B39 Rapid DNA Analysis for Disaster Victim Identification in New York City

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Learning Overview: Mass disasters that result in human casualties require the need for swift and accurate victim identification. Visual identification, fingerprinting, and dental comparisons are often precluded by the poor condition of human remains recovered at a disaster site. DNA testing, although historically expensive and time-consuming, may sometimes be the only pathway to identification. For example, DNA testing played a role in almost 90% of identifications made from the World Trade Center attack in 2001. After attending this presentation, attendees will gain insight into the ability of Rapid DNA to enhance identification capabilities in the event of a mass fatality.

Impact on the Forensic Science Community: This presentation will impact the forensic science community by improving the way victim identification is handled by the forensic science community.

Rapid DNA systems encompass the stages of DNA testing such as extraction, amplification, electrophoresis, and analysis. All phases of testing are carried out in the self-contained unit. These systems are designed to be field deployable by military and law enforcement personnel and are therefore often rugged and easily transported. Instrument operation is fully automated and requires no user intervention after sample input. Typical processing time is less than two hours from the time the sample is loaded. Legislation enacted within the past two years has enabled NDIS-accredited laboratories to process DNA samples and search the resulting profiles in a database. A rapid DNA system would be ideally suited for a mass disaster because of its ability to function outside the typical laboratory setting and because of the speed with which results are obtained.

Postmortem bone samples from non-casework autopsies were tested using the ANDE™ Rapid DNA Analysis System. These bones had been previously extracted using the bone protocol routinely performed by the New York City Office of the Chief Medical Examiner (OCME) and amplified with the Identifiler™ kit. Bones were divided into groups and prepared using either the manufacturer's instructions or the OCME's bone protocol. Samples prepared and extracted using both methods were tested by Rapid DNA analysis. The results obtained using the conventional methods were compared to those obtained by Rapid DNA analysis.

Severely damaged bones collected from the site of the Twin Towers collapse that have yet to be identified still exist. Successful DNA typing of these samples has been prevented by the damage caused by exposure of the bones to fire, heat, and jet fuel at the site of the disaster. A select group of bones collected from the site of the collapse which have previously yielded no DNA profiles were tested using Rapid DNA analysis to determine if the results displayed any improvement over conventional protocols.

The success of any DNA identification effort relies upon the submission of reference samples. Many of the reference samples submitted for the World Trade Center disaster were tested with an amplification kit that is no longer used by the OCME because it does not contain enough loci to generate CODIS-eligible profiles. The OCME has recently converted to a newer kit with more loci to comply with FBI requirements for CODIS participation. Many of the reference samples collected have yet to be re-tested with the newer kit to facilitate better comparisons. A group of reference samples submitted for the World Trade Center identification effort was selected for Rapid DNA analysis to demonstrate that this technology can provide DNA profiles that more closely align with current amplification kits. Rapid DNA analysis may eventually be used to re-test all 9/11 reference samples to enable better comparisons.

Rapid DNA can significantly reduce the time commitment needed for processing postmortem samples and analyzing the resulting DNA profiles. Simultaneous typing of reference samples enables fast comparisons to occur so that results can be reported with utmost speed and without compromising reliability. Rapid DNA analysis has the capability to drastically improve the overall success of disaster victim identification.

Rapid DNA, Disaster, Bone