



**NorthWest
Public Health
Observatory**

Mephedrone – an update on current knowledge

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This briefing presents information on the substance **Mephedrone** (also known as: 4-MMC, 'Meow', 'M-Cat') and other related drugs. This substance has received recent media attention concerning its legality and (largely unconfirmed) speculations around its contribution to the deaths of several young people. Little scientific evidence is available on mephedrone and most information is derived from users themselves or user orientated websites such as www.erowid.org. FRANK has some general information on mephedrone (www.talktofrank.com).

Key points

- Mephedrone and related drugs are currently legal and have no licensed medicinal use. The ACMD is currently reviewing evidence and is expected to advise Government in 2010.
- Mephedrone is usually available as tablets or powder.
- It costs around £3 for a dose and produces effects that users report are similar, but not identical to, ecstasy/MDMA. Bulk purchases up to 1kg are significantly discounted by retailers.
- The effects last for around 2 to 3 hours when taken orally. After effects such as insomnia may last for several hours longer.
- Negative effects appear to be dose related and are similar to ecstasy/MDMA. They include: a desire to redose, uncomfortable changes in body temperature (sweating and chills), heart palpitations, impaired short term memory, insomnia, tightened jaw muscles, grinding teeth (trismus and bruxia), and light headedness.
- There has been little scientific investigation of mephedrone. Two A&E case reports from London confirmed the presence of mephedrone. In one, the patient presented with heart palpitations and blurred vision; body temperature was slightly below normal. The patient recovered approximately six hours after oral treatment with the benzodiazepine lorazepam. In the second case, mephedrone had been taken with other substances and the presentation was primarily due to ingestion of GHB.
- No information is available on the interaction of mephedrone with other drugs.

Important Note: As there is little scientific evidence available at this time, much of this information was obtained from user reports and the user orientated website www.erowid.org and therefore should be treated with some caution.

What is mephedrone?

4-Methylmethcathinone is a synthetic stimulant with empathogenic effects that is chemically similar to methcathinone and therefore is in the cathinone group. These compounds are derivatives of the phenethylamines (family of amphetamine compounds that include MDMA 'ecstasy'). Each of the phenethylamine compounds has a parallel compound (an analogue) that is a cathinone.

What does it do?

The effects of 4-Methylmethcathinone are often compared by users to those of MDMA, and other euphoric stimulants. Mephedrone is often confused with methedrone (4-methoxymethcathinone) or methylone (bk-MDMA), due to the similar names, although they are different compounds. It is a little less potent than MDMA by mass. As of 2009, it is most often found as a powder, though some tablets have been pressed that include 4-methylmethcathinone (www.erowid.org).

Mephedrone is most commonly used for its euphoric effects and users report that it does not have any substantial hallucinogenic effects. Effects include: mental and physical stimulation, feelings of openness and empathy, increased sociability and talkativeness, a pleasurable rush, decreased appetite, pupil dilation, unusual body sensations (flushing, goosebumps), change in body temperature regulation, increased heart rate and blood pressure and sweating.

Depending on how much and how recently one has eaten food, oral 4-methylmethcathinone generally takes 15-45 minutes to take full effect. On a full stomach, onset can be considerably slower. When insufflated (snorted), effects are usually felt within a few minutes and the peak is reached within 30 minutes or less. The primary effects of 4-methylmethcathinone last approximately 2-3 hours when taken orally. For many people there is an additional period of time (1-4 hrs) where it is difficult to go to sleep but where mood and mind-set are mostly back to baseline. It is quite common for users to report a strong urge to redose as the effects wane, between 45 and 120 minutes after initial ingestion. With lower levels of consumption, the day-after effects are relatively mild, with most users reporting light to no hangover (www.erowid.org).

User reports (retrieved from www.erowid.org/chemicals/4_methylmethcathinone/4_methylmethcathinone_effects.shtml):

"A very nice substance for me overall. My elocution was remarkably enhanced, communicative centers were gaping wide, very comfortable and relaxed stimulation, empathy was significant (even though the 'magic' has long since departed my MDMA experiences). Comedown was not painful, just so swift it left a vacuum in its wake. I overindulged in MDMA when I was first introduced to it, and now I may as well have three caffeine drinks as take a pill. This substance feels (for me) like its effects could be similarly degraded with over-use. I'll be abstaining as much as my will permits".

