr, Mumaw CL, Greve HJ, Xuei X, Simpson E, Barnes MA, Green BJ, Croston TL, Ahmed C, Lemons A, Beezhold DH, Block ML [2021]. *Aspergillus versicolor* inhalation triggers neuroimmune, glial, and neuropeptide transcriptional changes. *ASN Neuro* 13:1-20.

Increasing evidence associates indoor fungal exposure with deleterious central nervous system (CNS) health, such as cognitive and emotional deficits in children and adults, but the specific mechanisms by which it might impact the brain are poorly understood. Mice were exposed to filtered air, heat-inactivated *Aspergillus versicolor* (3×10^5 spores), or viable *A. versicolor* (3×10^5 spores) via nose-only inhalation exposure 2 times per week for 1, 2, or 4 weeks. Analysis of cortex, midbrain, olfactory bulb, and cerebellum tissue from mice exposed to viable *A. versicolor* spores for 1, 2, and 4 weeks revealed significantly elevated pro-inflammatory (Tnf and Il1b) and glial activity (Gdnf and Cxc3r1) gene expression in several brain regions when compared to filtered air control, with the most consistent and pronounced neuroimmune response 48H following the 4-week exposure in the midbrain and frontal lobe. Bulk RNA-seq analysis of the midbrain tissue confirmed that 4 weeks of *A. versicolor* exposure resulted in significant transcriptional enrichment of several biological pathways compared to the filtered air control, including neuroinflammation, glial cell activation, and regulation of postsynaptic organization. Upregulation of *Drd1*, *Penk*, and *Pdyn* mRNA expression was confirmed in the 4-week *A. versicolor* exposed midbrain tissue, highlighting that gene expression important for neurotransmission was affected by repeated *A. versicolor* inhalation exposure. Taken together, these findings indicate that the brain can detect and respond to *A. versicolor* inhalation exposure with changes in neuroimmune and neurotransmission gene expression, providing much needed insight into how inhaled fungal exposures can affect CNS responses and regulate neuroimmune homeostasis.

Methods and Laboratory Science Honorable Mention

Histopathology of the Broad Class of Carbon Nanotubes and Nanofibers Used or Produced in U.S. Facilities in a Murine Model

Fraser K, Hubbs A, Yanamala N, Mercer RR, Stueckle TA, Jensen J, Eye T, Battelli L, Clingerman S, Fluharty K, Dodd T, Casuccio G, Bunker K, Lersch TL, Kashon ML, Orandle M, Dahm M, Schubauer-Berigan MK, Kodali V, Erdely A [2021]. Histopathology of the broad class of carbon nanotubes and nanofibers used or produced in U.S. facilities in a murine model. *Part Fibre Toxicol* 18:47.

Multi-walled carbon nanotubes and nanofibers (CNT/F) have been previously investigated for potential toxicities; however, comparative studies of the broad material class are lacking, especially those with larger diameter. Computational modeling correlating physicochemical characteristics and toxicity outcomes have been infrequently employed, and it is unclear if all CNT/F confer similar toxicity, including histopathology changes such as pulmonary fibrosis. Male C57BL/6 mice were exposed to one of nine CNT/F (MW#1–7 and CNF#1–2) found in exposure assessment studies of U.S. facilities with diameters ranging from 6 to 150nm. Human fibroblasts were used to assess predictive value of in vitro to in vivo modeling systems. All materials induced histopathology changes, types and magnitude of changes varied. Larger diameter MWs and CNF#1 induced greater histopathology changes compared to MW#1 and #3 while MW#4 and CNF#2 were intermediate in effect. Differences in individual alveolar or bronchiolar outcomes and severity correlated with physical dimensions and how materials agglomerated. Human fibroblast monocultures were found to be insufficient to replicate in vivo fibrosis outcomes suggesting in vitro predictive potential depends upon more advanced cell culture in vitro models. Pleural penetrations were observed more consistently in CNT/F with larger lengths and diameters. Physicochemical characteristics, notably nominal CNT/F dimension and agglomerate size, predicted histopathologic changes and enabled grouping of materials by toxicity profiles. Particles of greater nominal tube length were associated with increased severity of histopathology outcomes. Larger particle lengths and agglomerates were associated with more severe bronchi/bronchiolar outcomes. Spherical agglomerated particles of smaller nominal tube dimension were linked to granulomatous inflammation while a mixture of smaller and larger dimensional CNT/F resulted in more severe alveolar injury.

Research Service Awardee

Scientific Considerations for Potential Addition of Uterine Cancer to the List of Covered Conditions by the World Trade Center Health Program

World Trade Center Health Program [2021]. Scientific considerations for potential addition of uterine cancer to the list of covered conditions by the World Trade Center Health Program. By Carreón-Valencia T, Calvert G. Washington, DC: U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health, https://www.cdc.gov/wtc/pdfs/stac/ScientificConsiderationsUterineCancer_STAC.pdf.

The World Trade Center (WTC) Health Program provides medical monitoring and treatment benefits for health conditions on the List of WTC-Related Health Conditions (the List). The List currently includes aerodigestive disorders, mental health conditions, musculoskeletal disorders, and cancers. The List was established in the Zadroga Act. New health conditions may be added to the List by rulemaking. The Program's regulatory provisions in 42 C.F.R. Part 88, the WTC Health Program Policy and Procedures for Adding Types of Cancer to the List of WTC-Related Health Conditions governs evaluation of evidence supporting potential addition of a type of cancer to the List. Uterine cancer is currently the only type of cancer not included in the WTC Health Program's List of WTC-Related Conditions. In September 2020, the WTC Health Program received a submission to add uterine cancer to the List. The medical basis for the submission was the contributing role of endocrine disrupting chemicals (EDCs) on incidence rate of uterine cancers. Although this submission did not meet the Program's petition requirements, the Administrator instructed WTC Health Program staff to review evidence for uterine carcinogenicity by EDCs and other 9/11 agents. This document provides WTC Health Program's assessment of currently available evidence to support adding uterine cancer to the List. In addition to directing the Science Team to assess available evidence supporting addition of uterine cancer to the List, the Administrator is seeking advice of the Scientific/Technical Advisory Committee (STAC) for a recommendation regarding whether there is reasonable basis for adding uterine cancer to the List. The Administrator will evaluate the STAC's advice and will take an appropriate action after receipt of the recommendation.

Research Service Honorable Mention

Career Firefighter Killed, a Police Officer and a Civilian Wounded when They Were Shot during EMS Incident—Wisconsin

NIOSH [2021]. Career firefighter killed, a police officer and a civilian wounded when they were shot during EMS incident—Wisconsin. By Miles ST, Bowyer M, Chiu S, Hornsby-Myers J. Morgantown, WV: U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health, Fire Fighter Fatality Investigation and Prevention Report No. FACE-F2019-13.

A career firefighter was killed, and a police officer and a civilian were injured after being shot while on an emergency medical services (EMS) incident involving a patient who overdosed. The firefighter and crew were dispatched with a private ambulance company. A police officer was first on scene. The unconscious patient was treated with naloxone by a paramedic and regained consciousness. A second police officer arrived after the patient walked off the bus. First responders believed the patient would need additional medical assistance and should be transported to a local hospital. The patient produced a concealed handgun and began firing at the responders. The patient/shooter and police officers exchanged gun fire. One firefighter was shot by the patient/shooter, was transported to a local hospital and pronounced dead. A police officer was shot while returning gun fire. The patient/shooter took a civilian bystander as a hostage and continued to fire until the patient/shooter was shot. The civilian hostage was shot. The patient/shooter was secured, provided medical treatment, transported to a local hospital and pronounced dead. The wounded police officer and civilian were treated at local hospitals and recovered. First responders and agencies who deliver medical assistance to patients who overdose should train staff on standard operating procedures (SOPs) for naloxone administration. Fire, EMS, and police departments should take steps to help ensure scene safety. Authorities Having Jurisdiction should consider developing SOPs or guides specifying when a patient should receive a pat down and when a patient might be restrained. SOPs should be operationalized, trained, and exercised by law enforcement, the fire service, and EMS as part of a Unified Command response.

Alice Hamilton Awards 2021 Updates

Behavioral and Social Science

Occupational injury and psychological distress among U.S. workers: the National Health Interview Survey, 2004-2016

Gu JK, Charles LE, Fekedulegn D, Ma CC, Violanti JM, Andrew ME [2020]. Occupational injury and psychological distress among U.S. workers: the National Health Interview Survey, 2004–2016. *J Saf Res* 74:207–217.

