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A COMPARATIVE ANALYSIS OF TECHNIQUES FOR SAMPLING
DENTIN POWDER FOR MITOCHONDRIAL DNA TESTING

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Abstract

Modern times has brought about an era where large numbers of people move freely across both state and continental borders more rapidly than ever before. High mortality rates caused by people dying in automobile crashes, mass disasters, homicides, and air crashes year-round, have increased the difficulty in the identification of deceased persons. In cases such as these, bodies are left badly decomposed, fragmented or incinerated, making human identification difficult since soft tissue may not be present. Identifiable traits such as hair, piercings tattoos and any phenotypic idiosyncrasies may be altered or absent, complicating the identification process.

Structures such as teeth have proven to be useful during these circumstances. Teeth are known to be the hardest structures in the human body and able to withstand the harshest of conditions. With the technical advances in molecular biology and the incorporation of DNA fingerprinting, the utilization of dental DNA analysis is more prevalent. DNA is an excellent means of victim identification, specifically mitochondrial DNA (mtDNA).

There are various methods that can be used to sample mtDNA from teeth. I analyze two techniques for sampling dentin powder: manually crushing tooth roots between two bolts with liquid nitrogen and drilling tooth roots with liquid nitrogen. Using pig molars as a proxy for human teeth, I analyze the viability of each dentin sample technique and overall mtDNA yield with two DNA quantification methods. I conclude that the sampling of dentin powder can be performed effectively by either method. Yet, manually crushing tooth roots between two bolts with liquid nitrogen yields a higher mtDNA concentration per powdered dentin weight (ng/ μ l). Further research is required to confirm the validity of such results with more trials and human teeth.