FEASIBILITY STUDY TO DEVELOP A METHOD FOR AUTOMATING DIFFERENTIAL EXTRACTION AND DNA ISOLATION: A COMPARISON OF AUTOMATED SYSTEMS

Erin Hoffman, Margaret Ringberg
Minnesota Bureau of Criminal Apprehension, St. Paul, MN

Automation of DNA extraction techniques for forensic evidence has been increasing in popularity in recent years. By automating laborious sample handling steps one would reduce human sample handling errors, standardize scientist-to-scientist variations and decrease time of sample preparation, thus reducing casework backlogs. This study involved assessing an automate system of processing samples most commonly found in sexual assault cases. These cases primarily involve evidence with a mixture of sperm cells and epithelia (non-sperm) cells. The method of extracting DNA from these samples is called the differential extraction. This extraction procedure is a two-step method where the first extraction digests the non-sperm cells present in a sample, the supernatant containing the non-sperm cell DNA is removed and the second extraction digests the remaining sperm pellet. The most labor intensive step involved in differential extraction is the repetitive washing of the sperm pellet, which removes as much DNA from the digested non-sperm cells as possible in order to obtain a DNA profile only from the sperm cells. The QIAGEN QIACube was utilized to determine the feasibility of automating the sperm pellet wash steps using in house prepared reagents. Isolation and purification follows extraction of both the non-sperm cells and sperm cells, which currently utilizes hazardous PCIA and Millipore Amicons. Comparisons were made between different automated systems for isolating DNA, which included the QIAGEN EZ1 XL, QIAGEN QIAamp kit using the QIACube and Applied Biosystems AutoMate, to determine which method would yield the highest quality of DNA.