Injuries at work may negatively influence mental health due to lost or reduced working hours and financial burden of treatment. Our objective was to investigate, the prevalence of serious psychological distress (SPD) by injury status (occupational, non-occupational, and no injury) and injury characteristics, and the association between injury status and SPD in U.S. workers. Self-reported injuries within the previous three months were collected annually for 225,331 U.S. workers in the National Health Interview Survey (2004-2016). Psychological distress during the past 30 days was assessed using the Kessler 6 (K6) questions with Likert-type scale (0-4, total score range: 0-24). SPD was defined as K6 \geq 13. Prevalence ratios from fitted logistic regression models were used to assess relationships between injury and SPD after controlling for covariates. The prevalence of SPD was 4.74%, 3.58%, and 1.56% in workers reporting occupational injury (OI), non-occupational injury (NOI), and no injury, respectively. Workers with head and neck injury had the highest prevalence of SPD (Prevalence: OI=7.71%, NOI=6.17%), followed by workers with scrape/bruise/burn/bite (6.32% for those with OI). Workers reporting OI were two times more likely to have SPD compared to those without injury (PR=2.19, 95% CI: 1.62-2.96). However, there was no significant difference in SPD between workers with OI and workers with NOI (PR=0.98, 95% CI: 0.65-1.48). The prevalence of SPD varied by injury status with the highest being among workers reporting OI. We found that the workers reporting OI were significantly more likely to have SPD than those without injury, but not more than those with NOI. Mental health management programs by employers are necessary for workers who are injured in the workplace.

Communication and Guidance

3D printing with metal powders: Health and safety questions to ask

NIOSH [2020]. 3D printing with metal powders: health and safety questions to ask. By Glassford E, Dunn KL, Dunn KH, Hammond D, Tyrawski J. Cincinnati, OH: 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. 2020-114.

This poster was designed to help workers recognize potential hazards associated with metal powder 3D printing and explore ways to reduce these hazards in their work environments. This poster poses key health and safety questions for users of 3D printers to consider when using metal powders as a 3D-printing material. As users work through the key questions, the poster introduces best practices for all phases of the 3D printing operation.

The Advanced Materials and Manufacturing Field Studies Team (AMMFST) who helped produce the poster through fieldwork experience, has conducted 20 on-site assessments for over 10 different companies using 3D-printing technology since 2017. These assessments helped us gain knowledge about exposures and controls in real-world settings and produce this general guidance for workplaces considering the addition of both metal powder 3D printing, and a companion poster covering filament 3D printing [NIOSH Publication Number 2020-115].

The poster has been downloaded over 800 times since its publication. From the start of the 2017 field work and the publication of this poster, the AMMFST has used the data gathered on these early assessments to produce four additional related publications (listed below), and two NIOSH numbered documents that are currently in review. The AMMFST plans to continue with in-person assessments in the near future, collecting additional data to build upon these early successes.

Dunn KL, Hammond D, Menchaca K, et al. “Reducing ultrafine particulate emission from multiple 3D printers in an office environment using a prototype engineering control.” [J Nanopart Res (2020) 22:112] <https://doi.org/10.1007/s11051-020-04844-4>.

Dunn KL, Dunn, KH, Hammond D, et al. “Three-dimensional printer emissions and employee exposures to ultrafine particles during the printing of thermoplastic filaments containing carbon nanotubes or carbon nanofibers.” J Nanopart Res 22, 46 (2020). <https://doi.org/10.1007/s11051-020-4750-8>.

Dunn KL, Hammond D, Tyrawski J, Duling M (2018, August 16). “Characterizing 3D Printing Emissions and Controls in an Office Environment” [Blog Post] Retrieved from <https://blogs.cdc.gov/niosh-science-blog/2018/08/16/3d-printing/>.

NIOSH [2018]. 3D printing with metal powders: health and safety questions to ask. By Glassford E, Dunn KL, Dunn KH, Tyrawski J. Cincinnati, OH: 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. 2018-103 <https://doi.org/10.26616/NIOSH PUB2018103>.



COVID-19 Communication (1 of 2)

Interim Guidance for Businesses and Employers Responding to Coronavirus Disease 2019 (COVID-19) Update.

Dahm M, Delaney L, Dowell C, Dunn KL, Edmonson M, Garcia A, King B, Martin S, Mead K, Novicki E, Shugart J, Topmiller J. Interim Guidance for Businesses and Employers Responding to Coronavirus Disease 2019 (COVID-19).

The Interim Guidance for Businesses and Employers was the first CDC document published on general business worker safety and health at the onset of the COVID-19 response. Throughout the response CDC and NIOSH have contributed to the development of updated guidance and support documents to help businesses respond to the pandemic. Currently, NIOSH maintains 27 web pages ranging in topics from testing and ventilation to personal protective equipment optimization strategies and types of masks and respirators. In January 2021, the Occupational Safety and Health Administration (OSHA) developed [Protecting Workers: Guidance on Mitigating and Preventing the Spread of COVID-19 in the Workplace](#), which provided updated guidance and recommendations and outlined existing applicable safety and health standards. Additionally, OSHA issued an Emergency Temporary Standard (ETS) on Vaccination and Testing in November 2021. NIOSH provided technical assistance to OSHA as they developed the ETS and updated their COVID-19 guidance to align with new CDC recommendations. With the availability of workplace guidance from OSHA NIOSH archived the Interim Guidance for Businesses and Employers, along with a number of other workplace communication products developed in the early days of the response. NIOSH plans to convert this business guidance into a general pandemic planning webpage to support future non-COVID-19 response efforts.

COVID-19 Communication (2 of 2)

Optimizing the Supplies of Personal Protective Equipment (PPE) Supplies

Bell M, Bergman M, Britton J, Casey M, Christensen B, Cichowicz J, Cole G, Dahm M, de Perio M, D'Alessandro M, Delaney L, Dowell C, Dunn KL, Edmonson M, Fazio G, Fisher E, Forrester C, Fries M, Fritz JE, Greenawald L, Gupta N, Harris J, Harney J, Kallen A, Kilinc-Balci FS, Kosmoski C, Kuhar D, Metzler R, Niemeier RT, Norton E, Patel A, Pillai S, Radonovich L, Schaefer M, Stein R, Tyrawski J, Young M. Optimizing Personal Protective Equipment (PPE) Supplies.

During the COVID-19 pandemic, shortages of personal protective equipment (PPE) posed tremendous challenges to the U.S. healthcare system, compromising the health and safety of 18 million healthcare personnel (HCP). The team developed the [PPE Burn Rate Calculator](#) and [PPE Tracker App](#) for employers to assess current PPE stock and consumption rate. Using the framework of surge capacity, the team also developed strategies to optimize supplies of PPE in healthcare settings according to conventional, contingency, and crisis capacity while maximizing the level of protection offered to HCP. The team published a series of webpages with strategies to optimize supplies of N95 and other respirators, isolation gowns, facemasks, eye protection, and gloves. Throughout the pandemic, these strategies have been periodically updated according to emerging science and feedback from stakeholders and partners.

The strategies highlighted the critical need to increase supplies of PPE to protect HCP and helped spur increased production. In May 2021, in light of the increasing supply and availability of NIOSH-approved respirators, CDC issued a [situational update](#) that healthcare facilities should promptly resume conventional practices. The announcement was made in conjunction with the Food and Drug Administration decisions to revoke the emergency use authorizations for non-NIOSH-approved disposable respirators and for decontamination systems in June–July 2021. As surges from the Delta and Omicron variants have occurred, healthcare facilities have had to transition between conventional and contingency capacity strategies to conserve their PPE supplies.

From April 2020–January 2022, the app has been downloaded over 23,000 times by users in 147 countries. From February 2020–January 2022, the suite of optimizing PPE strategies webpages have collectively totaled over 18.7 million page views. The team is working on adapting these strategies for use in other pandemic and disaster situations, and resources will be placed on [NIOSH's emergency preparedness webpage](#).

COVID-19 Research

Filtering Facepiece Respirators with an Exhalation Valve: Measurements of Filtration Efficiency to Evaluate Their Potential for Source Control

NIOSH [2020]. Filtering facepiece respirators with an exhalation valve: measurements of filtration efficiency to evaluate their potential for source control. By Portnoff L, Schall J, Brannen J, Suhon N, Strickland K, Meyers J. Cincinnati, OH: 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. 2021-107.

The exhalation valve study of filtering facepiece respirators (FFRs) was completed—from conception to finish—in four months. The technical report (NIOSH Publication Number 2021-107) summarizes NIOSH research to provide improved science-based recommendations on the use of FFRs with an exhalation valve. A concern with FFRs with an exhalation valve is that individuals may spread disease if unfiltered, virus-laden aerosols pass through the valve. This project showed that FFRs with an exhalation valve provide respiratory protection to the wearer and can also reduce particle emissions to levels similar to or better than those provided by surgical masks, procedure masks, or cloth face coverings. This critical finding continues to influence CDC guidance and recommendations related to FFRs.

