



## Pathology Biology Section – 2006

### **G61 Comparison Study of Various Protocols to Release Maximal Amounts of Amplifiable DNA From Decomposed Soft Tissue Exposed to Different Environmental Conditions**

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After attending this presentation, attendees will understand what protocols are most suitable for certain decomposed tissue remains based on type of soft tissue and the environmental conditions from which it came.

This presentation will impact the forensic community and/or humanity by providing guidance to the pathologist and DNA analyst in obtaining the maximum quantity and quality of DNA from decomposed soft tissue samples.

The protocols investigated were compared using five different tissue types (brain, heart, kidney, liver, lung) exposed to three different environmental conditions (fire, submersion in water, and bog/swamp).

This presentation will benefit the forensic community by providing guidance to the pathologist and DNA analyst in obtaining the maximum quantity and quality of DNA from decomposed soft tissue samples.

At autopsy, questions are often raised regarding what type of tissue to send off for DNA analysis when the body is in a state of decomposition. While the standard answer has routinely been deep muscle tissue, anecdotal evidence from the Delaware OCME DNA Unit and Armed Forces DNA Identification Laboratory (AFDIL) have suggested that this is not always the case and that in fact, organ tissue is often preferable. Historically, the research regarding decomposed tissue samples and associated DNA yields has been somewhat limited because the typical DNA laboratory does not have access to such samples. The fact that Delaware's forensic DNA laboratory is located at the Office of the Chief Medical Examiner and, therefore, has access to such samples, allowed for this much needed study to be performed. Decomposition is a cumulative consequence that naturally occurs over time once a body is no longer living. Decomposition originates from the activity of microorganisms/bacteria and internal biodegradative enzymes, including DNases that cause autolysis of the body. The concentration levels of bacteria and enzymes vary amongst organs during decomposition based on the organ's function and location within the body. This variation results in some organs degrading DNA at a faster rate than other organs. Additionally, decomposition can be altered by external stimuli associated with different environmental conditions because different conditions have different effects on factors such as temperature, moisture, pH, and partial pressure of O<sub>2</sub>.

Four extraction protocols were investigated in a collaborative effort between Delaware OCME, AFDIL, and National Medical Services (NMS) to develop the most successful extraction procedure from various organ tissues exposed to different environmental conditions. The four different extraction protocols were an organic extraction using a non-ionic detergent based digestion buffer, an organic extraction using an ionic detergent based digestion buffer, a non-organic extraction using standard columns, and a non-organic extraction with paramagnetic beads. In addition, variations in reagent amount as well as variations in reagent amount plus sample amount were studied. The tissue sample extracts were then quantitated, amplified, and analyzed. Data and conclusions will be presented and discussed at the meeting.

**DNA, Decomposition, Tissue**