NMS Labs offers a wide range of topics and tools to help law enforcement, healthcare professionals and parents understand this illicit market and provide insights into the dynamic nature of designer drug trends.

Visit DesignerDrugTrends.org to find current information about local laws, national drug scheduling laws, drug sightings, scientific changes, emerging designer drugs and testing trends.

Knowledge sharing keeps us one step ahead of drug manufactures and dealers.
Most laboratories simply don’t have the time or resources to keep up with the designer drug marketplace. NMS Labs has the solution.

The headlines are full of alarming and horrific stories—assaults on police officers, violence, suicides, psychosis—all attributed to individuals under the influence of the latest round of designer drugs, or so-called “legal highs.” We’re committed to continually investing in research and development to meet the challenge of the designer drug epidemic. Our team of leading forensic chemists and toxicologists provide key insights that identify designer drugs as they emerge.

- Emerging ELISA tests do not detect the most current designer drugs and are a barrier for forensic laboratories in keeping up with the diversity of new drugs on the street, requiring comprehensive mass spectrometry testing.
- Using an older drug screen or confirmation test is not useful. As financial constraints impact most budgets for businesses and organizations, selecting the most current test is more important than ever.

NEW TESTS COMING SOON

NBOMe, Blood
25H-NBOMe, 25I-NBOMe, 25B-NBOMe, 25C-NBOMe

Hallucinogens Screen - Expanded
25H-NBOMe, 25I-NBOMe, 25B-NBOMe, 25C-NBOMe added

Drug Impaired Driving/DRE Toxicology Hallucinogens Add-On
25H-NBOMe, 25I-NBOMe, 25B-NBOMe, 25C-NBOMe added

Pyrrolidinophenones, Blood
Pyrovalerone, Naphryone, Alpha PBP, Alpha PPP, MePPP, MDPPP, MOPPP, MPBP, MPHP

Synthetic Cannabinoids, Blood
AB-FUBINACA, ADBICA, 5F-ADBICA, ADB-PINACA, ADB-FUBINACA, 5F-ADB-PINACA, AKB-48, 5F-AKB-48, THJ-2201, THJ-018, 5F-AB-001, AB-PINACA
Designer Drugs, in a nutshell

NMS Labs proactive, comprehensive portfolio of designer drug testing keeps you one step ahead. We are committed to continually investing in R&D to meet the challenges of the designer drug epidemic. Our team of leading forensic chemists and toxicologists provide key insights that identify designer drugs as they emerge.

Synthetic cannabinoids
Known on the street as K2 or “fake weed”, these drugs are very real. The newest compounds on the street are chemically different than the first generation compounds. They are potent, impairing and addictive, but their chemistry makes them invisible to older designer drug screens and traditional drug tests.

Bath salts
Data becoming available shows “bath salts” are deadly. Of 472 samples recently submitted to NMS Labs, 30% confirmed positive for 1 or more analytes in our Expanded Bath Salts & Stimulants Panel. Other next generation compounds, 25I-NBOMe, 25C-NBOMe, 25H-NBOMe, are commonly found in “bath salts” and have been recently linked to deaths in the United States. Although labeled as “not for human consumption,” these substances often come as a powder to be snorted, injected or smoked by users.
The leader in identifying designer drug trends and toxicology

- The Center’s mission is to monitor the state of analytical science practice in the United States and internationally; to steer the development of new tests and technologies; and ensure that the needs of both public safety and public health are being met in a timely manner.

- The Center explores developments in designer drugs. Stay ahead of the ever-changing landscape of the designer drug market. NMS Labs assists law enforcement and healthcare professionals in their struggle against designer drugs.

- The Center has a dedicated, interdisciplinary staff to draw on, with expertise in clinical and forensic toxicology, criminalistics, forensic biology, and research and development. It brings both academic and professional perspectives to the table.

