B52 Evaluation of Collection Protocols for the Recovery of Biological Samples From Crime Scenes

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After attending this presentation, attendees will understand how to improve the efficacy of the processes of collection and storage up to the point where the evidential material is received at a laboratory. Included in this presentation will be the effect of the environmental factors on degradation of collected samples before they reach the laboratory.

This presentation will impact the forensic science community by providing a clear indication of best practices in post-collection sample handling while in transit to the laboratory and may form the basis of future sample handling protocols.

The main focus in forensic genetics in the past 20 years has been to increase efficiency of the extraction and identification of DNA from a wide variety of evidence and to improve DNA profiling technology by making it more sensitive and robust. Much effort has been put into the improvement of DNA extraction and analysis techniques. Whichever technology is used, the precursors to extraction and analysis are the sample collection, handling, and storage. Collection, preservation, and storage of DNA are critical factors in ensuring reliable forensic genetics. These steps can have a fundamental impact on the quality of the sample and the resultant DNA profile; however, the methods used to recover DNA evidence from crime scenes have seen little development. This study proposed to improve the efficacy of the collection and storage up to the point where the evidential material is received at a laboratory.

Sample collection is one of the most critical steps in DNA profiling. Great care has to be taken to avoid contamination and degradation of the samples and the consequential spoiling of evidence. With the correct protocols, sample preservation in the laboratory can be carefully controlled, but this is more difficult in the field or when transporting from the scene of the crime to the laboratory. The preservation of the evidence is increasingly important when the environmental conditions are extreme and the time between collection and receipt by the laboratory is extended.

The collection of biological evidence with swabs using ultrapure water as a wetting agent was compared to the use of a propriety detergent-based wetting agent. The recovery of biological material using the detergent-based wetting agent is only marginally better than ultrapure water, but the post-collection stability is greatly improved. DNA degradation can be seen after approximately 6h at room temperature when using ultrapure water as the wetting agent. The detergent-based solution stabilized DNA for up to 48h, even when the temperature is increased to 37°C. The impact of this is likely to be limited in circumstances in which crime scene evidence can be kept at low temperatures until it reaches the laboratory; however, in contexts where this is problematic, the modified method for collection could have a large impact on the preservation of forensic evidence before it reaches the laboratory. The result of this initial research confirms that post-collection environmental factors have a significant impact on DNA recovery rates. Further research will be required to confirm and extend these results. Other substrates may be considered. This research should give a clear indication of best practices in post-collection sample handling while in transit to the laboratory and may form the basis of future sample handling protocols.

Forensic Genetics, Biological Samples, DNA

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