Synthetic cannabinoids are similar to natural THC and the endogenous cannabinoids Anandamide and 2AG. Illicit synthetic cannabinoids are usually more powerful than both endogenous and natural cannabinoids. They often have a stronger receptor affinity and have effects that are often described by users as unpleasant. Typically, the only habitual users of illicit synthetic cannabinoids are individuals attempting to avoid detection on U.A.’s and those who have developed significant tolerance to marijuana or concentrates like butane honey oil (BHO). There are two cannabinoid receptors that have been identified in the nervous system, CB1 and CB2. The “Synthetic Drug Act” prohibits CB1 receptor agonists.

Use of synthetic marijuana is alarmingly high. According to data from the 2011 Monitoring the Future survey of youth drug-use trends, 11.4 percent of 12th graders used Spice or K2 in the past year, making it the second most commonly used illicit drug among seniors.

The effects of synthetic marijuana include agitation, extreme nervousness, nausea, vomiting, tachycardia (fast, racing heartbeat), elevated blood pressure, tremors and seizures, hallucinations, and dilated pupils.

Euphoria
Disorienting
Initially stimulating then sedating
Warm physical sensation
Often used by those with tolerance to THC

Some Examples:
JWH-007, JWH-015, JWH-018, JWH-019, JWH-030, JWH-051, JWH-073, JWH-081, JWH-098, HU-211, HU-243, HU-308, HU-320, HU-331, HU-336

Details

Synthetic cannabinoids

Epidemiology

Use of synthetic marijuana is alarmingly high. According to data from the 2011 Monitoring the Future survey of youth drug-use trends, 11.4 percent of 12th graders used Spice or K2 in the past year, making it the second most commonly used illicit drug among seniors.

The effects of synthetic marijuana include agitation, extreme nervousness, nausea, vomiting, tachycardia (fast, racing heartbeat), elevated blood pressure, tremors and seizures, hallucinations, and dilated pupils.

Calls Received by Poison Control Centers Relating to Synthetic Marijuana, 2010-2011

- Department of Justice and DEA, Special Report: Emerging 2C-Phenethylamines, Piperazines, and Tryptamines in NFLIS
- Office of National Drug Control Policy, Synthetic Drug Fact Sheet
- Uppers, Downers and Allrounders, Inaba & Cohen
- Karch’s Pathology of Drug Abuse
- Vaults of Erowid
- NIDA, Drug Facts, drugabuse.gov

Eric Martin, MAC, CADC III, CRM, CPS, Michael Razavi, MPH, CADC I, CRM, CPS
### Synthetic Cathinones

**Methylenedioxypyrovalerone (MDPV “Bath Salts”)**

**Methylenedioxymethcathinone (Methylone)**

**Fluoromethcathinone (Flephedrone)**

**Methoxymethcathinone**

---

### Details

Synthetic cathinones mimic the natural cathinone inside of the leaves of the Khat plant. Khat is native to the middle east and is commonly chewed. Cathinones are molecularly unstable, therefore the plant hasn't been widely exported from the middle east. The cathinone molecule breaks down rapidly after the leaves are picked and converts to a less powerful stimulant known as cathine.

People chew fresh leaves in order to absorb cathinone. Khat has been described as being similar to cocaine. Synthetic cathinones are molecularly stable and have a much longer shelf life and can be distributed around the world.

Research on cathinones suggests they cause increased activity of norepinephrine and dopamine, similar to cocaine and other stimulants.

### Resources

- Department of Justice and DEA, Special Report: Emerging 2C-Phenethylamines, Piperazines, and Tryptamines in NFLIS
- Office of National Drug Control Policy, Synthetic Drug Fact Sheet
- Uppers, Downers and Allrounders, Inaba & Cohen
- Karch's Pathology of Drug Abuse
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### Natural Cousins

Intense Euphoria

Very Stimulating

Paranoid Type Hallucinations

Users describe the high as being similar to cocaine and methamphetamine.

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### Dangers

Paranoia and violent behavior

Hallucinations

Delusions

Suicidal thoughts

Seizures

Panic attacks

Increased blood pressure

Increased heart rate

Chest pain

Nausea and vomiting

---

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<th>Year</th>
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</tr>
</tbody>
</table>

American Association of Poison Control Centers
Synthetic Phenethylamines

Phenethylamines occur naturally in plants like Peyote Mescaline (3,4,5-trimethoxyphenethylamine). Phenylethylamine is a naturally occurring neurotransmitter in the mammalian nervous system. Phenethylamine drugs are referred to as entactogens or empathogens because they elicit emotional expression. They are often considered to be different than most other hallucinogens. Allegedly, whereas, most other hallucinogens disconnect people from reality, phenethylamines are emotional and social and tend to make people feel more emotionally connected to others. 2C phenethylamines have become increasingly popular due to mass publication of a book by Alexander Shulgin, PIHKAL (Phenethylamines I Have Known and Loved).

The 2C’s
- 2C-B
- 2C-C
- 2C-I
- 2C-T-2
- 2C-T-7
- 2C-P
- 2C-H
- 2C-8
- 2C-9

Common Effects
- Stimulating
- Euphoric
- Emotional
- Visual & Tactile Hallucinations

Resources
- Department of Justice and DEA, Special Report: Emerging 2C-Phenethylamines, Piperazines, and Tryptamines in NFLIS
- Office of National Drug Control Policy, Synthetic Drug Fact Sheet
- Uppers, Downers and Allrounders, Inaba & Cohen
- Karch’s Pathology of Drug Abuse
- Vaults of Erowid
- NIDA, Drug Facts, drugabuse.gov

An estimated 580 reports of 2C-phenethylamines were submitted to State and local forensic laboratories in the United States from January 2006 through December 2010 and analyzed by March 31, 2011. During this five-year period, the number of 2C-phenethylamine reports increased from 28 in 2006 to 228 in 2010. During the first half of 2011, an estimated 102 reports of 2C-phenethylamines were submitted to State and local laboratories. In 2010, 2C-phenethylamines were identified in 32 States; 39% were identified as 2C-B, 33% as 2C-E, and 23% as 2C-I. Regionally, there were 44 reports of 2C-phenethylamines in the West, 70 reports in the Midwest, 32 reports in the Northeast, and 83 reports in the South.

