



Annex 1

Europol–EMCDDA Joint Report on a new psychoactive substance: 4-methylmethcathinone (mephedrone)

Main information sources

1. Europol and its network of Europol National Units (ENUs) — standard reporting and replies to Joint Report questionnaire.
2. EMCDDA and its network of National Focal Points (NFPs) — standard reporting and replies to Joint Report questionnaire.
3. EMA and its network of Member States' National competent authorities (NCAs) responsible for human and veterinary medicinal products — replies to Joint Report questionnaire.
4. Scientific articles published in peer reviewed journals:

Barker, J.M., Byron, D.J., Huddleston, P.R. (1969), '2-Thienyl analogues of ephedrine and Ψ -ephedrine', *Journal of the Chemical Society (C): Organic* 1969, Volume 16, pp. 2183–2185.

Camilleri, A., Johnston, M.R., Brennan, M., Davis, S., Caldicott, D.G.E. (2010), 'Chemical analysis of four capsules containing the controlled substance analogues 4-methylmethcathinone, 2-fluoromethamphetamine, alpha-phthalimidopropiophenone and N-ethylcathinone', *Forensic Science International*, Volume 12, DOI: 10.1016/j.forsciint.2009.12.048

Carroll, F.Y., Blough, B.E., Mascarella, S.W., Navarro, H.A., Eaton, J.B., Lukas, R.J., Damaj, M.I. (2010), 'Synthesis and biological evaluation of Bupropion analogues as potential pharmacotherapies for smoking cessation', *Journal of Medicinal Chemistry*, DOI: 10.1021/jm9017465

Cozzi, N.V., Sievert, M.K., Shulgin, A.T., Jacob III, P., Ruoho, A.E. (1998), 'Methcathinone and 2-methylamino-1-(3,4-methylenedioxyphenyl)propan-1-one (methylone) selectively inhibit plasma membrane catecholamine reuptake transporters', *Society for Neuroscience Abstracts*, Volume 24, pp. 381–388.

Cozzi, N.V., Shulgin, A.T., Ruoho, A.E. (1988), 'Methcathinone (MCAT) and 2-methylamino-1-(3,4-methylenedioxyphenyl)propan-1-one (MDMCAT) inhibit [3H]serotonin uptake into human platelets', *American Chemical Society Division of Medicinal Chemistry*, Volume 215, p.152.

Dal Cason, T.A., Young, R., Glennon, R.A. (1997), 'Cathinone: an investigation of several N-alkyl and Methylenedioxy-substituted analogs' *Pharmacology Biochemistry and Behavior*, Volume 58(4), pp. 1109–1116.

DeRuiter, J., Hayes, L., Valaer, A., Clark, C.R., Noggle, F.T. (1994), 'Methcathinone and designer analogues: synthesis, stereochemical analysis, and analytical properties', *Journal of Chromatographic Science*, Volume 32, pp. 552–564.

Foley, K.F., Cozzi, N.V. (2003), 'Novel Aminopropiophenones as potential antidepressants', *Drug Development Research*, Volume 60, pp. 252–260.

Hägerkvist, R., Hultén, P., Personne, M. (2010), 'Increasing abuse of new cathinone derivatives in Sweden — a poisons centre study for the years 2008–2009', *Clinical Toxicology*, in press.

Hartung, W.H., Munch, J.C. (1929), 'Amino Alcohols. I. Phenylpropanolamine and para-tolylpropanolamine', *Journal of the American Chemical Society*, Volume 51, pp. 2262–2266.

Hartung, W.H., Munch, J.C., Crossley, F.S. (1935), 'Ring substituted propadrins', *Journal of the American Chemical Society*, Volume 57, pp. 1091–1093.

Hyde, J.F., Browning, E., Adams, R. (1928), 'Synthetic homologs of d,l-ephedrine', *Journal of the American Chemical Society*, Volume 50, pp. 2287–2292.

Measham, F., Moore, K., Newcombe, R., Welch, Z. (2010), 'Tweaking, Bombing, Dabbing and Stockpiling: The emergence of mephedrone and the perversity of prohibition', *Drugs and Alcohol Today*, Volume 10(1).

Radchenko, O.S., Novikov, V.I., Willis, R.H., Murphy, P.T., Elyakov, G.B. (1997) 'Synthesis of polycarpine, a cytotoxic sulfur-containing alkaloid from the Ascidian *Polycarpa aurata*, and related compounds', *Tetrahedron Letters*, Volume 38, pp. 3581–3584.

Roussel, O., Perrin, M., Herard, P., Chevance, M., Arpino, P. (2009) 'La 4-méthyléphédronne sera-t-elle une "Ecstasy" du XXIème siècle?', *Annales de Toxicologie Analytique*, Volume 21(4), pp. 169–177.

Saem de Burnaga Sanchez, J. (1929), 'Sur un homologue de l'éphédrine', *Bulletin de la Société Chimique de France*, Volume 45, pp. 284–286.

Schmauder, H-P., Gröger, D., Schwalbe, S. (1969), 'Zur Kenntnis von Ephedrin und seiner *p*-alkylierten Derivate', *Die Pharmazie*, Volume 24(12), pp. 735–745.

Schmitt et al. (1968), 'Synthesis of anorexigenic compounds from Pervitin', *Chemical Abstracts*, Volume 68, p. 7508, abstract No 77874z.

