H104 The Technique of Sampling Skeletal Remains for Mitochondrial DNA Testing

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After attending this presentation, attendees will understand the correct procedure and sampling areas for submitting skeletal remains for Mitochondrial DNA testing.

This presentation will impact the forensic community and/or humanity by demonstrating how mitochondrial DNA testing has proven to be a valuable tool in the identification of skeletal remains. Fragmented, weathered osseous material has been successfully sampled and sequenced providing a data base for comparison with family reference samples. The knowledge of how and where to sample the skeletal remains could benefit the general community to help resolve missing persons cases. It is proposed that the ME offices get their "skeletons out of the closet" and submit them for mtDNA testing for comparison with a maternal relative of the missing persons.

The mission of the Joint POW/MIA Accounting Command-Central Identification Laboratory (CIL) is to search for, recover and identify missing U.S. service personnel from past wars. Remains processed through the CIL include a wide range, from single individuals, such as the frozen WWII airman recovered from the mountains of California, to the commingled skeletal remains turned over by the North Koreans from former POW camps. Mitochondrial DNA testing has proven to be a very important tool in the identification of individuals represented by complete or fragmented skeletal remains. The sequence data generated also assists in the sorting of commingled remains from crash sites and mass burials. The CIL is currently at a submission rate of 900 osseous and dental samples per year. Contemporary missing person cases may also benefit from the data generated from the mtDNA testing of the skeletal remains. Self actuating samples are not necessary as results are compared to maternal relatives of the missing persons.

A minimum sample of two to five grams of concentrated cortical bone is necessary for processing osseous material for mtDNA. Each test uses two grams of sanded, cleaned bone which is ground to a powder prior to amplification. When presented with a complete, single set of skeletal remains, an aggressive sampling strategy is not necessary as a three square centimeter sample from any part of the femoral diaphysis will yield a minimum of 10 grams of cortical bone. However, the larger long bones which are preferred for sampling, are not always recovered, or as in commingled remains, can not be associated with the skull or other recovered skeletal elements. Such cases require the utilization of optimal sampling areas. The choice of skeletal element is equally important when limiting the number of samples per case to be tested.

This presentation will discuss the sampling strategy developed for submitting osseous samples to the Armed Forces DNA Identification Lab (AFDIL) for mtDNA sequencing. It will also review sample contamination precautions and recommended equipment use.

Mitochondrial DNA, Missing Persons, Skeletal Remains

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