Centers for Disease Control and Prevention
MMWR
Morbidity and Mortality Weekly Report
Weekly / Vol. 62 / No. 6
February 15, 2013

Acute Kidney Injury Associated with Synthetic Cannabinoid Use — Multiple States, 2012

In March 2012, the Wyoming Department of Health was notified by Natrona County public health officials regarding three patients hospitalized for unexplained acute kidney injury (AKI), all of whom reported recent use of synthetic cannabinoids (SCs), sometimes referred to as "synthetic marijuana." SCs are designer drugs of abuse typically dissolved in a solvent, applied to dried plant material, and smoked as an alternative to marijuana. AKI has not been reported previously in users of SCs and might be associated with 1) a previously unrecognized toxicity, 2) a contaminant or a known nephrotoxin present in a single batch of drug, or 3) a new SC compound entering the market. After the Wyoming Department of Health launched an investigation and issued an alert, a total of 16 cases of AKI after SC use were reported in six states. Review of medical records, follow-up interviews with several patients, and laboratory analysis of product samples and clinical specimens were performed. The results of the investigation determined that no single SC brand or compound explained all 16 cases. Toxicologic analysis of product samples and clinical specimens (available from seven cases) identified a fluorinated SC previously unreported in synthetic marijuana products: (1-(5-fluoropentyl)-1H-indol-3-yl) (2,2,3,3-tetramethylcyclopropyl) methanone, also known as XLR-11, in four of five product samples and four of six patients' clinical specimens. Public health practitioners, poison center staff members, and clinicians should be aware of the potential for renal or other unusual toxicities in users of SC products and should ask about SC use in cases of unexplained AKI.

Epidemiologic Findings

The first three patients (Table 1, cases 1–3) reported smoking SCs in the days or hours before symptom onset. Public health staff members interviewed the three and reviewed their medical records. The patients were young, previously healthy males who reported smoking either a blueberry-flavored SC product (one patient) or an unspecified SC product (two patients). They experienced severe nausea, vomiting, and flank or abdominal pain and went to emergency departments during February 26–29. Local law enforcement officials were notified and released a media advisory warning of illness associated with SC use.

The Wyoming Department of Health launched an investigation to identify other cases and determine the cause of illness. A case initially was defined as nausea, vomiting, abdominal or back pain, and AKI (i.e., serum creatinine concentration above the facility's reference range) in a patient reporting SC use and illness onset during February 1–March 1. Hospital staff members from two regional medical facilities conducted retrospective reviews of emergency department and hospital admission records. The Wyoming Department of Health issued a health alert on March 1 to all licensed health-care providers, hospitals, emergency departments, and urgent-care centers in Wyoming, describing the possible association between AKI and SC use and requesting that potential cases be reported.

INSIDE

Continuing Education examination available at http://www.cdc.gov/mmwr/cme/conted_info.html#weekly.

U.S. Department of Health and Human Services
Centers for Disease Control and Prevention

Exhibit A

On March 21, the Wyoming state epidemiologist contacted CDC regarding the first three cases. On March 24, a fourth Wyoming patient became ill after smoking either a blueberry-flavored or bubblegum-flavored SC product and was found to meet the case definition (Table 1, case 4).

A collaboration among several state public health officials, poison center toxicologists, forensic laboratory scientists, individual clinicians, and the Arkansas K2 Research Consortium, identified an additional 12 cases of SC-associated AKI in Oregon (six cases), New York (two), Oklahoma (two), Rhode Island (one), and Kansas (one) in hospitalized patients who had serum creatinine concentration above the facility's reference range after smoking an SC product during March 16–December 3. CDC medical toxicologists reviewed clinical and laboratory data from all 16 cases (Table 1).

All 16 patients initially visited emergency departments and subsequently were hospitalized. The 16 patients included 15 males aged 15–33 years (median: 18.5 years) and one female aged 15 years; all but one had nausea and vomiting. Twelve patients reported abdominal, flank, and/or back pain. None reported preexisting renal dysfunction or use of medication that might have caused renal problems. The highest serum creatinine concentrations (creatinine peak) among the 16 patients ranged from 3.3 to 21.0 mg/dL (median: 6.7 mg/dL; normal 0.6–1.3 mg/dL) and occurred 1–6 days after symptom onset (median: 3 days). Urinalysis for 15 patients showed variable results: proteinuria (eight patients), casts (five), white blood cells (nine), and red blood cells (eight). Twelve patients underwent renal ultrasonograpy, nine of whom had a nonspecific increase in renal cortical echogenicity; none had hydronephrosis.

Six of eight patients with a renal biopsy demonstrated acute tubular injury, and three of eight patients demonstrated features of acute interstitial nephritis. Kidney function recovery was apparent within 3 days of creatinine peak in most patients. However, five of the 16 patients required hemodialysis, and four patients received corticosteroids; none died. Other infectious, autoimmune, pharmacologic, or other toxic causes of AKI were not found.

