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PII: S1872-4973(18)30033-4
DOI: https://doi.org/10.1016/j.fsigen.2018.06.014
Reference: FSIGEN 1912

To appear in: *Forensic Science International: Genetics*

Received date: 22-1-2018
Revised date: 25-5-2018
Accepted date: 21-6-2018

Please cite this article as: Alderson G, Gurevitch H, Casimiro T, Reid B, Millman J, Inferring the Presence of Spermatozoa in Forensic Samples Based on Male DNA Fractionation Following Differential Extraction, *Forensic Science International: Genetics* (2018), https://doi.org/10.1016/j.fsigen.2018.06.014

Inferring the Presence of Spermatozoa in Forensic Samples Based on Male DNA Fractionation Following Differential Extraction

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HIGHLIGHTS

- Results of differential lysis on semen, blood and saliva samples were compared.
- Male DNA from spermatozoa is highly enriched in the sperm fraction.
- Male DNA from blood or saliva is predominantly observed in the epithelial fraction
- Spermatozoa in a sample can be inferred by ratios of male DNA between fractions.
- Inferring spermatozoa relies on quantitation but not electropherogram results.

Abstract

To address sexual assault kit backlogs some laboratories in North America have implemented 'Direct to DNA' (DTD) approaches for the examination of relevant vaginal, oral, rectal and external genitalia swabs from sexual assault examination kits. Using this approach no preliminary serological screening for semen or spermatozoa is performed. Instead, swabs are directly subjected to differential extraction and quantitation using a dual quantification system. Decisions regarding the next steps in processing each sample are typically based on the quantity of male DNA detected, the fraction in which it is detected, and its ratio to the total human DNA in the sample.

In the absence of serological results it remains of value in many cases to determine whether spermatozoa are present in the sample and whether the male DNA profile may be attributed to this body fluid. In this study we examine the distribution of male DNA from various body fluids between epithelial and spermatozoa fractions following differential extraction. Based on these results we identified criteria under which a DNA profile can be reliably attributed to spermatozoa.