## K26 Distribution and Comparison of Oxycodone and Other Drugs in a Case with Preand Post-Embalmed Autopsy Specimens

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This poster will provide the reviewer a potential means of correlating oxycodone, acetaminophen, paroxetine and alprazolam concentrations in preand post-embalmed autopsy specimens.

The data presented can provide potentially useful interpretive information for several drugs in preand post-embalmed blood and tissues.

Embalming fluid is a formaldehyde-based fluid that is infused into the body through the vasculature in preparation for burial to help disinfect and preserve the remains. It is well-recognized that embalming fluids can alter many agents of toxicological significance. For example, pseudoephedrine in the presence of formaldehyde partially or completely converts to an oxazolidine structure. At its worst, the effects of embalming fluids on cyanide may result in an inability to detect the compound at all in postmortem specimens. Unfortunately, there is a general paucity of information regarding the effects of embalming on the majority of compounds of toxicological interest. Most studies on the subject involve in vitro experiments. The work here afforded us a rare opportunity to study the effects of embalming on a few different drugs before and after embalming in the same individual.

The case history was that of a 20-year-old male who had undergone a dental procedure. For pain, he was prescribed an oxycodone/acetaminophen compound. He was subsequently found dead at home within 24-hr post-procedure.Within a period of three days, he was autopsied, embalmed and then re-autopsied. Typical tissue specimens were collected during both autopsies. In addition, while whole blood was not available during the second autopsy, a blood-like substance was recovered from the left popliteal vein and submitted for toxicological analysis.

Two different laboratories performed the toxicological analyses; with one laboratory analyzing pre-embalmed specimens while the other analyzed post-embalmed specimens.Analyses were carried out using standard extraction and analytical toxicological testing procedures and followed the individual laboratories standard operating procedures. In addition, post-embalmed specimen analyte concentrations were determined by the method of standard addition and dilution. Analytical techniques included liquid chromatography, gas chromatography and gas chromatography/mass spectrometry.

Oxycodone Concentrations in Pre- and Post Embalmed Fluid and Tissues

| Specimen | Pre-Embalmed Levels | Post-Embalmed Levels |
|---|---|---|
| Blood | 500 ng/mL | 120 ng/mL* |
| Liver | 400 ng/g | 720 ng/g** |
| Kidney | NP | 1800 ng/g** |

*blood-like material from popliteal vein
**total concentration

Other pre- and post-embalmed drug findings.

Pre-Embalmed Concentrations

| Specimen | Acetaminophen | Alprazolam | OH-Alprazolam | Paroxetine |
|---|---|---|---|---|
| Blood | < 10 mcg/mL | 60.9 ng/mL | < 10 ng/mL | 200 ng/mL |
| Liver | Not Detected | 245 ng/g | 24 ng/g | 9.2 mcg/g |

Post-Embalmed Concentrations

| Specimen | Acetaminophen | Alprazolam | OH-Alprazolam | Paroxetine |
|---|---|---|---|---|
| Blood | 0.57 mcg/mL | 46 ng/mL | ---- | ~ 140 ng/mL |
| Liver | 4.3 mcg/g | 410 ng/g | ~ 25 ng/g | ~7.6 mcg/g |

This case allowed for a comparison of oxycodone, acetaminophen, paroxetine, alprazolam and hydroxyalprazolam concentrations in blood and liver as determined prior to embalming and following the embalming process. One potentially influencing factor in comparing the concentrations in this case was that two different laboratories performed the analyses. Even so, findings revealed that oxycodone in the blood decreased by 76% whereas in the liver levels increased by 80% following embalming. The latter finding can be explained through comparison of free versus total concentrations, especially in light that between 7-30% of oxycodone is excreted as a glucuronide conjugate. The former finding is most likely due to the post-embalming “blood” specimen and the effect of embalming fluids (i.e., degradation of oxycodone, redistribution of drug, dilution effects). Regardless, it appears that liver oxycodone findings may be a good monitor of pre-embalmed concentrations in post-embalmed tissue. Other drug findings in the case

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were comparable preand post-embalming and would not appear to have significant affect on the interpretation of the findings.

When comparing preand post-embalmed drug findings, numerous factors must be considered, including: completeness of initial tissue perfusion and pooling effects that may occur between and within specimen types; incomplete or non-uniform perfusion of any given tissue with embalming fluid; potential redistribution of drugs caused by the embalming fluids; and, analyte stability in embalming fluids. In addition, it is sometimes inferred that penetration of the embalming fluid is uniform throughout the body. However, this may not necessarily be true in all instances. For example, more vascularized tissues have greater infiltration of embalming fluid. In addition, structures closest to the site of administration are subject to higher pressures of infiltration.

The consequence of these variations in preand post-embalmed fluids and tissues is dependent upon factors surrounding the nature of the death investigation. One should be acutely aware that the process of embalming might affect the concentrations of certain drugs within body fluids and tissues. This study provides potentially useful interpretive information for the compounds detected in this case. Acknowledgment: Forensic Toxicology Laboratory, Office of Chief Medical Examiner, New York, NY

**Embalmed, Oxycodone, Distribution**

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