Toxicologic Analysis

Of the 16 cases, toxicologic analysis of implicated SC products and clinical specimens was possible in seven (Table 2). No single SC product explained all of the cases. Two SC products recovered by law enforcement officials in Wyoming and epidemiologically linked to cases 1–3 were tested by the Arkansas K2 Research Consortium laboratory (Arkansas K2) and the University of California–San Francisco Clinical and Environmental Toxicology Laboratory (UCSF). Gas chromatography/mass spectrometry (Arkansas K2) and liquid chromatography/time-of-flight mass spectrometry (UCSF) analysis revealed that both products contained 3-(1-naphthoyl) indole, a precursor to several aminoalkylindole synthetic cannabinoids. One of the two product samples also contained the potent synthetic cannabinoid AM2201, which has been linked to human disease and death, but not to AKI.

The *MMWR* series of publications is published by the Office of Surveillance, Epidemiology, and Laboratory Services, Centers for Disease Control and Prevention (CDC), U.S. Department of Health and Human Services, Atlanta, GA 30333.

Suggested citation: Centers for Disease Control and Prevention. [Article title]. MMWR 2013;62:[inclusive page numbers].

TABLE 1. Demographic and clinical characteristics and implicated product in 16 cases associated with synthetic cannabinoid use — multiple states, 2012

Case no.	State	Patient age (yrs)	Chief symptom at presentation	Peak creatinine (mg/dL)	Urine microscopy results*	Renal ultrasound results	Implicated product
1	Wyoming	19	Nausea and vomiting, abdominal pain	5.2	WBCs, RBCs, RBC/ granular casts	Within normal limits	Synthetic cannabinoid, not otherwise specified
2	Wyoming	15	Nausea and vomiting, abdominal pain	6.8	WBCs, RBCs, RBC/ granular casts, eosinophils	Increased cortical echogenicity bilaterally	Synthetic cannabinoid, not otherwise specified
3	Wyoming	21	Nausea and vomiting, flank pain	6.3	WBCs, RBCs, epithelial casts, granular casts	Not available	Blueberry-flavored
4	Wyoming	18	Nausea and vomiting, flank pain	4.1	Hyaline casts, WBCs	No increased cortical echogenicity or hydronephrosis	Blueberry-flavored or bubblegum-flavored
5	Rhode Island	25	Nausea and vomiting, anuria	21.0	RBCs, proteinuria, eosinophils	Not performed	Synthetic cannabinoid, not otherwise specified
6	New York	30	Nausea and vomiting	9.0	WBCs, RBCs, RBC/ hyaline casts,	Not performed	Phantom Wicked Dreams
7	Oregon	18	Nausea and vomiting, abdominal pain pain	6.6	WBCs, protein 30	Increased cortical echogenicity, no hydronephrosis	"Synthetic marijuana"
8	New York	33	Nausea and vomiting	3.3	Not available	Not performed	Spice Gold
9	Oregon	27	Flank pain	4.7	Small blood, protein 30	Normal echogenicity, no hydronephrosis	Mad Monkey or Clown Loyal
10	Washington/ Oregon	15	Nausea and vomiting, abdominal pain / back pain	9.1	Protein trace	Increased cortical echogenicity, no hydronephrosis	Synthetic cannabinoid, not otherwise specified
11	Kansas	26	Nausea and vomiting, abdominal pain / back pain	7.7	Within normal limits	Increased cortical echogenicity	Mr. Happy
12	Oregon	17	Nausea and vomiting, flank pain	10.6	WBCs, RBCs, protein 2+, eosinophils 1+	Increased cortical echogenicity, no hydronephrosis	Clown Loyal
13	Oregon	18	Nausea and vomiting, abdominal pain pain	9.6	Protein 2+, blood 3+, no RBCs	Increased cortical echogenicity, no hydronephrosis	Lava
14	Oregon	18	Nausea and vomiting, abdominal pain pain	5.5	Protein 1+	Increased cortical echogenicity, no hydronephrosis	Lava
15	Oklahoma	15	Nausea and vomiting, abdominal pain pain	11.5	WBCs, RBCs	Increased cortical echogenicity, bilateral symmetrical enlargement	Flame 2.0
16	Oklahoma	15†	Nausea and vomiting	6.2	WBC, protein 1+	Increased cortical echogenicity	Flame 2.0

Abbreviations: WBCs = white blood cells; RBCs = red blood cells.
* Elevated levels listed if above the reporting laboratory's reference range.
† Female patient; all others are male.