Engineering and Control

Reducing ultrafine particulate emission from multiple 3D printers in an office environment using a prototype engineering control.

Dunn KL, Hammond D, Menchaca K, Roth G, Dunn KH [2020]. Reducing ultrafine particulate emission from multiple 3D printers in an office environment using a prototype engineering control. *J Nanoparticle Res* 22(5):112.

3D printing is a rapidly growing industry. Studies show that workers are being exposed to emissions from 3D printing processes and suffering health effects. While there are commercially available engineering controls, most of them cost more than the printers themselves. With these issues in mind, the objective was to develop controls that would be affordable and available to all. We worked with one of the world's largest manufacturers of desktop 3D printers to develop a low-cost engineering control that could be retrofitted to one of their most common 3D printers. Several components of the control can be fabricated using a 3D printer and combined with an off-the-shelf fan, filter, and hose for a cost of less than \$60 and reduces ultrafine particle concentrations by more than 98%.

Since publishing the paper, the instructions and part files for building this control were published on the National Institutes of Health (NIH) [3D print exchange](#) (under model #: 3DPX-015467) to make them free and available to download. In addition, the company has added filtration to a new line of printers which achieved [UL GREENGUARD certification](#).

We are continuing to develop low-cost engineering controls for three additional desktop 3D printers from other manufacturers, and preliminary results indicate 91%- 99% reduction in ultrafine particles when these various 3D printers are equipped with the custom, retrofitted control. These solutions are similarly able to be fabricated with a 3D printer and commercially available components, costing under \$60 per 3D printer to implement, and will also be released on the NIH 3D Print Exchange upon completion of this work.

Population-based age adjustment tables for use in occupational hearing conservation programs

Flamme GA, Deiters KK, Stephenson MR, Themann CL, Murphy WJ, Byrne DC, Goldfarb DG, Zeig- Owens R, Hall C, Prezant DJ, Cone JE [2020]. Population-based age adjustment tables for use in occupational hearing conservation programs. *Int J Audiol* 59(Suppl 1):S20–S30.

In occupational hearing conservation programs, workers exposed to hazardous noise levels have annual hearing tests to identify significant changes, trigger interventions, and report adverse worker health outcomes. Age adjustments (a.k.a. “age corrections”) are sometimes used to account for changes in hearing sensitivity assumed to be due to inevitable effects of aging rather than noise exposure. NIOSH developed a set of age adjustment tables in its initial 1972 noise criteria document based on the best available science at the time. However, the tables used cross-sectional data from relatively small numbers of people and were insufficient to address demographic variations, covered age-related changes only through age 60, and were not validated using longitudinal data.

The study published in 2020 derived an updated set of population-based age adjustment tables using data from the National Health and Nutrition Examination Survey (NHANES) and validated them using a retrospective longitudinal cohort of noise-exposed workers. Differences in age-related hearing loss trajectories were observed in males compared to females and non-Hispanic Blacks compared to other race-ethnicities. As a result, four tables were developed describing population-based hearing changes across ages 18-85 years for each gender/race-ethnicity combination. Tabled adjustment factors matched median longitudinal changes in the validation dataset well.

Future work involves extending the analysis to include data from additional NHANES cycles, comparison of age adjustment values from the general population to samples screened for significant otologic or noise exposure history, and further validation on other longitudinal datasets. These efforts are planned in conjunction with updating the NIOSH noise criteria document.

Exposure and Risk Assessment

Exposures and Emissions in Coffee Roasting Facilities and Cafes: Diacetyl, 2,3-Pentanedione, and Other Volatile Organic Compounds

LeBouf RF, Blackley BH, Fortner AR, Stanton M, Martin SB, Groth CP, McClelland TL, Duling MG, Burns DA, Ranpara A, Edwards N, Fedan KB, Bailey RL, Cummings KJ, Nett RJ, Cox-Ganser JM, Virji MA [2020]. Exposures and emissions in coffee roasting facilities and cafés: diacetyl, 2,3-pentanedione, and other volatile organic compounds. *Front Public Health* 8:561740.

This study described occupational emissions and personal exposures to alpha-diketones and other volatile organic compounds (VOCs) at 17 coffee roasting and packaging facilities that included 10 cafés. Comprehensive exposure assessments focused on collecting instantaneous measurements for evaluating peak exposures, short-duration task measurements that identify high exposure tasks for prioritizing interventions, and full-shift measurements to assess personal exposures for epidemiologic investigations were conducted. An advanced Bayesian data analysis method was used to summarize exposures by jobs, tasks, and activities, and to provide uncertainty values to truly appreciate the possible range of the exposures of interest.

With comprehensive exposure datasets, the Bayesian method used for summarizing exposures to model determinants of exposure by identifying and quantifying factors affecting short-duration and full-shift exposures to alpha-diketones continue to be extended. These models can identify factors that increase or decrease exposures and can be used to prioritize interventions to mitigate exposures.

Our exposure assessment strategy facilitates several exposure metrics to be generated to explore multiple questions on the nature of the exposure-response relationships in epidemiologic analyses of various respiratory health outcomes such as upper or lower respiratory symptoms, disease diagnoses, spirometry and impulse oscillometry parameters, and fractional exhaled nitric oxide values. These models can address questions regarding the relevance of peak, average, and cumulative exposure intensity and duration of exposure, or the role of individual versus combined alpha-diketones and other VOC mixtures on adverse respiratory health outcomes.

A companion study was published describing the rationale and approach for our exposure and health assessment strategy, and we are in the process of preparing several manuscripts on exposure and health modeling directly stemming from the initial paper.

Methods and Laboratory Science

Resolution of pulmonary inflammation induced by carbon nanotubes and fullerenes in mice: role of macrophage polarization

Lim CS, Porter DW, Orandle MS, Green BJ, Barnes MA, Croston TL, Wolfarth MG, Battelli LA, Andrew ME, Beezhold DH, Siegel PD, Ma Q [2020]. Resolution of pulmonary inflammation induced by carbon nanotubes and fullerenes in mice: role of macrophage polarization. *Front Immunol* 11:1186.

Deposition of inhaled particulates or engineered nanomaterials (ENMs) in the lung stimulates inflammation and reparative responses to clear the deposits and repair tissue damage. Recent findings reveal that the timely resolution of inflammation is essential for the proper repair and recovery of lung structure and function following injury. Unresolved inflammation would fuel overzealous wound healing, leading to fibrosis and tumorigenesis.

Prior to this study, how inflammation in the lung is resolved upon inhalation of particulates has been an unexplored area in the context of lung fibrosis and cancer. This study aimed to identify pro-resolving mechanisms during the inflammatory and fibrogenic responses to exposure of nanoparticles in mouse lungs.

Since its completion, two new studies are pursued to better understand the resolution of lung inflammation elicited by ENMs at tissue, cell, and molecular levels. First, the interactions between inhaled ENMs and inflammatory/immune cells in the lung are analyzed by *in vivo* imaging and real-time visualization. Second, molecular pathways mediating the time-dependent macrophage polarization, inflammation, and its resolution are analyzed *in vitro* with cultured cells.

Collectively, current findings have revealed certain new aspects of how pro-resolving responses are regulated to promote repair and recovery from exposure of toxic particulates. The studies have translational potentials for identification of markers of exposure and toxicity and targets of prevention and therapy against lung diseases caused by particles and ENMs.

Research Service

Evaluation of Occupational Exposures to Illicit Drugs at Forensic Sciences Laboratories

NIOSH [2020]. Evaluation of occupational exposures to illicit drugs at forensic sciences laboratories. By Broadwater KR, Jackson DA, Li JF. Cincinnati, OH: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health, NIOSH Report No. HHE-2018-0116-3370.

The NIOSH Health Hazard Evaluation program published the results of an assessment of drug exposures among forensic scientists in 2020. This work found that forensic scientists were exposed to the four drugs assessed on surfaces, in air, and on hands: methamphetamine, heroin, fentanyl, and cocaine. In scientists' urine, we found Methamphetamine, fentanyl, and cocaine, and their metabolites were found in the forensic scientists' urine. When asked, employees reported they had not experienced symptoms related to exposures to these drugs. The results of this project have been presented at the 2021 American Industrial Hygiene Conference and Exposition and at the 2022 Symposium on Current Trends in Forensics & Forensic Toxicology. Some findings were also included in the following publication:

Basham C, Cerles A, Rush M, Alexander-Scott M, Greenawald L, Chiu S, Broadwater K, Hirst D, Snawder J, Roberts J, Weber A, Knuth M, Casagrande R [2021]. Occupational safety and health and illicit opioids: state of the research on protecting against the threat of occupational exposure. *New Solut* 31(3):315-329.

