ALTERNATE METHODS FOR COLLECTION, PRESERVATION & PROCESSING OF DNA FROM DECOMPOSING HUMAN REMAINS

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Natural and mass disasters often result in large numbers of casualties. One of the most important considerations following a mass fatality event is victim identification. However, recovery and identification efforts may be complicated by harsh environmental conditions, limited facilities, loss of electricity and refrigeration. If remains cannot be stored or identified quickly, the body decomposes and the DNA in those tissues degrades and fragments making DNA typing more difficult. This project investigated the effectiveness of various quick, in-field methods for collecting DNA from decomposing human remains. In addition, several alternate DNA preservation, purification, and amplification strategies were also tested in order to facilitate faster and more direct DNA based identification processes.

Skin and tissue samples were collected from three decomposing human cadavers over a two-week period at the Southeast Texas Applied Forensic Science Facility (STAFS) in Huntsville, Texas. Three protocols were used to collect DNA from decomposing cadavers in the field: 1) swabbing skin with 4N6FLOQSwabs, cotton, and foam swabs, 2) inserting a swab into a small incision in the thigh, and 3) skin/muscle biopsy. Biopsy punches were compressed onto FTA Elute cards prior to storage or stored in a liquid tissue preservative that facilitates leaching of DNA into solution for quicker and more direct amplification. All samples were stored at room temperature for 1 and 3 months. Samples were processed in two ways: 1) standard workflow including DNA extraction, quantification, amplification, and capillary electrophoresis and 2) rapid purification and/or direct amplification.

DNA quantification and STR data will be presented in order to compare the success of each sampling, storage, and processing strategy. The novel combination of in-field sample collection methods, tissue preservation and more rapid, direct sample processing has great potential for forensic application and ultimately criminal justice investigations.

Keywords
Disaster victim identification, DNA typing, DNA collection, DNA preservation, Direct PCR