B62 Identification of Exhumed Human Remains Using a Bone DNA Extraction Kit and a Low Copy Number Approach for STR Markers

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After attending this presentation, attendees will be briefed on a method for DNA extraction from exhumed remains recommended for ancient bone samples and interpretation based on low copy number DNA strategy.

This presentation will impact the forensic community and/or humanity by demonstrating how this method or approach may increase the ability to obtain STR marker data from challenging human remains This presentation illustrates the use of an ancient bone extraction protocol for recovery of DNA from exhumed bones that were buried for more than ten years. The chemicals used in embalming and the natural decomposition processes can drastically reduce the ability to recover nuclear DNA that is of sufficient quality to generate even a partial short tandem repeat (STR) profile. Typically, teeth and long bones such as the femur are most successful in generating a DNA profile with STR markers. In this case, teeth were not available as samples and the femur failed to generate a DNA profile.

This case example began as a civil lawsuit for failure of a funeral home to notify the family of a burial. More than 10 years later, the family was still not confident that the human remains in the coffin were that of their deceased family member. The body was exhumed, examined for identifiable clothing or physical attributes, and representative bone and tissue samples (femur, rib, phalange) were collected for nuclear DNA testing. The general condition of the body was good with some tissues intact; the body was not fully skeletonized. No dental records or wedding ring was present for identification. DNA reference samples (buccal swabs) were also collected from family members to reconstruct the deceased's DNA profile for comparison. Mitochondrial DNA testing was not possible for this case due to no living maternal relatives.

Multiple bone samples were cleaned with 10% sodium hypochlorite and bone powder was removed with a Dremel drill from the central medullary portion of 3-day-old, oven dried bones. DNA extractions were performed using an Invisorb Forensic Kit (Invitek GmbH, Berlin, Germany) that specifies a procedure for DNA purification from ancient bone material. This procedure is based on bead capture technology that increases the recovery of DNA and reduces carry over of PCR inhibitors from the body decomposition process. PCR amplification was performed using a Profiler Plus™ (Applied Biosystems, Inc., Foster City, CA) human identification kit and DNA detection was performed on an ABI 310 DNA Sequencer®. A partial DNA profile was obtained from one of 10 DNA extractions; the successful sample originated from a rib bone. A low copy number approach (multiple PCR amplifications of the same DNA extract) was used to maximize the confidence in the DNA markers identified from the bone. After reconstruction of the deceased's DNA profile from family reference samples, it was concluded that the human remains did indeed belong to that family group.

The full case study will be presented as an example of a relatively quick DNA extraction process and low copy number PCR approach that was successfully used on challenging samples for human identification.

Bone, DNA, Forensic

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