Researchers in the NIOSH Division of Field Studies and Engineering and Western States Division are developing proposals to further evaluate these exposures and possible health effects among forensic scientists in a broader selection of forensic laboratories.

Bullard-Sherwood Research to Practice Award

This award recognizes outstanding efforts by NIOSH scientists and their partners in applying occupational safety and health research to prevent work-related injury, illness, and death. It highlights efforts that demonstrate noteworthy impact through partnerships.

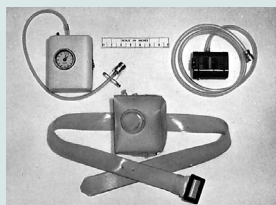


The award is named in honor of two distinguished inventors who made significant improvements in workplace injury and illness prevention.

Edward W. Bullard designed the first “hard hat” as protective headgear for miners with his “Hard Boiled Hat,” so-called due to the steam used to harden it during manufacturing. Later, he adapted his helmet to protect workers building the Golden Gate Bridge from falling rivets, leading to the bridge site becoming the first designated “Hard Hat Construction Area.” Mr. Bullard also designed and sold another helmet specifically to protect sandblasting workers at the bridge site. Similar to the Hard Boiled Hat, this helmet included a hood, or “canopy,” a see-through window, and an air supply. The helmets helped to prevent death and injury during the project and in the years since. Even so, 11 workers died at the bridge site—including 10 in 1937 when a scaffold collapsed. Today, about 6 million hard hats are sold annually throughout the world. Mr. Bullard’s family-owned company still produces many of those hard hats, as well as modern sandblasting helmets.



A Golden Gate construction worker wears a Bullard “hard boiled hat” in this photograph, circa 1936. Credit: Labor Archives and Research Center, J. Paul Leonard Library, San Francisco State University



The personal air sampler system designed by R. Jeremy Sherwood, as it appeared in a 1960 *Annals of Occupational Hygiene* article announcing its invention. From: Sherwood RJ, Greenhalgh DMS [1960]. A personal air sampler. *Ann Occup Hyg* 2:127–132, <https://doi.org/10.1093/annhyg/2.2.127>.

R. Jeremy (Jerry) Sherwood merged research and industrial hygiene by inventing the first practical personal sampling pump in the late 1950s. Until then, sampling occurred in a specific area, or while an industrial hygienist followed a worker while carrying bulky equipment. Using the newly developed personal sampling pump, Mr. Sherwood demonstrated that area sampling often severely underestimated worker exposures. Soon, personal sampling pumps became the staple that they are today. He also developed a miniature sampler for sulfur dioxide that became commercially available and was widely used throughout Europe. Finally, his research on respirators led to the first fit testing. While at the International Labour Organization and later at the World Health Organization, Mr. Sherwood trained others in occupational safety and health, particularly in developing countries, benefiting workers around the world.

Bullard-Sherwood Research to Practice Finalists

Finalists are listed alphabetically by project name.

Intervention

Development of Engineering Guidelines for Shale Gas Wells Influenced by Longwall Mining

Su W, Dougherty H, Schatzel S, Harris M, Kimutis R, Zhang P, Ajayi K, Khademian Z, Kim B, Van Dyke M, Watkins E, Addis J, Minoski T, Hollerich C, Perera E, Homer J, Murphy M, Slaker B

NIOSH COVID-19 IPA Program: Expanding Occupational Health and Safety Expertise Through External Partnerships

Glassford E, Kardous C, Papes D, Dwyer R, Castillo D, McKernan L, Armenti K, Bahnfleth W, Baker M, Ball C, Benishek L, Bonney T, Brown C, Butler-Dawson J, Caban-Martinez A, Cali S, Caporali S, Casanova V, Ceballos D, Choi S, Dale A, Davis K, Doerr A, Gerr F, Gladics A, Guyette F, Halverson C, Harrison R, Hegmann K, Huyhn T, Jaramillo D, Krisher L, Krum A, Le A, Levin J, Martin C, Martin-Gill C, Montgomery D, Moore K, Morris G, Neitzel R, Nessim D, Newman L, Nylander-French L, Ochran T, Parvanta C, Patterson D, Pratap P, Reponen T, Reynolds K, Roberts N, Roy N, Sembajwe G, Shapiro D, Staley J, Stracener E, Tenney L, Thiese M, Wang J, Wood E, Attwood W, Brueck S, Charles M, D'Alessandro M, Dahm M, Delaney L, Dowell C, Dunn KH, Earnest G, Eastlake A, Echt H, Flynn M, Forrester C, Garza E, Grant M, Hill R, Johns D, King B, Kitt M, Lincoln JM, Marsh S, Mead K, Niemeier R, Niemeier-Walsh C, Quinn T, Ramsey J, Schulte P, Shumate A, Sieber W, Spring C, Sussell A, Sweeney M, Tyrawski J, Weissman D

Knowledge

OSHA-NIOSH Small Business Safety and Health Handbook

Jacklitsch B, Lawrence B, Hagemann M, Cunningham T, Burnett G, Hamilton B, Farquah O, Burbick M, Dobson Y, Lee J, Headley T

Updating ISO Standard 11228-1 for Preventing Work-related Musculoskeletal Disorders

Lu M, Alveraz-Casado E, Colombini D, Fox R, Jaeger M, Occhipinti E, Sagmeister L, Zana J

Technology

Engineering Controls for Additive Manufacturing/3D Printing (NTRC)

Dunn KL, Dunn KH, Menchaca K, Hammond D, Roth G

Bullard-Sherwood Research to Practice Awardees and Honorable Mentions

Intervention Awardee

Development of Engineering Guidelines for Shale Gas Wells Influenced by Longwall Mining

Su W, Dougherty H, Schatzel S, Harris M, Kimutis R, Zhang P, Ajayi K, Khademian Z, Kim B, Van Dyke M, Watkins E, Addis J, Minoski T, Hollerich C, Perera E, Homer J, Murphy M, Slaker B

Over the past two decades, approximately 1,500 unconventional shale gas wells have been drilled through active and future coal reserves in Pennsylvania, West Virginia, and Ohio. Under certain conditions, the high gas pressure and volume of these wells in combination strata deformations associated with longwall coal mining could damage well casings and potentially introduce high-pressure, high-volume explosive gas into underground mine workings. This occurrence jeopardizes underground miners' safety and health, and public safety and health if the gas reaches surface dwellings and water wells. Current regulations governing gas well pillar stability issues, such as the 1957 Pennsylvania Gas Well Pillar Regulation, are outdated and no longer provide adequate protection. Agencies, however, have been unable to make necessary updates due to a critical lack of relevant scientific data.

In response, NIOSH engaged and coordinated with partners on a monthly basis to understand regulatory and operational issues and needs, and timely transfer NIOSH research findings. With this close coordination and cooperation, a critical partnership was formed with two gas operators to conduct the expensive subsurface caliper survey data collection. NIOSH, in turn, conducted data interpretation and modeling analysis. Ultimately, the team developed and disseminated critical engineering guidelines for longwall-induced subsurface deformations, gas well casing cementing alternatives, gas well setback distance, potential shale gas inflow and migration, and separating shale gas from coalbed methane. As a result, these guidelines are being used by the federal and state regulatory agencies and coal and gas operators to make the necessary updates to the current gas well pillar regulations to safeguard miner safety and health, as well the safety and health of public and gas workers.

Intervention Honorable Mention

NIOSH COVID-19 IPA Program: Expanding Occupational Health and Safety Expertise Through External Partnerships

Glassford E, Kardous C, Papes D, Dwyer R, Castillo D, McKernan L, Armenti K, Bahnfleth W, Baker M, Ball C, Benishek L, Bonney T, Brown C, Butler-Dawson J, Caban-Martinez A, Cali S, Caporali S, Casanova V, Ceballos D, Choi S, Dale A, Davis K, Doerr A, Gerr F, Gladics A, Guyette F, Halverson C, Harrison R, Hegmann K, Huyhn T, Jaramillo D, Krisher L, Krum A, Le A, Levin J, Martin C, Martin-Gill C, Montgomery D, Moore K, Morris G, Neitzel R, Nessim D, Newman L, Nylander -French L, Ochrán T, Parvanta C, Patterson D, Pratap P, Reponen T, Reynolds K, Roberts N, Roy N, Sembajwe G, Shapiro D, Staley J, Stracener E, Tenney L, Thiese M, Wang J, Wood E, Attwood W, Brueck S, Charles M, D'Alessandro M, Dahm M, Delaney L, Dowell C, Dunn KH, Earnest G, Eastlake A, Echt H, Flynn M, Forrester C, Garza E, Grant M, Hill R, Johns D, King B, Kitt M, Lincoln JM, Marsh S, Mead K, Niemeier R, Niemeier-Walsh C, Quinn T, Ramsey J, Schulte P, Shumate A, Sieber W, Spring C, Sussell A, Sweeney M, Tyrawski J, Weissman D