TABLE 2. Results of toxicologic analysis of implicated products and/or clinical specimens from seven patients with acute kidney injury associated with synthetic cannabinoid use — multiple states, 2012

Case no.	State	Implicated product	Synthetic cannabinoids identified from product samples	Clinical specimen type	Days after last use	Synthetic cannabinoids identified from clinical specimens
4	Wyoming	Blueberry-flavored or bubblegum-flavored	XLR-11 and indole precursor	Urine	2	XLR-11 N-pentanoic acid metabolite (400 ng/mL)
				Blood	3	Not detected
6	New York	Phantom Wicked Dreams	Not performed	Blood	2	XLR-11 N-pentanoic acid metabolite (42 ng/mL)
				Blood	3	Not detected
11	Kansas	Mr. Happy	XLR-11 (69 mg/g)	Serum	0	XLR-11 (35 ng/mL); N-pentanoic acid metabolite (102 ng/mL); UR-144 (6 ng/mL)
			UR-144 (61 mg/g)	Urine	0	XLR-11 N-pentanoic acid metabolite (529 ng/mL)
12	Oregon	Clown Loyal	XLR-11 (92.1 mg/g)	Serum	9	Not detected
13	Oregon	Lava	XLR-11 (1.7 mg/g)	Serum	2	XLR-11 (33 ng/mL); N-pentanoic acid metabolite (38 ng/mL)
				Serum	4	Not detected
14	Oregon	Lava	XLR-11 (1.7 mg/g)	Serum	2	Serum insufficient
				Urine	4	Not detected
15	Oklahoma	Flame 2.0	Not detected			Not performed

Standardized liquid chromatography–time of flight mass spectrometry methods validated for trace level analysis of synthetic cannabinoid parent compounds and metabolites were used for all clinical assays (UCSF). A sample of the product smoked by the patient in case 4 contained 3-(1-naphthoyl) indole and XLR-11, a previously undescribed fluorinated-derivative of the SC compound UR-144 currently in circulation. A urine specimen collected from the same patient was positive for the XLR-11 N-pentanoic acid metabolite. A blood specimen from the patient in case 6, who smoked "Phantom Wicked Dreams," contained the N-pentanoic acid metabolite of XLR-11. In case 11, analysis of the SC product "Mr. Happy" and a serum specimen revealed the SCs XLR-11 and UR-144; a urine specimen contained the N-pentanoic acid metabolite of XLR-11. In case 12, samples of "Clown Loyal" were found to contain XLR-11. In cases 13 and 14, analysis of "Lava" and associated clinical specimens identified XLR-11 and the N-pentanoic acid metabolite of XLR-11. In case 15, analysis of "Flame 2.0" was negative for XLR-11. For nine of the 16 cases, neither product samples nor clinical specimens were available for analysis.

Reported by

Tracy D. Murphy, MD, Kelly N. Weidenbach, MPH, Clay Van Houten, MS, Wyoming Dept of Health. Roy R. Gerona, PhD, Dept of Laboratory Medicine, Univ of California–San Francisco. Jeffery H. Moran, PhD, Arkansas Public Health Laboratory, Arkansas Dept of Health. Ronald I. Kirschner, MD, Nebraska Regional Poison Center. Jeanna M. Marraffa, PharmD, Christine M. Stork, PharmD, Upstate Medical Univ, Upstate New York Poison Center; Guthrie S. Birkhead, MD, Andie Newman, DVM, New York State Dept of Health. Robert G. Hendrickson, MD, B. Zane Horowitz, MD, Oregon Poison Center; Karen Vian, Douglas County Public Health; Richard F. Leman, MD, Oregon Public Health Div. Stephen L. Thornton, MD, Univ of Kansas Hospital Poison Control Center; Clayton Wood, DO, Dept of Emergency Medicine, Univ of Kansas Hospital. David A. Myers, MD, Oklahoma Univ Health Sciences Center. Erik Orr, MS, Geospatial Research, Analysis, and Services Program, John J. Devlin, MD, Michael D. Schwartz, MD, Office of Environmental Health Emergencies, National Center for Environmental Health; Genevieve L. Buser, MD, EIS Officer, CDC. ***Corresponding contributor:*** *Michael D. Schwartz, mschwartz@cdc.gov, 770-488-7282.*

What is already known on this topic?

Synthetic cannabinoids (SCs) are psychoactive chemicals dissolved in solvent, applied to plant material, and smoked as a drug of abuse. They are sold in "head shops" and tobacco and convenience stores under labels such as "synthetic marijuana," "herbal incense," "potpourri," and "spice." Most reports of adverse events related to SCs have been neurologic, cardiovascular, or sympathomimetic.

What is added by this report?

Sixteen cases of acute kidney injury following exposure to SCs were identified in six states with illness onset during March 16–December 7, 2012. Patients ranged in age from 15 to 33 years; 15 were male, and none reported a history of kidney disease. Gas and liquid chromatography and mass spectrometry identified a new SC, XLR-11, associated with some of these cases.

What are the implications for public health practice?

Novel drugs of abuse are emerging continuously. SCs often are packaged in colorful wrappers bearing labels such as "not for human consumption" or "incense," although health professionals and legal authorities know these products are smoked like marijuana. Law enforcement officials, public health officials, clinicians, scientists, and the members of the public should be aware of the potential for adverse health effects posed by SCs.

