

## Oral Presentation

### Methodology

#### 0242 MEASURING AND ESTIMATING PHYSIOLOGICAL RESPONSES TO OCCUPATIONAL HEAT EXPOSURE

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There are direct and indirect health and performance detriments associated with occupational heat stress. This presentation will review methods and tools that can be used to examine physiological responses to occupational heat stress and highlight future directions for practice and research.

Technological advancements have opened new opportunities for the capture and monitoring of physiological responses and metrics, particularly in the field. Continued validation of new technologies is necessary to benchmark the reliability and validity of field-based measures and methods.

Measures of body temperature, metabolic workload, hydration status and psychophysiological responses can yield important information as to the strain induced from working in a hot environment. While there are a range of measurement techniques and methods to measure or estimate physiological responses, there are limitations that must be considered. These include the sensitivity, reliability and practicality of proposed measures. For example, gastro-intestinal temperature measures via a telemetric pill allows for direct, wireless, non-invasive measurement of deep internal temperature. However, water ingestion can influence telemetric pill readings while it remains in the stomach and the expense of such a system makes it prohibitive to use in large cohorts.

Continued validation of new technologies is necessary to benchmark the reliability and validity of field-based measures and methods with the ultimate goal being to better quantify exposure-response and exposure-effect relationships for workers' health, wellbeing and productivity. Importantly, more comprehensive assessments of the heat strain experienced by different populations would aid the interpretation of climate change impact on worker's health at a local and global level.

## Oral Presentation

### Shift Work

#### 0243 ROTATING SHIFT WORK AND PREVALENCE OF DIABETES MELLITUS AND PREDIABETES IN MALE EMPLOYEES OF A LARGE GERMAN CHEMICAL COMPANY: RESULTS OF A CROSS-SECTIONAL STUDY

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**Purpose** The aim of the study was to investigate the association between rotating shift work (RSW) and prevalence of diabetes and prediabetes in male employees of a large chemical company.

**Methods** We used cross-sectional data, surveyed in health checks between January 1<sup>st</sup>2011 and December 31<sup>st</sup>2014 at BASF SE in Ludwigshafen (Germany). A blood sample, physical examination and anamnesis by a medical officer as well as a written questionnaire were part of the health-check. Diabetes status (no diabetes, prediabetes, diabetes) was assessed via HbA<sub>1c</sub>-value and information provided by employees themselves. Shift status was surveyed using company records. Partial proportional odds models for ordinal response variables were applied to assess the association of RSW with diabetes status.

**Results** Data on 9765 male employees (40.4% rotating shift workers) with a mean age of 44.3 years (SD: 9.6) could be used for analyses. Prevalence of diabetes and prediabetes in rotating shift workers were 6.4% and 14.2% respectively. Corresponding figures for day workers were 3.6% and 11.5% ( $p < 0.001$ ). Unadjusted analyses yielded an Odds Ratio of 1.85 (95%-CI: 1.53–2.22) for RSW (comparing diabetes with prediabetes/no diabetes). The effect attenuated in the fully adjusted multivariable model (aOR: 1.38; 95% CI: 1.11–1.70) but remained significant. The association between RSW and diabetes status varied by BMI and occupational status. The association was stronger in skilled/supervisory workers and respondents with a BMI  $< 30$  kg/m<sup>2</sup>.

**Conclusions** The present study found a significant association between RSW and diabetes which differed by BMI and occupational status.

**Declaration of potential conflict of interest:** All authors are employees of BASF SE.

## Poster Presentation

### Respiratory

#### 0244 THE DIAGNOSIS OF PNEUMOCONIOSIS USING A SENSOR ARRAY TECHNIQUE

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Pneumoconiosis is a traditional occupational disease and has reemerged in recent years. Current medical surveillance program have flaws that may result in poor detection of early pneumoconiosis around the world. Pneumoconiosis could generate specific volatile organic compounds (VOCs) that may constitute a specific breath print for diagnosis. The objective of this study was to develop a breath test for pneumoconiosis using a sensor array technique. We conducted a case-control study that enrolled 36 asymptomatic cases of pneumoconiosis and 64 healthy controls between October and November 2016 to construct the prediction model. One litter of breath air was collected after five minutes of tidal breathing through a non-rebreathing valve with inspiratory VOC-filter, and storage by a Tedlar bag. The air was analysed by a 32