

Infidelity Testing

Sexual infidelity is a serious problem plaguing relationships today and is associated with approximately seventeen percent of all divorces in the United States. While estimates of the frequency of marital infidelity vary widely, one well-known expert, Peggy Vaughan, author of *The Monogamy Myth*, estimates that 60 percent of husbands and 40 percent of wives will have an affair at some point during their marriage.

Investigation of Female Infidelity

The presence of stains on female undergarments can be a possible indicator of sexual infidelity with a male. During and after sexual activity, semen can be deposited on undergarments, panties, bed sheets, clothing, upholstery or other surfaces. Sperm cells can reside in the vagina for up to five days after intercourse and can remain identifiable for years in dried stains. Stains on female undergarments can also be attributable to urine, urinary tract infection, blood, feces or natural vaginal excretions associated with menstruation, ovulation or vaginal infection.

Laboratory analysis of suspicious stains is performed in two stages, screening and DNA analysis.

In the first stage, the suspicious stain is screened by a Forensic Analyst for the presence of semen using a series of techniques.

If semen is detected in the stain, DNA analysis of the stain and a reference swab sample from the partner is performed to determine if the semen belongs to the partner or another unknown male. Biological stains resulting from sexual activity often contain a mixture of both male and female DNA. The female DNA usually originates from epithelial cells from the vaginal wall, the mouth or skin. Stains are first processed with a differential extraction that takes advantage of the unique characteristics of each cell type. A DNA profile is generated from each stain extract and DNA from the male reference. If the male DNA in the stain does not match that of the DNA from the reference man, the results indicate that the semen stain is from another man.

Investigation of Male Infidelity with a Female

The presence of stains on male undergarments can be a possible indicator of sexual infidelity with a female. Natural staining of male undergarments can be caused by urine, urinary tract infection, feces or semen. Similarly, stains to undergarments from sexual infidelity with a female can be caused by semen, vaginal fluids, blood, saliva or feces.

Laboratory analysis of suspicious stains is typically performed in two stages, screening and DNA analysis.

In the first stage, the suspicious stain is screened by a Forensic Analyst for the presence of semen, saliva or other biological material using a series of techniques. After screening, DNA analysis of the stain and a reference swab sample from the known partner is performed. Biological stains resulting from sexual activity often contain a mixture of both male and female DNA. The female DNA usually originates from epithelial cells from the vaginal wall, the mouth or skin. Stains are first processed with a differential

Setting the Standard for Quality DNA Identification



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extraction that takes advantage of the unique characteristic of each cell type. A DNA profile is generated from each stain extract and from the female reference. If the female DNA in the stain does not match the DNA from the reference female, the results indicate the presence of another woman.

Investigation of Male Infidelity with a Male

The presence of stains on male undergarments can be a possible indicator of sexual infidelity with a male. Natural staining of male undergarments can be caused by urine, urinary tract infection, feces or semen. Similarly, stains to undergarments from sexual infidelity with a male can be caused by semen, saliva, blood or feces.

Laboratory analysis of suspicious stains is typically performed in two stages, screening and DNA analysis.

In the first stage, the suspicious stain is screened by a Forensic Analyst for the presence of semen, saliva or other biological fluids using a series of techniques. After screening, DNA analysis of the stain and a reference swab sample from the known partner is performed. Biological stains from homosexual activity often contain a mixture of DNA and can originate from epithelial cells from the anus, the mouth or skin. Stains are first processed with a differential extraction that takes advantage of the unique characteristic of each cell type. A DNA profile is generated from each stain extract and from the male reference. If the male DNA in the stain does not match the DNA from the reference male, the results indicate the presence of another man.

Limitations of Infidelity Testing

- Condom use often precludes the presence of semen for testing; however it may or may not eliminate foreign DNA from saliva or other sources.

General Guidelines for Sample Collection

- Garments and other evidence samples should be placed into paper bags or envelopes and stored at room temperature. Samples should not be placed in plastic bags or refrigerated.
- The reference sample from the known partner should be collected from the inside of the cheek using sterile swabs provided by the laboratory.

Summary of Semen Screening Methods

Suspicious stains can be rapidly and reliably screened for the presence of semen utilizing a combination of four techniques: ultraviolet illumination, acid phosphatase, prostate specific antigen (PSA) and microscopy.

Ultraviolet Examination

Ultraviolet (UV) light is a popular tool in many forensic investigations for the presumptive identification of body fluids on a variety of substrates. Materials such as semen, saliva, perspiration and vaginal secretions are naturally fluorescent under UV light which offers a discriminating method for locating these stains which might otherwise be invisible to the naked eye. Once the precise location of the stain is determined, confirmatory testing can be conducted utilizing the PSA and microscopy techniques.

Acid Phosphatase

Acid phosphatase (AP) is an enzyme secreted by the prostate gland that is present in large amounts in seminal fluid. AP can be found in other biological fluids, including vaginal secretions. It is therefore considered a presumptive chemical test for the presence of semen and must be confirmed by sperm detection.

Prostate Specific Antigen

Prostate-specific antigen, PSA, is a glycoprotein produced in the prostate and secreted into seminal fluid. PSA is one of the major proteins in seminal fluid with concentrations of 0.2 to 3.0 mg/ml. In sharp contrast, PSA is found in very low concentrations in vaginal fluid, ranging from 0 to 1.25 ng/ml. This makes PSA a useful forensic marker for the detection of small amounts of seminal fluid. It can be found in the absence of spermatozoa in the case of vasectomized men. PSA demonstrates good stability and on average is detectable in vaginal smears 27 hours after intercourse. PSA has been recovered from semen stains as old as 30 years.

Microscopy

Sperm heads can be accurately identified based on their morphological characteristics via microscopy.

Summary Typical Result Scenarios for Semen Screen

Semen Screen Test Result			Conclusion	Comments/Follow Up Testing
Acid Phosphatase	PSA	Sperm		
Negative	Negative	Negative	No evidence of semen	DNA Testing: Even though no evidence of semen exists, sexual intercourse may have occurred using a condom. It is possible to pick up DNA from epithelial cells that were deposited on a garment from the groin area.
Positive	Positive	Negative	Presumptive evidence of semen	PSA is a strong indicator of the presence of semen, however it can be found in low concentrations in vaginal sections. This type of result is also typical in men that have been vasectomized. DNA testing is necessary for confirmation
Negative	Negative	Positive	Presence of semen confirmed	DNA Testing: Although the presence of sperm has been confirmed, the donor to the sperm has not been confirmed. Sperm has been found to remain intact in garments throughout a laundry cycle. Therefore, DNA testing should be used to confirm the donor to the sperm.
Negative	Positive	Positive	Presence of semen confirmed	DNA Testing: Although the presence of semen has been confirmed, the donor to the semen has not been confirmed. DNA testing should be used to confirm the donor to the semen.
Positive	Positive	Positive	Presence of semen confirmed	DNA Testing: Although the presence of semen has been confirmed, the donor to the semen has not been confirmed. DNA testing should be used to confirm the donor to the semen.
Positive	Negative	Negative	Weak Evidence of Semen	DNA Testing
Negative	Positive	Negative	Presumptive evidence of semen	PSA is a strong indicator of the presence of semen, however it can be found in low concentrations in vaginal sections. This type of result is also typical in men that have been vasectomized. DNA testing is necessary for confirmation