Editorial Note

Synthetic cannabinoid compounds originally were developed to facilitate study of cannabinoid receptor pharmacology, but in recent years have emerged as drugs of abuse. In 2005, SC products marketed as "Spice" first emerged in European countries, before appearing in the United States in 2009, where they were marketed initially as "K2." Today, SC products are distributed worldwide under countless trade names and packaged in colorful wrappers designed to appeal to teens, young adults, and first-time drug users (*1*). Products often are packaged with disingenuous labels such as "not for human consumption" or "incense," but health professionals and legal authorities are keenly aware that these products are smoked like marijuana. Despite federal and state regulations to prohibit SC sale and distribution, illicit use continues, and reports of illness are increasing (*1–4*).

The expectation of a more intense high than that induced by marijuana, easy access, affordability, and avoidance of detection by many commonly used urine drug tests all contribute to the growing abuse of SCs, especially among male adolescents (*1,5*). The increasing use of SCs by young persons, coupled with mounting evidence of adverse health effects, has led to state and federal legislation (*3,6*). However, full recognition of the potential dangers of SCs is not widespread among users or sellers, and SC products remain available on the Internet and at many convenience stores. Further, differences in state drug enforcement statutes have led to different laws and approaches to drug enforcement (*7*).

Although related to delta-9-tetrahydrocannabinol, the active ingredient in marijuana, SCs are two to three times more likely to be associated with sympathomimetic effects (i.e., tachycardia and hypertension), and approximately five times more likely to be associated with hallucinations (*8*). In addition, an increase in the occurrence of seizures has been reported with SC use (*9*). This report describes unanticipated AKI with SC abuse. Given the rapidity with which new SC compounds enter the marketplace and their increasing use in the past 3 years, outbreaks of unexpected toxicity associated with their use are likely to increase.

Management of suspected SC toxicity is symptomatic and supportive; no antidote exists. All of the patients in this report recovered creatinine clearance during their hospital stay, although the length of time was variable; one patient was discharged before his creatinine normalized. However, a risk for long-term kidney sequelae might exist. Recent studies suggest an increased risk for chronic and end-stage renal disease following AKI of various etiologies, despite initial recovery (*10*). Physicians caring for otherwise healthy adolescents and young adults with unexplained AKI should inquire about SC use, and cases of suspected SC poisoning should be reported to both the regional poison center and the appropriate state health department. Regional poison centers can be reached by telephone at 1-800-222-1222, from anywhere in the United States.

In this report, the product used by five of the 16 patients, including two patients (cases 13 and 14) who used the same product, contained a novel fluorinated SC (XLR-11). In addition, XLR-11 and/or XLR-11 metabolites were found in five of the seven cases for whom clinical specimens were available. XLR-11 emerged on the SC market in the first half of 2012; therefore, experience with this fluorinated compound has been limited. The consistent finding of XLR-11 in product samples and clinical specimens has alternative explanations. XLR-11, a metabolite, or a contaminant associated with it might be responsible for AKI in these patients, or its presence might simply reflect the widespread use of this particular compound in SC products during the study period rather than a causal association with AKI. Health-care providers should be aware of renal and other unexpected toxicities from use of SC products, especially with newer SC compounds.

Acknowledgments

Casper-Natrona County Health Dept, Casper Police Dept, Casper, Wyoming. Cindy Moran, Arkansas State Crime Laboratory, Little Rock, Arkansas. Saurabh Dasgupta, MD, Oklahoma Univ Health Sciences Center, Oklahoma City, Oklahoma. Colin Segovich, MD, Miriam Hospital, Providence, Rhode Island.

References

1. Fattore L, Fratta W. Beyond THC: the new generation of cannabinoid designer drugs. Front Behav Neurosci 2011;5:60.
2. Cohen J, Morrison S, Greenberg J, Saidinejad M. Clinical presentation of intoxication due to synthetic cannabinoids. Pediatrics 2012;129:e1064–7.
3. Lapoint J, James LP, Moran CL, Nelson LS, Hoffman RS, Moran JH. Severe toxicity following synthetic cannabinoid ingestion. Clin Toxicol (Phila) 2011;49:760–4.
4. Shanks KG, Dahn T, Terrell AR. Detection of JWH-018 and JWH-073 by UPLC-MS-MS in postmortem whole blood casework. J Anal Toxicol 2012;36:145–52.
5. Bebarta VS, Ramirez S, Varney SM. Spice: a new "legal" herbal mixture abused by young active duty military personnel. Subst Abus 2012;33:191–4.
6. Drug Enforcement Administration. Schedules of controlled substances: temporary placement of five synthetic cannabinoids into schedule I. Washington, DC: US Department of Justice, Drug Enforcement Administration; 2011. Available at http://www.deadiversion.usdoj.gov/fed_regs/rules/2011/fr0301.htm.
7. National Conference of State Legislatures. Synthetic cannabinoids (a.k.a. "K2"/"Spice") enactments. Washington, DC: National Conference of State Legislatures; 2012. Available at http://www.ncsl.org/issues-research/justice/synthetic-cannabinoids-enactments.aspx.
8. Forrester MB, Kleinschmidt K, Schwarz E, Young A. Synthetic cannabinoids and marijuana exposures reported to poison centers. Hum Exp Toxicol 2012;31:1006–11.
9. Hoyte CO, Jacob J, Monte AA, Al-Jumaan M, Bronstein AC, Heard K. A characterization of synthetic cannabinoids exposures reported to the National Poison Data System in 2010. Ann Emerg Med 2012;60:435–8.
10. Coca SG, Singanamala S, Parikh CR. Chronic kidney disease after kidney injury: a systemic review and meta-analysis. Kid Int 2012;81:442–8.

