

Comparison of some field tests for illicit drug and drug trace detection in the service of the Swiss Customs and Swiss Border Guard

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Abstract

Aim: The objective of our study was to evaluate field tests currently used by the Swiss Border Guard to detect drugs and drug traces in powder samples and on contaminated surfaces.

Methods: Samples of lidocaine and flour were analyzed with the immunological test Drugwipe2 (Labtec Services AG, Wohlen, Switzerland), the chemical test Minilab (Sunilab SA, Château-d'Œx, Switzerland), ion-mobility spectrometry (IMS) and Fourier transform infrared spectrometry (FT-IR) by trained officers (teams of two) of the Swiss Border Guard.

Results: A) lidocaine sample: Drugwipe2: number of tests applied = 25, false positive results for cocaine = 3, correct results = 22; Minilab: Number of tests applied = 16, false positive results for cocaine = 1, not correctly interpreted tests = 12, correct results = 3. IMS and FT-IR: All tests performed gave correct results. B) flour sample: Drugwipe2: Number of tests applied = 18, false positive results for amphetamine = 1, correct results = 17; Minilab: Number of tests applied = 18, not correctly interpreted results = 3, correct results (amphetamine = negative) = 15. IMS and FT-IR: All the tests performed gave correct results.

Discussion: Drugwipe2 is an immunological test and designed to detect drug traces. It is easily overloaded. This may explain the false positive results. Minilab is a chemical test to identify illicit drug powder samples. The color nuance produced by the chemical reaction as well as the time course of the reaction must be observed and interpreted exactly according to the standard operating procedure (SOP).

Conclusion: To get reliable results, intensive training of the agents and working exactly according to the SOP is mandatory. Under these circumstances both Drugwipe2 and Minilab can be very helpful tools at border control.

1. Introduction

Rapid testing methods for drugs of abuse based on immunological or chemical techniques are employed by the Swiss Border Guard for on-site testing of powder samples or potentially contaminated surfaces. The aim of this study was to evaluate two of these field tests regarding the reliability of the test results. Ion-mobility spectrometry (IMS) and Fourier transform infrared spectrometry (FT-IR) were used as confirmatory techniques.

2. Material and Methods

2.1. Chemicals and Materials

Amphetamine, cocaine and lidocaine were purchased from Alltech (State College, PA, USA). Flour was clear flour purchased from a local supermarket.

The evaluated field test systems were the immunochromatographic Drugwipe2 test (Labtec Services AG, Wohlen, Switzerland) [1] and the chemical system Minilab (Sunilab SA, Château-d'Œx, Switzerland) [2,3], which uses color reactions for identification.

For FT-IR analysis a PerkinElmer Spectrum One spectrometer with ATR sampling accessory (PerkinElmer, Schwerzenbach, Switzerland) was used. IMS was carried out using an Ionscan 500DT instrument (Smiths Heimann, Wiesbaden, Germany).

Pictures were taken with a resolution of 1280×1024 pixels using a Bresser USB Hand Microscope (Meade Instruments Europe, Rhede, Germany)

2.2. Methods

Lidocaine was analyzed 25 times with the Drugwipe2 and 16 times with Minilab. For comparison, a sample of cocaine was also analyzed with Minilab. The flour sample was tested 18 times each with both Drugwipe2 and Minilab. A sample of amphetamine was analyzed with Minilab for comparison. Drugwipe2 and Minilab tests were carried out by several teams of two trained officers of the Swiss Border Guard. All substances were confirmed by IMS and FT-IR.

3. Results and Discussion

3.1. Lidocaine sample

Out of 25 tests conducted with the Drugwipe2 tests, three gave a false positive result for cocaine, while 22 correctly gave a true negative result (Fig. 1a). Tests with the Minilab system were conducted 16 times. Out of these, one test showed a false positive result for cocaine, twelve tests were not correctly interpreted because the correct reaction time was not observed and three tests gave true negative results and were correctly interpreted by the conducting agents. Figure 1b shows a comparison of the time-dependent results of both lidocaine and cocaine with the Minilab system. All IMS and FT-IR tests gave correct results.

