

New drugs of abuse: New threat?

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ABSTRACT

There has been an increase in the abuse of synthetic drugs. This article explores the prevalence and legal issues regarding synthetic drugs (e.g., bath salts).

KEYWORDS

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Abuse of synthetic drugs—"K2", "Spice", and "bath salts"—soars to new heights. First discovered in Europe, this new class of drugs was discovered only recently in the United States.¹ The rise in emergency room visits and poison control center calls rapidly multiplied due to increased use of synthetic cannabinoids (K2 or Spice) and cathinones (bath salts).^{2,3} Poison control centers across the United States received 3,200 calls related to synthetic drugs in 2010. In 2011 the number increased to a staggering 13,000 calls.² Falsely marketed as incense or bath salts, these agents are not what they appear. They are sold under the pretense of household items, but, in fact, are synthetic drugs that produce pronounced psychoactive effects. Federal agencies fail to regulate many of these products because they are sold with the disclaimer "not for human consumption."¹ Until recently, they were sold in convenience stores, "head shops," and on the Internet. Available package sizes of Spice include 400 mg, 1500 mg, and 3000 mg and, on average, range in price from \$5 to \$30.⁴ Bath salts appear to be more expensive ranging in price from \$20 to \$70 for package sizes of 200 mg, 500 mg, and 1000 mg.⁵ However, new regulatory action has made them temporarily illegal for sale and possession. A myriad of reasons led to the significant rise in synthetic drug abuse. These agents are undetectable on urine drug screens making them useful alternatives for those monitored at work or probation.^{3,6} Some consumers misperceive these agents as natural or safe because they are so readily obtained; however, evidence shows these agents can have dangerous and potentially fatal effects.⁶

In 2010, poison control centers received 2,906 calls regarding synthetic cannabinoids. By 2011, calls increased to 6,959. As of September 10, 2012, 4,161 calls have been received.⁷ K2 or Spice consists of a mixture of herbs, resembling incense or potpourri, that is sprayed with a

synthetic cannabinoid.⁸ Numerous synthetic cannabinoids are available and can be differentiated by chemical name (JWH-018, JWH-073, JWH-200, CPo47,497).^{8,9} Synthetic cannabinoids are structurally dissimilar to the active psychotropic component of cannabis, delta-9 tetrahydrocannabinol (Δ^9 -THC). However, both act as agonists on the cannabinoid receptor type 1 (CB₁) producing similar physiologic effects.⁹ While Δ^9 -THC is a partial agonist at CB₁, synthetic cannabinoids are full agonists leading to more pronounced effects and greater potential for toxicity.^{1,3,9} Synthetic agents may be 4-10x more potent than natural marijuana.¹⁰ Physiologic effects include a similar euphoria and relaxation often associated with marijuana. Negative side effects can include tachycardia, elevated blood pressure, paranoia, agitation, panic attacks, psychosis, seizures, and cardiac ischemia.^{1,8,9} The duration of effects varies between compounds. JWH-018 appears to have a shorter duration of action compared to Δ^9 -THC, whereas CP-47,497 can last up to 5-6 hours.¹

Similar to K2 and Spice, bath salts are marketed under false pretenses. Sold in convenience stores, "head shops," and on the Internet as a loose white powder, bath salts are synthetic stimulants derived from cathinone, a stimulant found naturally in the khat plant.¹¹ Consumers snort, smoke, inject, or take bath salts orally in capsule form.¹¹ The American Association of Poison Control Centers reports a dramatic increase in calls received pertaining to synthetic cathinone intoxication. In 2011, 6,138 calls were received, up from 304 calls in 2010. As of September 10, 2012, 2,251 calls have been received.¹² The main ingredient in bath salts varies. Mephedrone and methylenedioxypyrovalerone (MDPV) are the two most common synthetic cathinones encountered.¹¹ These agents resemble powerful stimulants, with effects similar to amphetamines and cocaine. Mephedrone and MDPV

act to prevent norepinephrine and dopamine reuptake and may directly increase presynaptic release of monoamines.^{1,6} Physiologic effects include tachycardia, elevated blood pressure, palpitations, diaphoresis, seizures, and severe cardiac effects. Psychological effects can include agitation, anxiety, paranoia, and psychosis.¹¹ Seizures and psychosis have been reported quite commonly, occurring in 20-40% and 14-40% of patients, respectively.^{1,13} Physiological and psychological effects may persist for more than 24 hours.¹⁴

