



## Criminalistics Section – 2005

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### **B157 Lead Isotopes in Gunshot Residues**

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The goal of this presentation is to inform the forensic community about the possible usefulness of using lead isotope ratio analysis in specific cases.

Different from the absolute concentration of an element or element/element ratios, radiogenic isotopic ratios from elements like lead or strontium are not sensitive to production or manufacturing processes and provided that no additional radiogenic isotope is added, the isotopic signature from the source material is retained. Due to geological processes on geological time scales most raw materials have developed identifiable isotopic fingerprints. Especially the lead isotopes are unique because the combination of three radiogenic isotopes ( $^{206}\text{Pb}$ ,  $^{207}\text{Pb}$  and  $^{208}\text{Pb}$ ) and one stable isotope ( $^{204}\text{Pb}$ ) allow the construction of several different isotope ratio scatter diagrams which permit a very sensitive and discriminative assessment of the possible different sources of the lead.

In a recent case the clothes of a murder suspect contained elevated traces of lead, possibly from GSR from a shooting incident. The defense argued that the lead contamination had been caused by exposure in a technical workshop. Additionally the evidence material had been kept under suboptimal conditions for several years that could not exclude contamination. Preliminary trace element analysis indicated elevated concentrations of several metals including lead.

In this study the authors compared the lead isotopic composition of two GSR sheets from the murder victim with fifteen samples taken from a pullover of the suspect. The samples from the pullover were taken from the front and the back and the two sleeves in order to evaluate any focus of possible lead contamination from the GSR.

This study showed that three different sources contributed to the lead found on the pullover but that none of these three sources agreed with the composition of the GSR found on the sheets.

**Lead Isotopes, Gunshot Residues, Isotope Analysis**