



THE FORENSIC SCIENCE SERVICE®

Fact sheet (8)

Investigating sexual assaults

The Forensic Science Service® (FSS®) has developed two innovative DNA techniques, resulting in a real breakthrough for the investigation of sexual assaults.

These new techniques mean that DNA profiles can be obtained from semen samples containing very few or no sperm cells.

- **LMD sperm**

In 2003 The FSS introduced laser micro-dissection (LMD), a specialist technique which can recover sperm cells from microscope slides. It enables the re-analysis of cold cases where the only remaining forensic evidence consists of stained slides with low sperm numbers.

Microscope slides prepared for forensic examination often contain a mixture of cell types, e.g. sperm cells from an assailant and vaginal cells from the victim. Removal of the female material without loss of sperm has previously proved problematic and poor results were often obtained when very few sperm were present on a slide.

LMD provides a means of isolating sperm without also removing a large amount of female material, improving the chances of obtaining an interpretable male DNA profile.

Once sufficient sperm cells have been recovered by LMD, Low Copy Number (LCN) DNA technology is used to produce a DNA profile.

- **Male Cell Identification**

Male cell identification is useful in rape and sexual assault cases where the assailant's semen does not contain any sperm, for example, as a result of a vasectomy or a medical condition. In such cases, the vaginal swabs may be stained with semen but no sperm will be available for traditional processing methods.

A new technique, Fluorescence In Situ Hybridisation (FISH), is used to identify the male cells (non-sperm) present in the semen.

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This technique uses fluorescent probes to label the sex chromosomes. It colours all X chromosomes orange and all Y chromosomes green. Male cells can be identified as they have both the X and Y chromosomes, whereas female cells have two X chromosomes.

Laser micro-dissection is then used to recover the male cells, and LCN DNA technology is used to produce a DNA profile.

Using this new technique, full male profiles have been obtained from vaginal swabs taken up to 24 hours after sexual intercourse.

Profiles obtained using these two techniques are compatible with The National DNA Database® (NDNAD) and are produced by copying ten informative DNA sites. LCN DNA is more sensitive than SGM Plus® because a greater number of copies are generated from a smaller amount of starting material.

LCN DNA has the same discriminating power as the routine technique – about one in a billion. This means that if the DNA profile recovered from the cells matches a suspect, then the chance of obtaining the profile if it had originated from someone other than, and unrelated to, that suspect is approximately one in a billion.

Case study:

- Murder of Helen Nilsson - a semen sample retained on a microscope slide for nearly 15 years was sent to the FSS in 2003 from Sweden. The sample came from the body of a 10 year-old girl, Helen Nilsson, killed in 1989. The FSS used LMD and LCN DNA technology to obtain a full DNA profile from sperm and police then asked possible suspects to provide DNA samples. There was a match against Ulf Olsson. Olsson was convicted of the murder in April 2005.

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