



Investigation of JWH-018 Concentration in Spice Packages

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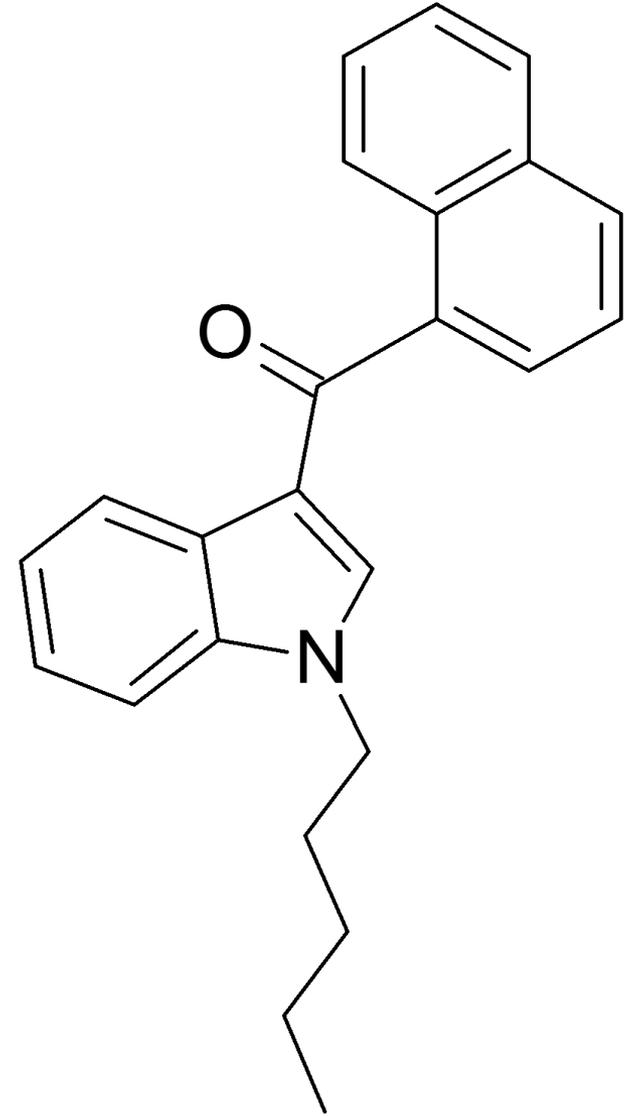
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JWH-018

- Synthesized by John W. Huffman in 1995
- Sold as a research chemical “bonsai fertilizer” and in smoking blends
- Users take orally or through inhalation



MANUFACTURING

- Cannabinoid is dissolved in solvent
 - Acetone or alcohol are usually used
- Solution is added to the plant material
 - Either sprayed on or mixed in
 - 1kg powder for 10 – 60kg plant material
- Plant material is spread out to dry and then packaged



Investigate the JWH-018 Concentration Variability

- Cone and sample technique
- Grinding
- Variability within a package
 - Same brand name
 - Same flavor
 - Same artwork on the package
- Variability between different brands or packaging
 - Same brand name but different flavor or packaging
 - Different artwork on the package