"Compared to MDMA, similar euphoria (when bombed [swallowed]), far more hornyness, a bit less empathy, no psychedelia (although light tends to prism after several redoses, I think this is just a serotonin effect) - but what was amazing is that the next day, I felt brilliant, like I hadn't done anything the previous night. I would also compare it to speed and coke a little in its stimulating effects, which were far more than MDMA on its

own. [...] The euphoria was absolutely crazy. I looked in the mirror, my eyes were saucers. I felt giddy from how amazing I felt. Stroking my arm was like having an orgasm. It was about as mindblowing as my first 'e'."

"[M]ephedrone really disappointed me. The initial come-up rush led me on to thinking I had stumbled upon something very special - then it dropped off. [...] It seems that few reports from Erowid and afar have mentioned a lack of euphoria, so it just goes to show that chemicals affect people uniquely. [...] At no point was I compelled to take more mephedrone, despite its reputation of being moreish".

"Mephedrone is a nice drug, the euphoria I experienced was extremely pleasurable and from what I remember I had a great time. Mixing Mephedrone with alcohol was a very bad idea I experienced a great deal of memory loss and this is not something that usually happens to me and the nausea of today is unbearable".

What are the negative effects?

With increased doses comes the increased likelihood of negative effects. These can include: desire to redose, uncomfortable changes in body temperature (sweating and chills), heart palpitations, impaired short term memory, insomnia, tightened jaw muscles, grinding teeth (trismus and bruxia), muscle twitching, nystagmus, dizziness, light headedness, vertigo. Some user reports collated on erowid.org suggest vasoconstriction when snorted: pain and swelling in nose and throat, sinusitis (www.erowid.org).

Davies, Wood and their respective colleagues¹ presented case reports in the journal *Clinical Toxicology* on two UK patients who presented to A&E after ingestion of what was later confirmed to be mephedrone. Case 1 was a 22 year old male who presented after oral ingestion of 200mg and subcutaneous injection of 3.8g of mephedrone. He developed palpitations and blurred vision shortly after use. On arrival in A&E he had sympathomimetic features (agitation, 7mm dilated pupils, HR 105, BP 177/111 mmHg). His temperature was 36.3°C and he had normal tone with no clonus. EKG showed a sinus tachycardia only. He was treated with 1mg of oral lorazepam. His sympathomimetic features settled within 6 hours of presentation. Case 2 was a 30 year old male, presenting with drowsiness (GCS 6/15), respiratory rate 20 per minute, heart rate 47 per minute and BP 140/80 mmHg. He was alert and orientated within 2 hours of presentation. He subsequently gave a history of ingestion of 1 g of mephedrone, GBL, "neo-doves" and "neo-blues".

Does it have dependency potential?

In recent months there have been a small number of cases of mephedrone reported to National Drug Treatment Monitoring System (NDTMS), with some of these cases reported from young person's services. While these numbers remain very low (i.e. no more than one or two cases per Government Office Region) it is of interest as until recently there had been no reports to the NDTMS. This situation will require careful surveillance. As with other similar stimulant type substances, there is no reported physical withdrawal syndrome, although psychological dependency is possible.

Are there interactions with any other drugs?

There are no current scientific reports relating to interactions.

¹ Wood et al., (2009) Recreational Use of 4-Methylmethcathinone (4-MMC) Presenting with Sympathomimetic Toxicity and Confirmed by Toxicological Screening. *Clinical toxicology*. 2009;47(7):733. Abstract 153.

Davies et al., (2009) Two cases of confirmed ingestion of the novel designer compounds: 4-methylmethcathinone (mephedrone) and 3-fluoromethcathinone. Poster presentation at 47th Annual Meeting of the International Association of Forensic Toxicologists TIAFT, Geneva.

What is the treatment for adverse reactions?

Apart from the case responses described above, there are no current guidelines for the treatment of adverse reactions relating to mephedrone.

How much does it cost and where is it purchased from?

