



Pathology Biology Section – 2011

G102 Mass Disaster Procedures: Forensic Pathology and Genetic Techniques Used to Locate Nine Missing People in the Calabria Region (Southern Italy)

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After attending this presentation, attendees will understand the importance of a unified and well organized multidisciplinary approach resulting in a set of guidelines useful during a mass exhumation.

This presentation will impact the forensic science community by documenting the management of the first mass exhumation and DNA identification of one hundred corpses. This procedure will be useful in the future following an actual mass disaster event.

The Public Prosecutor's Office of the city of Paola (CS, Calabria Region, Southern Italy) opened an investigation into a number of criminal offenses that have repeatedly occurred in aged care facilities where people with physical and psychological handicaps are managed.

The aged care facility manager was a suspect and due to his irregular management was arrested.

In different periods over recent years nine residents had gone missing from the house. The resident's families reported this to the legal authorities about their missing relatives to the legal authorities. Moreover the families expressed concern that during the last meeting when they saw their relatives, they were all injured.

An investigation was organized in order to find the missing patients. This was concentrated in the local cemetery where the police found unmarked graves without any identification.

The public prosecutor gave permission to the Legal Medicine Department of Magna Graecia University of Catanzaro to exhume the unmarked graves and examine each corpse so they could be identified.

In a period of 15 days, 101 corpses were exhumed for identification using DNA and to determine if any trauma had occurred either antemortem or perimortem.

The medico-legal task force which was multi-disciplinary consisted of three phases: a planning phase; a pre-analytical phase; and, an analytical phase.

Planning Phase: During this phase mass disaster operative procedures were enacted. A medico-legal camp was built close to the cemetery area. Briefing meetings were organized to coordinate the schedule of pathologists, molecular biologists, entomologists, mechanical engineers, computer scientists, physics, and law enforcement agents (Arma dei Carabinieri and fire brigade).

Pre-Analytical Phase: Under the direction of the coordinating pathologist, pneumatic tents were positioned courtesy of the fire brigade. Each tent had its own purpose (external inspection, x-ray, autopsy, biological laboratory). The camp site was powered by portable electric generators. Moreover, the camp set up was established in order to prevent the infestation of insects attracted by human remains which would complicate or invalidate the medico-legal analyses. Approximately 40 people worked each day in the camp.

Analytical phase: This phase was developed in the Genetic Laboratory of the RIS, Carabinieri Messina. The methodology was previously validated at the Forensic Genetic Laboratory of Magna Graecia University where techniques had been previously established to extract DNA from old and badly preserved bones. The main difficulty of this work was the DNA extraction from corpses in colliquative, corification, and skeletonization stages.

A piece of femur diaphysis (4 cm length) was sampled from each corpse and fixed in alcohol. Subsequently all muscle tissue and internal trabeculae (if present), was removed from the bone. The bone was then washed in water-alcohol-ether, then pulverized and demineralized.

The pulverization of 0.5 g of bone was achieved by impact and friction using 30 Hz frequency and spun together with a single tungsten carbide ball inside a cylindrical steel container.

The bone powder demineralization was obtained using an EDTA solution 0.5 M pH 8.0.

After chloroform extraction, the DNA purification was completed using silica gel columns.

The quantity of obtained DNA was determined by REAL-TIME PCR technique.



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The DNA personal profiles were obtained with multiplex amplification and subsequent separation in capillary electrophoresis.

The results obtained allowed the DNA identification of the corpses regardless of their stage of decay. The obtained DNA profiles were compared with relatives to confirm the identity of the exhumed bodies. **Mass Disasters, Forensic Pathology, Forensic Genetics**