



### **F45 Vitreous Chemical Analysis in Postmortem Cases: Reliability of Reported Methamphetamine Concentrations**

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After attending the presentation, attendees will appreciate the need for accurate and precise postmortem toxicology confirmation of methamphetamine levels utilizing vitreous chemical analysis and its reliability compared to that of central and peripheral blood.

This presentation will impact the forensic science community by illustrating the reliability and usefulness of vitreous chemical analysis by a real-life example of the sampling, analysis, and reporting in a second-degree driving under the influence murder case in California in which the decedent had significant methamphetamine in his central blood, peripheral blood, and vitreous.

This begs the questions: (1) Is there a correlation between postmortem methamphetamine levels in the chest cavity, peripheral blood, and vitreous eye fluid?; and, (2) What affect does postmortem distribution or diffusion have in obtaining reliable methamphetamine levels at the time of death when sampled from different areas of the body?

Methamphetamine use has become prevalent among both adolescents and adults in America due in part to the addictive nature and multiple routes of ingestion. Arrests and deaths related to driving with measurable and/or impairing amounts of this central nervous stimulant in the body have increased in recent years. The need for accurate and reliable toxicology results in these cases is critical to insure that valid science is presented in the courtroom.

Sampling the vitreous (the acellular, viscous, translucent fluid made up of water, glucose, acids, collagen, and inorganic salts found in the eye) can be accomplished by inserting a narrow-gauge needle with syringe into the globe of the eye at the lateral canthus with low-pressure draw on the syringe to extract a sample of the 2+mL of fluid. One benefit of sampling the vitreous is that some literature indicates that the sampling may be conducted three to five days postmortem without compromising the reliability of the results. Analysis of the sample can be accomplished presumptively with Enzyme-Linked Immunosorbent Assay (ELISA) immunoassay analysis and confirmed by Gas Chromatography/Mass Spectrometry (GC/MS).

The vitreous concentrations of several drugs have been studied and have been correlated with premortem levels sampled from other parts of the body; however, since postmortem diffusion of certain drugs from the brain into the vitreous may occur, the value of the results must be viewed with a critical eye. Studies reveal that hydrophilic drugs are more likely to have concentrations similar to that of whole blood or plasma compared to drugs that are highly protein-bound, like benzodiazepines. Interestingly, it has been reported that with cocaine, the vitreous concentration can increase with time, leaving courts and juries to wrestle with the value of the proffered evidence.

There is evidence that postmortem methamphetamine distribution in the vitreous compared to central and peripheral blood can be assigned a reliable ratio, provided the proper uncertainty ranges are included in responsible reporting.

#### **Vitreous Chemical Analysis, Methamphetamine Postmortem, Methamphetamine Distribution**