

Emerging Designer Drug Monograph

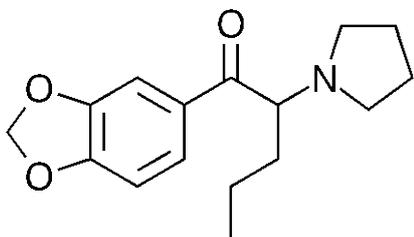
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Drug Name: MDPV

Synonyms: 3,4-methylenedioxypropylvalerone; 1-(1,3-benzodioxol-5-yl)-2-pyrrolidin-1-ylpentan-1-one; all above as hydrochloride

Structure:



Formula: C₁₆H₂₁NO₃

Molecular Weight: 275.3

Pharmacological Drug Class: Stimulant, norepinephrine dopamine reuptake inhibitor (Simmler et al, 2013).

Metabolism: Demethylenation to catechol propylvalerone followed by methylation to methylcatechol propylvalerone; aromatic and side chain hydroxylation and oxidation of the pyrrolidine ring to the corresponding lactam as well as ring opening to the corresponding carboxylic acid (Stranno-Rossi, 2010; Meyer et al, 2010).

Blood Concentrations: In a retrospective case series of patients reported to two poison centers with exposures to bath salts (Spiller et al, 2011), there were 236 patients of which 184 (78%) were male, with an age range of 16 – 64 years (mean 29 years, SD 9.4). Clinical effects were primarily neurological and cardiovascular and included: agitation (n=194), combative behaviour (n=134), tachycardia (n =132), hallucinations (n = 94), paranoia (n = 86), confusion (n =83), chest pain (n= 40), myoclonus (n= 45), hypertension (n = 41), mydriasis (n=31), CPK elevations (n= 22), hypokalemia (n=10), and blurred vision (n =7). MDPV was detected in 13 of 17 live patients (range 24 – 241 ng/mL, mean 58 ng/mL). Three of five patients had MDPV detected in urine (range 34 – 1386 ng/mL, mean 856 ng/mL).

In a reported case of psychosis including bizarre behaviour, suicidality, and hallucinations after reportedly insufflating a “bath salt” product. He was found to have MDPV levels of 186 and 136 ng/mL in his serum and urine respectively, and flephedrone (4-methylmethcathinone) levels of 346

and 257 ng/mL in the serum and urine respectively (Thornton et al, 2012). A 40-year-old male who injected and snorted "bath salts" containing MDPV and subsequently became agitated, aggressive, and experienced a cardiac arrest. He was resuscitated after his initial arrest; however, he developed hyperthermia, rhabdomyolysis, coagulopathy, acidosis, anoxic brain injury, and subsequently died. MDPV was quantified in his serum at 82 ng/mL.

Marinetti and Antonides (2013) reported a series of deaths and DUID cases, featuring poly drug cases with multiple synthetic or therapeutic drugs present. In five cases both peripheral and heart blood were tested positive for MDPV with an average heart to peripheral blood ratio of 1.48, with a range of 1.3 to 1.7. The concentration range of MDPV for PM blood specimens was 10 to 640 ng/mL, with an average of 109ng/mL. Blood concentration did not appear to predict outcome regarding fatalities or impairment. In PM Case 1, the death was caused by injuries sustained in an auto accident; however, this decedent had a blood methylone concentration of 729 ng/mL (Marinetti and Antonides, 2013).

DelTondo et al, (2013) reported a case involving a 42-year-old Caucasian male with a history of alcohol abuse, Hepatitis C, and liver disease. He was found unresponsive by family members at his residence where he had reportedly been ingesting PABS. Initial toxicology screening performed at the treating hospital was positive for PCP and opiates and negative for alcohol. He ultimately developed multisystem organ failure and sepsis after a prolonged stay in the intensive care unit. Death ensued thirteen days after initial presentation. Treating physicians could not rule out a possible overdose.

Behonick et al (2013) reported MDPV concentrations in a series of suicide case reports. Three of the cause-of-death classifications involved self-inflicted gunshot wounds, while two cases were attributed to hanging. Three of the five cases were male, with an age range of 25 – 36 years for the five decedents. The range observed for the concentration of MDPV in postmortem blood was 68.3 to 1,044ng/mL.

Effects and Toxicity: MDPV is a stimulant drug chemically related to alpha-PVP (both are pyrovalerones). MDPV is a synthetic stimulant reported to have effects similar to methylphenidate at low doses and cocaine at high doses. Toxicity is expected to include cardiovascular, cognitive, and psychoactive effects.

Analysis: This is a simple basic drug, with a low molecular weight and appears to extract along with amphetamines and other basic drugs, and chromatographs well by GCMS without derivatization. Analytical data are available in the references cited in the Forendex database and on SWGDRUG monographs. Methodological approach (GCMS) is described in Marinetti and Antonides, 2013.

References:

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SWGDRUG Monograph

<http://www.swgdrug.org/Monographs/3,4MDPV.pdf>

Forendex Database

<http://forendex.southernforensic.org/index.php/detail/index/1091>

<http://www.aafs.org/sites/default/files/pdf/ProceedingsWashingtonDC2013.pdf>