AFFIDAVIT OF CHELSEA ROSIPAJLA

The undersigned, Chelsea Rosipajla, having been first duly sworn, states the following:

1. I am currently employed as a Criminal Investigator for the State of Colorado with the Department of Revenue, Liquor & Tobacco Enforcement Division ("DOR"). I have been employed as an Investigator with the DOR since 2007. My office with the DOR is located at 1881 Pierce Street, #108, Lakewood, Colorado 80214. I can be reached at (303) 205-2305.

2. On June 28, 2012, I went to the Tobacco King, located at 2255 Main Street in Longmont, Colorado to conduct a tobacco compliance check. The Tobacco King is a store which sells cigarettes and other tobacco products. The Tobacco King also sells glass pipes and other paraphernalia associated with smoking marijuana. I was accompanied by Investigator Clyde Anderson, also with the DOR.

3. As part of the compliance check, I directed an under-aged minor operative into the Tobacco King to purchase a pack of cigarettes. I observed that a female clerk, who I later identified as Yung H. Leaming, sold cigarettes to the minor without asking for any proof of age

4. Following the sale to the minor operative, I entered the store and observed two plastic display cases containing products that I suspected to be illegal synthetic cannabinoids or "spice." In Colorado, synthetic cannabinoids are commonly referred to as "spice" by users and law enforcement.

5. The spice products were professionally packaged and placed next to legally-sold smoking paraphernalia.

6. Investigator Anderson and I asked Ms. Leaming about the spice products in the display case. Ms. Leaming called her son and owner of the store, Sang Leaming, to come to the store.

7. Sang Leaming arrived at the store and told Investigator Anderson and I that all of his spice products were "legal." He stated he was given a lab report that the products were legal for sale in Colorado.

8. I explained to Sang Leaming that based on my prior experience as an investigator, including previous seizures of spice products, I believed that the products contained illegal synthetic cannabinoids.

9. As part of my duties with the DOR, I have observed that products which have labels such as "Plant Food," "Potpourri," and "Not for Human Consumption," and that are sold along with items used to smoke marijuana such as glass pipes, rolling papers and lighters almost always test positive for synthetic cannabinoids. As part of my duties

with the DOR, I have seized these products and submitted them to the Colorado Bureau of Investigations ("CBI") for testing and reviewed the laboratory results. The laboratory results have almost always shown the presence of illegal synthetic cannabinoids.

10. Sang Leaming also showed Investigator Anderson and I several large boxes of spice products located behind the display shelves. Some of the products were packaged in small plastic packets; some were in small or medium jars. The names of the products were labeled on the containers and included Happy Tiger, Scooby Snax, Cosmic Kratom, Black Magic, Mad Hatter, 2012, High Roller Plant Food, Prism, Jamaican, and Funkey Monkey.

11. Investigator Anderson and I informed Leaming that we were seizing the SPICE products and would submit samples of the product for testing to the Colorado Bureau of Investigations. I told Leaming that the products would be returned if they were determined to be legal.

12. Investigator Anderson and I seized a total of 1,049 containers or packets of spice products. I have reviewed Exhibit B and it is a fair and accurate copy of the Evidence/Property Report that I prepared for placing the spice products into storage.

13. I submitted samples to CBI for testing of all the products that were seized at the Tobacco King.

14. On February 4, 2013, I received the laboratory results from CBI Forensic Agent/Laboratory Scientist Scott Web and reviewed the results. I have reviewed Exhibit C and it is a fair and accurate copy of the lab results that I received from CBI. The results showed that CBI tested 5 of the products. The products labeled as Happy Tiger, Scooby Snax and Black Magic tested positive for an illegal analog of the synthetic cannabinoid JWH-018. The High Roller Plant Food tested positive for a controlled substance, Schedule II amphetamines. The sample of Cosmic Kratom did not contain any controlled substances.

Chelsea Rosipajla
CHELSEA ROSIPAJLA, AFFIANT

CITY OF Lakewood)
) ss.
STATE OF COLORADO)

The foregoing Affidavit is SUBSCRIBED and sworn to before me by Chelsea Rosipajla this 3 day of September, 2013. Witness my hand and official seal.

