First experiments on the possible use of diphenhydramine as a model substance for the evaluation of oral fluid sample collection

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Introduction

Oral fluid (OF) is gaining increasing interest in drugs of abuse and compliance testing as a less intrusive matrix compared to serum or urine. However, little is known about the influence of the collection process on analyte recovery depending on different collection devices. In addition contamination of OF with corresponding drugs shortly after drug ingestion may lead to interpretation problems. Furthermore unintended oral contamination (eg: "hawking") could be cited (safely or correctly) by patients / clients to explain their positive drug testing results. A proper model substance to investigate possible ways of oral contamination and the OF sampling process with its influencing factors is therefore needed. Pharmacological and physicochemical properties (pH=9.0, plasma protein binding: 80%, oral bioavailability: 50% - 70%, t1/2: 4 - 6h) relative safety and availability (non-prescription drug) makes Diphenhydramine (DPH) a candidate substance for evaluation. This approach is complemented by the ease of capillary white blood cells.

Methods

Objective: All volunteers were between 23 and 47 years of age, some participated in more than one experiment.
Sample collection: OF samples were collected using the liquid based Greiner Bio-One (GBO, "Dorm", Berco, Kleve, Germany) and solid phase based Immunalysis Quantisal (I mmunalysis, Pomona, USA) device according to the manufacturer. Volunteers were asked to rinse their mouth with 15mL OF or SES (GBO) 4 times (30s each) respectively the other way around (Group b) or with the Greiner ("Dorm", Berco, Kleve, Germany) SCS pH 4.2 device or the Quantisal (I mmunalysis, Pomona, USA) device (Group a) or with the Greiner ("Dorm", Berco, Kleve, Germany) SCS pH 4.2 device. Amylase and OF concentration in GBO sample were measured with an Olympus AU680.

Results

Concentration of Diphenhydramine (DPH): 0.14 - 13.70 ng/mL OF/SES; see Fig. 5, 6.

Discussion

- DPH fulfills the key criteria for a good model substance: long detectability in both matrices, "sufficient" elimination half-life and a correlation between OF and blood concentrations.

Conclusion

- The detection times of DPH in OF and CB are comparable.

- The DPH/CB ratios of the first two hours after ingestion (mean: 5.96, CV: 113%, range: 0.04 - 0.1% of the initial DPH concentration: range: 20.5 - 285 ng/mL OF/SES). See Fig. 5, 6.

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- The instrument operated in ESI positive mode and two different OF collection devices in the same individuals gave comparable concentrations.

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