LABORATORY OF FORENSIC CHEMISTRY AND TOXICOLOGY

MDMA Intoxication in Potential Donor with Cardiac Arrest – A case report

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INTRODUCTION

Amphetamines consumption is still an important public health issue, namely in terms of compounds variability and disposition to consumers. However, some of them, still classic substances, keep standing in the illicit market, with remarkable and continuous success. That is the case of MDMA. Nevertheless, there is always new information and data on MDMA intoxication, both *in vivo* as in *post-mortem* context.

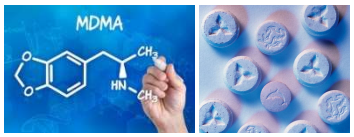

Fig. 1. MDMA (©iStock.com/Zerbor).

Fig. 2. National Institute of Blood and Transplantation.

Fig. 3. Non Donor national Registry Database – "If you donor, someone will say "thanks", but you're not obliged to do it!"

In Portugal, the rule of law defines that every citizen is a potential organ donor, unless clearly expressed otherwise by the individual, through a specific written form, under the Portuguese Blood and Transplantation Institute management. As so, whenever an individual is considered dead, mainly in ER or Intensive Care Units, becomes automatically a Potential Donor (Fig.2, 3).

AIMS & CASE REPORT

The authors report an intoxication case with MDMA in an 18 years old male, who was considered a potential organ donor, after a cardiac arrest. Whole blood samples were collected *in vivo*, at the Emergency Room (ER), in different moments, and *post-mortem*, at the Forensic Pathology Department of the North Branch of the National Institute of Legal Medicine and Forensic Sciences.

Male, 18 Y
No previous illicit drugs consumption

9.00 am:
Emergency call: unconsciousness/ possible intoxication

9h17:
Emergency team arrival
Stridor;
Mydriasis
Hiperthermia tympanic temp: 42ºC

9h51:
Emergency Room:
Potential Organ Donor
Death verification (10h13)
Organ sampling (14h00 – 16h00)
Medico legal autopsy (day 2 – 15h30)

day 2 – 15h30
Medico legal Autopsy

ANALYTICAL PROCEDURE

A general screening toxicological procedure, including the detection of ethanol, licit and illicit drugs was applied. For MDMA quantification, samples were extracted by an SPE procedure (OASIS® MCX) followed by derivatization with MBTFA.

Table 1 – Sampling time and sample type.

Sampling time	sample
10H45 – ER	Whole blood
11H34 – ER	Whole blood
12H48 – ER	Whole blood
Day 2 – 14H00 – Autopsy	Whole blood

Samples were processed using a GC-MS single quad, in SIM mode. Instrumental conditions are described in Table 2 and Table 3.

Fig. 4. GC-MS single quad.

Table 2 – GC-MS Instrument conditions.

GC	AGILENT 6890N
MS	AGILENT 5973N
Autosampler	AGILENT 7683
Chromatographic column	J&W Scientific 5-ms, 30 m x 0,25 mm x 0,25 µm 90ºC for 1', to 200ºC at 25ºC/min, plateau 4', to 290ºC at 30ºC/min, plateau 2'
Detector	Direct interface; Internal Ionization by IE ; $T_{transferline}$: 280ºC $T_{quadrupole}$: 150ºC; SIM mode, dwell time 1 sec/scan; $T_{ionization}$: 230ºC.

Table 3 – Target-ions in SIM mode.

Compound	Target-ions
MDMA	**154**, 135, 162
MDMA-D_5 (IS)	158

Compound	Target-ions
MDA	135, **162**, 275
MDA-D_5 (IS)	167

RESULTS

The post-mortem whole blood sample was positive for Lidocaine (< 500 ng/mL), compatible with advanced life support intervention, and positive for MDMA (2278 ng/mL) and MDA (49 ng/mL). All the whole blood samples collected in vivo (during the maintenance of the individual under life support), were also positive for MDMA and MDA (Table 4). The samples were negative for other substances, namely other illicit compounds, ethanol and drugs. Table 5 shows the ratios between *post-mortem* (PM) and *ante-mortem* (AM) samples.

Table 4 – Sampling time and sample type.

Sampling time	MDMA (ng/mL)	MDA (ng/mL)
10H45 – ER	504	Neg
11H34 – ER	1918	89
12H48 – ER	1359	20
Day 2 – 14H00 – Autopsy	2278	49

Table 5 – PM / AM ratio.

Sampling time	Ratio PM/AM
10H45	4.52
11H34	1.19
12H48	1.68

Fig. 6 shows the behaviour of MDMA concentration along the time interval, between death certificate and medico-legal autopsy.

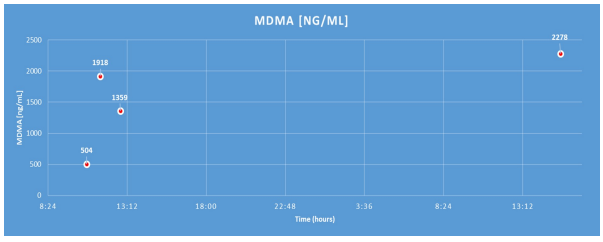

Figure 6 – MDMA concentration during the studied time interval.

Also, autoptic and histological evidences included organ congestion, pleural petechial hemorrhage, pulmonary edema, pulmonary and alveolar hemorrhage.

DISCUSSION AND CONCLUSIONS

The obtained results suggested MDMA intoxication as the cause of death, based on the identification of the substance, the obtained value, and the presence of edema in the pulmonary tissue histology. The different values obtained during the mechanical ventilation and other life-support measures show that MDMA was still being metabolized (Figure 6). As so, information on this procedure should always be transmitted to the medico-legal team. Post-mortem interval is an important point of discussion, concerning toxicological results and interpretation. In this particular case, the increased MDMA concentration observed in the PM sample, and after studying the PM/AM ratio, is coherent with previous studies. Nevertheless, the body manipulation needed for organ collecting procedures could alter PM redistribution, influencing the quantitative result for the substance.

Interpretation of these results is crucial to understand the behaviour of the substance. **Therefore, MDMA post-mortem behaviour should be carefully evaluated, considering as possible influencers, in the specific context of the case, the time lapse between the death verification, the maintenance of the advanced life support and the body manipulation for organ collection purposes. The post-mortem/ante-mortem ratio of MDMA obtained values, compared with literature references, also supports the conclusions. No doubt that death was due to MDMA intoxication, but information from the in vivo samples analysis suggests that this type of sample should also be considered, in a complementary role, whenever possible. Consequently, the authors consider that communication between the medico-legal services and Hospital departments can be decisive, in order to obtain samples collected as closer to the event as possible, as well as all the medical data available.**

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