

# Emerging Substances of Abuse – K2/Spice (Synthetic Cannabinoids)

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Presentation Last Updated 12-May-11

# K2/Spice – Synthetic Cannabinoids



# K2/Spice – Synthetic Cannabinoids

- The terms Spice and K2 refer to commercially available products that have been sprayed with research chemicals called synthetic cannabinoids but do not contain any cannabis (marijuana) components.
- Currently legal in New Jersey (though there is an emergency national ban on 5 synthetic cannabinoids), they are sold in local markets throughout the U.S. including gas stations, liquor stores, convenient stores, smoke shops, or on the Internet under the brand names "K2," "Spice," "Chronic Spice," "Spice Gold," "Spice Silver," "Stinger," "Yucatan Fire," "Skunk," "Pulse," "Black Mamba," "Mystery," "Red X Dawn," "Zohai," "Mr. Nice Guy," "Spicylicious," "K3," "K3 Legal," "Earthquake," or "Genie." This listing of names only covers some of the brand names, where more brand names crop up very often.

# What are Synthetic Cannabinoids

- Synthetic cannabinoids are a structurally diverse class of mostly synthetic substances that bind to cannabinoid receptors in our body, and when ingested create a similar type of high that naturally occurring cannabinoids (marijuana) produce.
- More than 100 different synthetic cannabinoids have been created (mostly created in laboratories for research purposes).
- The psychoactive compounds found in Generation 1 of Spice and K2 include the synthetic cannabinoids JWH-018, JWH-073, JWH-250, CP 47,497 and/or CP 47,497 C8. Other synthetic cannabinoids include JWH-019, JWH-081, JWH-200, HU-210, CP 55,940 (we have a more comprehensive listing later in this presentation).

# The History of Spice

- The cannabinoid-like chemicals were developed in research laboratories, for example, to study neuronal receptors found in the body and brain.
- One of these synthetic cannabinoids, JWH-018, was first made in 1995 for experimental purposes in the lab of Clemson University researcher [John W. Huffman, PhD.](#)
- It is believed that the manufacturers of "Spice" read the research and copied it in order to reproduce Dr. Huffman's chemicals to produce the synthetic cannabinoid and market it for commercial distribution.



# The History of Spice

- The cannabinoid-like chemicals were developed in research laboratories to study neuronal receptors found in the body and brain, or for other research purposes.
- The five nationally banned synthetic cannabinoids are JWH-018, JWH-073, JWH-200, CP 47,497 and cannabicyclohexanol (CP 47,497 C8, a homologue of CP 47,497).
- CP 47,497 was developed in 1980 by Pfizer and has analgesic properties. Cannabicyclohexanol (CP 47,497 C8) was developed by Pfizer in 1979.
- Both of these compounds produce cannabis type effects when ingested.

# The History of Spice

- HU-210 and HU-211 were first synthesized in 1988 at Hebrew University in Israel, and they have anti-inflammatory and anesthetic properties, respectively.
- While HU-210 is anywhere from 100 to 800 times more potent than natural THC, and is a potent analgesic, HU-211 does not act on the cannabinoid receptor and does not produce cannabis type effects when ingested, though it is commonly listed as a synthetic cannabinoid.
- HU-210 is currently classified nationally as a schedule 1 controlled substance, though state by state it may be legal (e.g., in PA and NJ it is currently legal).

# The History of Spice

- The brand "Spice" was released in 2004, and in 2006 the brand gained popularity, particularly throughout Europe. The company that started Spice went from assets of 65,000 Euros in 2006 to 899,000 Euros in 2007.
- Spice was the dominant brand until 2008 when competing brands hit the market (such as K2).
- In 2009 Spice products were identified in 21 countries. Spice, K2 and other products peaked in popularity in 2008 in Europe, with many European countries banning it at that time.
- In 2009, Spice, K2 and others gained their popularity in Canada and the United States.

# The Effects of Spice/K2

- Since the psychoactive ingredients are similar to those of naturally grown marijuana, the effects are similar.
- Synthetic cannabinoids are listed as the same class of drug as marijuana; a hallucinogen.
- The effects of smoking JWH-018 has a variable duration. Some sites we have viewed report the high lasts probably an average of 10-30 minutes, while anecdotal reports from users of K2 report effects lasting for 1-2 hours.
- Synthetic cannabinoids have tested at least 5 - 45 times more potent than some of the strongest marijuana (with HU-210 again being 100-800 times more potent than naturally occurring THC).
- A neurophysiology theory on the better potency of synthetic cannabinoids over natural marijuana is that the synthetic cannabinoids bind better and longer to the CB1 and CB2 receptors than does natural THC.