As most people spend the majority of time at work, occupational environments have been critical to long-term efforts to contain COVID-19. Throughout the pandemic, occupational safety and health expertise has been needed to assist employers, workers, state and local government agencies and public health officials with responding to the evolving COVID-19 pandemic. To address this need, the NIOSH COVID-19 Intergovernmental Personnel Act (IPA) Program created a national network through IPA agreements with occupational safety and health experts, including 54 subject matter experts from 32 different universities and centers across 24 states and territories. This flexible and responsive program evolved with the needs of the pandemic, adding new experts to the IPA network to address emergent gaps such as vaccination hesitancy and ventilation. Since inception, the NIOSH COVID-19 IPA program has assisted NIOSH, employers, workers, government and public health officials with responding to the COVID-19 pandemic by conducting specialty research and surveillance on targeted areas of interest such as vaccine hesitancy among specific worker groups; conducting outreach, education, and trainings for various industry stakeholders; responding to requests for expert speakers; providing virtual assistance to local businesses; and helping update NIOSH guidance documents. IPA projects have reached 30 different industry groups or occupations, including: first responders, construction workers, mariners, nail salon employees, meat processing employees, surgeons, remote and temporary workers, truckers, courthouse employees, entertainment workers, and more. Over 100 different research and surveillance projects and outreach initiatives have also been conducted since the start of the program, reaching over 325,000 people through IPA-led trainings and presentations, views and downloads of communication materials and research articles, social media impressions, news coverage, and more.

Knowledge Awardee

Updating ISO Standard 11228-1 for Preventing Work-related Musculoskeletal Disorders

Lu M, Alveraz-Casado E, Colombini D, Fox R, Jaeger M, Occhipinti E, Sagmeister L, Zana J

Musculoskeletal disorders, especially low back disorders (LBDs), are a significant health problem and economic burden in the workplace. LBDs have been shown to be primarily caused by forceful or repetitive manual lifting and handling. In 1993, NIOSH published a paper to guide safety professionals and workers on how to lift manually to reduce the risk of LBDs using the revised NIOSH lifting equation (RNLE). In 2003, the International Organization for Standardization (ISO) adopted the RNLE and expanded their standard 11228-1 (Manual handling part 1: Lifting, lowering and carrying) to include additional lifting risk factors for setting exposure limits to manual lifting. Since then, however, there has been no clear guidance on how to interpret the lifting exposure limits in relation to the risk of LBDs in the standard.

To address this gap, an ISO workgroup consisting of NIOSH and other multinational subject matter experts worked collaboratively to develop new guidance on interpreting lifting risk data calculated by the formulas used in the standard. As a result the standard has been updated and now provides important guidance in using lifting risk information in terms of the protected working population. The combination of the workgroup's hands-on research experience, industry understanding and expertise in various fields from different countries has greatly contributed to the success of updating the ISO standard and maximizing its impact.

To date, the updated standard has been included in many ergonomic training materials and adopted by the European Committee for Standardization and many countries as their national standards. In the absence of the national standard, many industry stakeholders in the United States have also adapted the updated standard to protect workers from lifting-related LBDs.

Knowledge Honorable Mention

OSHA-NIOSH Small Business Safety and Health Handbook

Jacklitsch B, Lawrence B, Hagemann M, Cunningham T, Burnett G, Hamilton B, Farquah O, Burbick M, Dobson Y, Lee J, Headley T

While a majority of U.S. businesses are considered small businesses (fewer than 20 employees), this is a population that is notoriously difficult to reach with occupational safety and health information, as they often do not have assistance from safety and health professionals. Small businesses are also restricted by their limited resources—both time and finances. As safety and health may not always take priority, small businesses are also burdened with higher injury and fatality rates.

Last updated in 2005, the Occupational Safety and Health Administration (OSHA) Small Business Safety and Health Handbook documents the benefits of an effective safety and health program, provides self-inspection checklists for employers to identify workplace hazards, and reviews key workplace safety and health resources for small businesses. The handbook is one of the most visited publications on the OSHA website. Recently, however, OSHA had received feedback from small businesses and those that work with small businesses indicating a need to update the content. Concurrently, NIOSH had collected feedback over the years on occupational safety and health products that could be applicable when updating products such as the handbook. With these complementary sources of information and a history of successful collaboration on the topic of small business safety and health, the two agencies partnered to not only update the content but improve the usability of the small business handbook.

Following publication, OSHA and NIOSH implemented a broad dissemination strategy, resulting in more 4,800 downloads of the updated handbook from the OSHA and NIOSH websites in the first five months since publication. Additionally, OSHA and NIOSH intend to continue collaborations on new checklist topics for the next edition of the handbook.

Technology Awardee

Engineering Controls for Additive Manufacturing/3D Printing (NTRC)

Dunn KL, Dunn KH, Menchaca K, Hammond D, Roth G

Three-dimensional (3D) printing is a rapidly growing technology currently used in many settings including industry, schools, laboratories, and hospitals. Recent studies show that workers are being exposed to 3D printing emissions including ultrafine particles and volatile organic compounds and suffering respiratory and cardiovascular health effects as a result of those exposures. Prior to NIOSH research in this area, low-cost engineering controls to reduce worker exposures to 3D printing emissions were not commercially available.

To demonstrate the possibility of low-cost engineering controls for 3D printer emissions, NIOSH engineers collaborated with one of the world's largest manufacturers of 3D printers to develop a low-cost control that could be retrofitted to one of the most common 3D printers on the market. A unique aspect of the design is that several components can be fabricated using a 3D printer in a "print-your-own-control" fashion and then combined with an off-the-shelf fan, filter, and hose to build a control that costs less than \$60 to reduce 3D printing emissions by more than 98%. Instructions and part files are now publicly available on the [NIH 3D print exchange](#) to be freely downloaded and assembled by any 3D printing user. Additionally, our collaboration with an industry leading manufacturer of 3D printers led to the further research and development of engineering controls that are now offered by the manufacturer with the purchase of their most popular new 3D printers. Further translating research into practice, the company later approached Underwriters Laboratory and achieved [GREENGUARD Certification](#) of their clean air system that was based on NIOSH recommendations.

Plain Language Award

The Plain Writing Act of 2010 requires that federal agencies provide clear communication that the public can understand and use. NIOSH encourages plain language in all of its communication products.

Established in 2017, this award recognizes NIOSH fact sheets, brochures, infographics, and web topic pages that demonstrate excellence in applying plain language principles.

Awards are given in two categories:

Before and After: Recognizes a revised NIOSH-branded brochure, infographic, fact sheet, or web topic page that includes both an original, difficult to read version and the revised version that uses plain language principles. Judges consider the improvements.

Original: Recognizes a NIOSH-branded brochure, infographic, fact sheet, or web topic page created originally using plain language principles.



Plain Language Award Finalists

Finalists are listed alphabetically by project name.

Before and After

The Respiratory Protection Information Trusted Source

Fries M, Kiederer M, Micciche M, Cichowicz J

What Workers Should Know about Histoplasmosis

De Perio M, Coffey C, Di Giuseppe M, Kirby E, Lybrand E, Wanstreet A, Benedict K

Workplace Safety and Health Topics – Occupational Cancer

Velazquez-Kronen R, Hartle G, Whelan E

Original

How to tell if your N95 Respirator is NIOSH Approved

Cichowicz J, Andrews A, Fries M

Law Enforcement Agencies: How to Prevent Motor Vehicle Collisions

Tiesman H, Knuth R

World Trade Center Health Program Young Adult Interest Page

Iker K, Romero N, Morgan C, Spring I, Bossie C

Plain Language Awardees and Honorable Mentions

Before and After Awardee

The Respiratory Protection Information Trusted Source

Fries M, Kiederer M, Micciche M, Cichowicz J

Since 2009, *The Respiratory Protection Information Trusted Source* has become the authoritative resource on respirators domestically and abroad. This webpage was originally developed in response to the 2009 H1N1 Influenza Pandemic and provides answers to frequently asked questions ranging from basic respirator facts to more complex subjects on respirator function and performance. In response to the over 7,400 COVID-19 public inquiries addressed by division staff, new knowledge gained from NIOSH research during the pandemic, and a broader, non-occupational audience, health communication staff began the process of revising *The Respiratory Protection Trusted Source* in 2021 using plain language principles.