Ueda, T., Takahashi, K., Muraoka, M., Ohki, K. (1956), 'Studies on the syntheses of ring substituted *p*-alkylephedrine and *p*-alkylnorephedrine', *Pharmaceutical Bulletin*, Volume 4(3), pp. 182–188.

Wood, D.M., Davies, S., Puchnarewicz, M., Button, J., Archer, R., Ramsey, J., Lee, T., Holt, D.W., Dargan, P.I. (2009), 'Recreational use of 4-Methylmethcathinone (4-MMC) presenting with sympathomimetic toxicity and

confirmed by toxicological screening. "Abstracts", *Clinical Toxicology*, Volume 47(7), p. 733.

Wood, D., Davies, S., Puchnarewicz, M., Button, J., Archer, R., Ovaska, H., Ramsey, J., Lee, T., Holt, D.W., Dargan, P.I. (2010) 'Recreational use of mephedrone (4-methylmethcathinone, 4-MMC) with associated sympathomimetic toxicity', *Journal of Medical Toxicology*, in press.

Wood, D.M., Greene, S.L., Dargan, P.I. (2010), 'Clinical pattern of toxicity associated with the novel synthetic cathinone mephedrone', *Emergency Medicine Journal*, in press.

5. Publications of expert and official bodies

Advisory Council on the Misuse of Drugs. Letter on the ACMD consideration of mephedrone (and related cathinones), 22 December 2009.

Bajaj, N., Mullen, D., Wylie, A.S. (2009), "'Legal highs" dependence and transient psychosis with 4-methylmethcathinone/mephedrone use', poster presentation at the Royal College of Psychiatrists Faculty of Addiction Conference in Edinburgh, UK.

Cozzi, N.V., Foley, K.F., Fontanilla, D., Gopalakrishnan, A., Ruoho, A.E. (2007), 'A novel amphetamine-related photoaffinity probe', *University of Wisconsin School of Medicine and Public Health and Department of Medical Laboratory and Radiation Sciences*, University of Vermont, poster.

Cozzi, N.V., Marona-Lewicka, D., Nichols, D.E., Gokin, A., Foley, K.F. (2005), 'Novel aminopropiophenones as anti-obesity agents', *PhysioGenix, Inc.*, Purdue University and University of Vermont, poster.

Davies, S., Archer, R., Ramsey, J. (2009), 'Analytical profiles of methcathinone and related compounds', London Toxicology Group.

Davies, S., Puchnarewicz, M., Button, J., Dargan, P.I., Wood, D.M., Archer, R., Ramsey, J., Lee, T., Holt, D.W. (2009), 'Two cases of confirmed ingestion of the novel designer compounds: 4-methylmethcathinone (mephedrone) and 3-fluoromethcathinone', St George's University of London, Guy's and St Thomas' Poisons Unit and Kingston University, poster.

Department of Health, Social Services and Public Safety (UK), 'Legal highs', fact sheet, February 2010.

Florida Office of Drug Control, updated, 22 December 2009.

German State Institute for Public Health Classification Document, Appendix 5 to the Resolution of the Government Chancellery. Proposal submitted, 25 March 2009.

Scottish National Health Service, information about mephedrone 'Bubbles'.

Sumnall, H., Wooding, O., 'Mephedrone — an update on current knowledge', Centre for Public Health, Liverpool John Moores University, 2009 briefing.

6. Grey literature.

Corner, L. Early adopters. *DrugLink*, January–February 2010, pp. 16–17.

Crew (UK), Mephedrone info sheet.

Dick, D., Torrance, C. (2010), 'Mixmag drugs survey', *Mixmag*, 14 January 2010, Issue 225, pp. 44–53.

Gilliver, D. (2010) 'Legally high?' *Drink and Drugs News*, 18 January 2010, pp. 6–8.

Gustavsson, D., Escher, C. (2009), 'Mephedrone-Internet drug which seems to have come and stay. Fatal cases in Sweden have drawn attention to previously unknown substance', *Lakartidningen*, Volume 106, pp. 2769–2771.

Lifeline (UK), Mephedrone information sheet.

Lifeline (UK), Mephedrone(M-cat, Meow), frequently asked questions.

Newcombe, R. (2009), 'The use of mephedrone (M-cat, Meow) in Middlesbrough', *Lifeline Publications and Research*, December 2009.

Power, M. (2010), 'How mephedrone shook the drug trade', *DrugLink*, January–February 2010, Volume 25(1), pp. 7–13.

Power, M. (2009) 'Mephedrone: the future of drug dealing?' *DrugLink*, March/April 2009, pp. 6–9.

Psychonaut WebMapping Research Group (2009), Mephedrone report, Institute of Psychiatry, King's College London: London, UK.

Public Safety Substance Abuse Newsletter, DAR Newsletter Special Bulletin: 'Reports of "mephedrone" seizure in the US and Canada', *MEDTOX Journal*, January 2010.

Riley, K. (2009), 'New drug on gay scene', *Bulletin*, 17 September 2009, pp. 61.

UNISEX (UK), Mephedrone (Meow) Information, 2010.

7. Newspaper and magazine media articles.

8. Internet websites and discussion groups.

9. Personal communication with key informants.

Meyer, M.R., Peters, F.T., Maurer, H.H. (2009), 'Metabolism of the new designer drug mephedrone and toxicological detection of the beta keto designer drugs mephedrone, butylone and methylone in urine' *The International Association of Forensic Toxicologists (TIAFT)* meeting, personal communication, August 2009.