

# Identification and quantitative analysis of drugs in biological samples by GC/MS.

Émilie PASQUIER

## Introduction

Laboratories specialized in forensic analyses must be able to research, identify and quantify any compounds contained in biological or non-biological samples.

Our laboratory researches 4 families of narcotics: cannabinoids, opiates, cocaine and amphetamines with a method involving Gas Chromatographic - Mass Spectrometry (GC-MS).

## Présentation of the case

The laboratory of toxicology was required to analyse 2 biological samples (1 blood and 1 urine) and 1 non-biological sample (powder discovered under a watch).

This case dealt with a man who died in detention. He was a drug-addict and an alcoholic. The authorities suspected that the investigated powder was heroin.

Research for opiates in the hydrolyzed blood, urine, and constituents of the powder was performed.

A GC/MS method was used to analyse each sample.

## Material and methods

The analysis was performed using a Saturn 2000 Varian Chrompack system.

Analytical column : HP-5MS, length 30 m, 0.25 mm i.d.

Detector: ion trap mass spectrometer Saturn 2000.

The laboratory tested for 4 different opiates : codeine, dihydrocodeine, morphine and 6-mono-acetyl-morphine (6-MAM) in the 2 biological samples. A mixture of D3 internal standards drugs was used for the quantification. The analytical procedure was the same for the 2 matrix :

- i. hydrolysis
- ii. liquid-liquid extraction
- iii. evaporation under nitrogen flow
- iv. silylation with BSTFA
- i. injection of 1 $\mu$ L

In order to determine the composition of the powder (drugs as well as products used for cutting), 8mg were dissolved into 4mL of a chloroform/toluene mixture(50/50).

## Results and conclusion

After absorption, heroin is transformed into 6-MAM and then morphine. The test of the urine sample confirmed the presence of morphine, 6-MAM and codeine. The quantitative analyses gave the following concentrations: 7.4  $\mu$ g/mL for morphine, 940 ng/mL for 6-MAM and 344 ng/mL for codeine.

As for the blood sample, only the morphine was identified, with a quantity of 213 ng/mL.

The powder found in a bag under the watch was heroin. The drug was cut with paracetamol (33%), caffeine (20%) and impurities of acetylcocaine. The presence of TMS paracetamol can be explained by the derivation of paracetamol by residual BSTFA, a contamination in the devices' injection line from prior injections.

Concentrations of morphine and 6-MAM suggests death was caused by an overdose. The report was communicated to the expert close to courts.

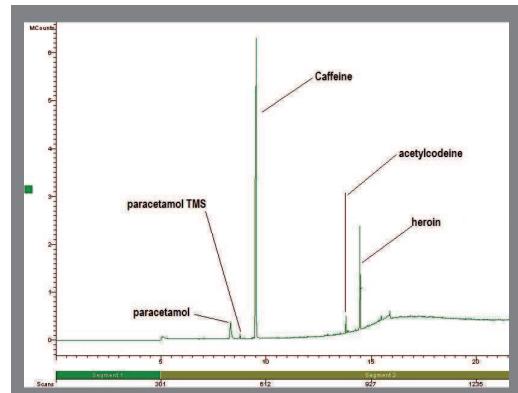
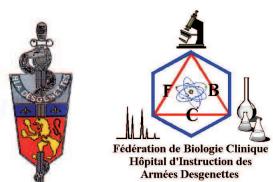


Figure 1: Chromatogram of the powder with identification of peaks



Laboratory of toxicology, HIA Desgenettes  
108 boulevard Pinel, 69998 Lyon Armées