Before and After Honorable Mention

What Workers Should Know about Histoplasmosis

De Perio M, Coffey C, Di Giuseppe M, Kirby E, Lybrand E, Wanstreet A, Benedict K

What Workers Should Know about Histoplasmosis is a plain language fact sheet that informs workers about histoplasmosis in the United States and ways to protect themselves from exposure in the workplace. Workers can use this fact sheet to understand what histoplasmosis is, to recognize activities that might expose them to *Histoplasma*, and to protect themselves from exposure. This fact sheet is the result of an update to the 2005 version of the (more technical) booklet *Histoplasmosis – Protecting Workers at Risk*, originally published in 1997. In September 2020, the Protecting Workers from Histoplasmosis Team convened to update and enhance NIOSH guidance for employers and workers on preventing work-related histoplasmosis in the United States.

Original Awardee

Law Enforcement Agencies: How to Prevent Motor Vehicle Collisions

Tiesman H, Knuth R

Motor vehicle-related incidents are a leading cause of line-of-duty deaths for law enforcement officers in the United States—many of them are also preventable. Yet, for many officers and agency leaders, the focus on officer safety is usually centered on the prevention of intentional assaults and firearm deaths. While these are also important topics, motor vehicle safety should also be considered in an agency's overall safety and health profile.

This fact sheet uses plain language principles to highlight the risk of motor vehicle collisions for law enforcement officers and makes recommendations on safe driving strategies for agencies and officers based on evidence from a large evaluation study.

Original Honorable Mention

How to tell if your N95 Respirator is NIOSH Approved

Cichowicz J, Andrews A, Fries M

During the course of the COVID-19 pandemic, there has been significant confusion among workers, employers, as well as the general public, as to what a NIOSH-approved respirator is. For many individuals, the pandemic marked the first time they learned what a respirator is or how NIOSH is involved in respiratory protection. Complicating this situation is the significant number of counterfeit respirators on the market and abundant misinformation regarding how to properly wear these devices. To address these issues, NIOSH communication staff developed a simple fact sheet that incorporates plain language principles to clearly communicate with very diverse audiences.

Service Excellence Award

These awards focus on both the management and operations side of the Institute and recognize NIOSH staff who provide excellent administrative and managerial support to the Institute's mission and projects.

The awards recognize distinction in four categories:

Excellence in Administration recognizes one current NIOSH employee or group of NIOSH employees each year for exceptional administrative support. This award honors the contributions made by employees in administrative occupations to increase the effectiveness or efficiency of a division, laboratory, or office.

Excellence in Leadership recognizes one current NIOSH employee per grade grouping (GS-14 and above, GS-11 to GS-13, and GS-9 and below) each year for exceptional personal leadership. This award honors the efforts made by employees to exhibit leadership at NIOSH.

Excellence in Workforce Development recognizes one current NIOSH employee or group of NIOSH employees each year for exceptional contributions that promote development of the NIOSH workforce. This award acknowledges those who mentor, teach, promote, or design activities that develop the workforce.

Excellence in Workforce Diversity recognizes one current NIOSH employee or group of NIOSH employees each year whose actions promote the creation and support of a diverse NIOSH workforce. This award acknowledges those whose efforts promote the recognition and value of diversity, including recognition of health equity issues.



Service Excellence Award Finalists

Finalists are listed alphabetically by nominee or team name.

Excellence in Administration

Michael Beaty, Respiratory Health Division

Teresa Kneipp, Division of Science Integration

Lewis Underwood, Office of the Director

Shelly West, Western States Division

Excellence in Leadership

GS-14 and above

Andrea Steege, Division of Field Studies and Engineering

GS-11 to GS-13

Jennica Bellanca, Pittsburgh Mining Research Division

Lee Greenawald, National Personal Protective Technology Laboratory

Taylor Shockey, Division of Field Studies and Engineering

Miriam Siegel, Division of Field Studies and Engineering

GS-9 and below

No nominations were submitted for this category.

Excellence in Workforce Development

Occupational Medicine Rotation Program Team, Division of Field Studies and Engineering

Eisenberg J, Chiu S, Patel N

Kellie Pierson, Office of the Director

Adam K. Smith, National Personal Protective Technology Laboratory

Jennifer Tyrawski, Division of Field Studies and Engineering

Workforce Development Team, National Personal Protective Technology Laboratory

Greenawald L, Fisher E, Palya F, Szalajda J, Peterson J, Smith A, D'Alessandro M, Moore S

Excellence in Workforce Diversity

Pamela Graydon, Division of Field Studies and Engineering

Sarah Mitchell, Office of the Director

NIOSH Blueprint for Action Transition Team & Blueprint in Action Network

Roberts R, Reeves K, Jones B, Cornell J, Reddick Brown J, Banks K, Carlson K, Kocher L, Maples E, Chubb L, Grubb P, Watts S, Burgos Z, Chang C, Fechter-Leggett E, Dougherty H, Bourgeois J, Graydon P, Powell M, Daniells K, Ajayi K, Syron L, Chaumont-Menendez C, Dugdale Z, Edmondson M, Broadwater K, Carreon-Valencia T, Battelli L, Hughes S, Levine N, Li J, Bahrami D, Caruso D, Elliott K, Jenkins B, Larsen M, Novicki E, Ribble C, Shoeb M, Sieber W, Steege A, Sussell A, Uebel C, Walker R

Service Excellence Awardees

Excellence in Administration Awardee

Lewis Underwood, Office of the Director



Mr. Underwood has made outstanding contributions in implementing and managing NIOSH administration programs and functions related to human resource and human capital management during an emergency hiring effort due to the COVID-19 pandemic. The overall challenge was to increase the effectiveness and efficiency of human capital and talent management goals and objectives in NIOSH. Despite the lapse in filling vacancies for critical positions, Mr. Underwood was proactive in partnering with HRO staff and division, laboratory, and office leadership in identifying positions, ensuring justifications were supportable, and submitting actions with appropriate documentation in a timely manner. Due to his leadership, there was a record number of new hires for 2020.

Because of his expertise in administrative programs, Mr. Underwood was able to identify problem areas or issues and develop positive methods for addressing, correcting, and streamlining processes and procedures. He led several efforts that resulted in:

- Emergency COVID-19 funding received by NIOSH and approval to hire 21 positions for the COVID effort
- An evaluation process that appropriately classified Title 5 researchers so they would be eligible for peer review promotion considerations and qualified to continue the NIOSH research mission
- A significant reduction in the rate of routing and approval issues for Title 42 packages
- A streamlined Title 42 peer review process that significantly reduced the workload associated with conducting Peer Review Panels
- The identification of strategic mechanisms that can be utilized to decrease the overall time to hire in filling a high volume of positions
- Quality applicant pools for making hiring selections

These results will allow NIOSH to recruit and retain the high-quality staff needed to accomplish its multi-faceted mission.

Excellence in Leadership: GS-14 and above Awardee

Andrea Steege, Division of Field Studies and Engineering

In 2017, Dr. Steege developed a National Occupational Research Agenda (NORA) proposal to modernize the National Occupational Mortality Surveillance (NOMS) system by integrating coded industry and occupation (I&O) data into the National Center for Health Statistics (NCHS) National Vital Statistics System (NVSS). NVSS is a CDC system that obtains real-time death data, with the goals of expanding NOMS to all states and jurisdictions and making data available for analysis within two years.



In 2021, Dr. Steege and her team reached a huge milestone when 47 jurisdictions submitted I&O text to NCHS as part of their death certificate data. Under her leadership, census codes and groupings for I&O were updated to include four new fields in the 2020 mortality multiple cause-of-death file, and resources were updated to help funeral directors record the most accurate I&O data on death certificates. She also worked closely with NCHS on a part-time detail to produce the document titled, *Industry and Occupation (I&O) data as applicable to mortality vital statistics, 2020: History, Background, and Control Tables* to inform NVSS users how to use these new data fields.

Integration of the I&O variables into NVSS has transformed NOMS into a key part of the main national death surveillance system. The latest NOMS data will be added to the interactive NIOSH Worker Health Charts website for researchers to explore cause of death by occupation or industry, stratified by sex and race/ethnicity. Dr. Steege's leadership of the NOMS project team has truly transformed this NIOSH surveillance program.

Excellence in Leadership: GS-11 to GS-13 Awardee

Jennica Bellanca, Pittsburgh Mining Research Division

Ms. Bellanca volunteered for the first rotation of acting Deputy Director during a challenging time of transition for the Pittsburgh Mining Research Division, while her leadership and expertise were still required to keep her research projects on track. With little preparation or guidance, she was called upon to make critical decisions and take actions that would have significant impact on the successful rollout of the new organizational structure and evolving processes.



