Chapter 10

Saliva and Sweat Testing With Drugwipe®
A Review

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Summary

Drugwipe® (Securetec Detektions-Systeme AG) is a pen-size detector for illegal drugs in saliva, in sweat, and on surfaces. It was first launched in 1995 to support drug law-enforcement police in their operations against smuggling and dealing of contraband. In 1996 the US Office for National Drug Control Policy (ONDCP) tested Drugwipe for its accuracy, sensitivity, and specificity in detecting invisible traces of narcotics on surfaces (1). Since then, Drugwipe has been included in the technology transfer program of ONDCP.

With the increasing interest in saliva and sweat testing on the part of traffic police, the Drugwipe device has been significantly improved over the years. Today, Drugwipe is available for the detection of cocaine, opiates, cannabinoids, benzodiazepines, and amphetamines/methamphetamines ("ecstasy"). Drugwipe can be used to test oral fluids or sweat samples, or to detect invisible traces of narcotics. Commercially available Drugwipes include single, twin, and five-panel configurations. Drugwipe is especially designed for on-site applications and combines easy and rapid sampling with fast analysis. Drugwipe is used widely in Germany as a routine sweat or saliva test for roadside screening for driving under the influence of drugs (DUID). In the current Roadside Testing Assessment (ROSITA) II project, Drugwipe is under evaluation as a saliva test. The basic technology for analysis is lateral-flow immunoassay (see Chapters 3–6).

This chapter will first describe the technological basis of Drugwipe, including its major technical features. The second part will cover the various evaluation studies that
have been performed using Drugwipe under controlled and general field conditions. Some of the data are not yet published.

Drugwipe can detect various benzodiazepines to as low as 5 ng/mL, and Δ9-tetrahydrocannabinol (THC) can be detected at 30 ng/mL. These sensitivities are currently unique for point-of-collection oral fluid/sweat test kits. The second part of this paper summarizes various published and unpublished data from trials and studies under controlled and general field conditions. Based on 1763 cases, a statistical evaluation by traffic police in Germany shows that more than 97% of all positive Drugwipe sweat tests are confirmed with positive blood results.

1. **TECHNICAL DESCRIPTION OF DRUGWIPE**

   The product concept of Drugwipe is guided by user and operational requirements of law-enforcement units around the world. The testing procedures are similar to a laboratory process and consist of sampling, sample transfer, sample preparation, analysis, and output of the result. All of these procedures are integrated into a single-unit device. The sampling step is based on wiping. Wiping is fast, easy, and requires very little cooperation of the person under evaluation. Optimal sample transfer is guaranteed by the geometric design of the device. The lateral-flow immunoassay is specifically optimized to analyze various sample materials for the native drug. The signal output is simply visual and unambiguous.

1.1. **Design of the Device**

   Figure 1 shows the major components of Drugwipe. The wiping element is designed for the collection of various types of samples. The collection step itself consists of a sequence of wipes. This sequence differs from specimen to specimen and is standardized according to the type of specimen. Next, the sample is transferred to a lateral-flow immunoassay strip sitting inside the detection element. The design of the wiping and the detection element guarantees automatic and efficient sample transfer.

   Analysis of the sample starts with dipping of the Drugwipe absorbent pad into a small container of tap water for 15 s. The water container is part of the Drugwipe device and holds the correct amount of water to properly develop the test result. A positive test result develops within 2 to 5 min in the readout window, in the form of one line on a single-parameter strip and two red lines on a double-parameter strip. The time depends on the concentration and the type of drug to be analyzed, with high concentrations showing results quicker than low concentrations. In addition, a single red line has to appear in the internal control region. The appearance of only a control line indicates a negative result, confirming the correct usage of the device and the absence of interfering substances. A positive test result is shown as a second red line in the read-