Emerging Designer Drug Monograph

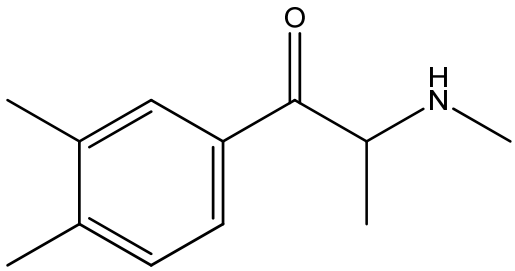
Revision Date: February 4, 2014

Author(s): Victor Uralets

Drug name: 3,4-Dimethylmethcathinone

Synonyms: 1-(3,4-dimethylphenyl)-2-methylaminopropan-1-one; 3,4-DMMC, DMMC

Structure:



Formula: $C_{12}H_{17}NO$

Molecular Weight: 191.3

Pharmacological drug class: 3,4-Dimethylmethcathinone (DMMC) is structurally related to methcathinone and its substituted analogs, such as mephedrone. It is considered a stimulant (1), similar to other synthetic cathinones. Its pharmacological properties have not been scientifically studied. DMMC has been reported in 2010 as a new designer drug (2) and was characterized analytically in a seized material (3). Six possible positional isomers of dimethylmethcathinone have been synthesized and characterized by GC/MS and FTIR (4).

Metabolism: Several metabolites of DMMC have been identified in human urine obtained from a known user (5): 1-(3,4-dimethylphenyl)-2-methylaminopropan-1-ol (two diastereomers); 3,4-dimethyl-cathinone and 1-(3,4-dimethylphenyl)-2-aminopropan-1-ol (two diastereomers). Carbonyl reduction to alcohols was the major pathway along with *N*-demethylation. Identification of the metabolite was confirmed by the synthesis of authentic standards. The same metabolic pattern for DMMC was observed in random urine samples during a large scale testing for designer stimulants (6). Two major metabolites of DMMC, diastereomers of 1-(3,4-dimethylphenyl)-2-aminopropan-1-ol, are currently available for analysis as reference standards (7). Xylyl oxidation products (alcohol and carboxylate) have been also detected in DMMC positive urine (5). Enzymatic hydrolysis increases slightly the yield of metabolites, suggesting, that they are partially conjugated (5).

Self-reported use: No data on effects and toxicity of DMMC are available in scientific literature. On Internet drug forums DMMC is rated low in comparison to other synthetic cathinones due to low

potency, short duration and severe side-effects. The reported dosages (snorted or oral) were between 100 and 1000 mg over a period of several hours.

Analysis: GC/MS detects DMMC metabolites in urine after basic liquid/liquid extraction and TFA derivatization (6). Parent drug, if present, was detected at low concentration. GC/MS and LC/MS/MS were used for the detection of DMMC metabolites in free and conjugated fractions (5).

Prevalence: In a study of 34,561 random urine samples in the US between February 2011 and May 2013, only 10 were found positive for DMMC metabolites (6). Their appearance was brief: August – December 2011. DMMC was among rarely detected synthetic cathinones.

References:

1. 3,4-Dimethylmethcathinone. http://en.wikipedia.org/wiki/3,4-Dimethylmethcathinone

2. EMCDDA–Europol 2010 Annual Report on the implementation of Council Decision 2005/387/JHA. Annex 2 — New psychoactive substances reported to the EMCDDA and Europol for the first time in 2010 under the terms of Council Decision 2005/387/JHA. http://www.emcdda.europa.eu/attachements.cfm/att_133126_EN_Annex_2_List_NPAS_notified_in_2010.pdf

3. Locos, O., Reynolds, D. (2012) The characterization of 3,4-dimethylmethcathinone (3,4-DMMC). *Journal of Forensic Science*, **57(5),** 1303-1306. http://www.ncbi.nlm.nih.gov/pubmed/22564211

4. Casale, J.F., Hays, P.A. (2012) Differentiation of 3,4-dimethylmethcathinone (3,4-DMMC) from its dimethyl aryl-positional isomers. *Microgram Journal*, **9(2)**, 75-83. http://www.justice.gov/dea/pr/microgram-journals/2012/mj9_75-83.pdf

5. Shima, N., Katagi, M., Kamata, H., Matsuta, S., Nakanishi, K., Zaitsu, K., *et al*. (2013) Urinary excretion and metabolism of the newly encountered drug 3,4-dimethylmethcathinone in humans. *Journal of Forensic Toxicology*. **31(1)**, 101-112. http://link.springer.com/article/10.1007%2Fs11419-012-0172-3

6. Uralets, V., Rana, S., Morgan, S., Ross, W. (2014) Testing for designer stimulants: metabolic profiles of 16 synthetic cathinones excreted free in human urine. *Journal of Analytical Toxicology*. **38(5)**, 233-241. http://www.ncbi.nlm.nih.gov/pubmed/24668489

7. 3,4-Dimethylmethcathinone metabolite (hydrochloride) https://www.caymanchem.com/app/template/Product.vm/catalog/9001431