Cannabis assay in biological samples by GC/MS

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Introduction

The pharmacology-toxicology laboratory of Desgenettes Hospital carries out forensic analyses but also pharmacology and medical work for the Emergency Department of the hospital, Lyon hospitals and private laboratories. One of the analyses performed was identification and quantification of cannabis in biological matrices by GC/MS (Gas Chromatography/Mass Spectrometry). What we will study here is the analysis of a blood sample from a person who had a roadside inspection.

Material and method

The analytical procedure to identify cannabis was:
Extraction with solvent
Evaporation under nitrogen flow at 50°C
Derivation, in this case, methylation
Injection of 2µL in the GC/MS.

We used a deuterated internal standard for the quantification because it has the same chemical and chromatographic behavior as the molecule being tested but with a different mass spectrum which allows the distinction.

GC separation was performed using an HP-5MS column. The GC characteristics were:
Length : 30m, internal diameter : 0.25mm and film thickness: 0.25µm.
Carrier gas: helium
Type of injection: splitless
Flow: 1 mL / min
Temperature gradient

From there results, we can state that the person has used cannabis recently. It is then possible to calculate the concentration of THC in the blood, based on the following formula:

$$C_{cannabis\ (ng/mL)} = \frac{Area_{no\ deuterated}}{Area_{deuterated}} \times \frac{m_{standard\ (ng)}}{V_{biological\ (mL)}}$$

Where, $m_{standard}$ = **5ng and** $V_{biological}$ = 2mL.

The concentration of THC in blood is 6.47ng/mL which corresponds to a high concentration. In conclusion, the technique GC/MS allows to confirm that the person stopped on the roadside had been using cannabis.

Results and conclusion

Identification of molecules was done based on their retention times and mass spectrum. We observed the presence of THC (a metabolite of cannabis) in the chromatogram in Figure 1. Similarly, on the mass spectrum in Figure 2, whose characteristic ions of THC were seen: m/z = 285, m/z = 313 and m/z = 328.

MS was used in SIM (Selected Ion Monitoring) mode.

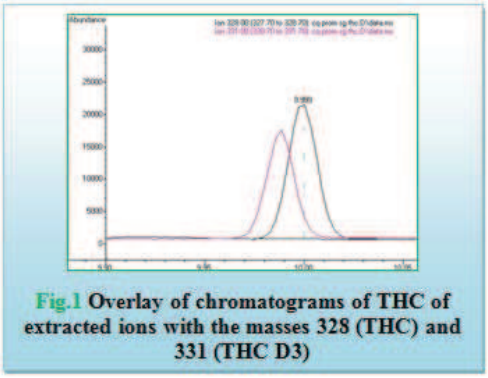

Fig.1 Overlay of chromatograms of THC of extracted ions with the masses 328 (THC) and 331 (THC D3)

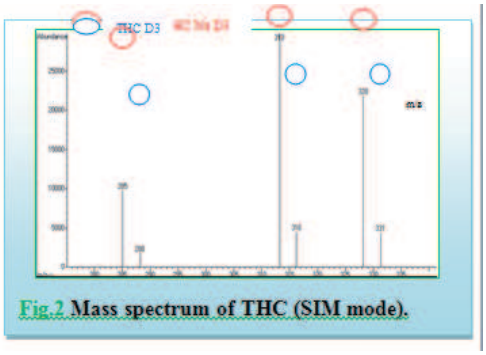

Fig.2 Mass spectrum of THC (SIM mode).