

Routine drug of abuse monitoring in saliva with a new collection procedure and a modified homogenous immunoassays

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AIMS: Saliva as alternative sample matrix to urine has many advantages for drug of abuse testing: it is readily available and its collection is non-invasive and with little stress. But many current saliva sampling techniques are plagued with a number of practical problems, from low and variable sample volumes in case of dry mouth (xerostomia), to hygienic questions and analyte absorption onto the collection device.

Considering these obstacles a new collection technique has been developed based on a liquid carrier system. The new practical tool, called the Saliva Collection System (SCS by Greiner Bio-One Coop) is composed of a non-toxic, coloured saliva extraction solution, a collection beaker and an evacuated collection tube.

METHODS: When saliva is obtained, the non-toxic extraction fluid is kept in the mouth by the individual for a short period of time, voided into the collection beaker and then hygienically transferred into an evacuated collection tube containing precipitation additives. Centrifugation gives a clear supernatant which can be directly used for many applications in drug of abuse testing or therapeutic drug monitoring. The exact amount of the collected (dissolved) oral fluid in the saliva extraction solution is easily and accurately determined by photometric quantification of the non-toxic dye in the extraction solution.

To be able to use this new saliva collection system under routine conditions a commercially available immunoassay was adapted for the low level concentration measurements in oral fluid. The sensitivity of the CEDIA opiate assay was extended into the measuring range of 10 ng/ml by modifying analyte and reagent volumes as well as by optimizing the measurement kinetics.

The performance of the new collection system for DOA screening was tested by collecting blood and saliva at different pH values over a period of 8 hours from volunteers who had licitly consumed poppy seed products.

RESULTS: Oral fluid collection can very easily and reproducibly be done using the new saliva collection device. As an important advantage to other techniques, collection can be done repeatedly for several times, showing constant saliva recovery and morphine levels. After poppy seed consumption the time course of saliva morphine concentrations curves follow closely those in serum, and, depending on the amount of poppy seeds consumed, concentrations in saliva peaked at 50 ng/ml after 30 min and dropped below 10 ng/ml in 6-8 hours. Depending on the pH in the saliva collection solution the saliva/serum ratios increase parallel to the increased pH in the saliva extraction solution.

CONCLUSIONS: The results confirm the utility of the new collection technique with the Greiner SCS in a simulated routine DOA testing environment. Using the modified CEDIA immuno assay the collected saliva samples can be analyzed fully automated on a standard clinical analyzer system. These are the major practical preconditions for the introduction of saliva as matrix for routine drug testing. In combination with a sensitive on-site drug detection system, the new saliva collection system also will be useable in on-site drug testing situations.

KEYWORDS: *Saliva collection device, DOA testing, Morphine, Poppy seeds, CEDIA*

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