

Analytical approaches of autopsy samples in a case of supposed suicidal death

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Introduction

At the end of December 2012, a forensic autopsy investigated a drug or toxic intoxication. To clear up this suspicion, biological samples such as gastric juice and cardiac blood were brought to the laboratory of toxicology-pharmacology. The objective of the paper is to carry out an analytical exploitation of these samples, through different devices such as SPME, GC-MS, HPLC-UV-DAD and HPLC-MS/MS.

Experimental procedures

The gastric juice emits a strong smell, therefore the first analysis is Headspace of gas chromatography coupled with mass spectrometer (SPME-GC-MS) in the electron impact mode. It is an analysis of volatiles. The HP-5MS capillary column (30 m x 0.25 mm x 0.25 µm film thickness) was used for the gas chromatographic separation, and helium is carrier gas.

Next, an analysis of gas chromatography coupled with mass spectrometer (GC-MS) after liquid-liquid extraction of cardiac blood and gastric juices molecules. The column characteristics are the same as previously.

High performance liquid chromatography coupled to diode array detectors (HPLC-DAD) use a column ODS (5 µm, 100*2 mm + precolumn 20*2 mm) with an elution gradient.

High performance liquid chromatography coupled to tandem mass spectrometry (HPLC-MS/MS) use a column UPLC BEC C18 (1.7 µm 2.1*50 mm) with an elution gradient.

Results and discussions

Different hydrocarbon compounds such as benzene tetramethyl, naphthalene, benzene pentamethyl, naphthalene methyl, naphthalene dimethyl, naphthalene trimethyl and biphenyl methyl were identified by SPME analysis of gastric juice suggesting ingestion of a naphta mixture.

GC-MS and HPLC-UV-DAD showed other unknown peaks with similar spectra, one peak was further identified as Dimethenamid, (Figure 1 and 2), the other could be metabolites.

Quantitative analysis was performed both by HPLC-UV-DAD and HPLC-MS/MS. However, these methods were not totally validated.

Instability of Dimethenamid during liquid-liquid extraction and evaporation was observed and not totally resolved.

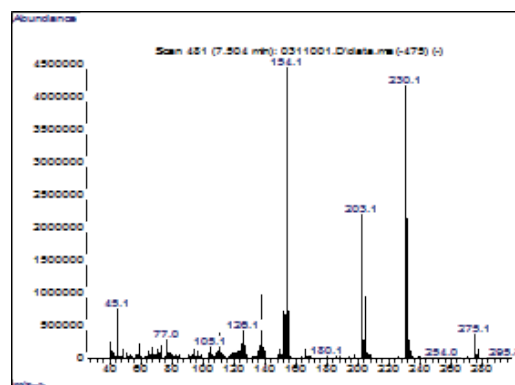
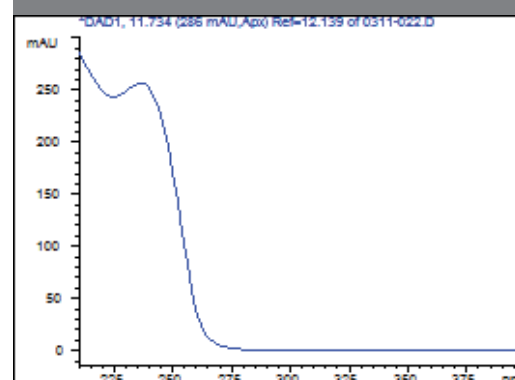
Sample precipitation of protein without evaporation process was tested for HPLC-MS/MS, but the validation process was not completed.

Instability of the Dimethenamid in biological samples was observed especially in whole blood but also in "plasma" supernatant and different concentrations levels were observed after repeated data on different weeks under +4°C storage conditions.

Conclusion

One of the causes of the suicidal death was the ingestion of a drink mainly containing Dimethenamid. This compound can be contained in some herbicides. The dimethenamide quantitative analysis was started but not totally validated because several problems occurred as indicated in the results and discussion part.

Figure 1: UV-visible spectra of Dimethenamid
Figure 2: Mass spectrum of Dimethenamid



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