B93 New Strategies for the Detection of Condom Residues

Hans Sachs and Burkhard Rolf, Institute of Legal Medicine, Frauenlobstraße 7a, Munich, D-80337, Germany; Wolfgang Keil, MD, Bauweberstr. 9a, München, Bayern 81476, Germany*

The detection of residues from condom surfaces is a powerful method to provide evidence for the use of condom during sexual intercourse. Microscopic and chemical investigations are used together. Data on new condom markers are presented.

The detection of residues from condom surfaces in vaginal or penile swabs is important during the investigation of sexual assault cases. If a condom was used by the rapist, no sperm cells can be found. The methods presented in this paper can help to provide evidence that a questioned sexual intercourse took place.

The detection of residues from condom surfaces in vaginal or penile swabs depends largely on the manufacturing process of the condom that was used. Many different coatings are used by the industry. By chemical analysis, for example, various silicone substances can be detected. By microscopy, particles like starch granules can be observed.

If the detection of residues from condom surfaces should be used for routine casework, it is necessary to establish the surface properties of unused condoms. From these data it can be predicted what substances could be expected in vaginal or penile swabs. These data should be used to create a laboratory database, since such a database might be helpful to identify condom residues in unknown samples. Furthermore, the time dependence of the residue detection has to be established. For this reason, vaginal and penile swabs from voluntary couples have to be analyzed. Since the manufacturers of condoms might change their coating protocols, the database should be made topical from time to time to cover the needs of forensic analysis.

We analyzed 50 different condom brands that are commercially available in Germany. Some of these condoms were produced in the US or in Sweden. The surface of the unused condoms was swabbed and then microscopically investigated (HE staining). As shown earlier, on most condom surfaces, corn starch granules can be observed. Furthermore, synthetic particles made from polyethylene could be identified. These particles replace more and more Lycopodium spores, which are suspected to cause allergies. In contrast to corn starch granules, polyethylene particles do not show polarization during microscopy. From a forensic point of view, these particles have the advantage that they do not occur naturally and that they are rarely found.

For the chemical investigation, the condom surfaces were rinsed. After alkaline extraction, various silicone oils could be identified by GS/MS. Substances that were added for the flavor of the condom could not be identified with this technique. These substances seem to be less important for the specificity of the observed chromatograms. However, we will present data on the detection of dithiocarbamat. Dithiocarbamat is more or less solely used for the vulcanization of rubber. This substance could become a highly specific marker for the use of condoms.

Eight voluntary couples had sexual intercourse with different condom brands. Subsequently, vaginal swabs were taken after defined time periods. These swabs were analyzed microscopically and chemically. The “new” condom marker polyethylene particles could be detected up to three days after the intercourse. Using GC/MS, we could detect silicone oils up to three days as well. The presence of nonoxinol9 in vaginal swabs was only seen in rare cases. The detection of dithiocarbamat was not successful so far.

The microscopic detection of polyethylene particles in vaginal swabs is a new strong evidence for the use of condoms. Besides that, the presence of starch granules is important as well. The microscopic results together with the chemical analysis using alkaline extraction and GC/MS can provide evidence for the use of a condom up to three days after the intercourse.

Condom Residues, Microscopy, GC/MS

 ** Presenting Author*