



### B92 Detection of Condom Residues by Microscopic and GC/MS Examination

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Attendees will understand the development of methods to provide evidence from the use of condoms during sexual intercourse and to distinguish between condom brands.

The increasing number of sexual assault cases, where the uses of condoms were reported, lead to the necessity of condom residue analysis. The currently available microscopic techniques can provide evidence for the use of condoms; however, the identification of a specific condom brand is rarely achieved. The aim of this study was the development of methods to distinguish between condom brands.

Examined microscopically were 30 condom brands available in Germany (1 from the US, 3 from Sweden, 26 from Germany). The surface of the condoms was swabbed with cotton tips and the swabs were spread on microscopic slides. After staining with HE and Sudan 3, 27 of the 30 samples showed numerous starch granules and 12 contained few lycopodium spores. Thus, detection of these particles might indicate the use of condoms. In rare cases, further types of surface particles (besides starch granules and lycopodium spores) can be observed. In such cases, even the microscopic examination might provide evidence for a special condom brand.

In a further experiment, 6 volunteer couples were asked to provide vaginal swabs in defined intervals after sexual intercourse using condoms. In one case, lycopodium spores could be detected up to 4 days after the intercourse. In the other cases, the spores could be detected only during the first day. In 2 of the 6 cases, many cornstarch granules could be found during the first day post coitus. These particles could be found up to the fourth day.

These experimental data support findings during casework examinations. If the victim claimed the use of a condom by the perpetrator, starch granules and also lycopodium spores were observed in some cases during the microscopic examination of the vaginal swabs.

Since cornstarch granules are found on powdered latex examination gloves as well, we would recommend the use of non-powdered gloves during the examination of rape victims.

In addition to the microscopic investigation, the surfaces were washed with ammonia buffer solution (pH 8.9). After a liquid-liquid extraction with an ether/ethyl acetate mixture, the organic phase was evaporated under nitrogen and the residue was derivatized with BSTFA. One  $\mu$ L of this solution was examined by GC/MS. Characteristic chromatograms were obtained for every condom brand. A library was established by storing the spectra of each chromatogram. The data collected could be used as a reference for comparison with spectra obtained from vaginal swabs collected in cases of sexual assaults. In an experimental set up, a vaginal swab was extracted 24 hours after an intercourse using a condom. The spectra obtained from the swab matched the reference spectrum in the library for the respective condom brand. The retrievals system calculated the match with 95%.

Thus, this data demonstrate that a combination of microscopic investigation and GC/MS analysis may provide not only evidence for the use of condoms but also a tool for the identification of a condom brand. Further experiments will be necessary to increase the reference library and to evaluate the chromatographic method with casework samples.

#### **Condom Residues, Microscopic, GC/MS**