OPTIMIZING UV-TREATMENT OF CONSUMABLES USED IN STR ANALYSIS TO ELIMINATE DNA FROM CONTAMINANT BLOOD AND SALIVA

Rogelio Alvillar[1,2], Stephanie Rogers[1,2], Leah Willis[3], James M. Robertson[1]
[1]Counterterrorism Forensic Science Research Unit, FBI Laboratory, Quantico, VA
[2]Oak Ridge Institute for Science and Education, Oak Ridge, TN
[3]Nuclear DNA Unit, FBI Laboratory, Quantico, VA

The surface of plastic consumables used in forensic DNA laboratories, such as pipet tips, spin baskets, and microcentrifuge tubes, may harbor contaminating human DNA from epithelial cells, blood or saliva acquired during the manufacturing process or handling. Quality assurance standards for forensic DNA laboratories typically require that such consumables be pre-treated with ultraviolet (UV) irradiation, e.g. via a UV-crosslinker device, to damage and therefore eliminate amplifiable, contaminant DNA. However, it has been recently reported that the positioning of the consumable relative to the lamp can influence the efficiency of DNA degradation in the UV-crosslinker when low copy number procedures are used for the analysis (1). For example, the most effective DNA damage was reportedly achieved when microcentrifuge tubes were placed close to the UV lamp and positioned vertically instead of horizontally.

In the present study, the positioning of microcentrifuge tubes in a UV-crosslinker and its effect on DNA degradation was further examined. The sample types used to simulate contaminating DNA included purified HL60 DNA, saliva, and whole blood. Small volumes of each sample type were placed on the inside walls of standard microcentrifuge tubes and dried overnight. The tubes were then placed in a UV-crosslinker at different distances from the lamps and were positioned either vertically or horizontally on the surface of a rack. Samples were exposed to UV irradiation in 30 minute intervals up to 8 hours, allowing the lamps to cool between intervals. Untreated control tubes were wrapped in aluminum foil and similarly exposed. The amount of undamaged DNA remaining following UV-treatment was assessed using real-time quantitative PCR (Quantifiler® Duo, Applied Biosystems, Foster City CA) and STR profiles were assessed using Identifiler® (Applied Biosystems) following 28 cycles of amplification.

At this presentation, the attendee will learn how the positioning of a microcentrifuge tube in a UV crosslinker can affect the inducement of DNA damage. Our results with standard copy number amounts and amplification parameters support the contention that the positioning of the consumables may affect the success of DNA degradation in the UV-crosslinker.

Reference:

1. Donley MA, Foley D, Powell M, Gefrides L, Kahn R.. Using the autoclave for DNA decontamination of consumables for use in low template DNA testing. AAFS Annual Meeting, Abstract A196, 2011