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THE DETECTION AND TREATMENT OF CONSUMABLE CONTAMINATION

Lisa A. Gefrides, MS, Mark C. Powell, MS and Roger Kahn, Ph.D.
Harris County Medical Examiner's Office, Forensic Biology Laboratory, Houston, TX 77054

Occasionally, DNA profiles arise in negative extraction and/or amplification controls that are not consistent with either the samples they are monitoring or profiles of laboratory staff. These unknown profiles are sometimes attributed to consumables used in DNA extraction or amplification procedures. It may be impossible to track a consumable profile back to an individual consumable or manufacturer: Consumable profiles are typically seen sporadically and may be difficult to reproduce. Coupled to that, laboratories use many different consumables in the DNA profiling process, some of which are even certified as "DNA free." Forensic science laboratories may use the same type of consumable (for example, 1.5 mL tubes) from a variety of different manufacturers and sources. Thus, a database of consumable contaminant profiles may not be helpful in identifying the source of a contaminant. If consumable contamination is seen in an extraction or an amplification blank, it may indicate consumable contamination is occurring at detectable levels in the samples, possibly at a rate inversely proportional to the number of blanks. The question of the most effective way to treat consumables becomes of utmost importance.

Forensic laboratories currently utilize different approaches for the treatment of their consumables ranging from no treatment to treatment with UV irradiation, autoclaving, or a combination of these methods. The effectiveness of these treatments is currently unknown. Preliminary studies suggest that a standard 20 minute autoclave treatment favored by many molecular biology laboratories is insufficient to effectively reduce typical levels of consumable contamination detectable in forensic casework. Likewise, UV treatments of 15 or even 30 minutes in a laminar flow or dead air hood will not significantly reduce the amount of consumable contamination, if present. Laboratory work stations equipped with UV lighting and preset treatment timers for work areas and consumables may not be sufficient to eliminate consumable contamination. Furthermore, while UV irradiation may be an effective treatment for purified DNA, no data is available on the efficacy of using UV irradiation to treat the cellular contamination that would be present from a consumable source in the form of saliva, dandruff, or nasal secretions.

This presentation will discuss a systematic comparison of UV and autoclave methods for the treatment of consumables. Strategies for detecting consumable contamination and an approach for monitoring the dosage of UV irradiation using a UV crosslinker will also be discussed.