B61 Mitochondrial DNA Amplification Success Rate as a Function of Hair Morphology

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After attending this presentation, attendees will have a better the understanding of the factors that influence amplification success rate in hair tissue.

This is a controlled study that considered amplification success as a function of several hair morphology characteristics. This presentation will impact the forensic community and/or humanity by demonstrating how this data may be compared to results obtained from casework samples in order to evaluate the potential factors that may contribute to a reduced amplification success.

This study examines the amplification success rate of mitochondrial DNA from human head hair and bloodstains with respect to their potential for forensic application. Mitochondrial DNA was isolated using a Chelex-based extraction method and amplified using the LINEAR ARRAY™ duplex PCR system. The particular focus of this study was to characterize the morphological features of human head hair in order to further the understanding of the factors that influence amplification success rate in hair tissue using the LINEAR ARRAY™ duplex PCR system.

131 bloodstains and 2554 head hairs from 132 individuals representing four population groups were amplified. The hair samples were characterized as follows: 1251 were identified microscopically as telogen hairs and 1303 were classified as hairs without roots (removed prior to extraction). Amplification success was assessed as a function of several independent variables: morphological characteristics; telogen root v. no root; donor age; scalp origin; use of cosmetic hair treatments; and race of the donor.

The results show that a positive correlation exists between amplification success and the presence of a telogen root. Combining the amplification success with either the original or optimized protocol, telogen hairs result in an overall success rate of 77.5% compared with 65% for hairs with no roots. Controlling for telogen hairs, the findings indicate that the overall success rate is independent of cosmetic hair treatments, medulla structure, shaft diameter, and scalp origin. Conversely, the age of the donor, the race of the donor, and hair pigmentation all contribute to a variation in amplification success rate.

Amplification Success, Mitochondrial DNA, Hair Morphology

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