Neuromotor Effects of Manganese Exposure in Adolescents Entering Workforce

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BACKGROUND

Manganese (Mn) is an essential nutrient, yet neurotoxic in excess. Mn can negatively impact neuromotor function. Adolescence is a critical time of development, as many begin to enter the labor force for the first time. Marietta, Ohio is home to America's largest ferromanganese refinery, a significant source of ambient Mn. In this community-based longitudinal cohort study, we investigate the relationship between adolescent exposure to manganese and neuromotor function.

METHODS

Recruitment Criteria
Mother resided in community since 16th week pregnancy, child initial enrollment at 7-9 yrs; age at balance testing 13-17 yrs

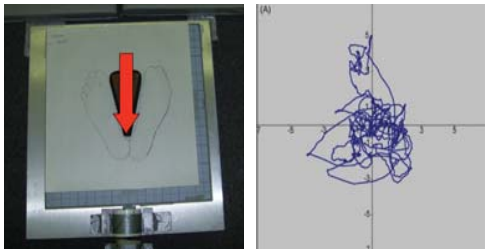
Biological Measures
Blood Mn, Pb; Hair Mn

Covariates
Age, sex, height to weight ratio, parent IQ, parent education, serum cotinine

Neuromotor Measurement
Postural Balance; Gait

NEUROMOTOR MEASURES

Postural Balance



Battery of 8 tests designed to eliminate/and or challenge systems used in maintaining upright postural balance: vision, proprioception, vestibular

Gait

3 trials normal walk
3 trials obstacle walk

PRELIMINARY DEMOGRAPHICS/RESULTS (N=74)	
Female	45%
Caucasian	92%
Biological Measures (7-9 yrs)	**GM ± GSD, Range (N=65-74)**
Hair Mn (ng/g)	447.4 ± 2.7 (63.2-7379.1)
Blood Mn (µg/L)	9.8 ± 1.3 (5.3-17.4)
Blood Pb (µg/dL)	0.8 ± 1.5 (0.4-2.6)
Postural Balance Measures (13-17 yrs)	
Mean Sway Area (cm^2)	53.30
Mean Sway Length (cm)	4.31

EXPECTED RESULTS

Given the role of Mn as both essential and neurotoxic, we expect to find a biphasic relationship between biomarkers of Mn exposure and adolescent neuromotor function, as measured by postural balance and gait.

Acknowledgements
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University of Cincinnati
19th Annual
Pilot Research Project
Symposium
October 11-12, 2018

Pilot Research Training Program (PRP) Overview

Welcome to the University of Cincinnati Education and Research Center's (ERC) 19th Annual Pilot Research Project (PRP) Symposium on October 11-12, 2018, held in the Kowalewski Hall Auditorium. The purpose of the PRP is to increase the research capacity of research trainees and young investigators in occupational health and safety and to encourage those in related disciplines to pursue occupational health and safety research.

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

At this symposium, the 2017-18 awardees will be presenting the results of their research and the 2018-19 awardees will make poster presentations of their proposed work. The keynote speaker on Thursday, October 11, 2018 is Captain Lauralynn McKernan from the CDC/NIOSH Division of Surveillance, Hazard Evaluation and Field Studies, presenting on "Listen to the Music: How Rock 'n' Roll Provides Touchstones for the Evolution of Occupational Health."

The University of Cincinnati's Education and Research Center is one of 18 national centers funded by the National Institute for Occupational Safety and Health (NIOSH). Dr. Tiina Reponen serves as the director of the ERC, which is based in the University's Department of Environmental Health within the College of Medicine. The purpose of the ERC is to train professionals in the didactic and research skills necessary to lead in occupational safety and health disciplines. Results of research are translated into action through an outreach program and shared with professionals and practitioners in the region via continuing education.

Since 1999, the PRP program has allocated over $1.4 million to support 239 pilot research projects. These projects have served as a catalyst in bringing over $41 million in additional research support to the region from sources independent of the PRP program, such as, the National Institute for Occupational Safety and Health (NIOSH), National Institutes of Health (NIH), United States Department of Agriculture (USDA), National Science Foundation (NSF), and the Centers for Disease Control and Prevention (CDC). Additionally, the PRP has brought 55 new investigators from other fields of expertise to the area of occupational safety and health research.

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