H142 Effective Use of Metadata in the Identification of Skeletal Remains With Weak DNA Kinship-Index Results

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After attending this presentation, attendees will have increased understanding of the utility of metadata in the personal identification process at a large urban medical examiner's office and the types of metadata that may be used effectively to support identification when DNA results are inconclusive. Retention of this information will be enhanced by the presentation of a complicated case series in which metadata were used effectively to assist in identification of skeletal remains.

This presentation will impact the forensic science community by increasing the potential for successful identification of deceased persons through the demonstration of innovative uses of metadata in personal identification of skeletal remains with degraded bone and limited family-reference sample availability.

In general, metadata is a term for information that describes other data. In the context of forensic personal identification, metadata are forms of evidence that may aid in interpretation of molecular evidence, i.e., DNA profile comparison results. Metadata are often provided to medical examiners by a consultant or staff forensic anthropologist in the form of the anthropologic profile, a comprehensive demographic description of an unidentified deceased individual in life constructed through observation and interpretation of metric and non-metric evidence preserved in the skeleton. Characteristics beyond age, ancestry, stature, and sex of the remains are assessed, including trauma, pathological conditions, anomalies, and stress markers. The use of DNA profile comparison for identification of skeletal remains has become standard procedure in many United States medical examiner offices over the last 20 years. The anthropologic profile reduces the pool of possible identities and may be used to simplify the search for potential family members who will donate family reference samples for DNA analysis. Once the DNA comparison is completed, a Kinship Index (KI) is reported by the laboratory to aid in the identification decision. When the KI is inconclusive, the metadata may support or cast doubt on the presumptive identity of the skeletal remains.

Harris County Institute of Forensic Sciences located in Houston, Texas, houses the Harris County Medical Examiner's Office (HCIFS). An unidentified skeletal remains case of a teenaged male killed during the "Houston Mass Murders" of 1973 (778) was identified in 2010 by HCIFS through DNA comparison with a living sister's profile. The sister's reference sample was collected following recognition of a similar dental non-metric trait pattern in photos of another deceased sibling. Although no dental records were available, photos clearly showed that both young men had both shovel-shaped incisors and pronounced bilateral Carabelli's cusps. The identification of 778 illuminated the 1973 misidentification of a different skeletal case (733). Investigation of the misidentification required exhumation of two teenaged male decedents who had been buried in the same casket (733 and 713). One of the decedents, 733, had been previously misidentified with the same identity confirmed through DNA for 778. The exhumed decedents were skeletal and the remains had been subjected to ebbing and flowing groundwater, degrading the DNA. The complete mitochondrial and partial nuclear DNA profiles obtained from 733 were compared with the profiles from a living sister but the KI was inconclusive. No other family references were available. The anthropologic profile was highly consistent with the medical records and descriptions of the unidentified boy. Additionally, the decedent had undergone multiple Electroconvulsive Therapy (ECT) treatments with a hard rubber mouth guard. The anterior dentition was marked by patterned wear and fractures inconsistent with his age. The wear pattern and fracture locations were found to be consistent in comparison with that of another identified teenaged male from the time period (750) who received multiple ECT treatments. Based on metadata support of the KI, the decedent was positively identified. Although these cases are 40 years old, ECT is currently in widespread use as a treatment for depression. Recognition of ECT-patterned wear and fractures may also provide supporting metadata in current casework.

Personal Identification, Electroconvulsive Therapy, Dental Non-Metric Traits

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