My commission expires: 12-23-15

SUSAN J CARIVEAU
NOTARY PUBLIC, STATE OF COLORADO
My Comm. Expires December 23, 2015

Susan J Cariveau
Notary Public

COLORADO BUREAU OF INVESTIGATION
FORENSIC SERVICES DIVISION

Ronald C. Sloan
Director

Janet M. Girten
Assistant Director

Laboratory Report

Lab Case #: D12-1653
Reporting Section: Chemistry
Date of Submission: August 21, 2012
Nature of Offense: DANGEROUS DRUGS
Date of Report: February 4, 2013
Date of Offense: June 28, 2012

Agency Case #: 12-04736
Submitting Agency: DEPARTMENT OF REVENUE (LIQUOR ENFORCEMENT DIVISION) 1375 Sherman Denver, CO 80261
Investigated by: Chelsea Rosipajla
Submitted to CBI by: Chelsea Rosipajla
Delivery Method: Hand to Hand Transfer

Involved Subjects
Suspect: Sand Leaming **DOB:** 10/08/1986 **SID:**

CBI Item #:	Agency Item #:	Description of Evidence:
Item 1	1	Happy tiger "spice"
Item 2	2	Scooby snax "potpourri"
Item 3	3	Cosmic kratom "unknown product"
Item 3.1		clear capsule with plant material
Item 3.2		thirteen clear capsules with plant material
Item 4	4	Black magic "spice"
Item 5	5	Mad hatter "spice"
Item 6	6	2012 "spice"
Item 7	7	High roller plant feeder "unknown product"
Item 7.1		clear capsule with tan powder
Item 7.2		clear capsule with light orange powder
Item 8	8	Prism "spice"
Item 9	9	Jamaican "spice"
Item 10	10	Funkey monkey "spice'

Results/Opinions and Interpretations:

Item 1: Analysis identified JWH-122 (4-methyl-1-naphthalenyl)(1-pentyl-1H-indol-3-yl)-methanone, weighing 2.36 gram(s) net weight, an analog of JWH-018 (1-Pentyl-3-(1-naphthoyl)indole), a synthetic cannabinoid controlled substance.

Item 2: Analysis identified AM2201 [1-(5-fluoropentyl)-1H-indol-3-yl]-1-naphthalenyl-methanone, weighing 3.12 gram(s) net weight, an analog of JWH-018 (1-Pentyl-3-(1-naphthoyl)indole), a synthetic cannabinoid controlled substance.

Item 3: Contains Items 3.1 and 3.2; see below.

Item 3.1: One clear capsule (no markings) weighing 0.60 gram(s) net weight. Controlled substances were not detected.

Item 4: Analysis identified AM2201 [1-(5-fluoropentyl)-1H-indol-3-yl]-1-naphthalenyl-methanone, weighing 6.25 gram(s) net weight, an analog of JWH-018 (1-Pentyl-3-(1-naphthoyl)indole), a synthetic cannabinoid controlled substance.

Exhibit C

Lab Case #: D12-1653	Chemistry	Date of Report: February 4, 2013

Item 7: Contains Items 7.1 and 7.2; see below.

Item 7.1: One clear capsule (no markings) weighing 0.45 gram(s) net weight. Analysis identified N-methylethcathinone (4-MEC), a controlled substance and 5-Iodo-2-aminoindane (5-IAI), an analog of Amphetamine, a schedule II controlled substance.

Item 7.2: One clear capsule (no markings) weighing 0.38 gram(s) net weight. Analysis identified N-methylethcathinone (4-MEC), a controlled substance and 5-Iodo-2-aminoindane (5-IAI), an analog of Amphetamine, a schedule II controlled substance.

Item 3.2, Item 5, Item 6, Item 8, Item 9 and Item 10: Not Analyzed - chose other items to analyze.

Scott Webb
Laboratory Agent/Forensic Scientist
CBI Greeley - Laboratory
P.O. Box 410
Greeley, CO 80632
Phone: (970)392-4620
(970)392-4621
Fax: (970)336-7258

State of Colorado
Liqour/Tobacco Enforcement Division
1881 Pierce Street Room 109A
Lakewood, CO 80214

Evidence/Property Report

Evidence or Property	Evidence	Page	1	Case Report Number	12-4736
		of	2		
Summons #(s)	Connecting Case #(s)	Type of Case			
		Drug Related			
Received From Name/DBA		Address		City/State/ZIP	
Tobacco King		2255 N. Main St. #115A		Longmont, CO 80501	
Licensee/Taxpayer Name				License/Tax Number	
Yongbro Corporation				42-85295-0000	
Investigator Receiving Name	Signature	Date/Time Received		Date/Time Booked	
Rosipajla		062812/0930			

