

**MITOCHONDRIAL DNA ANALYSIS OF SKELETAL REMAINS:
HOPE OR FUTILITY FOR THE NATIONAL
MISSING PERSONS DNA DATABASE**

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A principle goal of the National Missing Persons DNA Database is to match unidentified skeletal remains with missing persons through the use of both nuclear DNA typing and mitochondrial DNA typing. Essential to the success of this program is the ability to obtain profiles from highly degraded remains that may have been exposed to extreme environmental conditions. We have conducted a retrospective study of the mitochondrial DNA typing of skeletal remains submitted to our laboratory during routine forensic casework to examine the success of body identifications with our methodologies.

A total of 116 sample extractions of skeletal remains, which represents 77 cases, were performed from February 1999 through May 2005. Overall, the success of obtaining either a full profile or a partial profile was 83.6%. Among those remains that did not yield any amplifiable mtDNA, 68% were identified as burned. The samples were subdivided into those cases that involved primarily body identifications (n = 62) and those that were either personal cases or historical cases (n = 13). In two criminal cases, the known exemplar was skeletal material.

In general, most any type of remains that were submitted was suitable for mtDNA analysis and yielded either a full or partial profile. The majority of samples were either femur sections (n = 36) or teeth (n = 39) as that is what is most often selected, if available, by this laboratory. Unidentified small fragments (n = 13) were the least likely to yield a profile and none of these samples provided a full profile. Among body identification cases, 60% of the skeletal remains were 5 years or less in age, 29% were between 5 and 25 years, and 3% were greater than 25 years. For some cases, there was no information on possible age of the remains. Among historical and personal cases, the majority of cases were greater than 50 years of age and 68% of the remains exceed 100 years with the maximum age of approximately 1000 years.

For body identification cases, 46 of 92 (50%) sets of skeletal remains had the same mitochondrial DNA profile as the submitted reference sample. Of these 46, half of them were mothers providing reference samples for missing children. Siblings, who served as references for siblings, accounted for 12 additional samples. Approximately 5% of samples involved more distant maternal relationships such as an aunt providing the reference for a nephew.

Overall, success of developing a profile is high but laboratories must have the capability of using small amplicons on skeletal remains. When other information is available to suggest the possible origin of the remains, approximately 50% of these tentative body identifications are confirmed with the mtDNA test.