# Different Synthetic Compounds

This is a partial listing of known compounds.

- AM-630
- AM-679
- AM-694
- AM-1221
- AM-1241
- AM-2201
- CB-25
- CB-52
- CP 47,497
- CP 47,497 C8
- CP 55,940
- HU-210
- HU-211
- HU-308
- HU-331
- JWH-007
- JWH-015
- JWH-018
- JWH-019
- JWH-073
- JWH-081
- JWH-122
- JWH-133 (non-psychoactive)
- JWH-200
- JWH-201
- JWH-203
- JWH-210
- JWH-250
- JWH-251
- JWH-398
- RCS-4
- RCS-8
- WIN 48,098
- WIN 55,212-2
- WIN 55,212-3

# Origins of Each Synthetic Class

- **AM** prefaced compounds are fluorinated and named for Northeastern University professor **Alexandros Makriyannis**.
- **CP** compounds were developed in the late 1970's, early 1980's by **Pfizer**.
- **HU** compounds are named after **Hebrew University** where these compounds were first created and investigated.
- As stated earlier, **JWH** products were named after **John W. Huffman** from Clemson University.
- **RCS** compounds appear to have their origins of development in a single lab in mainland China.
- **WIN** compounds were developed by **Sterling Winthrop**.

# So what is in the 2<sup>nd</sup> Gen of K2/Spice?

(This is only conjecture ... with reasons why)

Possibly the **AM** class:

- This class contains hyperpotent cannabinoids based on CB1 binding affinity, with a fluorine on the end of the pentyl chain in an apparent attempt to increase duration of effect.

More likely the **RCS** class:

- With a chemical structure reminiscent of JWH-081, this synthetic cannabinoid has similar potency and effects to JWH-250, all allegedly without legal issues or the known JWH 'anxiety issues'.
- One internet report stated "prohibition made the production of these cannabinoids a huge cash cow, and now a self-sustaining independent industry."

# So what is in the Next Gen of K2/Spice?

(This is only conjecture ... with reasons why)

- Recently one supplier of herbal products is even giving out a product analysis report allegedly showing that their product contains none of the banned substances.
- Theorycrafting about what is in the next general of K2/Spice leans towards the RCS class. [Click this link to see the product analysis report](#) the herbal substance provider gave to their local outlets.
- There were **7 JWH** class drugs represented in the analysis (015, 018, 019, 073, 081, 200, and 250). There were also **3 CP** class drugs represented (47,497, 47,497 C8, 55,940); **4 HU** class drugs represented (210, 211, 308, 331); **2 WIN** (48,098, 55,212-2); and **1 AM** class represented in this analysis report (694).
- **Conspicuously absent from this report were the RCS and CB classes.** However, there is much more internet chatter regarding RCS class of synthetic cannabinoids than there is about the CB class (e.g., there is no CB class Wikipedia page, but there are rudimentary RCS class Wikipedia pages).

# Any Dangers Involved in Spice/K2 Use?

- Yes. Until a drug is tested, it cannot be considered safe. Not only have synthetic cannabinoids not been tested, nearly all were created for experimental use in animals and cell cultures, not tested for use in humans.
- JWH-018 inventor John W. Huffman, PhD, puts it bluntly: "It is like Russian roulette to use these drugs. We don't know a darn thing about them for real."
- These synthetic cannabinoids have been associated with impaired driving incidents, attempted suicides, and emergency department visits, and have been linked to such adverse effects as increased anxiety, panic attacks, heart palpitations, respiratory complications, aggression, mood swings, altered perception, and paranoia.
- Redwood Laboratories tested 37 different Spice/K2 products, and the results as to which compound is used is listed.

# Dangers/Legal Issues

- In 2010 there were 2,874 calls about synthetic marijuana products according to the American Association of Poison Control Centers' National Poison Data System (NPDS).
- As of May 12, 2011 poison centers reported 2,052 calls in 2011. "Statistics from NPDS show that this is an emerging phenomenon," said Alvin C. Bronstein, MD, acting director of toxicosurveillance for the American Association of Poison Control Centers.
- On November 24, 2010, the Federal Government took action to ban JWH-018, JWH-073, JWH-200, CP 47,497 and cannabicyclohexanol (CP 47,497 C8, which is a homologue of CP 47,497). The emergency ban was proposed to be in place for one year (December 24, 2010 - December 24, 2011) as federal officials study whether the products and chemicals should be permanently controlled.
- Finally on March 1, 2011, the U.S. Government placed an emergency one year ban on [these 5 synthetic cannabinoid substances](#).

