HEART RATE VARIABILITY IN SMELTER FURNACE WORKERS

1MD Bugge*, 2B Uvestad*, 3B Berlinger*, 4Ø Skare*, 5K Gjesdal*, 6DG Ellingsen*, 7STAM, National Institute of Occupational Health, Oslo, Norway; 8Oslo University Hospital, Oslo, Norway

Introduction Exposure to fine particulate matter in urban air has been associated with increased risk of hospitalisation and death from cardiovascular diseases. One hypothesis suggests a direct influence of particles on the autonomic nervous system. Some studies have shown an association between particle exposure and reduced heart rate variability (HRV). Furnace workers in metal smelters are occupationally exposed to fine and ultrafine particles. The aim of this study was to examine the association between exposure to particulate matter in metal smelters and HRV.

Methods We examined 64 workers in three Norwegian metal smelters on a working day, and on a day off after at least two days since last exposure. On the working day, exposure to different particle size fractions was assessed by personal sampling, using respirable cyclones and five-stage Sioutas cascade impactors. The workers carried Holter monitors for 24-hours’ heart rate registration during the working day and the day off. HRV indices were analysed by exposure for each hour of the day, using mixed model regression, adjusted for relevant covariates.

Results There were 58 male and 6 female workers. Their mean age was 34 years (range 19–64). The mean exposure to respirable particulate matter was 2.36 mg/m³, while 0.88 mg/m³ was below 250 nm. Standard deviation of normal-to-normal intervals (SDNN) was reduced during working hours on the working day relative to the day off, whereas in the afternoon and night hours there were no significant differences. Low frequency/high frequency (LF/HF) ratio was higher during working hours on the working day, but in the afternoon and evening hours the LF/HF ratio was significantly higher on the day off compared to the working day.

Conclusion HRV indices differ between working day and day off. Analyses are in progression, and further results on the effects of particle exposure will be presented.
Introduction The organophosphates (OPs) are a group of insecticides that have been widely used worldwide for the past 50 years. It is estimated that 3,000,000 people are exposed to OPs yearly, with the associated death rate being 30,000 deaths/year. OPs are cholinergic inhibitors and their toxicity is possible through acute or chronic exposure, with severe consequences for different organs and systems. The main objective of this study was to identify signs and symptoms of exposure to OPs on women with chronic exposure.

Methods A prospective study (1994–2014) followed up 43 women exposed to OPs, and evaluated signs and symptoms described as being associated to OPs exposure, as well as analytical parameters associated to asthenia and cellular protection, namely pyruvate (PA) and lactate (LA).

Results During the first appointment, 98% of the women had asthenia. Among the evaluated signs and symptoms, muscularkeletal injuries (78%) and menstrual cycle changes (36%) occurred with the highest frequency. Slightly less frequent were the changes observed in the peripheral nervous system (11%). Regarding the evaluated biochemical parameters, women generally showed a decrease in ferritin and an increase in TSH. Throughout the study a progressive drop in AChE was observed. In 64% and 92% of the women a change in PA and LA values respectively was observed.

Discussion The results suggest that prolonged exposure to OPs can chronically affect different human organism systems, namely parameters related to mitochondrial dysfunction.

Abstracts

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Introduction Dermal exposure to sensitizers such as diisocyanates have been described to promote the development of asthma in later stages when respiratory occupational exposure occurs. Therefore, we developed a reliable, sensitive and validated methodology based on dermal patches to assess skin exposure to diisocyanates.

Methods An UPLC-Unispray-MS/MS method was established and validated in order to reach very low levels of detection. Custom-made dermal patches were developed in order to allow optimal sampling of diisocyanates. Their sampling capability was evaluated in a controlled environment test-chamber where patches were exposed to increasing concentrations of diisocyanates.

Results The UPLC-MS/MS method using a Unispray ionisation source, based on supercritical fluids ionisation and Coanda effect, allowed reaching very low levels of detection (LoD=1 pg/mL) for all the targeted compounds (i.e. 4,4-MDI, 2,4-MDI, 2,6-TDI, 2,4-TDI, 1,6-HDI, and IPDI). Due to the high sensitivity of the analytical method, very low levels of diisocyanates (i.e. 25 pg/patch) are detected on the custom-made dermal patches. Furthermore, the patches allowed the sampling of a broad range of concentration levels (from 5 pg/cm² to 5 ng/cm²), which have been correlated with the air levels from the controlled environment chamber-test.

Discussion We succeeded to develop a method to assess dermal exposure to diisocyanates. Field studies are now necessary to further evaluate the suitability of the custom-made patches, as well as to relate low levels of detection and potential health outcomes.

Primary Care and Work

1701 SCALING UP WORKERS’ HEALTH COVERAGE THROUGH PRIMARY HEALTH CARE

1Garth Manning, 2Frank van Dijk, 3Peter Buijs, 4Chief Executive Officer, World Organisation of Family Doctors (WONCA); Bangkok, Thailand, 5Learning and Developing Occupational Health (LDOH) foundation, The Netherlands

Aim To explore ways of upskilling primary health care to offer essential occupational health to a broader population; some country examples.

Presenters: 1Prof Jukka Takala, 2Dr Ramnik Parekh, 3Dr Orrapan Un timan, 4Dr Hanifa M Denny, 5Dr Ezequiel Lopez, 6Dr Muzimkulu Zungu, 7Dr Ahmet Ozlı, 8Dr Paul Smits

1President of International Commission on Occupational Health (ICOH); Senior Consultant, Ministry of Manpower Services Centre, Singapore
2Chair- Mission BOHS: Indian Association of Occupational Health (IAOH), Mumbai, India
3Bureau of Occupational and Environmental Diseases, Department of Disease Control, Ministry of Public Health, Thailand
4Diponegoro University, Semarang, Indonesia
5Clinica Belgrano Family Medicine and Occupational Health Department, Quilmes, Argentina
6National Institute for Occupational Health School of Health Systems and Public Health, University of Pretoria
7Republic of Turkey Ministry of Health, General Directorate of Public Health, Ankara, Turkey
8Centre for evidence-based education, Academic Medical Centre (AMC), Amsterdam, The Netherlands

1701a GLOBAL BACKGROUND OF INSUFFICIENT COVERAGE BY OCCUPATIONAL HEALTH SERVICES: WHAT CAN WE DO TO SUPPORT PREVENTION AND CARE

Jukka Takala. Senior Consultant, Ministry of Manpower Services Centre, Singapore

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Background According to latest estimates by ILO 2.8 million men and women die every year caused by problems at work. Health disorders cause 2.4 million deaths. Costs are 3.9% of the global GDP or 3 trillion (million millions) USD. Problems include: poor legal and enforcement coverage, poor or no workers’ compensation systems, poor or no occupational health services – some 15% or less of the global workforce is covered. According to WHO 93% of global health resources go for treatment and 7% for prevention. Lack of knowledge, policies, systems and resources is evident.

Methods and processes A number of solutions and good practices have been identified to be useful and successful, although largely in developed countries. Simple methods to increase coverages and enhance services are needed. The ILO