% of College youth reporting Past Month, Past Year and Lifetime Ever use of “Ecstasy”

Ecstasy use peaked in 2001. 2C’s are fast becoming more popular than MDMA.

National Forensic Laboratory Information Systems

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**Synthetic Piperazines**

Benzylmethylpiperazine (MBZP)
Methylbenzylpiperazine (BZP)
Dibenzylpiperazine (DBZP)
Chlorophenylchloropropylpiperazine (mCPPP)
Chlorophenylpiperazine (mCPP)
Fluorophenylpiperazine (pFPP)
Methoxyphenylpiperazine (oMeOPP)
Methoxyphenylpiperazine (oMeOPP)
Methylphenylpiperazine (mMPP)
Methylphenylpiperazine (pMPP)
Trifluoromethylphenylpiperazine (TFMPP)

**Natural Cousins**

Users sometime claim piperazines are made from pepper, but they are not.

Synthetic piperazines really have no natural cousin.

**Euphoria**

- Very Stimulating
- Mild Hallucinations
- Paranoid Hallucinations

Different piperazines have varied effects.

**Common Effects**

- Agitation
- Paranoia
- Hallucinations
- Diaphoresis
- Vomiting
- Abdominal pain
- Palpitations
- Chest pain

**Dangers**

Euphoria

Among drug-related fatalities reported in DAWN from 2006 to 2010, BZP was identified in four deaths. Two additional piperazines (mCPP, TFMPP) were each noted in four or fewer deaths. The negative effects of mCPP often typical of a serotonin syndrome, include anxiety, dizziness, confusion, shivering, sensitivity to light and noise, fear of losing control, migraine and panic attacks.

**Epidemiology**

Piperazine drugs have no natural cousins. People often claim they are "natural" and derived from pepper. They are not. The name Piperazine was assigned because of its chemical similarity to piperine in the Piper genus of plants like pepper. Piperine and piperazine have vastly different effects in the human body. Piperazines were created in the 1950's, investigated as anti-parasitic, then later researched as anti-depressants in the 1970's.

They never made it to market because of extreme amphetamine like side effects. Today, piperazines, and 2C's are often referred to as “molly” along with MDMA. Animal studies have demonstrated that BZP stimulates the release and inhibits the reuptake of dopamine, serotonin and noradrenaline. Following oral administration of mCPP to healthy human male volunteers, the elimination half-life ranges from 2.6 to 6.1 hours with a wide variation in peak blood levels.

**Figure 6.2** Piperazine Reports to NFLIS, by State, 2010

**Resources**

- Department of Justice and DEA, Special Report: Emerging 2C-Phenethylamines, Piperazines, and Tryptamines in NFLIS
- Office of National Drug Control Policy, Synthetic Drug Fact Sheet
- Uppers, Downers and Allarounders, Inaba & Cohen
- Karch's Pathology of Drug Abuse
- Vaults of Erowid
- NIDA, Drug Facts, drugabuse.gov
Mushrooms, Piptadenia Perigrina leaves, Ayahuasca, Chacruna, Ibogaine, and Yohimbine are all natural plants containing various forms of tryptamine. Tryptamines have an indole chemical ring structure. They are chemically similar to the natural amino acid Tryptophan (from which the name is derived) and other trace amines. Tryptophan and Tryptamines are psychoactive. Tryptamines have a strong affinity for serotonin receptors.

Research is ongoing. Tryptamines are thought to act on the 5-HT2A and TAAR1 receptors. Tryptamine-containing plants have long been used in spiritual and religious ceremonies, especially in South America. In the 16th century, Christian missionaries from Spain and Portugal first encountered indigenous peoples using ayahuasca in South America. Hallucinogenic mushrooms were popular in mesoamerica, called “teonanacatl” by Aztecs.

Overdoses are characterized by nausea, vomiting, agitation, hypotension, mydriasis, tachycardia and hallucinations. While lethal overdoses on natural tryptamines are unheard of, cases of lethal overdoses on synthetic tryptamines do occur. Rhabdomyolysis and renal failure occurred in one young man and another one died 3-4 hours after an apparent rectal overdose. A 24 year old man also died of this compound being administered into the colon. Peranal administration is a common route for individuals who are experiencing tolerance with enteral administration. According to the 2010 NSDUH, lifetime use of DMT, AMT, or 5-MeO-DIPT among persons aged 12 or older remained stable between 2006 and 2009, at 0.3% annually, but increased significantly in 2010 to 0.5%. Among persons aged 18 to 25, 1.3% were lifetime users in 2010, which was higher than the percentages in 2006 (0.9%). The prevalence of use among persons aged 26 or older also increased significantly between 2009 and 2010, from 0.2% to 0.4%. In 2010, 0.7% of males and 0.3% of females were lifetime users. Between 2009 and 2010, lifetime use of DMT, AMT, or 5-MeO-DIPT increased significantly among males, from 0.5% to 0.7%.