



Physical Anthropology Section – 2006

H81 Reducing Problems With Osteological and Dental Samples Submitted to Missing Person DNA Databases

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After attending this presentation, attendees will be better informed about the Federal Bureau of Investigation's National Missing Persons DNA Database (NMPDD) Program and how it may better assist forensic anthropologists, odontologists, medical examiners, coroners, law enforcement officials and those they serve in identifying human remains.

Using case examples, this presentation will impact the forensic community and/or humanity by 1) illustrate how samples of various types are submitted and entered into NMPDD; and 2) through case examples, share information and suggestions concerning storage, handling, and sample preparation methods which will insure increased success in using the database. This presentation will impact the forensic science community by providing a more thorough understanding of the types of samples which will yield useable DNA for identification purposes.

Over the past five years, tissue samples from unidentified human remains have been submitted to the NMPDD by anthropologists, odontologists, medico-legal authorities, and law enforcement agencies. Most of the unknown specimens are osteological materials. These samples are typed for mitochondrial DNA and nuclear DNA (STRs). Genetic profiles from the unidentified remains are compared to genetic profiles of missing persons and appropriate biological relatives of missing persons entered into the database. Osteological samples that cannot be associated with a missing person are uploaded into the National DNA Index System, (NDIS), of the Combined DNA Index System, (CODIS).

Osteological specimens represent some of the most challenging samples that DNA analysts process. Challenges to successful genetic typing of osteological specimens will likely arise when the useable DNA content of specimens have been degraded or lost by improper sampling, cleaning techniques or other environmental insult. Experience shows that successful DNA extraction and comparison correlate with the initial condition of samples received. Improved methods of DNA extraction and the sensitivity of DNA typing techniques also means increased sensitivity to degradation and contamination. Thus, successful genetic typing and the identification process are hindered from the outset by factors which can be controlled by fairly simple means. Problem areas may be reduced to issues of 1) recovery, handling, and long-term curation; 2) maceration and cleaning; and 3) sampling.

As remains are collected or exhumed, all operators should attempt to reduce contamination by gloving, using clean containers and instruments, and reducing the number of individuals handling the remains. Those charged with maceration, cleaning, and sample selection should avoid using chemicals that damage DNA, (especially oxidizing agents), and high temperatures. This is particularly important when samples are small and already highly degraded, particularly when additional samples cannot be obtained for re-extraction. Instruments used for cutting samples should be used only once to avoid cross-contamination when multiple samples are involved, (single-use fiber Dremel blades should be used once and discarded). Some laboratories prefer to cross-link DNA on contaminated sample surfaces before sanding or cutting.

Case examples will demonstrate model working relations between various forensic agencies and laboratories already in operation. Clearer mutual understanding of various functions and responsibilities will improve sample processing and lead to an increase in the numbers of missing person identifications.

Missing Person DNA Database, Osteological and Dental Samples, CODIS