



# New Drugs of Abuse on the Rise Worldwide

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Mark B. Mycyk, MD, Cook County Health and Hospitals System, Chicago, Illinois, USA, discussed the latest street drugs, their clinical effects, and unique aspects of treatment based on recent literature. He also highlighted overall trends in drugs of abuse. According to Dr Mycyk, the United States comprises 60% of the world drug market. The National Survey on Drug Use and Health estimates that in the United States, 166 000 people abuse heroin, 2.0 million abuse cocaine, and 6.2 million abuse prescription drugs [Substance Abuse and Mental Health Services Administration. *National Survey on Drug Use and Health*. 2013]. Dr Mycyk estimated that in the past decade, emergency department (ED) visits for traditional drugs of abuse increased from about 29% to 48% and that although complications from heroin use have increased in recent years, complications from new drugs have increased up to 5800%.

Many adolescents and young adults perceive prescription drugs as safer than street drugs and will ingest any number of unidentified pills passed around at “pharm parties,” including stimulants, antidepressants, anticonvulsants, and “anything that affects the brain.” Peer pressure is one of the main reasons for increasing drug use among young people in the United States. It is also notable that the number of new drug users has increased substantially since 1995 when Internet use became common [Wax PM. *Pediatrics*. 2002].

A popular Web site for information about new drugs of abuse is [www.erowid.org](http://www.erowid.org), which, in addition to testimonials, includes links to credible research articles and hospital systems to go to for help. Other Web sites include [www.lycaeum.org](http://www.lycaeum.org), [www.shroomery.org](http://www.shroomery.org), and [www.talktofrank.com](http://www.talktofrank.com). People also share information about new drugs using instant messaging and via social media Web sites [Boyer EW et al. *Cyberpsychol Behav*. 2007, Chary M et al. *J Med Toxicol*. 2013].

Dr Mycyk presented 9 brief case studies of patients who presented to the ED after using new drugs of abuse. The case presentations are summarized below, and the drug features are described in Table 1.

## CASE 1: CLUB ZOMBIE

A young adult aged 19 years acting “zombie-like” arrived from a club with a needle in his arm. His vital signs were the following: blood pressure (BP), 168/95 mm Hg; heart rate (HR), 125 beats per minute (bpm); temperature, 98.9°F. He had 6-mm pupils with rotatory nystagmus, was not rigid, and was “staring off into space.”

He had taken methoxetamine [Corazza O et al. *Hum Psychopharmacol*. 2012; Hofer KE et al. *Ann Emerg Med*. 2012].

## CASE 2: A DESIGNER HIGH

A man, aged 24 years, presented seizing after snorting a drug bought online. He was agitated, aggressive, hallucinating, and foaming at the mouth. His vital signs were the following: BP, 175/100 mm Hg; HR, 111 bpm; temperature, 101°F. He would not cooperate for a neurologic examination. He had taken the designer amphetamine 2,5-dimethoxy-4-iodophenethylamine.

## CASE 3: NATURALLY BETTER

A “former” heroin addict aged 41 years presented with dyspnea and altered mental state. His vital signs were the following: BP, 90/65 mm Hg; HR, 80 bpm; temperature, 98.6°F. He was sleepy with small pupils and shallow respiration and did not improve with naloxone. His friend identified the drug as ibogaine [Alper KR et al. *J Forensic Sci*. 2012] on [www.erowid.org](http://www.erowid.org).

## CASE 4: TAKING THE CINNAMON CHALLENGE

A man, aged 43 years, became dyspneic while trying to complete the “cinnamon challenge.” His vital signs were the following: BP, 110/72 mm Hg; HR, 120 bpm; temperature, 98.6°F. He developed shock, acute respiratory distress syndrome, and was hospitalized for 3 days. The “cinnamon challenge” involves swallowing a tablespoon of cinnamon without drinking anything [Grant-Alfieri A et al. *Pediatrics*. 2013].

## CASE 5: SEIZING AT THE VET

A man, aged 22 years, brought his dog to the veterinarian for new-onset seizures and started seizing during the dog evaluation [Gugelmann H et al. *Clin Toxicol (Phila)*. 2014]. His vital signs were the following: BP, 167/102 mm Hg; HR, 106 bpm. He was agitated and combative and was intubated because emergency antidotes were ineffective. A urine drug screen was negative. The offending drug was PB-22, a new-generation synthetic cannabinoid.

## CASE 6: MEOW MEOW

A woman, aged 22 years, presented with agitation, tachycardia, and hypertension (all adverse effects reported by users of mephedrone [Vardakou et al. *Toxicol Lett*. 2011]) after seizing at a nightclub. She admitted to using mephedrone after obtaining it online.

