A38 Wildfire Search Protocols and Victim Recovery

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Learning Overview: After attending this presentation, attendees will better understand the use of Rapid DNA for disaster victim identification and the integration of Rapid DNA identification with forensic odontological, pathological, and anthropological analyses. The primary goal of this presentation is to discuss the value of routine, coordinated utilization of Rapid DNA identification during and in the immediate aftermath of a mass disaster.

Impact on the Forensic Science Community: This presentation will impact the forensic science community by discussing the use of Rapid DNA to generate DNA IDs (also known as DNA fingerprints or Short Tandem Repeat (STR) profiles) in real-time from unidentified human remains. By comparing a database of these DNA IDs to those generated from familial reference samples and antemortem victim samples, it is possible to assign identities to victims, often within hours of intake.

In November 2018, the Camp Fire raged through Butte County, consuming 800 acres of Northern California per minute. As with most mass disasters, conventional identification modalities (e.g., fingerprints, dental records, radiographic features, hardware) were utilized to identify victims. The intensity and duration of the fire severely degraded most of the remains, and, as a result, the conventional approaches were useful in only about one-quarter of the cases. In the past, the remaining cases would be subjected to laboratory DNA analyses, which typically requires months to years. Instead, Rapid DNA identification, was, for the first time, utilized to identify the majority of victims within hours to days following recovery.

Rapid DNA identification is the fully automated process of generating a DNA ID from a forensic sample, typically performed outside the laboratory by non-technical operators, with results available in less than two hours.[1] Rapid DNA identification is based on four integrated processes: purification of genomic DNA from a sample; rapid multiplexed amplification of the FlexPlex™ loci, a set of 27 STR loci (amelogenin, 3 Y-chromosomal STR (Y-STR) loci, and 23 autosomal loci); separation of the resulting STR amplicons by polyacrylamide gel electrophoresis; and data processing and locus and allele assignation using an onboard expert system.[2] DNA IDs generated from human remains were compared to DNA IDs generated from family references samples using automated kinship software.

Rapid DNA identification expanded to take on a central role in victim identification. Faced with burn victims, among the most difficult types of remains to identify, the use of Rapid DNA led to surprising synergies, with work being performed in parallel in pathology, odontology, and anthropology. From the use of DNA IDs to triage efforts in these disciplines to the identification of comingled remains, Rapid DNA was shown to be an invaluable tool in the victim identification process. This presentation will describe results from the rapid processing of severely degraded bone, tissue, and blood samples and the use of familial searching software. Finally, the application of Rapid DNA in related forensic applications will be discussed.

Reference(s):

1. Christopher Carney et al. Developmental validation of the ANDE Rapid DNA system with FlexPlex assay for arrestee and reference buccal swab processing and database searching. *Forensic Science International: Genetics* 40 (2019): 120, https://doi.org/10.1016/j.fsigen.2019.02.016.
2. Ranjana Grover et al. FlexPlex 27—Highly multiplexed Rapid DNA identification for law enforcement, kinship, and military applications. *International Journal of Legal Medicine* 131:6 (2017): 1489, https://doi.org/10.1007/s00414-017-1567-9.

Rapid DNA Identification, FlexPlex™, Familial Searching

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