B113 Tissue Preservation With Direct-to-Polymerase Chain Reaction (PCR) for DNA Profiling: An Alternative Disaster Victim Identification (DVI) Approach

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After attending this presentation, attendees will be informed regarding the efficiency of various solutions to preserve DNA in fresh and decomposing tissue samples when stored in warm ambient temperatures for up to four weeks. In addition to the benefits of storing samples at room temperature, this presentation will also describe the results of combining these preservatives with direct-to-PCR amplification in order to process a high volume of tissue samples for faster DNA identification.

This presentation will impact the forensic science community by addressing the demands for DNA preservation in rapidly decomposing remains and providing faster DNA identification during a mass disaster. By directly amplifying DNA in solution (with dilution in some cases), DNA extraction from the dense tissues can be avoided and successful Short Tandem Repeat (STR) profiles can be obtained in a timelier manner.

Tissue preservation offers the ability to stabilize and isolate DNA from tissues in the field, far from a laboratory setting, where refrigeration may not be available. This has potential application to Disaster Victim Identification (DVI) as well as to any form of field-based forensic biological evidence or intelligence collection.[1] Forensic DNA analysis is one of the three primary methods of identification recommended by the International Criminal Police Organization (INTERPOL), together with fingerprint and dental analysis.[2]

Previous work has demonstrated the ability to obtain full STR profiles from DNA extracted from fresh muscle tissue preserved in Tris, EDTA, NaCl, Tween 20 (TENT) buffer, salt-saturated DMSO-EDTA solution (DESS), and two proprietary preservatives: DNAgard® from Biomatrica® and one from DNA Genotek, Inc.[3] Three of the preservatives (DESS, DNAgard®, and DNA Genotek) also yielded full profiles from DNA extracted from aliquots of the preservative solution surrounding the muscle tissues. Therefore, in this study, the possibility of obtaining DNA profiles without DNA extraction, by adding aliquots of preservative solutions surrounding fresh and decomposing human tissue samples directly to PCR, was explored.

The results of this work, in which full PowerPlex® 21 and GlobalFiler® STR profiles were obtained from fresh and decomposed tissue preserved at 35oC for up to 28 days, as well as from fresh tissue which had been stored at 35oC for up to 28 days, and then at -80oC for four years, will be presented.

Reference(s):

1. Montelius K., Lindblom B. DNA analysis in disaster victim identification. *Forensic Science, Medicine, and Pathology*. 2012; 8(2): 140-147.
2. INTERPOL: *Disaster Victim Identification Guide*. 2009; Lyon.
3. Allen-Hall A., McNevin D. Human tissue preservation for disaster victim identification (DVI) in tropical climates. *Forensic Science International: Genetics*. 2012; 6(5): 653-657.

DNA Preservation, Direct-to-PCR, DVI

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