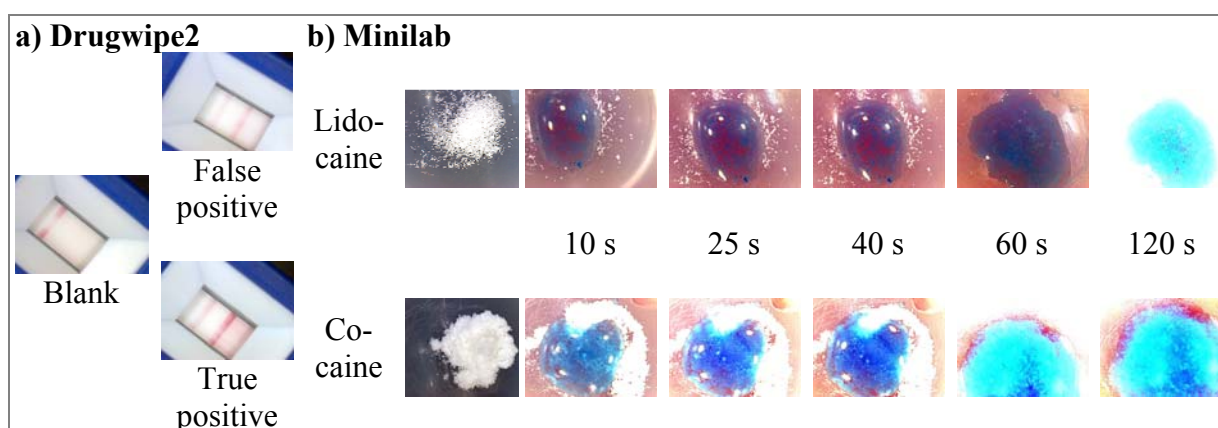


Fig. 1. a) Blank (true negative), false positive and true positive results for cocaine with Drugwipe2 test; b) results for lidocaine and cocaine with Minilab system over time.

3.2. Flour sample

Out of 18 tests with Drugwipe2, one gave a false positive result for amphetamine and 17 gave true negative results (Fig. 2a). With the Minilab system, three out of 18 tests were not correctly interpreted because the correct reaction time was not observed while the remaining 15 tests gave true negative results and were correctly interpreted (Fig. 2b). All IMS and FT-IR experiments gave correct results.

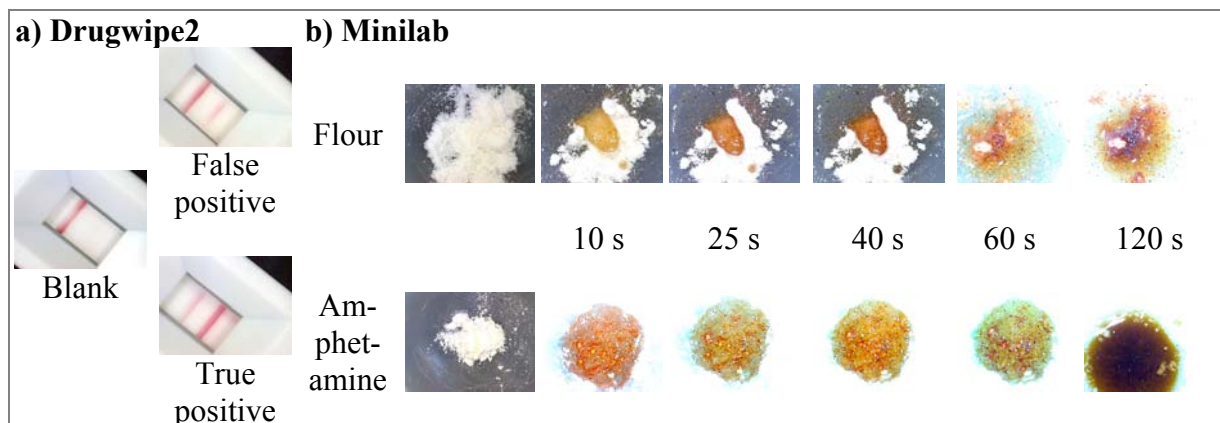


Fig. 2. a) Blank (true negative), false positive and true positive results for amphetamine with Drugwipe2 test; b) results for flour and amphetamine with Minilab system over time.

Drugwipe2 is an immunochromatographic test designed for detection of drug traces and may therefore be easily overloaded when analyzing bulk drugs. This in turn might explain the false positive results. Minilab on the other hand is a test based on chemical reactions designed to identify drug powder samples by changes in color. Both the color nuance produced by the reaction and the reaction's time course must be observed closely and interpreted following standard operating procedures (SOP).

4. Conclusion

The conducted experiments showed that for reliable results intensive training of the conducting agents and adherence to the respective SOPs is mandatory. Considering this, both Drugwipe2 and Minilab can be very helpful tools at border control.

5. References

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