# Legal Issues of Synthetic Cannabinoids

- Spice, K2 and other similar products are getting the fast track in many states to be made illegal, and they are currently (as of this printing - March, 2011) illegal in many states (e.g., Kansas, Louisiana, Mississippi, Missouri, Georgia, Indiana, Louisiana, Alabama and Tennessee) with other states considering legislation to do the same, (e.g., New Jersey and Pennsylvania).
- Bill [A2644](#) has been introduced by New Jersey Assemblywoman Mary Pat Angelini proposing to ban JWH-018, JWH-073 & HU-210 in May, 2010.
- On January 11, 2011, The NJ Senate Introduced an identical bill, S2606. This bill was referred to the [Senate Law and Public Safety Committee](#) where it currently sits.
- This Senate bill also only proposes to ban the same [three \(3\) compounds](#) the assembly bill proposes to ban, despite being introduced months after the proposed (and now enforced) emergency national ban (which has 5 substances listed).

# Legal Issues of Synthetic Cannabinoids

- On March 11, 2011, Assemblywoman Angelini responded to concern that banning compounds that are no longer being used in Spice/K2 anymore, she replied "The status it is supposed to come before Law & Public Safety, the next time they meet, which is late May or June [of 2011]. **We are going to amend current version to include the general language that includes chemical compounds created solely to simulate a marijuana-like high.**"
- In Pennsylvania, the House Judiciary Committee voted 24-0 approving the bill [HB-365](#) in September, 2010 (proposing to ban JWH-018, JWH-019, JWH-073, JWH-200, JWH-250, HU-210, HU-211, CP 47,497, & CP 47,497 C8,).
- On April 4, 2011, the [PA House voted 195-0](#) to pass HB 365 and have now passed this bill onto the Senate for approval.
- PA's bill is further along than NJ's bill, which has yet to be reviewed by the NJ Assembly Law and Public Safety Committee and NJ Senate Law and Public Safety Committee (since 2 bills have now been presented in NJ).

# National vs. State-by-State Bans

- Just because a federal ban is enacted on a drug, it does not mean local authorities will take action on this drug.
- States still need to enact legislation to ban the substances in order for state (then local) authorities to take action.
- Federal bans will go after larger distributors, but it will be locally determined as to whether users and smaller, local distributors (such as convenience stores, gas stations and head shops) will be sought after without a state ban.
- Certain synthetic cannabinoids are detectable in urine drug screens and with saliva based drug screening. For example, [Redwood Toxicology](#) currently tests for JWH-018 and JWH-073 in urine drug screen testing. They recently developed a saliva test that tests for JWH-018, JWH-073, and JWH-250.

# Final Conclusions

- Do not expect this national ban of five synthetic cannabinoids to be the end of this story. Already on the internet there are the K2 and Spice portals of sale, stating that "there is a new generation of K2 products that are completely legal everywhere."
- Not covered by any ban, restriction or regulation! These are: **K2 Sky**, **K2 Solid Sex**, **K2 Orisha**, **K2 Amazonian Shelter** and **K2 Thai Dream**. As stated earlier, at least one K2/Spice distributor even went through the trouble of having their product tested which reported none of the nationally banned substances were in their product.
- The Federal Government (then followed by each State Government) should ban this entire class of substances, including the derivatives, analogues and homologues.
- Otherwise we will continue to see years of this 'dance' where the Government bans a small subset of synthetic cannabinoids, followed by the makers of Spice/K2 coming out with a new version of their product containing other synthetic cannabinoids not yet banned.

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- The information on Spice/K2 was taken from: <http://www.hdap.org/spice.html> This article was last updated on 03/06/11 and uses citations from 20 sources dating from 2008 – 2011. The PowerPoint uses the following citations:
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# About this Presentation

- A comprehensive article on this topic is available at: <http://www.hdap.org/spice.html>
- If you are interested in the emerging drug trend of MDPV/Mephedrone ("Bath Salts"), please visit <http://www.hdap.org/mdpv.html> or view the corresponding PowerPoint presentation at <http://slidesha.re/gUfX50>.
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