

EXTENDED ABSTRACT

Title: Lower Workplace Exposure Standards Call for Higher-order Controls: Are Staff in Modern University Anatomy Laboratories at Risk of Formaldehyde Exposure?

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Objectives

Modern university anatomy laboratories are required to implement control measures to maintain formaldehyde exposure within acceptable exposure when compared to the Australian workplace exposure standards (WES) of 1 ppm 8-hr TWA and STEL of 2 ppm. Safe Work Australia (SWA 2019) propose a ten-fold reduction in the WES to 0.1 ppm TWA and a STEL of 0.3 ppm. The aim of this study was to determine formaldehyde exposures in modern university anatomy laboratories, review the adequacy of current controls and assist with planning to meet the reduced WES.

Methods

A basic risk characterisation exercise was conducted using a direct reading device (Multirae PGM6208), followed by collecting personal air samples in accordance with Australian Standard 2986.1: 2016 Workplace air quality - Sampling and analysis of volatile organic compounds by solvent desorption/gas chromatography pumped sampling method. Results were compared to the American Industrial Hygiene Association (AIHA) exposure risk rating categories based on Bayesian Analysis. Participants completed a nine-question Likert scale questionnaire after each sampling period which was evaluated to correlate exposure data to reported symptoms. Dissection table exhaust ventilation rates were assessed using an Alnor model 9870 air velocity meter.

Results

Direct reading results during a 2hr period revealed dissection tasks exceed the current 8-hr TWA and STEL WES. Additional personal monitoring was then conducted (8 TWA and 6 STEL samples), with the reported 8-hr TWA and STEL geometric mean of 1.1 ppm and 1.5 ppm respectively. The 8-hr TWA and STEL 95th percentiles were 5.1 ppm (CI 95%, 2.7 – 21.5 ppm) and 2.7 ppm (CI 95%, 2.0 – 5.8 ppm) respectively. Bayesian Analysis confirmed the results were consistent with an AIHA category four exposure risk rating. Workers reported smelling formaldehyde and experienced occasional formaldehyde symptoms, including itchy/red eyes, headaches and some discomfort when breathing. The

duct exhaust rate of 4.96 m/s in the primary dissection room and slot capture velocity of 0.07 m/s at the dissection table were inadequate as control exposures.

Conclusions and Recommendations

The 95th percentiles for TWA and STEL samples exceeded the current WES and are consistent with an AIHA category four risk rating indicating that exposures in this study were unacceptable and placing anatomy dissection staff at risk of adverse health effects. Given workers in modern University laboratories are currently at risk from formaldehyde exposure, the proposed lowering of the WES will be difficult to achieve without focussed effort on higher-order controls such as the adequate provision and maintenance of local ventilation systems. Alternatives to formaldehyde should be actively pursued.

Keywords

Formaldehyde, anatomy, dissection, university, laboratory, exposure, HCHO, workplace exposure standard, ventilation, compliance