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Evaluation study about the SERATEC® rapid tests

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1. Introduction

SERATEC® a-Amylase and PSA Immunochromatographic rapid tests are commonly used for confirming the presence of human biological fluids in forensic samples [1,2].

These tests use two monoclonal antibodies that form a sandwich complex with PSA or Amylase if they are present in the sample. The complex can be seen on the membrane as a red line allowing a clear and easy interpretation of the test result. Seratec provides in the kits a buffer which ensures maximum extraction efficiency [3].

The aim of present study is to confirm the tests efficacy to detect biological fluids eluted either in buffer than in water and to verify that the extraction medium not has any negative effect on DNA profile, so to ensure that routine use of Seratec tests is suitable for DNA typing.

2. Material and methods

Reference samples were prepared using biological fluids from a know donor.

In particular 5 ul of saliva and semen from a volunteer are placed on a 1×1 cm cotton and 5×5 mm area eluted in 200 ul buffer and sterile water for about 2 h by using a shaker. In addition a portion of some forensic samples (balaclava, shirt, bra, bottle, condom, clothes) eluted in a appropriate amount of buffer and sterile water were tested. Three drops (about 120 ul) were added in the sample well and results evaluated after 10 min incubation at room temperature.

A negative control (only buffer or water) was prepared. Remaining elution volumes (buffer or water) with their substrates were used for DNA analysis.

DNA extraction using rapid-resin (IstaGene Matrix, Biorad), silica-column (NucleoSpin, Macherey-Nagel) and magnetic beads (PrepFiler Forensic DNA Extraction kit, Applied Biosystems) was performed according to the protocols provided by the manufacturers. Extacted DNA was quantified by the Quantifiler™ DNA Quantification Kit using a 7300 Real Time System kit (Applied Biosystems) following the manufacturer protocol.

STRs amplification was carried out according to the AmpFlSTRs NGM SElect™ PCR Amplification kit protocols using GeneAmp PCR Systems 9700,2720 thermal cyclers.

Positive and negative controls were used during all amplification steps. PCR products were analyzed by capillary electrophoresis by an ABI PRISM 3130 Genetic Analyzer. For fragment length determination of the products, the internal lane DNA standard LIZ 600 was used for calibration. Allele assignment was carried out by comparison with kit ladders (Applied Biosystems) using GeneMapper IDX software.

3. Results and discussion

All SERATEC® Immunochromatographic rapid tests work properly with control known samples and forensic samples extracted either in buffer than in water.

Anyway it's recommended to check the solution pH in order to verify if it is neutral or close to neutral: in case it should be adjusted in order to optimize the performance and to prevent false results from occurring.

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DNA quantification data showed extraction efficiency in control samples was depending on the extraction procedure while in forensic samples it was influenced also by the age of the sample and the type of substrate containing the trace. This underline the importance to choose an appropriate and efficient extraction procedure.

No effect due to the different elution in water or buffer was observed, since the DNA quantity recovered was quite similar in both cases.

DNA profiles from controls and forensic samples were evaluated for the presence of pull-up, artifacts, off-scale peaks, peaks imbalance, allelic/locus dropout.

All profiles were good in quality, reliable and concordant with quantification results, with no negative effect on DNA profiles due to the samples treatment with the Seratec buffer.

4. Conclusion

Seratec immunochromatographic tests provides a useful contribution to the investigation, for confirming the presence of human semen or saliva from a wide range of forensic samples. The method is rapid and allows also subsequent DNA analysis.

No significant differences were observed in the test efficiency, DNA recovery and quality of DNA profiles obtained when using buffer or water as elution medium for forensic samples.

Conflict of interest

None.

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