

HOW CLEANING AGENTS ADVERSELY AFFECT A FORENSIC BIOLOGY LABORATORY

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Detergents are critical to a forensic laboratory to maintain a clean environment removing trace amounts of contaminants and environmental residue.

Ongoing issues observed in data generated in the Institute of Environmental Science and Research Limited (ESR) Forensic DNA laboratory led to extensive troubleshooting to identify the cause(s) of a recurring pattern of drop out of the same three loci of the Identifiler™ multiplex (referred to as tri loci dropout) and lack of 3130 resolution. After excluding the more common lab variables as the cause of these problems the effects of detergent were investigated. Testing was undertaken to determine the effect of varying concentrations of different cleaning agents (commonly used in Forensic Biology laboratories internationally) on STR amplification and 3130 processing. The results indicated that in the presence of Trigene™ ADVANCE tri loci dropout occurred (D7, D18 and FGA) in Identifiler™ amplifications and issues related to poor 3130 data including lack of resolution, failed size standards and poor sensitivity are observed. At increased concentrations a complete inhibitory effect occurred whereby no profiling data is generated. It is postulated that the halogenated tertiary amines present in Trigene™ ADVANCE cross the cell membrane causing transcriptional changes in the genes associated with cell death and inflammatory response and interfering with the helical structure of the DNA rendering it unable to replicate. This work details the problem observed, troubleshooting undertaken, the effects of Trigene™ ADVANCE on other STR multiplexes and the effect of other cleaning agents on DNA profiling and 3130 performance.