

Determination of Carbaryl in Putrefied Postmortem Samples

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A case study of a suspected suicide by ingestion of a commercial pesticide formulation is presented. The badly decomposed body of a 45-year old male was found in his kitchen alongside an empty container of an insecticide product known as Sevin. This product, which contained 240 g of carbaryl per litre, is commercially available in many retail outlets. The 250-mL container was empty and it was not known what quantity, if any, that the deceased had consumed.

Samples of postmortem blood and liver tissue were submitted to the Saskatchewan Health Provincial Laboratory for the analysis of carbaryl. Forensic results from previous poisonings involving carbaryl have shown that the intact pesticide is detected in postmortem blood and many body tissues. In this particular case, however, the analysis was complicated by the fact that the victim's body was in an advanced state of decomposition. Only 1 mL of blood was sent to the laboratory. The blood had coagulated and was brownish black in appearance. The liver tissue sample was highly putrefied and almost black in colour.

The blood sample was diluted with water and extracted with hexane. The hexane extract was subsequently reacted with MTBSTFA to produce the t-butyldimethylsilyl derivative of carbaryl. Analysis by GC-MS using selected ion monitoring revealed that carbaryl was present in the blood sample at a concentration of 0.53 $\mu\text{g/mL}$. Other reported fatal cases of carbaryl poisoning have had postmortem blood concentrations ranging from 6 to 27 $\mu\text{g/mL}$.

A portion of the liver tissue sample was homogenized with water and then vortexed with acetonitrile. The water-acetonitrile mixture was extracted with ethyl ether. The ethyl ether extract was derivatized with MTBSTFA and analyzed by GC-MS-SIM. No carbaryl was detected in the sample with a method detection limit of 0.01 $\mu\text{g/g}$. Concentrations in previously reported cases of fatal poisoning have ranged from 12 to 29 $\mu\text{g/g}$.

Carbaryl is rapidly metabolized by the body and therefore it is normally not detected in blood samples in cases of general environmental exposure. Even had the deceased been recently spraying this material, it is highly unlikely that the level found in the blood would have been this elevated. The results obtained for this case were lower than other results reported in the literature. Without knowing exactly what quantity had been consumed and what period elapsed between consumption and the onset of death, it is difficult to draw specific conclusions. Also, the advanced state of decomposition probably affected the quantity of carbaryl present in the samples. Putrefaction involves bacterial degradation and enzymatic activity. It is highly likely that these processes would have reduced the amount of intact pesticide remaining at the time of the autopsy. Postmortem redistribution between various tissues and fluids has been demonstrated to occur for numerous drugs, however it is not known what affect, if any, this may have had on the analytical results.

