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The recovery of illicit drugs from oral fluid sampling devices

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AIMS: Oral fluid drug testing is being actively promoted internationally (including New Zealand) as a preferred option for drug testing of drivers, workplace drug testing, prison inmate testing, and testing in rehabilitation centres. The ease and speed of collection of this non-invasive sampling, ability to directly observe collection, and the reduced risk of specimen adulteration and substitution are all touted as advantages of this emerging technique. An Australian Standard for Oral Fluid Testing titled "Procedures for the collection, detection and quantitation of drugs in oral fluid" is also scheduled for release late 2006.
As New Zealand's leading provider of drugs of abuse testing, ESR needs to keep abreast of advances in this field. A study has been undertaken to:

- determine appropriate oral fluid collecting devices to recommend
- compare screening techniques for THC, opiates, amphetamines and benzodiazepines
- develop and validate methods for confirming and quantifying the presence of drugs in oral fluid.

The results of our findings will be presented along with their implications for future work in this field.

METHODS: Oral fluid blank specimens were spiked with the following concentrations of drug:

- THC (4, 10, 15, 25 ng/ml)
- Morphine (40, 100 ng/ml)
- Methamphetamine (50, 125 ng/ml)
- Clonazepam, diazepam, oxaxepam & triazolam (4, 10 ng/ml)

These solutions were used to prepare what we called "collected" samples which were stored at both 5 and 25°C. The samples were analysed over a period of 10 days to determine the stability of the drug in the stored samples.
Samples were screened using the immunoassay kit or other instrumentation/reagents provided by the supplier of the collecting device. Screening results were compared with the confirmation and quantitation results obtained from GCMS (morphine, methamphetamine) and LCMSMS (THC, benzodiazepines).

A single collection device and immunoassay technique was tested from the following three suppliers:

- Cozart collection system & EIA kits[1]
- Immunalysis collection system & EIA kits[2]
- 3rd party collection device & Microgenics MGC240 analyser with Cedia reagents[3]

The Diagnostics EIA kit was also introduced for benzodiazepine screening.

RESULTS:

THC: Substantial amounts of THC (>60%) were rapidly lost from both the Immunalysis and Microgenics supplied collection devices. Recoveries from the Cozart collecting device were acceptable. However, the Immunalysis EIA was superior for sensitivity to THC at 4ng/ml. Morphine & Methamphetamine: For both drugs, all three immunoassays gave good discrimination between oral fluid spiked at the lower levels and drug-free oral fluid. GCMS quantitation demonstrated that all three collection systems gave acceptable results with no obvious loss of analytes at the concentrations and storage temperatures.

Benzodiazepines: Neither the Immunalysis nor Cozart EIA screens performed well at the concentrations tested. The Microgenics displayed the best sensitivity. LCMSMS quantitation showed that all four benzodiazepines were stable at both concentrations and temperatures in the Immunalysis and Cozart collection systems. The Microgenics device gave excellent recoveries for three benzodiazepines but clonazepam stored at room temperature declined markedly.

CONCLUSIONS: During oral fluid collection and specimen storage, substantial drug losses of THC and clonazepam were shown to occur with some commercially supplied collection systems. There was also variation in the sensitively of the EIA kits studies and the Microgenics system depending on the both the analyte and concentrations.

REFERENCES:

1 Cozart, Oxfordshire, U.K.

2 Immunalysis, Pomona, California

3 Microgenics, Fremont, California

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