# SACI in the analysis of addicted drugs in human fluid oral

Keywords: Street drugs, fluid oral, no sample preparation

Today oral fluid is used as a readily available alternative to blood for some applications in therapeutic drug monitoring. Oral fluid analysis for drugs of abuse are now performed in many environments, including law enforcement, workplace or roadside drug testing, and drug treatment. Drug concentration (of not ionizable drugs within the pH range of saliva) in oral fluid have been reported to correlate with drug concentrations in plasma or with the free fraction of the drug in plasma. Oral fluid is usually collected by spitting into a collection tube [Fig.1] or by wiping the oral cavity with a swab. LC–MS assay published for determination of some drugs (eg. amphetamines, cocaine, its metabolite benzoylecgonine, codeine, and morphine) in oral fluid required sample preparation with SPE or deproteinization for work-up led to important ion suppression.

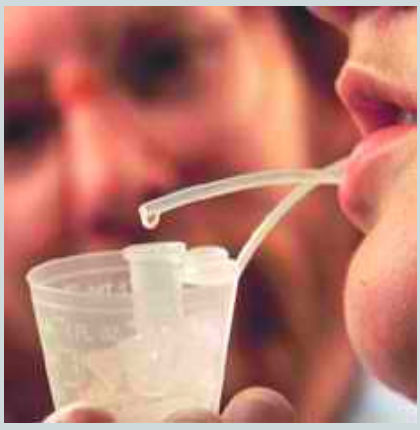

Figure 1: Oral fluid sampling

## Surface Activated Chemical Ionization:

*Surface-Activated Chemical Ionization* technology (SACI) constitutes a significant improvement with respect to Atmospheric Pressure Chemical Ionization sources (APCI), ElectroSpray Ionization sources (ESI) and advanced heated Ionization sources (H-ESI, Turbo-V). In particular, this new technology introduces two key innovations to upgrade current ionization sources:

1.Insertion of a metallic surface in the ionization chamber [Fig.2], allowing for a better ion focalization and hence for an increase in ionization efficiency.

2.Application of a low electric potential (usually 100 - 400 V) to this surface, causing the ionization of the neutral molecules of the analyte, instead of the high potential (usually 2.000 – 5.000 V) applied to corona discharge needle that gives rise to ionization of the analyte molecules in APCI.

Figure 2: SACI source on HCT ultra.

## Experimental conditions and settings:

Analyte: Cocaine , Benzoyletgonine, 6-MAM and MDMA (Ecstasy)

Sample: fluid oral

Sample Preparation and Analytical Conditions: Oral Fluid diluition 1:10 in Water

LC-MS/MS conditions $C_{18}$ 100 × 2.1 mm, 3.5 µm column was used. The chromatographic analysis was performed under gradient conditions.

The mobile phases were: (A) $H_2O$ + 0.1% HCOOH and (B) $CH_3CN$ + 0.1% HCOOH. The gradient was used passing from 5% of B to 80% of B in 20 min. Flow rate: 0.25ml/min, injection volume 20 µL per sample.

Instruments Employed:

- HCT ultra, Bruker Daltonics
- HPLC Dionex Ultimate 300

## Experimental Results:

*1.Mass spectra and Chromatograms*

MS/MS spectra obtained with the HCT ultra mass spectrometer coupled with SACI ionization technique allow to detect an extremely clear signal (Fig.3) and the low spectrum chemical noise makes possible to obtain high sensitivity.

SACI allows to detect trace of Cocaine, Benzoyletgonine, 6-MAM and MDMA in diluted oral fluid (as reported in Fig.3); precursor ions and respective product ion of these compounds are reported in table 1.

| Drug | MW | Precursor | Product |
|---|---|---|---|
| Cocaine | 304 | 305 | 182 |
| BEG | 289 | 290 | 168 |
| 6-MAM | 327 | 328 | 211 |
| MDMA | 193 | 194 | 163 |

Table 1: MW, precursor and product ions of drugs analysed

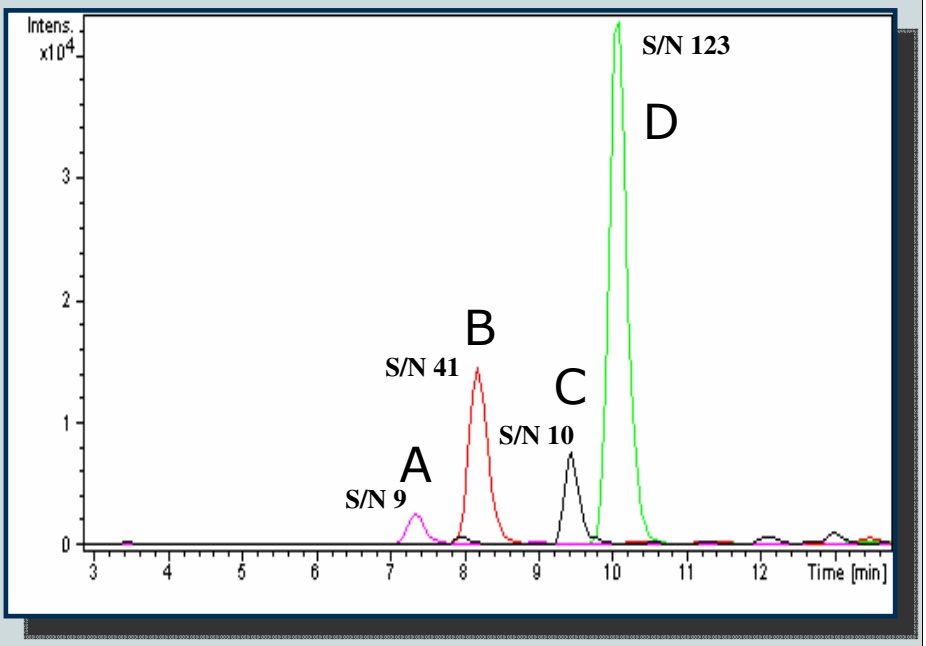


Figure 3: EIC of MDMA (A) , BEG (B), 6-MAM( C) and Cocaine ( D) obtained by SACI LC-MS/MS analysis of a sample of human oral fluid in water (dilution factor 1:10).

## Conclusions:

SACI source and the instruments employed, allowed to achieve a significant results in drugs analysis even avoiding traditional purification steps (e.g. Solid Phase Extraction – SPE).

## Acknowledgements and References:

*Acknowledgements*

1) ISB srl, via Fantoli 16/15, 20138 Milano.

2) Bruker Daltonics S.r.l., Macerata, Italy.

*References*

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