

**Title:** *STK® Sperm Tracker STK Skin improves the detection of semen on skin and supports forensic examination of sexual assault victims*

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**Published:** March 2025 | Journal: *Rechtsmedizin*

**Background:** The conventional identification of semen stains with the naked eye on the body of a victim of sexual assault can be difficult so that many samples are often taken at random from a victim's body, with no guarantee of obtaining the perpetrator's genetic material.

With the STK Sperm Tracker *STK Skin* (hereinafter *STK Skin*), AXO Science has introduced a non-toxic spray for the use on skin and hair, which can be used to visualize the acid phosphatase contained in human semen when illuminated with UV light (365nm). The visualization with *STK Skin* does not alter the molecular analyses of collected semen stains.

**Material and methods:** For the validation of *STK Skin*, the specificity and sensitivity (among other things), shelf life/stability (in both full and partial half pack size of the dissolved solution) as well as possible influences on a subsequent molecular genetic analysis were examined. In addition, the performance was tested in simulated cases of sexual assault.

**Results:** The *STK Skin* showed a high sensitivity and specificity as well as a long shelf life. Visualization was still possible 24 h after application of semen samples; however, washing of affected areas did not result in the detection of any blue fluorescence.

Vaginal secretions fluoresced after being sprayed with *STK Skin* and blood masks the fluorescence of acid phosphatase in a blood/semen mixture, while tested, e.g., care products did not interfere with the results.

In realistically simulated test runs and all traces were successfully detected. Moreover, *STK Skin* showed no influence on the quality and/or quantity of the trace samples taken in further molecular analyses.

**Conclusion:** The *STK Skin* provides a high level of benefit in the detection of even small amounts of semen and the DNA profile of the trace donor could be determined even after months of sample storage.

### **Keywords**

Sexual violence · Acid phosphatase · Fluorescence · Product validation · Molecular genetic analyses

## **Scientific Summary – English Version**

### **What is STK Skin?**

STK® Sperm Tracker STK Skin is a **non-toxic spray** developed by AXO Science for the **detection of semen on skin and hair**. It reacts with **acid phosphatase** found in semen, creating a **blue fluorescence** when illuminated with **UV light (365 nm)**. Unlike other reagents, it is **safe for skin use** and **does not alter DNA** or interfere with molecular genetic analysis.

### **Main Objectives of the Study**

- Validate the **specificity, sensitivity, and stability** of STK Skin.
- Evaluate its **performance in realistic simulated forensic cases**.
- Assess its **impact on molecular biology techniques** (DNA profiling, RSID™ Semen, histology, etc.).

### **Key Results**

- **High sensitivity:** Detected semen even at high dilutions (up to 1:50) and **up to 24h post-application**.
- **High specificity:** No false positives from other body fluids (saliva, urine, blood) or skin products.
- Slight fluorescence detected with vaginal secretions (due to presence of acid phosphatase).
- **No impact** on DNA profiling or histological sperm detection.
- **Effective on different skin tones** and even on **cadaveric skin**.
- **Simulated cases** (blind studies): All semen traces were correctly identified by medical staff using STK Skin, even without knowing where it had been applied.

### **Molecular Biology Compatibility**

- No degradation or contamination of DNA.
- Full, high-quality STR profiles obtained—even from **samples stored 3 months**.
- No false positives in **RSID™ Semen** or **Bacchi histological tests**.

### **Conclusion**

STK® Sperm Tracker STK Skin is a **reliable, skin-safe tool** that significantly enhances the **detection of semen on skin**, improves the targeting of forensic swabs, and supports accurate **DNA recovery**, especially useful in delayed or unclear sexual assault cases.

Used under UV light, it reduces the need for blind sampling, especially in the critical **first 48 hours post-assault**, without interfering with downstream forensic analyses.