**Strategic Partnerships**

At NMS Labs, we value collaborative partnerships. We are always looking for strategic partners who can help us bring innovation and testing closer to patient point-of-care or the scene of the investigation.

For more information, visit NMS Labs Center for Innovation at www.nmslabs.com/c4i
Database of Deaths

To highlight the severity of the use of synthetic cannabinoids, NMS Labs is compiling a database of deaths related to their use. These include homicides, suicides, accidents and toxic deaths. Over 60 cases have been identified to date.

Contact Dr. Barry Logan at Barry.Logan@nmslabs.com to be included in the study.

New Publication Highlights the Human Health Risks and Impairing Effects of Synthetic Cannabinoid Drugs

Pharmacology, Toxicology, and Adverse Effects of Synthetic Cannabinoid Drugs
S. M. R. Gurney, K. S. Scott, S. L. Kacinko, B. C. Presley, B. K. Logan
Forensic Science Review 26:53; 01/2014

Abstract: Synthetic cannabinoid drugs have become an established part of the recreational drug landscape in the United States and internationally. These drugs are manufactured in clandestine laboratories internationally and distributed in the United States in smoking mixtures, use of which produces effects very similar to use of marijuana. The adverse-effect profile of the drugs has not been studied in humans and infrequently in animal models, so much of the information about their toxicity comes from emergency department and treatment reports and forensic case studies. This review considers the discovery and characterization of the endocannabinoid system, approaches to receptor-binding studies of various synthetic cannabinoids from the first wave of naphthoylindoles (e.g., JWH-018) to the emerging adamantoylindole drugs (e.g., AKB-48), and their analogs, to evaluate the potential activity of drugs in this class. Currently employed approaches to assessing functional activity of the drugs using in vitro and in vivo models is also described, and comparisons made to the effects of THC. The physiological effects of activation of the endocannabinoid system in humans are reviewed, and the physiological effects of cannabinoid use are described. Case reports of adverse events including emergency department admissions, mental health admissions, and clinical and forensic case reports are presented in detail and discussed to summarize the current state of knowledge of adverse effects, both clinical and forensic in humans, including effects on driving ability, and tissue injury and death. The greatest weight is accorded to those reports that include toxicological confirmation of use. Finally, we discuss the current status of attempts to schedule and control the distribution of synthetic cannabinoids and the relevance of receptor binding and functional activity in this context. There is growing toxicological and pharmacological evidence of impairment, psychosis, tissue injury, and isolated deaths attributable to this emerging class of drugs.

To request an electronic copy of this article, please visit www.nmslabs.com/publications.
Synthetic Cannabinoids

**JWH-018 alone is not enough; Next generation compounds still dominate**

- XLR-11 and UR-144 are chemically different than the 1st generation of synthetic compounds & are invisible to outdated drug screens.

- XLR-11 & UR-144 account for the majority of confirmed positive findings

Source: Data extracted from NMS Labs Laboratory Information Management System. October 2010 - January 2014.

### Simple Selection of Key Synthetic Cannabinoids Tests

<table>
<thead>
<tr>
<th>CPT Code</th>
<th>Synthetic Cannabinoids Screen, blood, (Forensic)</th>
</tr>
</thead>
<tbody>
<tr>
<td>9562U</td>
<td>Synthetic Cannabinoid Metabolites Screen—Expanded, urine (Forensic)</td>
</tr>
<tr>
<td>9563U</td>
<td>Synthetic Cannabinoid Metabolites Screen, urine</td>
</tr>
</tbody>
</table>

Source: Data extracted from NMS Labs Laboratory Information Management System. October 2010 - January 2014.

B: Dec 2013: Denver, CO. **Synthetic marijuana is linked to the sickness of 221 people during a month long outbreak in Colorado** “Synthetic Marijuana has sickened more than 200 people in Colorado” The Huffington Post December 13, 2013.