Currently, evidence of synthetic cannabinoid and cathinone use in humans is relegated to case reports and epidemiologic studies. Consequently, guidance on treatment of psychiatric symptoms induced by these drugs of abuse is lacking. Benzodiazepines may help treat agitation and seizures associated with intoxication. Antipsychotics should be used cautiously because of their ability to lower the seizure threshold in this population already at risk of seizures.¹ Haloperidol and risperidone possess a low risk of lowering the seizure threshold, while olanzapine and quetiapine carry an intermediate risk. Clozapine and chlorpromazine significantly lower the seizure threshold; these agents should be avoided in this population.^{15,16}

Recent legal status changes have occurred for both synthetic cannabinoids and cathinones. In March 2011, the Drug Enforcement Administration (DEA) temporarily placed 5 synthetic cannabinoids (JWH-018, JWH-073, JWH-200, CP047,497, cannabicyclohexanol) into Schedule I of the federal Controlled Substances Act (CSA).⁸ The following year, Congress agreed upon legislation to assign synthetic cannabinoids to Schedule I on the CSA.¹⁷ The DEA also temporarily placed 3 synthetic cathinones (mephedrone, MDPV, methylone) in Schedule I of the CSA.¹¹ Temporary scheduling remains in effect until April 2013 while the DEA deliberates on permanent status.¹⁸ These agents may not be sold, purchased, or possessed while the order is in place. While these agents are prohibited, numerous other synthetics are produced and circumvent regulations by alterations to their chemical structure.¹ The fight to keep these new drugs of abuse off the market remains in force.

REFERENCES

1. Jerry J, Collins G, Strem D. Synthetic legal intoxicating drugs: the emerging 'incense' and 'bath salt' phenomenon. *Cleve Clin J Med.* 2012;79(4):258-64. DOI: [10.3949/ccjm.79a.11147](https://doi.org/10.3949/ccjm.79a.11147). PubMed PMID: [22473725](https://pubmed.ncbi.nlm.nih.gov/22473725/).
2. AAPCC Issues Statement on the Synthetic Drug Abuse Prevention Act [Internet]. Alexandria (VA): American Association of Poison Control Centers; [cited 2012 Sept 30]. Available from: www.aapcc.org.
3. Gunderson EW, Haughey HM, Ait-Daoud N, Joshi AS, Hart CL. "Spice" and "K2" herbal highs: a case series and systematic review of the clinical

