

## 9/11 Through the Eyes of a Medical Examiner

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**Charles S. Hirsch, MD**, is the Chief Medical Examiner of the City of New York. He is also currently Professor and Chair of the Department of Forensic Medicine and Professor of Pathology, New York University Medical School.

**Robert Shaler, PhD**, is a medical examiner in the Office of the Chief Medical Examiner of the City of New York. Dr Shaler was previously a criminalist at the Pittsburgh Crime Laboratory and a professor of chemistry at the University of Pittsburgh. He established the current forensic biology laboratory at the Chief Medical Examiner's Office in 1990.

Both men participated in an interview with JIM regarding their role as medical examiners in dealing with the September 11th tragedies.

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**JIM:** Could you describe how the resources of the Office of the Chief Medical Examiner (OCME) were marshalled on September 11th? Had there been a plan in place that was adaptable for this crisis, or did this require a new blueprint and strategy?

**Shaler:** The OCME has had a disaster plan in place for years. However, the DNA part of the plan was conceived and implemented on September 11th. The DNA effort focused on three areas initially. First, a supervisory line was established so that the laboratory could have a presence in the autopsy area to guide medical examiners as to which samples would most likely give DNA test results. A mechanism to accept autopsy specimens in the laboratory (established within a week) and sample processing began soon afterward. Initially, the lab extracted the samples (most were tissues), and DNA profiles were run. However, because of the volume, we decided that we could either work exclusively on the disaster or casework. Because our on-going re-

sponsibility is casework, we decided to 'manage' the DNA testing by contracting with high-volume DNA test laboratories while continuing to extract DNA from tissues so that a separate supervised disaster 'line' would be available 24 hours, 7 days a week. Also, the New York State Police (NYSP) accepted the role of processing family samples. Thus, the World Trade Center disaster DNA processing initially occurred in two places: at the OCME for disaster samples and at the NYSP in Albany for family sample processing. Two private laboratories, Myriad and Celera, were involved initially; a third, Bode Technology Group, was added as a resource to extract DNA from bones.

**JIM:** How were additional personnel recruited to assist in the forensic efforts? Were there roles for "volunteer" medical professionals, scientists, and students, and if so, how were these individuals trained and organized?

**Shaler:** There was never a lack of volunteers. We have accepted volun-

teers from New York University (NYU) and Columbia Schools of Medicine and from the NYSP crime lab. These individuals were trained by the disaster supervisory staff of the DNA laboratory. A large part of the volunteer group came from D-MORT teams.

**JIM:** Given the nature of the injuries sustained by victims of the attack, were you compelled to adjust your approach to identification? How was this accomplished, and what were the greatest challenges to your response?

**Shaler:** Because of the nature of the samples coming into the lab, it has been apparent from the beginning that the bulk of the identifications would be DNA-based. The greatest challenge is yet to come. The majority of the samples (>50%) are not giving complete DNA profiles. This may dictate the need to use alternative approaches to obtain sufficient genetic information from the samples so that kinship and direct matches can be made. In this regard, we are



Charles S. Hirsch, MD

looking to the National Institute of Standards Testing to produce smaller amplicon STRs of the 13 STRs we are currently using. Additionally, we will explore the use of small amplicon single nucleotide polymorphisms, which have been developed by Gene Screen (a subsidiary of Orchid) for paternity testing. We also plan to use mtDNA sequencing.

**JIM:** Could you describe the method of DNA-based kinship identification? What were the roles of public/private partnerships in implementing the kinship identification protocols? Were privacy issues raised, and if so, how was this concern addressed by your office and the government?

**Shaler:** With the help of the NYSP and Dr Lisa Forman of the National Institute of Justice (NIJ), we have constituted a World Trade Center Kinship and Data Analysis Panel. This is a group of scientists from industry, government, and academia that is providing direction with regard to kinship analysis. One of the challenges is to obtain software that can perform kinship analysis on thousands of samples against thousands of family samples, for many of which there is incomplete or inaccurate

family information available. This is an ongoing effort. A huge lesson learned is that there must be a proper mechanism for collecting information from biological relatives. The forms used were not adequate, and many family samples simply have insufficient documentation with regard to the biological relationship to the missing person.

**JIM:** From a scientific viewpoint, can you identify factors, techniques, or data that would have been of great help in this process had they been available?

**Shaler:** Having a manual of 'what to do and how' for the entire process would have been helpful. Additionally, the FBI's CODIS (the national DNA database) should be adapted to handle the intricate software needs for these kinds of investigations. The software should be able to handle thousands of DNA profiles, be adaptable for 'novel' approaches, be able to import reference population databases so that relevant and appropriate kinship calculations (likelihood ratios) can be performed on thousands of samples simultaneously, and provide direct DNA matches (with likelihood ratios) of body parts to body parts and body parts to personal items from missing people. Additionally, a resource (probably provided by the NIJ or FBI) should be available of innovative DNA technologies that might be helpful in obtaining genetic information from highly degraded specimens.

**JIM:** What is the policy for the issuing of death certificates for persons missing since the World Trade Center attack but for whom DNA or other identification methods have not been successful?

**Hirsch:** The lack of a death certificate places great economic hardship on families already suffering the loss of a loved one. Without a death certificate, families cannot settle life insurance claims and other death ben-

efits, and they cannot begin to settle estates. Therefore, with the cooperation of the Mayor's Office, the Surrogate Court, and the New York City Law Department, a process was put in place to provide death certificates before the recovery and identification of bodies. The first step is for the family to submit an affidavit stating why they believe that a missing person was at the World Trade Center or on one of the airplanes and that the person has not been seen since September 11th. The second step is a confirming affidavit from the employer of the missing person or the presence of that person's name on the manifest of either airline. The Law Department merges and vets the two affidavits and presents them to the Surrogate Court. If the judge approves the application, she issues an order stating that the Medical Examiner has adequate basis for issuing a death certificate for that person. The death certificates state that the person died from physical injuries, a term that encompasses mechanical and thermal trauma, that the manner of death is homicide, whether the person was on an airplane or in an office building, and that the body has not been found. The first such death certificates were issued 3 weeks after September 11th, and thus far we have issued 2100. If a person is identified after the issuance of a "body not found" death certificate, a corrected death certificate is provided to the family. We believe that the prompt provision of death certificates in the foregoing circumstance has set a new standard for the compassionate treatment of bereaved survivors.

**JIM:** How did your office interface with social and psychological counseling services?

**Hirsch:** Psychological counselors have been made available throughout the City of New York, NYU, Bellevue, and nongovernmental volunteers. I do not know how many of our

employees have taken advantage of the available counseling.

**JIM:** In your best estimate, when will the work of the Medical Examiner on this challenge be complete? Are there lessons that you have learned from the response to this that will be valuable in fashioning a plan of action for another attack of the same magnitude, should it occur?

**Shaler:** Ideally, the work will be

complete when we have identified every missing person. Reality says, however, that this will never happen. Realistically, the work will be completed when the last specimen is obtained, all possible attempts to extract genetic data from all specimens obtained are exhausted, and every avenue for relating genetic and meta data for making identifications has been explored.

The lessons learned from the

World Trade Center disaster already have been used in our approach to the American Airlines Flight 587 crash victims. A big lesson is that labs need to have a plan in place in the event this happens again. Though it is probably impossible to plan for all eventualities because no disasters are the same, a general framework should be in place. At the end of this, we plan to produce a document that may help others.

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