C: Nov 2013: Waverly, NE. **18 year old smokes synthetic cannabis, goes to sleep and never wakes up.** Ristau, Reece “Nebraska teen’s death brings synthetic marijuana battle to forefront.” Daily Nebraskan November 15, 2013.

D: Jan 2014: Wasilla, AK. **Teenager found dead in his room next to a pipe full of Spice, official cause of death is unknown but spice is suspected culprit.** Doogan, Sean. “In the wake of a teen’s unexplained death, answers about Spice are hard to come by” Alaska Dispatch January 10, 2014.


F: Aug 2013: Asheboro, NC. **Police confiscate 3.5 pounds of synthetic weed from three stores valued at $12,000.** “3.5 Pounds of Synthetic cannabinoids seized from stores in Asheboro.” WFMY News 2 August 9, 2013.
30.7% Positivity Rate—Alpha PVP and Methylone are the Culprits

Source: Of the 472 blood samples submitted to NMS Labs in 2013, 30% confirmed positive for 1 or more analytes in the Expanded Bath Salts & Stimulants Panel (8756B). Alpha PVP was outside the scope of the assay prior to July 2013 updates; positive results were verified by secondary analysis. Since the updated scope with alpha PVP, there have been 31 positives in 362 blood cases for alpha PVP. Confirmed positive cases (n=145) included methamphetamine and amphetamine; of the 213 positive analytes, methamphetamine and amphetamine were 41.4% of the positives.

<table>
<thead>
<tr>
<th>Test Code</th>
<th>Test Description</th>
<th>Analytes</th>
<th>CPT Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>2626</td>
<td>Bath Salts Panel blood, urine, serum/plasma</td>
<td>DMAA, MDPV, Methylone, Pentedrone, alpha PVP</td>
<td>83789</td>
</tr>
<tr>
<td>8756</td>
<td>Bath Salts &amp; Stimulants—Expanded (includes confirmation) blood, urine, serum/plasma</td>
<td>Bath salts, cathinones, piperazines, stimulants, designer stimulants 25I-NBOMe, 25B-NBOMe, 25C-NBOMe available by special request in blood</td>
<td>80100</td>
</tr>
<tr>
<td>8755</td>
<td>Hallucinogens Screen—Expanded (includes confirmation) blood, urine, serum/plasma</td>
<td>Please refer to our website</td>
<td>80100</td>
</tr>
<tr>
<td>0245</td>
<td>Alpha PVP blood, urine, serum/plasma</td>
<td>Alpha PVP</td>
<td>83789</td>
</tr>
<tr>
<td>3143</td>
<td>NBOMe urine</td>
<td>25I-NBOMe, 25B-NBOMe, 25H-NBOMe, 25C-NBOMe</td>
<td>83788</td>
</tr>
</tbody>
</table>
Media Stories—Bath Salts Usage is Growing in Your Backyard

Percentage of total drug reports identified as alpha-PVP, by State, 2012*


A: Apr 2013: Orlando, FL. 17 year old dies after an overdose on bath salts. “Drug in bath salts caused teen’s overdose death, Dr. G says.” Click Orlando, WKMG Local 6 April 9, 2013.


D: Dec 2013: Bakersfield, CA. One thousand pounds of bath salts and other synthetic drugs are found in a smoke shop owner’s warehouse along with $2.7 million in cash. Jauregui, Andres. “1000 Pounds of Bath Salts, Other Synthetic Designer Drugs Seized in California” The Huffington Post December 17, 2013.


**Mislabeled Molly & More**

<table>
<thead>
<tr>
<th>If you think it’s...</th>
<th>It may actually be...</th>
</tr>
</thead>
<tbody>
<tr>
<td>MOLLY</td>
<td>METHYLONE</td>
</tr>
<tr>
<td>FAKE LSD</td>
<td>NBOMes</td>
</tr>
</tbody>
</table>

### Have You Seen Molly?

She's popular, the face on many t-shirts, and very dangerous; although her name sounds innocent, she's far from it. You find her in clubs, music, and very likely, right in your backyard.

