

Death by MDPHP

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Case Report

A highly aggressive 35 year-old male with a history of ADHD and depression (medicated with methylphenidate and an antidepressant) rioted at home. He cut the phone line outside the building, threw numerous objects from the balcony, destroyed a tablet computer, and shaved parts of his head (figures 5 and 6) - hair tufts lay in different rooms and in the refrigerator. Finally, he blocked a room knocking over a wooden cabinet. His mother fled to neighbours and called the police. The police forced access to the blocked room. The man was found lying underneath the cabinet bleeding (figure 2). His mother's wooden carvings and carving tools scattered around him. When the police tried to arrest him he suddenly fell unconscious and suffered a cardiac arrest. Resuscitation attempts were unsuccessful.



Figure 1



Figure 2

Methods

A medico-legal autopsy was performed and biological samples for toxicological analysis were collected. Full post-mortem toxicology including an LC-MS/MS method for stimulants in blood and hair was performed (MRM-Mode, Phenomenex Synergi 4µ PolarRP 80 Å, 150 mm x 2 mm, Phenomenex Kinetex 2.6µ Biphenyl 100Å, 100 mm x 2.1 mm).

Results

Autopsy yielded signs of resuscitation and unspecific findings of an intoxication like cerebral and pulmonary oedema, filled urinary bladder and blood congestion in visceral organs. Multiple haematomas, skin abrasions (figures 3 - 6) and a mass increase of the heart muscle (486 g) were found.



Figure 3



Figure 4

	femoral blood	urin
MDPHP	270 ng/ml	-
MDPHP metabolites	-	positive
Methylphenidate	2.2 ng/ml	positive
Ritalinic acid	positive	positive
Fluoxetine	< 20 ng/ml	n.d.
Norfluoxetine	positive	n.d.
Ethylglucuronide	-	positive
Ibuprofen metabolites	-	positive
FUB-AMB	not detected	-
FUB-AMB-Metabolite	-	positive

Ethanol in blood and urine was negative. A former intake of ethanol and FUB-AMB were proved by metabolites found in urine. FUB-AMB could also be found in hair together with AB-PINACA, another synthetic cannabinoid. The aforementioned antidepressant turned out to be fluoxetine. The prescribed drugs (fluoxetine and methylphenidate) were in subtherapeutic range. Hair analysis showed not only the use of the stimulants methylphenidate and MDPHP – as already detected in blood – but also amphetamine (see tables).



Figure 5

	hair		
	0 - 3 cm	3 - 6 cm	6 - 10 cm
MDPHP	980 pg/mg	1,400 pg/mg	2,200 pg/mg
Methylphenidate	1,600 pg/mg	3,300 pg/mg	6,600 pg/mg
Ritalinic acid	positive	positive	positive
Amphetamine	87 pg/mg	180 pg/mg	380 pg/mg
FUB-AMB	n.d.	0.73 pg/mg	1.6 pg/mg
AB-PINACA	n.d.	1.0 pg/mg	n.d.



Figure 6

Conclusion

The structural similarity between MDPHP and MDPV suggests a relatively high potency. The MDPHP concentration in post-mortem blood could easily explain the extremely aggressive behaviour of the deceased. Functional heart failure due to extreme excitation caused by a high dose of the pyrovalerone derivative MDPHP could plausibly explain death.

