B71 Mass Disaster Remains Sample Tracking (World Trade Center and American Airlines Flight 587)

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This presentation will describe how postmortem samples were collected, accessioned, processed, prepared, and packaged for DNA testing. A specific challenge arose through the use of several contract laboratories. This presentation will also describe the staffing needs related to the above.

When the World Trade Center collapsed, 2,823 individuals disappeared and were reported missing. In order to provide closure to their families, all human remains recovered from the site were genetically tested and compared to reference samples. Due to the extreme heat and friction it could not be expected to recover human remains for all victims and most samples were of very poor quality, therefore a decision was made to test even small samples without prior selection.

Sample collection started on the evening of 9/11 and continued in day, night, and weekend shifts. The Forensic Biology Department staff was required to aid in the sample collection in the morgue at all times. In the beginning samples sent to the lab, although barcoded at autopsy, had to be logged into the laboratory by hand. The New York State Police shared their LIMS system ("BEAST" by Porter Lee Company) and provided support by sending State Troopers and Laboratory Personnel already familiar with the system, along with a staff member from Porter Lee to train Forensic Biology personnel in the use of this system. As accessioning/processing needs were identified, the software was modified accordingly.

Sample handling in the laboratory was limited to a small group of Forensic Biology staff who had been trained in the LIMS software. Since the specialized and trained staff was urgently needed during the day, night shifts and weekend personnel was supplemented by support from OCME (Office of the Chief Medical Examiner) staff in the Department of Forensic Toxicology, as well as various agencies, including the Federal Group DMORT (Disaster Mortuary Operational Response Team), New Jersey State Police Scientists, and medical school students from Columbia and New York Universities. Utilizing volunteers was key to the success of the operation in both sample receipt and processing. A reduced number of forensic scientists was available day and night to train and oversee federal aides and volunteers.

After the accessioning was complete, tissue samples were immediately cut for DNA extraction and frozen for storage. Some samples were split upon receipt: for example, if bones were received with tissue adhering to them, the tissue was removed from the bone and the receipt of two items was recorded. This had two advantages: 1) from now on bones could be stored at room temperature or 4°C, and shipped at room temperature, while the removed tissue was stored at -80°C; 2) both items were tested and concordance of allele calls served as quality control for the process.

The BEAST was used to track samples on various levels: original item received from autopsy, cuttings taken for DNA extraction, DNA extracts in microtiter plates, aliquots prepared to be shipped to different contract labs, release of these aliquots, final release of the original item to a funeral director, applicable only if the sample received by forensic biology was not a cutting of a larger set of human remains but the whole "body part."

Most DNA typing of samples was outsourced due to the volume of samples (almost 20,000 at this writing), and the need for the department to avoid a backlog of regular casework.

Tissue extracts were processed robotically and stored in 96 well microtiter plates; the final extract is split into 3 aliquots in 3 plates with each plate sent to a contract laboratory for specific high through-ut DNA tests. Myriad, Bode Technology Group and Celera have received thousands of extracts so far; Orchid Genescreen will be added to this group. This way the OCME controls samples and DNA extracts which are shipped to four different contract labs, each with different requirements for the sample manifest. Bone samples, clean of tissue, are packed in groups of approximately 100 (50 mLconical vials) and shipped to Bode Technology group. All of the above is tracked utilizing the BEAST.

In the near future, all samples and sample extracts will return to the laboratory, and the actual samples as well as the results will be tracked to ensure that each sample has been tested in each of the required systems. Software for this purpose is currently being written.

It is hoped that this presentation will illustrate the need for a comprehensive teamwork approach and computer tracking capabilities in connection with the receipt and testing of remains from Mass Disasters.

Tracking, LIMS, Outsourcing

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