Item Number	Quantity	Description	Other
1	25	Cosmic Kratom	
2	2	Large Vials of 2012	
3	10	10 boxes (20 in each box) of 2012	
4	7	Small 2012	
5	24	Small 2012	
6	1	1 box (27 in the box) of small 2012	
7	1	1 box (54 in the box) of small 2012	
8	4	4 boxes (20 in each box) Prisim medium size	
9	47	47 loose jars of Prisim medium size	
10	56	56 loose jars of Prisim small size	
11	8	8 loose jars of Funky Monkey medium size	
12	2	2 boxes (36 in each box) Prisim small size	
13	12	12 boxes (20 in each box) Funky Monkey medium size	
14	4	4 packs of High Roller plant feeder	
15	6	6 packs of Scooby Snax potpouri	
16	24	24 packs Mad Hatter incense	
17	2	2 boxes (20 in each box) of Jamaican medium size	
18	15	15 loose of Jamaican medium size	
19	1	1 box (54 in the box) Jamaican small size	

Evidence Custodian Receiving Name	Signature	Date/Time Received	Date/Time Booked	Location Booked
Anita Sinko		6-28-12 0930	6-28-12 0930	TEU

CHAIN OF CUSTODY

Property In or Out	Date/Time	Person Receiving Property	Initials of Custodian	Item Number	Purpose/Status

Exhibit D

State of Colorado
Liquor/Tobacco Enforcement Division
1881 Pierce Street Room 109A
Lakewood, CO 80214

Evidence/Property Report

Evidence or Property	Evidence	Page	2	Case Report Number	12-4736
		of	2		
Summons #(s)	Connecting Case #(s)	Type of Case			
		Drug Related			
Received From Name/DBA		Address		City/State/ZIP	
Tobacco King		2255 N. Main St. #115A		Longmont, CO 80501	
Licensee/Taxpayer Name				License/Tax Number	
Yongbro Corporation				42-85295-0000	
Investigator Receiving Name	Signature	Date/Time Received		Date/Time Booked	
Rosipajla		062812/0930			

Item Number	Quantity	Description	Other
20	44	44 packs of Black Magic	
21	20	20 pack of Happy Tiger	

Evidence Custodian Receiving Name	Signature	Date/Time Received	Date/Time Booked	Location Booked
Anita Smith		6-28-12 093	6-28-12 0930	TEU

CHAIN OF CUSTODY

Property In or Out	Date/Time	Person Receiving Property	Initials of Custodian	Item Number	Purpose/Status

AFFIDAVIT OF DARREN BLOOM

The undersigned, Darren Bloom, having been first duly sworn, states the following:

1. I am a police officer with the Longmont Police Department in Longmont, Colorado.

2. On July 10, 2012, I went to the Tobacco King store located at 2255 Main St. #112 in Longmont, Colorado to investigate a complaint from a private citizen, Carey Ferguson. Ms. Ferguson stated that her son had become sick after using a product named Black Magic sold by Tobacco King. Ms. Ferguson and Sgt. Orr from the Longmont Police Department were present when I arrived.

3. Sgt. Orr showed me a small, black and purple package. The package was labeled as "Black Magic" and had the words "Not for Human Consumption," instructions which stated that it was to be used as incense. The package was also labeled with the words "JWH-018 Free."

4. From my experience and training, I was aware that "JWH-018" is a synthetic cannabinoid.

5. Ms. Ferguson told me that her son had been acting "crazy" and that she found a package of Black Magic in his room. Her son told her he had purchased the package of Black Magic from the Tobacco King.

6. Ms. Ferguson told me that she wanted to see if the Tobacco King was selling Black Magic so she went to the store. She was able to purchase a package of Black Magic from the Tobacco King.

7. I spoke with the owner of the Tobacco King, Sang Leaming. I advised him that the sale of synthetic cannabinoids was a felony.

8. Sang Leaming told me that he had purchased the products from another company, and that the company had provided him with a letter advising that the chemicals in the products were legal. The letter had letterhead with the wording AI Bio Tech. I have reviewed Exhibit K and it is a fair and accurate copy of the letter provided to me by Mr. Leaming.

9. I asked Sang Leaming if he had any more of the products in the store. Sang Leaming stated that he did have more of the products, and went into the backroom and brought out a small shoe box containing small plastic jars and several packages of Black Magic.

10. I asked Sang Leaming what he was going to do with these products and he stated that he was going to "get rid" of the products and not order any more. I asked him if he was going to sell the product, and he stated "Yes."

11. I advised Sang Leaming that I was going to take the products. I then proceeded to take 17 packages of "Black Magic," 9 jars of Funky Monkey," 3 jars of "2012 3X," 10 large jars of "Jamaican," and 12 small jars of "Jamaican."

12. I also took a copy of an invoice from Smart Smokes in Albany, N.Y. for what appeared to be 2 products, "2012 2X" and "Prism 2X." The total of the invoice was $2,099.75. I have reviewed Exhibit 5 and it is a fair and accurate copy of the Smart Smokes Invoice. 2

Darren Bloom , AFFIANT

CITY OF Boulder)
) ss.
STATE OF COLORADO)

The foregoing Affidavit is SUBSCRIBED and sworn to before me by Melissa Hernandez this 6th day of September, 2013. Witness my hand and official seal.

