H124 High Throughput DNA Typing for Degraded Skeletal Remains and Victim Reference Samples in a Large Scale "DNA- Led" Missing Persons Identification and Re-Association Project: The ICMP Work on the Missing Recovered From Srebrenica Mass Graves

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After attending this presentation, attendees will gain an understanding of the protocols, workflow, and challenges involved in operating a quality-controlled, high throughput laboratory specialized for challenging skeletal remains samples.

This presentation will impact the forensic community by furthering knowledge on the technical details and laboratory management practices that allow DNA typing to be used cost- and time-efficiently on a large scale in missing persons identification casework.

The International Commission on Missing Persons (ICMP) DNA laboratories were brought online in late 2001 to assist authorities in a blind DNA lead identification process in the former Yugoslavia. Since its inception the laboratories have successfully profiled close to 30,000 bone samples and over 85,000 family reference samples resulting in DNA matches to over 15,000 unique individuals.

The laboratories utilize a modular approach in which analysts play a specific role in each part of the process as opposed to processing the sample from start to finish. This approach allows maximal throughput which can process up to 105 bone sample extractions per day. Typically bone samples tested are between 10-17 years old but can range up to 65- years-old in other projects. For most cases performed over the years, an extraction protocol involving overnight digestion in protease K, followed by a silica-based purification has been used. The results of multiple thousands of DNA tests have permitted a detailed evaluation of the relative preservation of DNA in various skeletal elements. The overall success rate on the >15,000 skeletal and tooth samples submitted from Srebrenica-related graves has been 83%.

Recently, the DNA laboratories have validated a new extraction protocol based on a complete demineralization of the bone sample, coupled with silica based clean up. This new protocol requires significantly less starting material, and requires fewer manipulations throughout the procedure, and provides higher DNA yields. The purification portion of this new protocol has the potential to be automated.

Typing of bone/tooth sample extracts is primarily done with the Promega PowerPlex© 16 STR multiplex. Amplification conditions for optimal success with degraded samples, as well as profile interpretation criteria will be discussed. Additionally, the ICMP has developed a series of short-amplicon multiplexes, one of which (6 loci plus amelogenin) has been widely applied for cost-effective DNA-based re-assocation of dissociated body parts from Srebrenica-related graves. Other multiplex kits and Y-chromosomal testing are also applied as needed to resolve family relationships.

The ICMP DNA Laboratory system is accredited to ISO-17025 and ILAC standards, and the role of key elements of the ICMP Quality Management System in assuring accuracy and chain of custody in such a large scale system will be discussed.

DNA Typing of Skeletal Remains, International Commission on Missing Persons, Mass Grave

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