



B84 Survey of Trace Elemental Contributions to the Environment: Comparison of Samples From a Diverse Group of Occupational Workers With Primer Residues From Firearms

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By attending, participants will understand how trace elemental distributions on skin surfaces of different occupational segments of the population compare with trace element concentrations expected on the skin of someone that has fired a weapon.

This presentation will impact the forensic community by advancing knowledge of the natural variation of elemental components of GSR in persons who have not handled a firearm.

The objective of this phase of the study is to obtain a reliable estimate of the amount of environmental lead, barium or antimony present on the hands of individuals who have not recently handled or discharged a firearm. The study sample consists of individual volunteers from diverse occupational groups who as a group have differing potentials of coming into contact with environmental lead, barium or antimony.

The occupational groups selected for this experiment include: 1) carpenters, 2) electricians, 3) firearms examiners, 4) gas station attendants, 5) brake mechanics, 6) plumbers, 7) painters, 8) roofers, 9) police officers, 10) machinists, and 11) x-ray technicians. A group of office workers will serve as a control cohort.

In order to be included in the sample, the participant must not have handled or discharged a firearm within the previous 24 hours, nor must the participant have washed his or her hands within the previous hour. After obtaining informed consent, each participant had either the right or left hand swabbed twice with a cotton swab containing 4 drops of a 5 percent solution of nitric acid. The non swabbed hand was sampled with a commercially available carbon backed sticky tape affixed to a stub intended for Scanning Electron Microscopic (SEM) examination.

The collected samples were placed in the sample containers provided by the manufacture of the GSR collection kit, placed in an envelope and sealed. Analysis for lead, barium and antimony is being completed by the National Medical Service for comparison with individuals who have discharged a firearm immediately before sampling testing. Results from these Inductively-Coupled Plasma Atomic Emission Spectroscopic/Mass Spectrometric (ICP-AES/MS) examinations of swabs, digested using a 10% nitric acid solution with incubation at 80° C for 2-hours will be provided for each of the cohorts.

Comparisons with the control group (office workers) will be used to verify the method of collection and understanding of conventional environmental background. Comparison of elemental analytical results for workers from "non-weapon" occupations will be used to determine the discrimination potential for these examinations. The results of these experiments will add to the body of knowledge necessary to properly interpret results from similar collections and analytical procedures in cases in which handling or firing of a firearm is at question.

This NIJ-sponsored work at the Henry C. Lee Institute of Forensic Science at the University of New Haven is being performed in collaboration with other NIJ and NASA-collaboratively sponsored research into the application of remote sensing technologies for improved recognition of trace evidence in and on crime scene evidence.

Gun Shot Residue, Environmental GSR, Trace Elements