Hospitals are facing a difficult problem whenever someone comes in to be treated for a Molly overdose. The patient may believe they've taken a form of ecstasy, but do they know what they actually swallowed?

Molly is the street name for the synthetic drug MDMA. It's called Molly because of the powder or capsule form that it comes in, as opposed to tabs, and the presumption that the “molecular,” or Molly for short, form is more pure.

The problem is that drug users don’t know the person who designed their Molly. Experts are often finding METHYLONE in the pills, which is a key component in deadly bath salts. Although Methylone seems to be predominate right now, it is not uncommon to find other compounds in “Molly” as well.

Nevertheless, rappers and rock stars continue to sing about the “beauties” of Molly and young people continue to swallow whatever they are being told by their idols.
**Supporting DEA Control**

From the U.S. Drug Enforcement Agency, November 15, 2013:
"Effective today, the United States Drug Enforcement Administration (DEA) made the synthetic phenethylamines 25I-NBOMe, 25C-NBOMe, and 25B-NBOMe Schedule I, illegal drugs under the Controlled Substances Act (CSA) for the next two years..."

From the U.S. Drug Enforcement Agency, January 28, 2014:
“The Deputy Administrator of the Drug Enforcement Administration (DEA) is issuing this notice of intent to temporarily schedule 10 synthetic cathinones into schedule I pursuant to the temporary scheduling provisions of the Controlled Substances Act (CSA)...” These substances include alpha PVP.

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**CASEWORK AT NMS LABS**

NMS Labs was contacted by a medical examiner who was searching for a laboratory who could test for 25B-NBOMe, a new synthetic hallucinogen/stimulant, in blood. The medical examiner had a case of a 16-year-old male who had reportedly inhaled/snorted a white powder that his friend had purchased over the internet. He became violent, experienced seizure-like activity, was transferred to the hospital and died. Evidence was tested and the powder was determined to be 25B-NBOMe. NMS Labs was able to confirm the presence of 25B-NBOMe in the decedent’s blood, providing an answer for the medical examiner, law enforcement, and the decedent’s family.

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**NMS LABS HAS THE SOLUTION**

NMS Labs continues to dedicate resources to remain one step ahead of unreliable drug manufacturers and drug dealers. What drug users think they are taking are too often not what they are actually swallowing.

NMS Labs is here to help confirm the presence of the latest generation in designer drugs. We’re following the trends, we know that’s out there and what to look for. Most importantly, we’re answering questions that nobody else can.
Designer drugs have infiltrated our rural communities and metropolitan areas. These synthetic drugs are often a blind spot for regional labs, law enforcement and medical examiners. The rapid turnover of the compounds found in designer drugs challenges the analytical capabilities of most labs, frustrating attempts at deterrence and detection, while encouraging the growth of the market. Designer drugs may be the key piece of evidence that allows the reliable certification of a death, or explains a subject’s behavior in a medical or criminal case. As a result, consider testing for the newest designer drug compounds as standard practice.

A growing volume of data from emergency rooms, law enforcement and medical examiners suggests that the smallest dose of synthetic drugs may result in emergency room visits, fatal collisions, and unintended suicides. Detection may be stymied, as many of these compounds lack toxicological confirmation. That, coupled with the inability of most labs to offer updated and comprehensive testing for synthetic drugs, means that only a fraction of the problems that these new drugs are causing are recognized.

Reliable, timely and current toxicological screens are critical to the effective enforcement of new laws passed by Congress and the states to protect the public from these untested and demonstrably dangerous drugs.