Mephedrone is currently advertised as a 'plant food' on the internet and can be bought from various suppliers at around £3.00/dose. Substantial discounts are offered for bulk purchases. To avoid MHRA regulations, most retailers state that the chemical is not intended for human consumption. Those compounds currently sold from websites and head-shops are ring-substituted derivatives of methcathinone, i.e. analogues of MDMA and related compounds.

When 'mephedrone' is used as a search item in Google it retrieves about 450,000 results (December 2009). Two examples are listed below of typical sites that sell mephedrone.

- www.ekmpowershop14.com/ekmps/shops/micinamike/mephedrone-1-c.asp

MEPHADRONE / MEPHEDRONE

"HIGHEST GRADE: 4-Methylmethcathinone (Mephedrone / 4-MMC / Methadrone / MMCAT) 99.8% Pure White Micro Crystals. There is little odour. The colour is bright white, not light grey/yellow (implying contamination)".

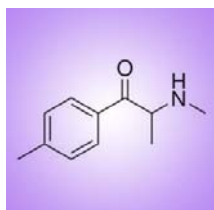
Prices range from £37.99 for 5 g to £3599.99 for 1kg



- web160.secure-secure.co.uk/broadeninghorizons.com/uklegal/

"Mephedrone, also known as MM-Cat & 4-Methylmethcathinone Purity: 99.8% Applications: Plant food, research chemical. Not for human consumption".

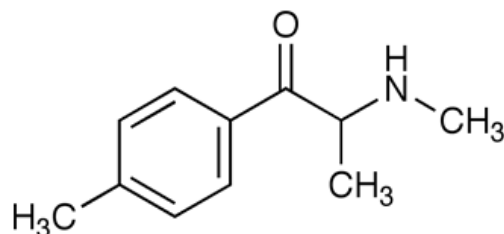
Prices range from £10 for 1.0g to £1900 for 500g



What does it look like?

Chemical name: 2-Methylamino-1-p-tolylpropan-1-one.

Chemical formula: C₁₁H₁₅NO



4-Methylmethcathinone
Image by Erowid, © 2008 Erowid.org



What doses are taken?

Oral	
Threshold	15 - 25 mg
Light	25 - 100 mg
Common	75 - 175 mg
Strong	125 - 250+ mg

Insufflated (Snorted)	
Threshold	5 - 15 mg
Light	15 - 25 mg
Common	20 - 80 mg
Strong	75 - 125 mg

Oral dose ranges are similar to MDMA, meaning that mephedrone tablets will be of similar size and appearance to ecstasy. According to Erowid, many user reports of 4-methylmethcathinone involve redosing multiple times. Users sometimes mix oral and nasal routes, taking some 4-methylmethcathinone orally, then snorting some, then taking more orally. Because of the common desire to recapture the pleasurable initial high, redoses are sometimes higher than the initial dose or are spaced closely together in time.

What is the legal status of mephedrone in the UK?

The ACMD are scheduled to provide a report to Ministers on the cathinones (including mephedrone) in 2010. However, because of the recent resignation of the ACMD Chair and other experts it is unknown whether this delivery date still stands.

Cathinone and some of its derivatives are already controlled under the Misuse of Drugs Act 1971. These include:

- Cathinone itself (Class C; active constituent in Khat (currently uncontrolled))
- Methcathinone (Class B; the analogue of methylamphetamine)
- Pyrovalerone (Class C)

Most substituted cathinones are **not controlled**. There are six principal members of this group and all have been seen in illicit products in the UK, these include:

- 4-Methylmethcathinone (Mephedrone, 4-MMC)
- 4-Methoxymethcathinone (Methadrone)
- Methylone (the cathinone analogue of MDMA)
- MDPV (the 3,4-methylenedioxy derivative of pyrovalerone)
- Beta-keto-MBDB (the cathinone analogue of MBDB (an early street MDMA substitute))
- 3-Fluoromethcathinone

However, if any of these products are sold as 'ecstasy' or other controlled drugs then the seller could be charged with intention to supply of an illegal drug.

For further information please refer to:

Erowid mephedrone pages

www.erowid.org/chemicals/4_methylmethcathinone/4_methylmethcathinone.shtml

Talk to Frank page on mephedrone

www.talktofrank.com/drugs.aspx?id=3597