E32 The Optimization of Spermatozoa Extraction and the Study of the Retention of Spermatozoa on Machine-Washed Clothing

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The goals of this presentation were to determine the variables/factors optimal for spermatozoa extraction and to determine if spermatozoa has the ability to retain on machine-washed clothing under various factors. The optimization of spermatozoa was performed while examining various factors including the time of extraction, the extraction solvent, and in-house vs. commercial stain. The retention of spermatozoa was examined under the variables of type of fabric, temperature of water, and detergent type.

This presentation will impact the forensic science community by discussing the preliminary results which suggest that not only is DNA able to retain on clothing through machine washing but also enough spermatozoa retains to obtain DNA profiles.

The presence of a suspect's seminal fluid on a victim's clothing often indicates the possibility of a sexual assault, particularly when the suspect and victim are not in close relation or association with each other. Many have speculated as to whether or not the detection of spermatozoa is either hindered and/or prohibited by machine washing; however, such areas are largely understudied. Previous work has failed to not only determine this possibility, but it also failed to address varying factors that may affect the retention of the spermatozoa.

The objective of this study was to determine if spermatozoa was, in fact, able to retain on clothing after machine washing under various factors such as the type of fabric and temperature of water (hot or cold). Furthermore, this study attempts to determine if the retained spermatozoa, if found, could produce a DNA profile adequate for analysis.

The seminal samples used in this study were collected from five donors and deposited via Pasteur pipets onto approximately 6"x6" swatches of five types of fabrics: cotton (underwear), denim, a sheet, a towel, and a cotton t-shirt. The transfer of spermatozoa onto the fabrics via pipet was performed as a laboratory control in order to eliminate uneven distribution as a factor of retention. Each of the five pre-stained fabrics were tested prior to machine washing for both Acid Phosphatase (AP) activity and fluorescence under the Alternative Light Source (ALS). All five fabrics tested positive for both AP and ALS. Additionally, an approximately 3x3mm cutting from each of the pre-stained samples underwent a two-hour, 1% Hydrochloric Acid (HCL) extraction, Christmas tree (Kernechtrot-Picroindigocarmine) staining, microscopy, and rating. The ratings ranged from 3+ to 4+ for all pre-stained samples. Each of the five pre-stained fabric samples were washed with a set size of pristine clothing for both the hot and cold wash. After washing, ten cuttings were taken from each fabric and viewed via microscopy. The cuttings were extracted under the same procedure as listed above, and examined via microscopy. Each of the fabrics were positive for spermatozoa in 100% of the cuttings taken. The sperm heads were counted for each fabric and ranged from 2-352 for the hot wash and 3-390 for the cold wash. During each of the washes, the washing machine, laundry detergent, cycle type, and size of load were kept constant to ensure no other factors were affecting the spermatozoa's retention. Also, a blank was run before each load to ensure no contamination from the machine itself. Finally, the cuttings were tested for DNA using a chelex extraction and Y-chromosomal Short Tandem Repeat (Y-STR) kit. The preliminary results suggest that not only is DNA able to retain on clothing through machine washing but also enough spermatozoa retains to obtain DNA profiles.

Retention, Spermatozoa, Washing