



## Pathology Biology Section – 2010

### G59 Does Embalming Impact Vitreous Glucose Levels?

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After attending this presentation, attendees will understand how embalming may impact the level of glucose found in vitreous fluid obtained during autopsy.

This presentation will impact the forensic science community by educating the viewer on the utility of analyzing vitreous glucose in embalmed decedents and by informing people of the valuable resource of human body donors and how they can be used to further forensic science.

This case involves an 80-year-old female who was known to be a brittle diabetic. Because of a presumed natural cause of death, the body was originally released to the funeral home. Adult Protective Services requested the coroner perform an investigation into the death due to allegations of elder abuse/neglect by a home care provider. The decedent was embalmed six days prior to autopsy using Ultra 27 (Pierce Chemicals/Royal Bond, Inc) as the arterial preservative and Restorative (The Dodge Company); both fluids are rich tissue hydrators. Most mortuary chemicals use glycerol as the main humectant. The vitreous glucose was analyzed at University of California Davis Medical Center using a GLUCm reagent on a Beckman Coulter Synchron System. The concentration of glucose is determined by measuring the rate of oxygen consumption based on the following chemical reaction:

Vitreous fluid collected at autopsy had an elevated level of glucose (544 mg/dL). The cause of death was determined to be from hyperglycemia due to diabetes mellitus with hypertensive cardiovascular disease listed as a contributing condition. The caregiver, a registered nurse, is facing criminal charges of elder abuse/neglect for failing to provide medical care.

It is not uncommon for the forensic pathologist to perform an autopsy on an individual who has already been embalmed. The interpretation of tests performed on the blood is clearly limited due to the dilution effects of the embalming process, but what about the vitreous fluid within the eyes? Is this fluid protected from the embalming process and can it be used to aid in postmortem examination? Can the value of an elevated glucose level in a post-embalmed individual be trusted or is the result falsely elevated due to contamination by an embalming fluid with high glycerol content? Was the analytical method used to measure the glucose specific for this analyte or was it unable to distinguish glycerol from glucose?

An experiment was designed to test the vitreous glucose levels on a body donor before and after embalming. The body donor was a 78-year-old female, average height and weight that died from respiratory failure and interstitial lung disease. Standard anatomical embalming was performed. The donor remains were arterially injected, and the preservation was supplemented by hypodermic injection to poorly preserved areas. The total amount of fluid injected was 951oz., much more than the funeral home had injected. The embalming solution used consists of various preservatives, disinfectants, water correctives, and humectants. A total of three samples of vitreous were obtained; the first an unadulterated sample from the un-embalmed donor, the second, also from the un-embalmed donor, was "spiked" with embalming solution by adding a drop to the test tube, and the final sample was obtained post-embalming. All samples were sent for glucose testing by the same service that tested the autopsy sample.

**Results:** There was a very slight increase in the post-embalming glucose level compared to the pre-embalming samples (15 mg/dL vs. 7 mg/dL), but not enough to be clinically significant. Both pre-embalming samples (neat and spiked) had the exact same result (7 mg/dL).

**Conclusion:** Embalming does not interfere with the analysis of glucose in the vitreous fluid when using the Beckman Coulter Synchron System with the GLUCm reagent. This study supports what has been previously published in the literature.

**Autopsy, Embalm, Glucose**