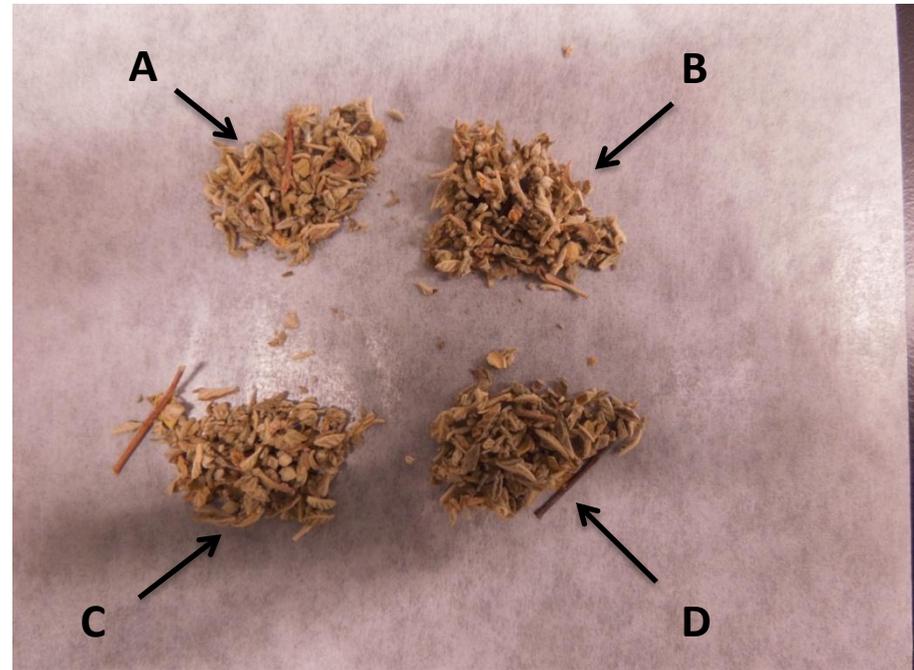


PROCEDURES

- Samples were screened with GC/MS to identify packets that contained JWH-018
- GC/FID was used to quantitate JWH-018
 - Internal standard - 0.3mg/mL papaverine HCl in dimethyl sulfoxide
 - Standard solution - 0.5mg/mL JWH-018 in internal standard solution
 - Plant material - final concentration is approximately 0.5mg/mL
 - Dilute the sample with the internal standard solution
 - Let the sample sit 24 hours
 - Filter an aliquot through a cotton plugged pipette into a GC vial
 - 12 minute GC/FID run



CONE AND SAMPLING



CONE AND SAMPLING RESULTS

- Three separate portions (A, B, and C) each from five individual packets
 - Cone and sampling is not a good representation of sample concentration in plant material

Package	1	2	3	4	5
Average JWH-018%	7.21	7.25	7.40	7.51	7.20
STDEV	0.33	0.43	0.19	0.62	0.03
CV (RSD)	4.51	5.87	2.59	8.26	0.48
Within Package Similarity	Yes	Yes	Yes	No	No



VARIABILITY IN IDENTICAL PACKAGES



ANALYSIS OF IDENTICAL PACKAGES

- The JWH-018 concentration was compared in different brands using one-way analysis of variance (ANOVA)
 - ANOVA compares the means of different samples
- Looked at seven different brands
 - Five packets were examined for each brand
 - Three replicate measurements were done for each packet



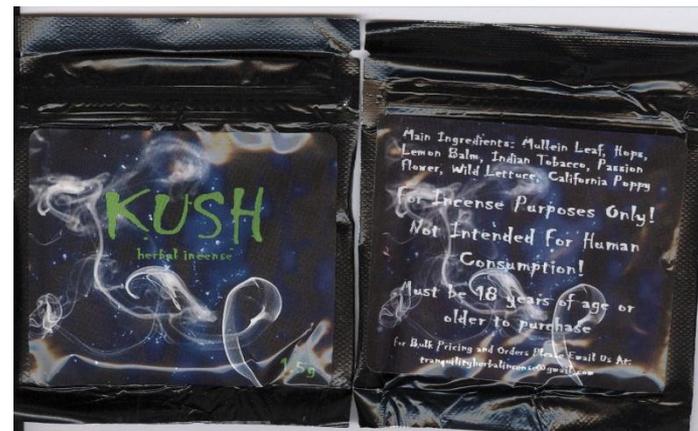
WITHIN BRAND SIMILARITY

Brand	K2 420 SUMMIT	K2 CLOUD 9	PURPLE FLAKE BLUE LABEL
Average JWH-018%	0.71	0.86	1.86
STDEV	0.14	0.18	0.22
CV (RSD)	19.47	20.98	11.80
Within Brand Similarity	No	No	Yes

Brand	FLORIDA SPICE MELON	KUSH - green label	Matrix Platinum	KUSH -blue label
Average JWH-018%	2.39	3.43	3.50	3.54
STDEV	0.11	0.11	0.21	0.10
CV (RSD)	4.75	3.10	5.97	2.91
Within Brand Similarity	No	No	Yes	Yes



