



A87 Preliminary Studies on the Chemical and Morphological Changes of Gunshot Residues Following Ingestion by Fly Larvae

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After attending this presentation, attendees will understand the importance of the differentiation between the presence of Pb, Ba, and Sb as pure chemical elements or as a GSR structure in the blowfly larvae tissue.

This presentation will impact the forensic science community by producing a series of different laboratory techniques to investigate in the presence of GSR in blowfly larvae tissues.

Medico-legal entomology is the use of insects and other arthropods in forensic investigation concerning decomposed bodies and it has become the gold standard for estimating time since death in many countries. In addition to this well-known use to estimate the postmortem interval (PMI), insects that feed on carcasses may also represent a reliable specimen for toxicological analyses (entomotoxicology) especially in the absence of tissues and fluids normally taken for such purposes.

The literature reports many studies involving the extraction of drugs and chemicals (morphine, cocaine, opiates, benzodiazepines, paracetamol, mercury, etc.) from blowfly larvae (Diptera: *Calliphoridae*) associated with a corpse. These analyses are useful in acquiring information about causes or circumstantial of death.

At present little research has focused on the analyses of gunshot residues (GSR) detection in blowfly larvae. The observation of the presence of GSR elements such as lead (Pb), barium (Ba) and antimony (Sb) in the tissues of larvae could help the interpretation of how a person died especially when bullets cannot be recovered in the body and the surrounding crime scene. Furthermore, on a highly decomposed body the larval activity could also easily lead to the destruction of gunshot wound diagnostic features but retention of GSR by the fly larvae will indicate a shooting crime.

Previous investigation involved in detection of GSR elements in blowfly larvae were conducted using Inductively Coupled Plasma Mass Spectrometry (ICP-MS) (Roeterdink *et al.* 2004; LaGoo *et al.*, 2010) and Laser Ablation Inductively Coupled Plasma Mass Spectrometry (LA- ICP-MS) (Swan, 2006). All these studies focused exclusively on the detection of gunshot residues in larvae as pure chemical elements.

However, due to the natural existence of these elements in the environment and in the fly larvae tissues, for a forensic purpose it's fundamental to differentiate the presence of natural Pb, Ba, and Sb from the presence of these elements as GRS specific morphological structure in the larva tissues.

The aim of this study is to determine if there are chemical and morphological changes of Pb, Ba and Sb following the uptake of GSR by larvae. This study was performed using the Scanning Electron Microscope (SEM), currently considered the most common technique for GSR detection analyses because it combines morphological examination with elemental analyses.

The fly larvae were fed meat that had been shot and then were formalin fixed and processed following basic histological methodologies. The resulting horizontal thin sections were examined by SEM.

This study allowed the identification of the presence of Pb, Ba, and Sb in fly larvae not just as chemical elements but as a complex gunshot residue structure helping in the interpretation of the causes of death in a highly decomposed body.

Gunshot Residues, Blowfly, Scanning Electron Micro