

THE IMPACT OF CONTAMINANTS ON DNA EXTRACTED USING THE DNA IQ™ SYSTEM

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A common method of isolating deoxyribonucleic acid (DNA) in forensics is through the use of the DNA IQ™ System. Early validation studies using this system at the Virginia Division of Forensic Science (VDFS) indicated there was a possibility that oily substrates could interfere with the extraction process and lead to reduced DNA yields. This study more thoroughly investigates this phenomenon using blood samples from substrates containing either light or heavy contamination with various oily substances, contraceptive gel, or a sexual lubricant. Samples were initially incubated in DNA IQ™ Lysis Buffer and manually extracted using the Small Sample Casework Protocol (Promega Tech. Bulletin #296). These data were extremely variable and thus the extraction method was modified so that most, if not all, of the hemoglobin was removed since we suspected the excess protein was contributing to the erratic results. A Proteinase K digest was subsequently incorporated into the procedure. The results obtained show clear trends with the uncontaminated controls generating the highest DNA yields. Not surprisingly in many cases, the heavily saturated samples showed more interference than lightly contaminated samples. Another trend observed was that simple and highly refined oils, such as vegetable oil, did not drastically reduce DNA yields to the extent that occurs when the substrate is heavily contaminated with body lotion. The results of this study also indicated that body lotion and water-based contaminants such as KY® Jelly interfered with DNA extraction more than the oily substances tested. A full short tandem repeat (STR) profile was obtained from most contaminated samples when typed with the PowerPlex® 16 BIO System and analyzed on the FMBIO® II Fluorescence Imaging System. While we were able to generate full STR profiles from most of the contaminated samples, a significant reduction in DNA yields could mean the difference between success and failure when analyzing casework samples. We are now in the process of assaying different procedures designed to overcome the interference created by the contaminants and restore DNA yields to those comparable to the control samples.