Ms. Bellanca provided significant mentorship and leadership by example to the next generation of project leaders while empowering research team members to take greater ownership of key tasks. Ms. Bellanca identified areas for improvement in budget and human resources elements and implemented a system for tracking and communicating critical statuses, improving decision-making at all levels of the organization. Concurrently with her detail duties, she provided targeted assistance on ongoing research projects. She continued to provide guidance and feedback for the virtual reality mine rescue software project, which provides state-of-the-art simulated training to industry-critical first responders, in collaboration with MSHA. As the principal investigator for the Haul Truck Safety project, she played the vital role of primary interviewer. This effort resulted in over 40 hour-long virtual interviews with front-line operators, maintenance personnel, trainers, and managers that were critical to the project's success.

Ms. Bellanca's selfless leadership and generosity has a significant impact on the quality of the workplace for her research teammates, the success of the Mining Program realignment and research project objectives, and NIOSH's mission. She leverages these exemplary efforts to elevate not only herself, but her whole team, inspiring them to perform at their best.

Excellence in Workforce Development Awardee

Kellie Pierson, Office of the Director

The Human Capital Management Office (HCMO) identified a recent gap in core competency training for the NIOSH workforce due to a lack of funding to conduct training for non-Atlanta employees. Historically, NIOSH would select vendors and offer in-person training at the various sites. However, due to funding constraints and the inability to offer in-person training due to the pandemic, HCMO identified the need to offer virtual classes across NIOSH to build and strengthen core competencies.



As a result of this need Ms. Kellie Pierson developed a new Signature Series for Employee Development that provides a variety of courses to employees meant to develop core competencies that support successful performance on job duties including communication, collaboration and partnering, decision-making, teamwork, and other important competencies. Ms. Pierson worked with CDC University to develop 22 unique courses offered between May and September 2021. She created the course announcements, marketed the new program, tracked attendance, and developed content for the new series intranet site. Her dedication and marketing of the new series lead to the employee development courses being offered 29 times with a total of 395 employees attending the courses in 2021. The new Signature Series accounted for over 6,000 training hours earned by the NIOSH workforce.

As a result of Ms. Pierson's efforts, the Signature Series for Employee Development has been established as a permanent training series for NIOSH employees. She is currently developing the curriculum for the 2022 series.

Excellence in Workforce Diversity Awardee

NIOSH Blueprint for Action (BFA) Transition Team and Blueprint in Action (BIA) Network



The NIOSH BFA Transition Team (“The Team”) and BIA Network (“The Network”) made numerous contributions to support the advancement of the NIOSH-wide Blueprint, which addresses seven diversity, equity, and inclusion (DEI) challenges identified through the BFA strategic planning process.

The Team helped launch the Diversity, Equity, and Inclusion Office the first NIOSH office specifically dedicated to DEI and the BIA. Within a short timeframe, the Team also developed and populated a Candidate Sourcing Tool (CAST) with information for over 700 organizations and groups to assist the NIOSH Division, Laboratories and Offices (DLO) with their diversity outreach and job recruitment efforts. The Team’s actions had significant reach and impact, and all DEI events organized by the Team were well-received as evidenced by favorable reviews from attendees.

The Network built upon this work by enriching the CAST’s organizational contact information, conducting a user assessment to improve its usability and continuing to develop and deliver DEI programming and produce useful DEI tools.

The Team and Network provided an unprecedented number of DEI events to NIOSH staff, including events to commemorate Dr. Martin Luther King, Jr. Day, Black History Month, and Women’s History Month. They provided the first of two virtual career and leadership development forums. Further, NIOSH leaders reported that they either had or planned to utilize the tools generated by the combined efforts of the Team and Network to promote DEI with their staff or integrate them into DLO policies, procedures, and practices over time.

Director's Intramural Award for Extraordinary Science

Science excellence is the foundation upon which NIOSH generates new knowledge to assure safe and healthful work for all.

This award recognizes the outstanding contributions and dedication of NIOSH staff to science excellence. The award honors experienced scientists, early career scientists, and scientific support staff whose collective body of work has resulted in significant contributions to the NIOSH mission.



The **Lew Wade Distinguished Career Scientist Award** recognizes a permanent employee or fellow who has made extraordinary scientific contributions to their field of work.

The **Early Career Scientist Award** recognizes a permanent employee or fellow who has received an initial terminal degree in a scientific discipline within the past five years prior to nomination.

The **Scientific Support Award** recognizes technical or administrative staff who are permanent employees or fellows that provide invaluable contributions to the successful completion of NIOSH scientific activities.

Director's Intramural Award for Extraordinary Science Finalists

Finalists are listed alphabetically.

LeWade Distinguished Career Scientist

Toni Alterman

Michael Bergman

William Lindsley

Paul Schulte

Early Career Scientist

Kaitlin Kelly-Reif

Tyler Quinn

Laura Syron

Scientific Support

Lauren Bowers

Ronald Jacksha

Jeanette Novakovich

Director's Intramural Award for Extraordinary Science Awardees

LeWade Distinguished Career Scientist

Paul Schulte, PhD, MS, FACE

Former Director

NIOSH Division of Science Integration



Dr. Paul Schulte has been a scientific leader and visionary at NIOSH for more than 45 years. He is an internationally renowned researcher and educator in occupational safety and health (OSH). His scientific expertise in occupational epidemiology, genetics, risk assessment, workers' rights and ethics, and nanotechnology is widely sought after and recognized. His numerous research and translation contributions have had a tremendous positive impact on workers, employers, researchers,

NIOSH, and the OSH community. Dr. Schulte's research is widely published. He has authored 353 scientific products, including manuscripts, textbooks, book chapters, and coauthored 43 NIOSH publications ranging from health hazard evaluation reports to NIOSH authoritative guidance documents.

Dr. Schulte's major contributions include leading a tripartite labor, industry, and government effort to address cancer risks from asphalt paving fumes; and leading the NIOSH effort to conceptualize and implement the workers' right-to-know movement. In addition, he promoted notifying participants of occupational epidemiological study research results and directed the growth and development of the translation research effort into a major NIOSH research category. Dr. Schulte proposed a strategy to operationalize the overarching concept of "worker well-being" that considers the interactions between personal and occupational risk factors.

As manager of the NIOSH Nanotechnology Research Center, Dr. Schulte and colleagues led this center to be considered one of the best sources of information and guidance on health and safety issues by the National Nanotechnology Coordinating Office. He represented NIOSH and advised international nanotechnology organizations. He directed and participated in the NIOSH development of the world's first authoritative occupational exposure limits for titanium dioxide, carbon nanotubes, and nanofibers which had great scientific impact.

Early Career Scientist

Kaitlin Kelly-Reif, PhD

Senior Service Fellow Epidemiologist

NIOSH Division of Field Studies and Engineering



Dr. Kelly-Reif is co-principal investigator for an initiative to develop the largest worker cohort exposed to carbon nanotubes and nanofibers (CNT/F) in response to biomarker studies indicating potential respiratory health effects from CNT/F exposure. With industrial hygiene colleagues, she leads the epidemiological component of a multifaceted study of workers exposed to per- and polyfluoroalkyl substances. She is updating a NIOSH study of cancer risks from occupational exposure to ethylene oxide, which is the basis of the U.S. Environmental Protection Agency's ethylene oxide limits. She has intramural funding for developing an exposure registry for disease risk among carbon nanotube-exposed workers; researching, with the NIOSH Western States Division, the experience of seafood processing workers in the Gulf Coast; and studying, with the NIOSH National Personal Protective Technology Laboratory, personal protective equipment availability among healthcare workers.

Dr. Kelly-Reif has published 15 manuscripts, 6 as first-author, on non-malignant lung disease among U.S. uranium miners, cancer risks among U.S. nuclear workers, and COVID-19 deaths among first responders. She is member of the Network on the Coordination and Harmonization of European Occupational Cohorts and the International Society for Radiation Epidemiology and Dosimetry steering committee. As a junior scientist, she serves on an expert working group developing a new volume in the International Agency for Research on Cancer Statistical Methods in Cancer Research Scientific Publication series on epidemiologic bias assessment in cancer hazard identification.

Scientific Support

Jeanette Novakovich, PhD

Technical Writer-Editor

NIOSH Division of Science Integration



Dr. Jeanette Novakovich is a valued and productive member of the NIOSH Writer-Editor team, providing scientific support to most NIOSH divisions, laboratories, and offices. She is frequently sought for her expertise in health communications, educational technologies, curriculum development, script writing, scientific writing, rhetoric, and research translation by researchers across the Institute.

Dr. Novakovich's technical expertise proved invaluable on key NIOSH products while providing critical scientific support to the CDC COVID-19 Response. She contributed to 14 external NIOSH products and publications and numerous internal NIOSH COVID-19 research reports. Dr. Novakovich served as the production editor for 10 editions of the NIOSH Emergency Preparedness and Response Office's Disaster Science Research Response Key and Emerging COVID-19 Research Update reports. She participates in leadership roles and program delivery activities that advance objectives of key NIOSH programs. She was a contributor on the 2021 CDC Style Guide update taskforce, serving as team lead and NIOSH representative for the update, which determines standards and guidelines for communication products agency wide.

