EXPOSURE ASSESSMENT-1

DERMAL PAH EXPOSURE IN SWEDISH FIREFIGHTERS AND POLICE FORENSIC INVESTIGATORS – PRELIMINARY RESULTS FROM TAPE STRIPPING ON WRIST AND COLLARBONE

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10.1136/OEM-2019-EPI.23

Objectives Firefighters (FFs) and police forensic investigators (PFI) may be exposed to a wide range of particles and combustion products, such as the carcinogenic benzo(a)pyrene and other polycyclic aromatic hydrocarbons (PAHs). The aim of this study was to evaluate the dermal exposure to 32 different PAHs for FFs and PFIs.

Methods The skin was sampled by tape stripping (three consecutive tapes) on lower wrist and collarbone area after end of work shift of 7 FFs (fire starters; team leaders inside the burning house; team leaders outside the burning house) during training fires (14 samples), 9 PFIs investigating the aftermath of fire events (10 samples) and 7 office workers/control persons (7 samples). We used semipermeable membrane dialysis for clean-up of the tape strip extracts and analysed the PAHs by gas chromatography mass spectrometry.

Results The median sum 32 PAH dermal exposure of the measured groups was in the range of 2 to 16 ng/cm² on the wrist and 2 to 4.6 ng/cm² on the collarbone area. Both gaseous and particle-associated PAHs were present on skin with large variability in levels between specific PAHs. The most abundant PAHs were phenanthrene, fluoranthene, and chrysene. For sum 32 PAHs the exposure of the wrist was statistically significantly higher for FF fire starters and PFIs than for controls. FF fire starters had the highest exposure for benzo (a)pyrene. For the collarbone area, the FFs and PFIs had lower exposures than on the wrist and similar to the levels for control persons.

Conclusions The dermal occupational PAH exposure for FFs and PFIs was generally higher on the wrist than on the collarbone area. Thus, the wrists seem to be less well protected by personal protective equipment than the collarbone area. On the collarbone area, the dermal PAH exposure levels were similar between FFs, PFIs and control persons.

FUMIGANT AND CHEMICAL RESIDUE 8-HOUR EXPOSURES IN WORKERS HANDLING CARGO FROM SHIPPING CONTAINERS AND EXPORT LOGS IN NEW ZEALAND

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10.1136/OEM-2019-EPI.25

Background Previous studies found elevated concentrations of fumigants and other chemicals in the air of unopened shipping containers, which led to the assumption that workers were likely to be highly exposed. This study assessed personal 8-hour exposures in workers handling cargo from shipping containers or export logs, which were fumigated prior to loading.

Methods 191 personal 8-hour air samples were collected and analysed for 1,2-dibromoethane, chloropicrin, ethylene oxide, hydrogen cyanide, hydrogen phosphide and methyl bromide, 1,2-dichloroethane, C2-alkylbenzenes, acetaldehyde, ammonia, benzene, formaldehyde, methanol, styrene and toluene. Additive Mixture Values were calculated using the Work Exposure (WES) standard set by Worksafe NZ and the Threshold Limit Values (TLV) set by the ACGIH. Linear regression was conducted to assess associations between time spent inside shipping containers and exposure (n=98).