VARIABILITY BETWEEN SIMILAR PACKAGES

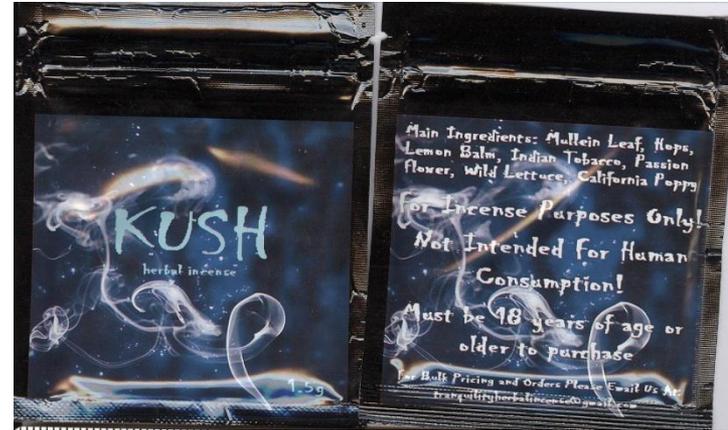


SIMILAR PACKAGE VARIABILITY

<i>Brand</i>	<i>PURPLE FLAKE TEAL LABEL</i>	<i>PURPLE FLAKE BLUE LABEL</i>	<i>FLORIDA SPICE</i>	<i>FLORIDA SPICE MELON</i>
Average JWH-018%	1.61	1.86	2.35	2.39
STDEV	0.049	0.22	0.066	0.11
CV (RSD)	3.04	11.80	2.80	4.75
Mean Statistically Similar to:	<i>PURPLE FLAKE BLUE LABEL</i>	<i>PURPLE FLAKE TEAL LABEL</i>	<i>FLORIDA SPICE MELON</i>	<i>FLORIDA SPICE</i>



Variability between brands



BETWEEN BRAND SIMILARITY

<i>Brand</i>	<i>K2 420 SUMMIT</i>	<i>K2 CLOUD 9</i>	<i>PURPLE FLAKE TEAL LABEL</i>	<i>PURPLE FLAKE BLUE LABEL</i>	<i>FLORIDA SPICE</i>	<i>FLORIDA SPICE MELON</i>
Average JWH-018%	0.71	0.86	1.61	1.86	2.35	2.39
STDEV	0.14	0.18	0.049	0.22	0.066	0.11
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Mean Statistically Similar to:			<i>PURPLE FLAKE BLUE LABEL</i>	<i>PURPLE FLAKE TEAL LABEL</i>	<i>FLORIDA SPICE MELON</i>	<i>FLORIDA SPICE</i>



BETWEEN BRAND SIMILARITY

<i>Brand</i>	<i>K2 MELON</i>	<i>KUSH - green label</i>	<i>Matrix Platinum</i>	<i>KUSH - blue label</i>	<i>KUSH - red label</i>
Average JWH-018%	2.94	3.43	3.50	3.54	4.48
STDEV	0.090	0.11	0.21	0.10	0.065
CV (RSD)	3.063	3.099	5.971	2.908	1.447
Mean Statistically Similar to:		<i>Matrix Platinum</i>	<i>KUSH - blue label</i>	<i>Matrix Platinum</i>	
			<i>KUSH - green label</i>		



CONCLUSIONS – CONE AND QUARTERING

- Grinding the plant material provides a more homogenous sample with repeatable quantitation results
- A cone and quartering technique can be used to identify the compounds added to the plant material but the quantitation results may not be repeatable.



CONCLUSIONS - WITHIN BRAND SIMILIARITIES

- The manufacturing process may use a more uniform procedure for dosing the plant material
 - Using a cement mixer to mix the plant material and chemicals versus spraying the plant material



CONCLUSIONS – DIFFERENT BRAND SIMILARITIES

- Florida Spice and Florida Spice Melon are similar
 - The addition of melon flavoring did not change the dosing amount of JWH-018
 - Possibly manufactured at the same facility at about the same time
- The two Purple Flake brands are similar
 - Manufacturer may have switched to another label during the manufacturing process
- Kush—green label, Kush—red label, and Matrix Platinum all are statistically similar in JWH-018 concentration



CONCLUSIONS

- K2 was one of the first cannabinomimetic brands in the U.S. market
- Due to its popularity, it was manufactured by numerous individuals throughout the country
- Packages analyzed may not have been manufactured at the same facility
 - Supported by the vast difference in JWH-018 concentrations between K2 Melon, K2 420 Summit, K2 Cloud 9



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Questions?



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