B182 A Specialized Workflow for Charred and Degraded Human Remains That Leads to Identifications

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After attending this presentation, attendees will learn how to obtain probative results from samples that have been degraded after prolonged exposure to fire. Attendees will see the effect of sample degradation and sample inhibition on forensic DNA cases and will learn about the tools that are available to address theses issues. Two cases, one from a recent transport disaster event and one from a missing persons' identification case from a 20th-century military conflict, will be presented to illustrate the typical condition of samples obtained from crime scenes and evidence exposed to fire.

This presentation will impact the forensic science community by identifying and sharing best practice methods that have enabled results to be generated from highly compromised samples that previously would have been unlikely to produce probative results. Attendees will learn bone and tissue preparation methods that can improve downstream success and, in these cases, led to positive identifications.

As a result of both the improved recovery of DNA from crime scene samples and increases in the sensitivity of forensic DNA testing systems, there is increased understanding of the robustness of DNA testing from degraded samples. Forensic analysts, therefore, are more frequently encountering challenging samples that require a specialized workflow to obtain probative data. These samples are often highly degraded and have been exposed to multiple Polymerase Chain Reaction (PCR) inhibitors from various environmental conditions. Degradation becomes one of the greatest challenges when processing evidence that has been subjected to fire. The length of exposure, the temperature of the fire, and preservation of evidence after collection affects the ability to recover a DNA profile with traditional Short Tandem Repeat (STR) testing systems.[1]

To improve the ability to maximize recovery from these complex tissue and bone samples, a specialized workflow has been developed. It involves combining efficient extraction, recovery, and subsequent analysis using commercially available technologies, including next generation autosomal STR marker systems, a highly sensitive quantification system, and an *Alu*-based maker system designed for highly degraded samples. This presentation will detail the proposed workflow, including tissue and bone preparation, analysis, and interpretation.

Two cases will be presented, one recent and one from a 20th-century military conflict. In both cases, samples were exposed to prolonged high-temperature fires. These cases will demonstrate the process that was used to achieve probative results from highly compromised samples exposed to and consumed by fire. In both cases, sufficient STR data was obtained to make a positive identification based on a family reference sample.

Reference(s):

1. K Ph.D, Kadunc R., Mann G., McLaughlin S. Comparison Of Quantity And Quality Of DNA Recovered From Burn Samples In Which Burn Temperatures And Conditions Were Varied. *The Internet Journal of Forensic Science. 2009 Volume 4 Number 2.*

Degraded, Bone, Human Remains