Dr. Novakovich leverages her technical knowledge and experience in support of developing and improving effectiveness of worker safety and health training and educational materials. She supports numerous researchers in the production of training products, expediting the translation of research into practice. Dr. Novakovich displayed initiative and innovation in supporting scientific activities in a leadership role on the CDC COVID-19 response.

Director's Intramural Award for Extraordinary Science 2021 Awardee Updates

LeW Wade Distinguished Career Scientist Awardee Update

Robert D. Daniels

Due to the COVID-19 pandemic, the funding was not released in time for Dr. Daniels to use it for his intended purpose to fund a student intern to the Division of Science Integration, Risk Evaluation Branch and for travel opportunities to foster productive collaborative relationships.

Early Career Scientist Awardee Update

Brie Hawley Blackley

Dr. Brie Hawley Blackley, a research industrial hygienist in the NIOSH Respiratory Health Division, used her 2020 Early Career Scientist (ECS) award to fund a pilot project evaluating the efficacy of source controls for aerosol exposure mitigation in dental clinic settings.

In early 2020, Dr. Blackley initiated a small National Occupational Research Agenda (NORA) project and collaborated with faculty at West Virginia University's (WVU) School of Dentistry (SOD) to evaluate exposures contributing to asthma and interstitial lung disease in dental personnel. However, the COVID-19 pandemic led to a (1) pause on the small NORA project and (2) heightened awareness of a need to understand controls that could reduce risks for exposure to SARS-CoV-2, the virus that causes COVID-19, in dental settings. Dental personnel were identified as among the highest risk occupations for exposure to SARS-CoV-2 due to many aerosol-generating procedures performed in dentistry and their close proximity to patients. Dr. Blackley used the ECS award to fund a pilot project that evaluated the efficacy of dental evacuation systems for aerosol exposure mitigation during simulated dental procedures. Results from this pilot project were summarized and recently submitted for consideration by the *Journal of Environmental and Occupational Hygiene* for their special issue on COVID-19 controls.

The ECS award allowed Dr. Blackley to expand her collaboration with WVU's SOD and complete a timely and novel project. Results spurred further research, including a recently funded study evaluating the efficacy of source controls for aerosol mitigation during dental procedures with patients. Both studies contribute to an understanding of the efficacy of source controls for aerosol exposure mitigation during routine dental procedures, an important topic during the ongoing COVID-19 pandemic.

Scientific Support Awardee Update

Jeffery Powell

Mr. Powell used his 2020 Scientific Support Award funds to support the project “Wearability and Use of Personal Protective Equipment: Effects of a Changing Workforce.” The specific task within this project is the research protocol “Evaluation of Self-contained Breathing Apparatus Design and Weight on Firefighter Stamina, Comfort, and Postural Stability.” The award money was used to purchase and maintain physiological monitoring equipment. In addition, supplies were purchased to conduct testing on the Automated Metabolic Breathing Simulator to determine the effects of covering a filtering facepiece respirator and elastomeric respirator with surgical masks, cloth masks, and face shields to determine the metabolic demands and internal breathing environments during prolonged use.

NIOSH Nominations for the 2022 Charles C. Shepard Science Award

CDC/ATSDR established the Charles C. Shepard Science Award in 1986 in honor of Charles C. Shepard, MD, an internationally recognized microbiologist whose career was marked by a pursuit of scientific excellence. He served as chief of the Leprosy and Rickettsia Branch at CDC for more than 30 years, until his death on February 18, 1985. The Charles C. Shepard Science Award recognizes excellence in science at CDC and ASTDR.

An award is presented for outstanding scientific publications in the following categories: Assessment, Prevention and Control, Laboratory Science, Data Methods and Study Design, and Health Equity Science. An award is also presented for Lifetime Scientific Achievement.



2022 NIOSH Nominations for Outstanding Scientific Publications

Assessment Category

Al-Tarawneh, IS, Wurzelbacher, SJ, Bertke, SJ. Comparative analyses of workers' compensation claims of injury among temporary and permanent employed workers in Ohio. *Am J Ind Med* . 2020; 63: 3– 22. <https://doi.org/10.1002/ajim.23049>. [DFSE]

Daniels RD, Bertke SJ., Exposure-response assessment of cancer mortality in styrene-exposed boatbuilders, *Occup Environ Med* 2020; 77:706-712.doi: 10.1136/oemed-2020-106445. [DSI]

LeBouf RF, Blackley BH, Fortner AR, Stanton M, Martin SB, Groth CP, McClelland TL, Duling MG, Burns DA, Ranpara A, Edwards N, Fedan KB, Bailey RL, Cummings KJ, Nett RJ, Cox-Ganser JM and Virji MA (2020), Exposures and Emissions in Coffee Roasting Facilities and Cafés: Diacetyl, 2,3-Pentanedione, and Other Volatile Organic Compounds. *Front. Public Health* 8:561740.doi: 10.3389/fpubh.2020.561740. [RHD]

Yoon, KN, Greenawald, LA, Rottach, DR, Pollard, JP, Yorio, PL, A general framework to test and evaluate filtering facepiece respirators considered for crisis capacity use as a strategy to optimize supply, *Journal of the International Society for Respiratory Protection* Vol. 37, No. 1, pp. 36-57 2020. [NPPTL]

Data Methods and Study Design Category

Wirth, O., Foreman, AM, Friedel JE, Andrew, ME, Two discrete choice experiments on laboratory safety decisions and practices, Journal of Safety Research <https://doi.org/10.1016/j.jsr.2020.08.005>. [HELD]

Health Equity Science Category

Fujishiro, K., MacDonald, L. A., & Howard, V. J. (2020). Job complexity and hazardous working conditions: How do they explain educational gradient in mortality? Journal of Occupational Health Psychology, 25(3), 176–186. <https://doi.org/10.1037/ocp0000171>. [DFSE]

Laboratory Science Category

Khaliullin, TO, Kisin, ER, Guppi, S, Yanamala, N, Zhernovkov, V, Shvedova, AA, Differential responses of murine alveolar macrophages to elongate mineral particles of asbestiform and non-asbestiform varieties: Cytotoxicity, cytokine secretion and transcriptional changes, Toxicology and Applied Pharmacology, Volume 409, 2020, 115302, ISSN 0041-008X, <https://doi.org/10.1016/j.taap.2020.115302>. [HELD]

Lim CS, Porter DW, Orandle MS, Green BJ, Barnes MA, Croston TL, Wolfarth MG, Battelli LA, Andrew ME, Beezhold DH, Siegel PD and Ma Q (2020) Resolution of Pulmonary Inflammation Induced by Carbon Nanotubes and Fullerenes in Mice: Role of Macrophage Polarization. Front. Immunol. 11:1186. doi: 10.3389/fimmu.2020.01186. [HELD]

Prevention and Control Category

Dunn, K.L., Hammond, D., Menchaca, K. et al. Reducing ultrafine particulate emission from multiple 3D printers in an office environment using a prototype engineering control. J Nanopart Res 22, 112 (2020). <https://doi.org/10.1007/s11051-020-04844-4>. [DFSE]

Wurzelbacher SJ, Lampl MP, Bertke SJ, Tseng CY, The effectiveness of ergonomic interventions in material handling operations, Applied Ergonomics, Volume 87, 2020, 103139, ISSN 0003-6870, <https://doi.org/10.1016/j.apergo.2020.103139>. [DFSE]

2022 NIOSH Nominee for the Shepard Lifetime Scientific Achievement Award

Dr. David N. Weissman



Dr. Weissman first joined NIOSH in 1997, advancing to become Director of NIOSH's Respiratory Health Division in 2005. Dr. Weissman's efforts have primarily focused on occupational respiratory disease. Dr. Weissman's work has had great practical impact. An important impact has been on development of regulations by CDC/NIOSH and other agencies to improve occupational safety and health. Specifically, he has led several efforts that updated NIOSH regulations for providing health surveillance to coal miners.

Dr. Weissman has strongly supported and made personal contributions in support of CDC emergency responses. This includes the anthrax attacks of 2001; respiratory aspects of the 2005 Hurricane Katrina; the 2009 H1N1 pandemic; the e-cigarette, or vaping, product use-associated lung injury outbreak of 2019-2020; and the current COVID-19 pandemic.

Dr. Weissman has also played an important role in helping researchers address complex technical issues. Dr. Weissman has also had an important leadership role in his discipline. These include leadership roles in the American Thoracic Society at the state and national levels.

[View the previous NIOSH Nominations for the Charles C. Shepard Science Award.](#)