## B18 Evaluation of Field Tissue Storage Methods Optimal for Preserving DNA

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After attending this presentation, attendees will learn about field tissue storage methods that can be implemented for optimal preservation of DNA with respect to various stages of decomposition, tissue types, tissue storage times, and seasonal/environmental influences. The success of forensic DNA analysis on recovered human remains largely depends on the quality and quantity of DNA present. Identifying superior tissue storage techniques is pertinent for preserving intact high quality DNA, which would increase the likelihood of successful human identification.

This presentation will impact the forensic community and/or humanity by identifying tissue preservation methods that are suitable for field application and long term tissue storage without compromising the success and ease of subsequent DNA analysis. This information will be useful for first responders, mass disaster response teams, law enforcement, medical personnel, crime scene technicians, and those seeking a tissue storage method for implementation on-site.

It is ideal to collect and preserve samples from decomposing remains as soon as possible to impede or reduce DNA degradation, which will increase the chances of successful downstream DNA analysis and identification. However, in instances of mass or natural disasters, rarely are tissue samples preserved for future DNA analysis as soon as the human remains are found; there is often a delay in tissue preservation due to time spent on recovering, documenting, and processing the discovered remains. Any lag time in tissue preservation may also be lengthened when scenes are in remote locations that are hard to access, along with there being no rapid and simple means of tissue storage available. Thus, identifying a quick and uncomplicated tissue storage technique that aids in prompt preservation of DNA is beneficial to the forensic community.

The tissue storage methods examined in this research were intended to be simple, rapid, cost effective, and would not require any extensive or specialized training to implement, making it more conducive to emergency situations. The portability, toxicity, obtainability, and stability over time at room temperature of the storage media were also taken into consideration for ease of use in the field.

Tissue samples collected were preserved in a DMSO salt solution, isopropanol (100%, 70%), ethanol (100%, 70%, 40%), and silica desiccant. Tissue samples were also frozen at -80$^0$C or left unpreserved, for comparison to the preserved samples. Pig carcasses were placed during the summer and winter seasons in a field to decompose. Tissue sections of muscle and skin were collected on-site from the pigs immediately after sacrifice and every 3 days thereafter. The collected tissues were sectioned into 0.2-0.3 g portions and preserved using the different storage methods. Samples were stored for three time periods: 1 week, 2 months, and 6 months. After tissue storage, DNA was isolated from the samples using a standard organic extraction method. The DNA extracts were assayed on a yield gel to determine if there was abundant high molecular weight DNA present. DNA quality was examined by amplification of three pig-specific PCR fragments of increasing length. Real-time PCR was used to assess the quantity of DNA in the samples.

The quantitative and qualitative approach implemented in this research will provide a more accurate assessment of DNA preservation among the different storage methods examined. The tissue storage method that excels in preserving high quality and quantity DNA across longer storage time, increased level of decomposition, seasonal/environmental influences, and different tissue types, coupled with the technique being simple and rapid, would be a superior method for tissue storage in the field.

**DNA Preservation, Mass Disasters, Tissue Storage**

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