NMS Labs continues to be a thought leader in designer drug toxicology and have documented cases with new compounds previously not seen on the street. NMS Labs is proud to be one of very few accredited labs to have committed the necessary resources, analytical and toxicological expertise to keep up with this divergent and rapidly growing list of drugs. We offer these tests to death investigation, law enforcement and healthcare providers.
Questions to ask about designer drugs

1. Why are you testing, detection or deterrence?
2. Are you depending on blood or urine positivity rates to guide deterrence test decisions?
3. Are you familiar with the current and popular bath salts and spice compounds? (e.g., 25I-NBOMe)
5. Does your spice test include XLR-11 and UR-144? The “ACA”s such as AB-FUBINACA? The “NBOMe”s?
6. We are now hearing about GRAVEL. Are you aware of this emerging, highly addictive synthetic stimulant?
<table>
<thead>
<tr>
<th>ACODE</th>
<th>DESCRIPTION</th>
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<tbody>
<tr>
<td>9105</td>
<td>Acetyl Fentanyl Screen, Blood, Serum/Plasma, Urine (Forensic)</td>
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<td>0205</td>
<td>Acetyl Fentanyl, Blood, Serum/Plasma, Urine</td>
</tr>
<tr>
<td>0245</td>
<td>Alpha PVP, Blood, Serum/Plasma, Urine</td>
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<tr>
<td>8756</td>
<td>Bath Salts and Stimulants Designer Drugs - Expanded Blood, Serum/Plasma, Urine</td>
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<tr>
<td>2626</td>
<td>Bath Salts Panel, Blood</td>
</tr>
<tr>
<td>2626</td>
<td>Bath Salts Panel, Serum/Plasma, Urine</td>
</tr>
<tr>
<td>1495</td>
<td>Desomorphine, Blood, Serum/Plasma</td>
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<tr>
<td>9229</td>
<td>DMAA Screen, Blood, Serum/Plasma, Urine</td>
</tr>
<tr>
<td>0278</td>
<td>DMAA, Blood, Serum/Plasma, Urine</td>
</tr>
<tr>
<td>8755</td>
<td>Hallucinogens Screen - Expanded, Blood, Serum/Plasma, Urine</td>
</tr>
<tr>
<td>2588</td>
<td>MDPV Stimulant Designer Drug Test, Blood, Serum/Plasma</td>
</tr>
<tr>
<td>2588</td>
<td>MDPV Stimulant Designer Drug Test, Urine</td>
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<tr>
<td>1138</td>
<td>meta-Chlorophenylpiperazine (mCPP), Blood (Forensic)</td>
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<tr>
<td>1138</td>
<td>meta-Chlorophenylpiperazine (mCPP), Serum/Plasma, Urine (Forensic)</td>
</tr>
<tr>
<td>1032</td>
<td>Methcathinone (CAT), Blood, Urine</td>
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<tr>
<td>1032</td>
<td>Methcathinone (CAT), Serum/Plasma</td>
</tr>
<tr>
<td>3078</td>
<td>Mitragynine and Metabolite (Qualitative), Urine</td>
</tr>
<tr>
<td>3143</td>
<td>NBOMe (Qualitative), Urine</td>
</tr>
<tr>
<td>9566</td>
<td>Postmortem Toxicology - Synthetic Cannabinoids Screen (Add-On), Blood</td>
</tr>
<tr>
<td>9562</td>
<td>Synthetic Cannabinoid Metabolites Screen - Expanded Urine (Forensic)</td>
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<tr>
<td>9568</td>
<td>Synthetic Cannabinoid Metabolites Screen 2, Urine</td>
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<td>9563</td>
<td>Synthetic Cannabinoid Metabolites Screen, Urine</td>
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<tr>
<td>9567</td>
<td>Synthetic Cannabinoids (Qualitative) Screen, Oral Fluid</td>
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<tr>
<td>9560</td>
<td>Synthetic Cannabinoids Screen, Blood (Forensic)</td>
</tr>
</tbody>
</table>
Visit DesignerDrugTrends.org
to find the most current information about:

Local laws
National drug scheduling laws
Drug sightings
Scientific changes
Emerging designer drugs
Testing trends
And more
No matter how designer drugs evolve, we’ll be ready.