

Analysis of morphine and codeine in dried blood on a carpet – a case report

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Abstract

Aims: In the case of a homicide dried blood of the victim was found on a carpet. Previous to death the victim was involved in an affray. In post mortem toxicological analysis consumption of heroine was detected. Therefore the question occurred if the victim had consumed the heroine before or after the loss of the blood. The carpet with a blood-stain (sized approximately 7x16 cm) and another piece of the same carpet without any blood-stains were sent to the Institute of Forensic Medicine in Munich for analysis.

Methods: 2 pieces of the blood-stained part of the carpet were cut out and chopped. Carbonate buffer and internal standards were added and the samples were treated with ultrasonication. Solid phase extraction was performed followed by GC-MS analysis. For matrix-matched calibration, whole blood was spiked with morphine and codeine, dropped on the not blood-stained carpet and analysed as reported above.

Results and Discussion: Morphine and codeine could be detected in the blood on the carpet. The ratio of morphine to codeine was 10:1, which is a typical ratio after consumption of illicit heroine. Only absolute values can be reported due to the lacking possibility to reconstruct how much blood had been on the carpet.

Conclusion: It was shown that extraction and analysis of drugs like morphine and codeine in dried blood is possible, even on an absorbent surface like a carpet. This may become important in various cases, e.g. in case the corpse is missing, or as shown in this case, the chronology of events is unknown.

1. Introduction

The Analysis of dried blood spots has been well established in the screening of newborns for metabolic disorders since the 1960s [1]. Forensic toxicologists today are increasingly interested in the analysis of dried blood spots as there are several advantages of them compared to whole blood, especially concerning long term stability [2,3]. Most experiments are performed with known volumes of blood and the use of standardized filtercards. Few is known about the analysis of dried blood on different other surfaces [4]. This can become important in some cases, as one is shown below.

2. Case Report

In the case of a homicide, dried blood of the victim was found on a carpet. Previous to death he had been involved in an affray, as several injuries proved, where he obviously had lost the blood. The result of the autopsy was death due to aspiration of blood. In postmortem toxicological analysis consumption of heroine was detected. The brother of the victim had been in the apartment at the time of offense and was accused of killing his brother. Therefore the

chronology of events became important to police and lawyers. The question occurred if the victim had consumed the heroine before or after the loss of the blood and if another person was liable for his death. A piece of carpet with the blood-stain (sized approximately 7x16 cm) and another piece of the same carpet without any obvious blood-stains were cut out and sent to the Institute of Forensic Medicine in Munich for analysis, especially for morphine and codeine, as they can typically be detected after consumption of illicit heroine. The carpet was seized 6 months after the death of the victim.

3. Material and Methods

From the blood stained part of the carpet, two pieces of approximately the size of a 2 €-coin were cut out and chopped into small pieces. 15 mL of carbonate buffer pH 8.9 and a mixture of internal standards were added and the samples were treated with ultrasonication. A solid phase extraction was performed analogically to preparation of whole blood and serum samples in the Institute of Forensic Medicine in Munich. The extracts were derivatised and analysed by GC-MS.

To approximate the amount of blood in the carpet, equal pieces of the not blood stained part of the carpet were prepared with different volumes of whole blood. Carbonate buffer was added and the colour of the solution was compared to those received from the original samples. The approximated amount of blood was 2 mL, so for matrix-matched calibration 2 mL of whole blood were spiked with the analytical reference standards morphine and codeine in different concentrations (range from 10 – 200 ng/mL) and dropped onto pieces of the carpet with obviously no blood on them. These samples were treated and analysed the same way as the samples reported above.



Fig. 1. Blood stain on the carpet (encircled in red).

There were several other bloodstains in the apartment of the victim. Additionally, 12 swabs had been taken from 4 different places in the apartment, where blood had been spilled onto. These were a plastic bottle, the bed, a sideboard and the wall. The swabs from each item had been combined because there was only little blood on them. These combined swabs were dried completely and then extracted for each item separately with carbonate buffer and prepared as described above. Original, untreated swabs were used as zero equation. Matrix-matched calibration was performed with 100 μ L of spiked whole blood in the same concentration range as reported above, dropped onto untreated swabs.

4. Results and Discussion

On the blood stained part of the carpet, both morphine and codeine, could be detected. The ratio of morphine to codeine was typical for the consumption of illicit heroine. The values for both pieces of the carpet were for morphine 118 ng and 376 ng and for codeine 21 ng and 64 ng, respectively. There are only absolute values to be given because of the lacking possibility to reconstruct exactly how much blood there had been in the piece of carpet. The reference part of the carpet with no bloodstains showed no signal for either morphine, codeine or heroine.



In two of the four extracts received from the swabs, there was a hint for morphine, but as we could find only 2 out of 3 masses in the spectrum, it is not corresponding with the guidelines of the Society of Toxicological and Forensic Chemistry (GTFCh). In the other two extracts neither morphine nor codeine could be detected. One of these two extracts was received from a single swab with little blood on it, the other one was received from 4 swabs with very few blood on them, so it is possible, that we could not detect morphine or codeine because it was below the limit of detection of the quantitation method used for this analysis.

Fig. 2. Four of the swabs with obviously very few blood on them.

It could be proved, that the heroine consumption occurred before the blood was spilled onto the carpet, because it already contained morphine and codeine. So the affray took place after consumption of heroine. In the end, the court had to acquit the accused for lack of evidence. In dried blood spots, some drugs can be analyzed for a very long time after drying. Due to the loss of water, enzymatic reactions are arrested and the degradation is slowed down or completely stopped. In this case, we could detect morphine and codeine even 6 months after the blood had been spilled onto the carpet. This is an example for the possibilities of modern technology and shows, that a lot of information is left, even in small bloodstains.

5. References

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