A98 An Evaluation of the Stability of Seminal Fluid in Condoms

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After attending this presentation, attendees will have a better understanding of the underlying mechanisms of the stability of semen stored in condoms.

This presentation will impact the forensic science community because the ability to recover spermatozoa from the seminal fluid in condoms holds significant implications to forensic investigations. The identification of spermatozoa serves to confirm the presence of semen while the genotyping of the spermatozoa serves to identify the semen donor.

Used condoms are routinely found at crime scenes. The ability to recover spermatozoa from the seminal fluid in condoms holds significant implications to forensic investigations. First, the identification of the spermatozoa by microscopic examination serves to confirm the presence of semen. Second, the genotyping of the spermatozoa serves to identify the semen donor, which may then implicate the guilty and exonerate the innocent. However, the analysis of semen in condoms can be problematic as demonstrated in casework. Even spermatozoa recovered from recently used condoms can be in poor condition, suggesting that condoms possess physical and/or chemical properties that can compromise the semen samples.

To better understand the underlying mechanisms of this phenomenon, a controlled study was conducted on the stability of semen stored in condoms. The two independent variables tested were condom type and duration of storage. The three condom types selected for this study were Trojan lubricated, Trojan non-lubricated, and Trojan spermicidal. One milliliter of semen was stored in each of the condoms for a period of 1, 3, 5, 7, and 14 days (short-term study) and 7-9 months (long-term study). The hypotheses of the study presented here is that the components of semen are expected to degrade over time when stored in a condom. In addition, spermicidal condoms were expected to compromise the morphology of the spermatozoa relative to lubricated and non- lubricated condoms. In order to test these hypotheses, the samples were evaluated for seminal acid phosphatase activity, spermatozoa morphology and spermatozoa concentration. The first and tenth swabs of selected samples were evaluated based on the ability to obtain mitochondrial DNA profiles and for total nuclear DNA recovery.

The results of the present study demonstrate that the type of condom and duration of storage are important factors that contribute to the instability of semen. Specifically, acid phosphatase activity was detected in all condom types for semen stored up to two weeks; only two lubricated condoms gave negative results. In comparison, acid phosphatase activity was detected in a majority of the non-lubricated condoms and some of the spermicidal condoms stored between 7-9 months. However, acid phosphatase activity was not detected in any of the lubricated condoms stored over a comparable time period. No major spermatozoa morphological changes or concentration decreases were observed for the samples stored in the short-term study. However, for samples stored in the long-term study, both non-lubricated and lubricated condoms primarily exhibited head and tail separation. The morphology of the heads associated with the lubricated samples appeared grainy suggesting compromised membrane structure. In contrast, spermatozoa were difficult to locate in samples stored in the spermicidal condoms. The heads that were identified appeared to have a grainy and tulip-shaped silhouette, again suggesting a compromised cellular membrane. Full mtDNA profiles were recovered from all samples tested, regardless of the type of condom used to store the semen. There was a noticeable decrease in the intensity of the profile for the long-term study samples. NuDNA was recovered for all samples; however, there was a decrease in the amount recovered as the duration of storage increased.

The results of the present study suggest that condoms have a negative affect on the stability of seminal fluid; however, nuDNA and mtDNA was recovered from all the samples. This suggests that there may be other factors (besides nuclease activity) contributing to the degradation of seminal fluid in condoms.

Semen Identification, Condoms, Genotyping

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