Mitochondrial DNA Recovery and Sequence Analysis from Human Bone Exposed to Controlled Thermal Loading

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Advancements in sequencing technology have increased the feasibility of using mitochondrial DNA (mtDNA) sequence data for the purpose of human identification and other forensic applications. MtDNA is usually employed as a last resort in situations where crime scene evidence or human remains defy testing of nuclear DNA markers. In situations such as airline disaster, explosions and fires, the remains needing identification and re-association are often burned to different degrees. Similar situations may be encountered in homicide investigations where victims are burned to conceal their identity or dispose of remains. Attempts to amplify and sequence DNA from these samples are often conducted without the guidance of validation studies characterizing the changes that bones and DNA contained in the bones undergo. This study was undertaken to provide reference data on the ability to obtain testable mtDNA and usable sequence data from human bones exposed to differing thermal loading. Sequence data obtained from the burned samples is compared to sequence obtained from reference bloods to provide data on length of read, sequence anomalies and general testing success. Correlations are drawn to microscopic structural changes that occur when bone is exposed to different temperatures and how these changes affect the outcomes of sequence analysis.