Table 1. Case Studies of Patients Presenting in the ED After New Drug Use

New Drug of Abuse	Features
Methoxetamine (MXE, Mket, Kmax, Mexxy) [Hofer KE et al. <i>Ann Emerg Med.</i> 2012; Corazza O et al. <i>Hum Psychopharmacol.</i> 2012]	Manufactured in China NMDA and DA receptor activity Analog of ketamine Longer duration of action and worse complications than ketamine Hypertension, tachycardia, renal injury, hyperthermia Toxic screen nondiagnostic
2,5-Dimethoxy-4-iodophenethylamine (2C-I, Smiles, Liquid acid) [Dean B et al. <i>J Med Toxicol.</i> 2013]	Designer amphetamine Nonspecific serotonergic subtype receptor effects Alpha1 agonism Dopaminergic and norepinephrine activity Multiple types of 2C drugs with substitutions at the 2 carbon atoms Drug screening typically nondiagnostic or negative Available online
Ibogaine [Alper KR et al. <i>J Forensic Sci.</i> 2012]	West African shrub <i>Tabernathe iboga</i> used for natural opioid detoxification but not effective Kappa opioid, NMDA, acetylcholinergic, and serotonergic activity Associated with fatalities
Swallowing a tablespoon of cinnamon without drinking anything [Grant-Alfieri A et al. <i>Pediatrics.</i> 2013]	Mostly used by 13- to 24-y-olds > 50000 YouTube videos Causes pulmonary fibrosis, histiocytosis, and damaged alveoli
Crazy Monkey (PB-22) [Gugelmann H et al. <i>Clin Toxicol (Phila).</i> 2014]	New-generation synthetic cannabinoid, similar to Spice and K2 Causes agitation, cardiac effects, kidney injury THC screen negative
Mephedrone (4-methylmethcathinone, Meow Meow, Drone, Bubble, Mcat) [Vardakou et al. <i>Toxicol Lett.</i> 2011]	Synthetic cathinone Sympathomimetic stimulant Similar effects as amphetamine Bath salts are also a synthetic cathinone
Methiopropamine (1-[thiophen-2-yl]-2-methylaminopropamine) [Lee H et al. <i>J Med Toxicol.</i> 2014]	Known as legal methamphetamine Popular in Europe since 2011 Nasal, oral, rectal administration Stimulant effects MAOI properties Norepinephrine, epinephrine, dopamine, serotonin release Severe complications
Phenibut ( $\beta$ -phenyl- $\gamma$ -aminobutyric acid, Noofen) [O'Connell CW et al. <i>Am J Med.</i> 2014]	Initially synthesized in Russia in 1960s GABA <sub>B</sub> agonist similar to baclofen Used primarily for anxiolysis Narrow therapeutic index Causes seizures
<i>Naja naja</i> snake bite [Katshu MZ et al. <i>Subst Abus.</i> 2011]	Snake venom containing alpha neurotoxins Centrally mediated opiate-like effects Potentially fatal

DA, dopamine; ED, emergency department; GABA<sub>B</sub>,  $\gamma$ -aminobutyric acid B; MAOI, monoamine oxidase inhibitor; NMDA, N-methyl-D-aspartate; THC, tetrahydrocannabinol.

### CASE 7: QUICKSILVER

A patient aged 27 years presented with palpitations, anxiety, and visual hallucinations [Lee H et al. *J Med Toxicol.* 2014]. The patient's vital signs were the following: BP, 109/77 mm Hg; HR, 80 bpm; temperature 98.4°F. The patient's pupils were dilated 5 mm. Friends reported that the patient had taken the drug methiopropamine.

### CASE 8: FUNNY BUT . . .

A man aged 25 years was found unconscious by his roommate after using a new drug purchased online for 4 days [O'Connell CW et al. *Amer J Med.* 2014]. His vital signs were the following: BP, 110/50 mm Hg; HR, 69 bpm; temperature, 97.2°F. His pupils were reactive and equal and the examination was not focal. He had been taking phenibut.

### CASE 9: SNAKE BITE HIGH

A man aged 44 years with a history of polysubstance abuse subjected himself to a *Naja naja* snake bite on his foot [Katshu MZ et al. *Subst Abus.* 2011]. He blacked out and felt a sense of well-being and lethargy.

Conventional drug tests do not identify most of these new drugs. However, Dr Mycyk recommended performing basic diagnostic tests, including serum electrolytes and an electrocardiogram, if a patient is symptomatic. Dr Mycyk suggested that health care providers question patients' friends to identify new drugs of abuse. He recommended subscribing to social media and reading online materials to become more knowledgeable in the new "lingo."

Management is largely focused on supportive care and symptom control. If patients are dehydrated, they should be rehydrated. If they are tachycardic and agitated, they can be relaxed with benzodiazepines. Patients should be observed until they are asymptomatic, and drug counseling prior to discharge is important. Studies among patients who abuse alcohol have shown that by linking the ED visit to the alcohol abuse, future ED visits and other morbidity can be reduced.

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