B109 Comparison of DNA Yield and Short Tandem Repeat (STR) Success Rates From Various Tissues in Embalmed Bodies

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After attending this presentation, attendees will understand some of the principles of genotyping chemically damaged and degraded tissue samples, such as those harvested from embalmed cadavers, for identification.

This presentation will impact the forensic science community by providing guidance concerning which tissues may be best harvested from embalmed bodies and those that will provide the highest quantity and quality DNA for human identification purposes in a timelier manner.

The process of formalin fixation is commonly used to preserve tissue sections for pathological testing and embalming cadavers for medical use or in preparation for burial. DNA extracted from formalin-fixed tissues may provide an alternative source of material for identification in forensic cases. Formaldehyde causes DNA damage and degradation, thereby reducing the quantity and quality of DNA available for downstream genetic analysis.

By analyzing the DNA yield, level of DNA degradation, and STR success of various tissues from embalmed cadavers, some guidance may be provided to forensic analysts regarding which samples from embalmed bodies are likely to generate more complete STR profiles.

In this study, tissue samples (N=122) were dissected from three male embalmed cadavers and included bone, cartilage, hair, muscle, internal organs, skin, teeth, and nail clippings. DNA was purified from all samples, the DNA quantity and level of degradation was determined using the QuantiFiler® Trio DNA Quantification kit, and genotyped using the GlobalFiler® Polymerase Chain Reaction (PCR) Amplification kit.

The results of this study, which showed a wide variation in DNA yield, degradation, and STR success between different types of tissues within each cadaver, and some variation between the three cadavers, will be presented. Overall, bone marrow samples resulted in the highest DNA yields, lowest DNA degradation values, and highest STR success; however, various muscle and skin samples also provided complete STR profiles, demonstrating that some soft tissues that are more quickly and easily harvested from embalmed cadavers can provide the same or greater DNA yields and STR success than the traditional, and more difficult to collect and process, bone and tooth samples.

When comparing tissues that experienced blood pooling (due to livor mortis) to tissues in regions that experienced compression, significantly more complete STR profiles on average were generated from the compressed tissues (62% versus 37% alleles recovered) (Analysis of Variance (ANOVA); p=0.02). These data support the thought that tissues affected by lividity may also experience greater exposure to formalin, resulting in DNA damage and reduction in downstream STR success.

Embalmed, DNA Damage, Tissue Sampling

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