



### A28 Second and Third Generation Legal Highs

Annessa Burnet\*, 5510 Milan Ave, Cincinnati, OH 45212; Nicholas Culverhouse, 1201 University Blvd, Birmingham, AL 35294; Geanee' Quinney, BS, Birmingham, AL; and Elizabeth A. Gardner, PhD, UAB, Dep of Justice, UBOB 210, 1530 3rd Avenue, S, Birmingham, AL 35294-4562

After attending this presentation, attendees will have understanding of the emergence of second- and third-generation legal highs.

This presentation will impact the forensic science community by presenting a selection of the emerging drugs of abuse that drug chemists may encounter in casework in the near future.

On July 9, 2012, President Obama signed the Synthetic Drug Abuse Prevention Act of 2012, intended to control chemicals designed to mimic marijuana and amphetamines. On July 12, 2012, "*Wired Science*" declared the ban obsolete. The legislation was in response to two emerging drugs of abuse: spice and bath salts. When the public first became aware of these drugs in 2008, bath salts were primarily the cathinone analogs, methylenone, mephedrone, and methylenedioxypropylone (MDPV). Spice, sold as synthetic marijuana, was not a cannabinoid at all. The psychoactive substances in spice were cannabinoid agonists, chemicals that bound to the CB1 and CB2 cannabinoid receptors. The most prevalent were the JWHs developed by John W. Huffman in the 1990s. A few examples are JWH-018, JWH-073, JWH-019, JWH-200, JWH-250, JWH-081, JWH-122, and JWH-398.

Individual states were the first to respond. By late 2011, over 30 states had banned the cathinones and several of the spice ingredients. The online vendors immediately responded with new "legal highs." Some even had state-specific websites. The most prevalent second-generation legal highs were naphyrone, butylone, and 5, 6-methylenedioxy-2-aminoindane (MDAI). The cannabimimetics were extended to include C8 homologs, AM2201, AM678, and many more JWHs.

As quickly as one class of legal highs is banned, new drugs are put on the market. They are sold online, in gas stations, and in head shops. They are often disguised as "bath salts" or "plant food." These substances are of concern because numerous incidents of overdose, organ damage, and even death have resulted from their consumption. The drugs are untested and unregulated. Distributors have no quality assurance and there is no guarantee that a person is receiving the drug they intended to purchase.

The objective of this project is to purchase new legal highs as they are offered online and in local head shops. The information found in this study is disseminated to poison control centers and lawmakers to help in treatment of patients by health professionals, to warn the public about the dangers of these substances, and to aid policy makers in preventing their distribution.

The samples are generally in the form of a powder or plant material. Each sample is ground in a mortar and pestle to homogenize the material and ensure a representative sample. The powders are extracted by two methods; an acid/base and extraction directly into hexane. Plant materials undergo an additional sonication step in both the acid extraction step and the direct hexane extraction. The samples are analyzed by gas chromatography and mass spectroscopy. If identification cannot be determined by the mass spectra, ESI and NMR are used to determine the structure.

In this study, several legal highs were analyzed for active components. The legal high, "synthacaine" was ordered online and found to contain a mixture of methiopropamine (MPA) and benzocaine. MPA is a thiophene-based analog of methamphetamine. Another drug, sold online, contains a mixture of MPA and MDAI. MDAI is a drug that can produce effects similar to MDMA. Other substances analyzed include legal highs containing 6-APB, of which all contained the second-generation cannabimimetics, UR-144, XLR-11, A-796,260.

**Legal Highs, Cannabimimetics, Cathinones**