- effects and biopsychosocial implications of synthetic cannabinoid use in humans. *Am J Addict.* 2012;21(4):320-6. DOI: [10.1111/j.1521-0391.2012.00240.x](https://doi.org/10.1111/j.1521-0391.2012.00240.x). PubMed PMID: [22691010](https://pubmed.ncbi.nlm.nih.gov/22691010/).
4. Super Strong Incense Blends Legal in Most US States [Internet]. [place unknown]: Spice Gold Direct; c2012 [cited 2012 Nov 4]. Available from: <http://spice-gold-direct.com>.
5. Stimulating Bath Salts Powder Blends Legal in USA [Internet]. [place unknown]: Bath Salts Direct; c2012 [cited 2012 Nov 4]. Available from: <http://bath-salts-direct.com>.
6. Coppola M, Mondola R. Synthetic cathinones: chemistry, pharmacology and toxicology of a new class of designer drugs of abuse marketed as "bath salts" or "plant food". *Toxicol Lett.* 2012;211(2):144-9. DOI: [10.1016/j.toxlet.2012.03.009](https://doi.org/10.1016/j.toxlet.2012.03.009). PubMed PMID: [22459606](https://pubmed.ncbi.nlm.nih.gov/22459606/).
7. Synthetic Marijuana Data [Internet]. Alexandria (VA): American Association of Poison Control Centers; [cited 2012 Sept 30]. Available from: www.aapcc.org.
8. Drug Fact Sheet: K2 or Spice [Internet]. Washington D.C.: Drug Enforcement Administration; c2012 [cited 2012 Sept 30]. Available from: http://www.justice.gov/dea/druginfo/drug_data_sheets/Bath_Salts.pdf.
9. Seely KA, Prather PL, James LP, Moran JH. Marijuana-based drugs: innovative therapeutics or designer drugs of abuse?. *Mol Interv.* 2011;11(1):36-51. DOI: [10.1124/mi.11.1.6](https://doi.org/10.1124/mi.11.1.6). PubMed PMID: [21441120](https://pubmed.ncbi.nlm.nih.gov/21441120/).
10. Wells DL, Ott CA. The "new" marijuana. *Ann Pharmacother.* 2011;45(3):414-7. DOI: [10.1345/aph.1P580](https://doi.org/10.1345/aph.1P580). PubMed PMID: [21325097](https://pubmed.ncbi.nlm.nih.gov/21325097/).
11. Drug Fact Sheet: Bath Salts or Designer Cathinones (Synthetic Stimulants). [Internet]. Washington D.C.: Drug Enforcement Administration; c2012 [cited 2012 Sept 30]. Available from: http://www.justice.gov/dea/druginfo/drug_data_sheets/K2_Spice.pdf.
12. Bath Salts Data. [Internet]. Alexandria (VA): American Association of Poison Control Centers; [cited 2012 Sept 30]. Available from: www.aapcc.org.
13. Emergency department visits after use of a drug sold as "bath salts"--Michigan, November 13, 2010-March 31, 2011. *MMWR Morb Mortal Wkly Rep.* 2011;60(19):624-7. PubMed PMID: [21597456](https://pubmed.ncbi.nlm.nih.gov/21597456/).
14. James D, Adams RD, Spears R, Cooper G, Lupton DJ, Thompson JP, et al. Clinical characteristics of mephedrone toxicity reported to the U.K. National Poisons Information Service. *Emerg Med J.* 2011;28(8):686-9. DOI: [10.1136/emj.2010.096636](https://doi.org/10.1136/emj.2010.096636). PubMed PMID: [20798084](https://pubmed.ncbi.nlm.nih.gov/20798084/); PubMed Central PMCID: [PMC3143586](https://pubmed.ncbi.nlm.nih.gov/PMC3143586/).
15. Alldredge BK. Seizure risk associated with psychotropic drugs: clinical and pharmacokinetic considerations. *Neurology.* 1999;53(5 Suppl 2):S68-75. PubMed PMID: [10496236](https://pubmed.ncbi.nlm.nih.gov/10496236/).
16. Pisani F, Oteri G, Costa C, Di Raimondo G, Di Perri R. Effects of Psychotropic Drugs on Seizure Threshold. *Drug Safety.* 2002;25(2):91-110. DOI: [10.2165/00002018-200225020-00004](https://doi.org/10.2165/00002018-200225020-00004).
17. Congress Agrees to Add 26 Synthetic Drugs to Controlled Substances Act [Internet]. Washington D.C.: Drug Enforcement Administration; c2012 [cited 2012 Nov 12]. Available from: <http://www.justice.gov/dea/pubs/pressrel/pro61912.html>.
18. Schedules of Controlled Substances: Extension of Temporary Placement of Methylone Into Schedule I of the Controlled Substances Act [Internet]. Washington D.C.: Drug Enforcement Administration; c2012 [cited 2012 Nov 12]. Available from: http://www.deadiversion.usdoj.gov/fed_regs/rules/2014/fr0307_2.htm.
19. Vardakou I, Pistos C, Spiliopoulou C. Spice drugs as a new trend: mode of action, identification and legislation. *Toxicol Lett.* 2010;197(3):157-62. DOI: [10.1016/j.toxlet.2010.06.002](https://doi.org/10.1016/j.toxlet.2010.06.002). PubMed PMID: [20566335](https://pubmed.ncbi.nlm.nih.gov/20566335/).

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