B8 The Relationship Between DNA Quantity and the Quality of the DNA STR Profile for DNA Extracted From 1013-Year-Old Bone Samples

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After attending this presentation, attendees will be shown results obtained while working with 10 - 13-year-old bone samples.

This presentation will impact the forensic community and/or humanity by assisting people working on DNA STR analysis of degraded samples.

The International Organization of Missing Persons (ICMP) has been tasked with the identification of approximately 30,000 missing persons. The ICMP identification system has been implemented using deoxyribonucleic acid simple tandem repeat (DNA STR) testing of family reference samples and bone samples. To ensure the accuracy of the identification process the minimum acceptable posterior odds for matching of reference and bone samples has been set at 99.95%. Unfortunately for many cases there are few family members alive to use as reference samples and therefore achieving a posterior odds of 99.95% requires a large number of STRs.

The ICMP uses the Promega PowerPlex® 16 system (PP16) as the primary kit for STR analysis. With the ICMP's extraction procedure the success rate for reporting of 12 or more loci from the first run is approximately 88%. Unsuccessfully tested samples, however, represent a large number of missing, due to the fact that the overall number of victims is so high.

Samples that fail the initial testing are quantified using the Applied Biosystems Quantifiler™ system. The Quantifiler™ kit uses Real-time PCR technology to obtain both the amount of DNA present in a sample as well as to assess the level of inhibition that occurs during the PCR amplification.

Quantification was performed on 200 DNA extracts that had already been tested with the PP16 system. For these 200 samples a range of results were obtained during the PP16 testing. Samples were selected that amplified no alleles while others were chosen that amplified between 1 and 16 loci. A correlation was made between DNA content of an extract and the success rate of the STR testing. Samples with fewer than 16 loci amplified were then retested using adjusted amounts of DNA.

This presentation will discuss the range of DNA quantities calculated by the Quantifiler™ system and how this information can serve as a means of improving the success rate of the PP16 testing. It will also show how the relatively inexpensive Quantifiler™ testing can both reduce the cost and improve the results of the more expensive STR testing. Ultimately improving the success rate of the STR testing will increase the number of cases of which the posterior odds are over 99.95% and therefore can be identified.

DNA, Real-Time PCR, STR

 ** Presenting Author*