

# Determination of cocaine in several matrices

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## Introduction

Nowadays, forensic toxicology is present everywhere. This is the new tool of truth against narcotics traffic, doping or crime. A fatal intoxication with narcotics was reported: a 42-year-old man was found dead in a street. On the corpse, there were gastric rejections. The autopsy was performed and the biological fluids were submitted to a full toxicological screening. Immunochromatograph screening of the urine revealed the presence of cocaine. Here, we will specifically interest ourselves in the concentration of cocaine in blood and hair by using gas chromatography.

## Material and methods

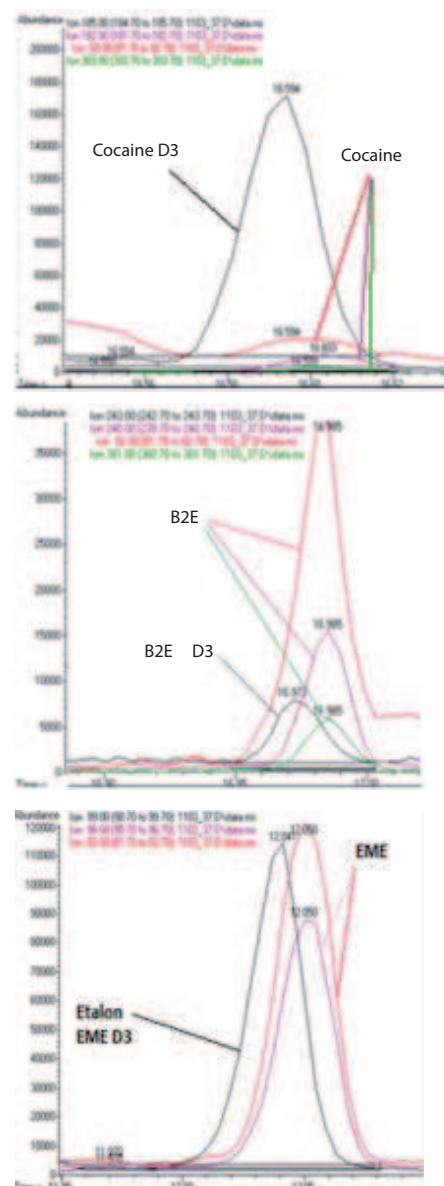
Molecules in blood were extracted by liquid-liquid extraction using a Toxi-tube A. Hairs were hydrolyzed in acid then extracted as for the blood. All the analyses were performed on a Hewlett-Packard (G1888) gas chromatograph in combination with a mass spectrometer system operating in the electron-impact mode at 70eV. The HP-5ms capillary column (30m x 0.25mm x 0.25µm film thickness) was used for the gas chromatographic separation. The injector was at 260°C. Column temperature was programmed from 50°C to 310°C at 65°C/min (initial time 1 min, final time 4 min) then at 310°C for 19min. MS conditions were set at single ion monitoring (SIM) mode using the following mass numbers: cocaine, m/z 182; benzoylecgonine (a metabolite of cocaine), m/z 240; methylecgonine ester (a metabolite of cocaine), m/z 96.

## Results and discussion

The screening of cocaine was done in blood. To detect and quantify the amount of cocaine as well as possible, deuterated standards were added to the blood during the extraction. The analysis revealed that the blood contained cocaine with two of its principal metabolites (BZE and EME) represented on figure 1.A on which we can see the 3 molecules with their analogues.

Cocaine is revealed at a concentration of 12.7ng/ml. Its two principal metabolites, BZE and EME, are at 414ng/ml and 155ng/ml, respectively. Hairs were also analyzed. The hair matrix helps finding out the frequency of consumption. It was established that hair grows 1 cm a month. So, the toxicological past of a victim can be known. The analysis was performed on 38mg of hair. Cocaine was detected at a value of 2.38ng/mg and EME at 0.43ng/mg.

For the interpretation, we used blood because it is the only matrix with therapeutic, toxic and fatal ranges in the literature. Cocaine is a liposoluble molecule, so it accumulates in body fat. After death, cocaine is redistributed and it tends to equilibrate throughout the whole body by diffusion. The presence of cocaine in hair proves that the victim was a frequent consumer. The values in blood are only toxic for BZE but post-mortem redistribution could overestimate the concentration. Other narcotics and alcohol were found in the biological fluids of this victim. Finally, in absence of other causes of death, we can assume a toxic origin.



**Figure 1 A** : Chromatograph of blood: (To left to right : Cocaine, BZE et EME).  
Conditions : Column HP5ms ; L=30m ;  
 $d_c = 0,25\text{mm}$  ;  $f_t = 0,25\mu\text{m}$  ;  $V_{inj} = 1,00\mu\text{l}$ ,  
Mode SIM