My commission expires: 8-6-14

MELISSA HERNANDEZ
Notary Public
State of Colorado
My Commission Expires August 06, 2014

Notary Public

AFFIDAVIT OF M. SCOTT WEBB

The undersigned, Scott Webb, having been first duly sworn, states the following:

1. I am currently employed as a Laboratory Agent/Forensic Scientist with the Colorado Bureau of Investigations ("CBI"). I work at the CBI Laboratory in Greeley, Colorado. I can be reached at (970) 392-4620.

2. Exhibit G is a fair and accurate copy of my curriculum vitae.

3. Exhibit C is a fair and accurate copy of a Laboratory Report that I wrote on February 4, 2013.

4. Exhibit C contains the results of testing that I performed on several items that were sent to CBI by Investigator Chelsea Rosipajla of the Colorado Department of Revenue ("DOR").

5. I tested 5 items at the request of the DOR. The items labeled as "Happy Tiger," "Scooby Snax" and "Black Magic" tested positive for containing an analog of the illegal synthetic cannabinoid JWH-018. The High Roller Plant Food tested positive for an analog of amphetamine, a Schedule II controlled substance. The sample of Cosmic Kratom did not test positive for controlled substances.

M. Scott Webb

M. Scott Webb , AFFIANT

CITY OF Greeley)
) ss.
STATE OF COLORADO)

The foregoing Affidavit is SUBSCRIBED and sworn to before me by M. Scott Webb this 25 day of September, 2013. Witness my hand and official seal.

My commission expires: June 5, 2017

RONALD E. ARNDT
NOTARY PUBLIC
STATE OF COLORADO
NOTARY ID 20134035406
MY COMMISSION EXPIRES JUNE 5, 2017

Ronald E. Arndt

Notary Public

Exhibit F

COLORADO BUREAU OF INVESTIGATION
FORENSIC SERVICES

Curriculum Vitae
M. Scott Webb
Criminal Investigator II
Colorado Bureau of Investigation, Greeley Laboratory

Discipline
Chemistry – Controlled Substances

Education
2003
- Texas A&M University, Master of Science, Wildlife and Fisheries Sciences

1995
- University of North Texas, Bachelor of Arts, Major – Biology, Minor - Chemistry

Experience
2012- Present
- Colorado Bureau of Investigation, Criminal Investigator II, Greeley, CO

2011-2011
- DynCorp International, Analytical Forensic Advisor, Erbil, Iraq

2006-2011
- Dallas County, Drug Chemist II, Dallas, TX

2001-2006
- University of Texas Medical Branch, Research Associate, Galveston, TX

1991-1997
- US Army Reserves, Medical Lab Technician, Seagoville, TX

Training
2010
- Introduction to Forensic Drug Chemistry, West Virginia University, online course

2009
- Forensic Chemist Seminar, Drug Enforcement Administration, Sterling, VA

2008
- Statistical Uncertainty Seminar, Southwestern Association of Forensic Scientists (SWAFS), Little Rock, AR
- Quantitative Method Validation Seminar, SWAFS, Little Rock, AR
- Ethics in Forensics Seminar, SWAFS, Little Rock, AR
- GC/MS Operation, Maintenance and Troubleshooting, Agilent Technologies, Austin, TX

2007
- Expert Witness Testimony Seminar, SWAFS, Austin, TX
- Infrared Spectroscopy, DEA South Central Lab, Dallas, TX
- Introduction to GC/MS, Restek, Dallas, TX

Court Experience
- Testified in Controlled Substances since 2006

Updated 5/24/2012

Exhibit G

AFFIDAVIT OF SARAH BRUHN

The undersigned Sarah Bruhn, having been first duly sworn, states the following:

1. I am a registered nurse (BSN), certified specialist in poison information, currently employed as a Clinical Supervisor for the Rocky Mountain Poison and Drug Center (RMPDC), a department of the Denver Health and Hospital Authority. RMPDC is located at 990 Bannock Street, Denver, CO 80204. I can be reached at 303-389-1718.

2. RMPDC was established in 1956 and is the state-designated regional poison center. A portion of RMPDC poison center activities are funded by the Colorado Department of Public Health and Environment.

3. As a poison and drug center, RMPDC receives phone calls regarding how to best assess and treat exposures to poison and drugs.

4. Approximately 80% of calls to RMPDC are from lay individuals and 20% are from medical professionals, including emergency department physicians who are seeking assistance in treating persons in need of urgent care.

5. RMPDC routinely receives calls about synthetic cannabinoid ingestion. Synthetic cannabinoids are commonly referred to as "spice," "mamba," or "Black Mamba."

6. My review of RMPDC's records shows that from 1/01/11 to 9/16/13, RMPDC received 154 calls where patients were exposed to synthetic cannabinoids in Colorado. RMPDC received 44 calls regarding synthetic cannabinoid exposure in 2011, 38 calls in 2012, and 72 calls as of 9/16/13. Year to date, calls have nearly doubled since 2012.

7. 69 out of 154 patients (45%) were less than 20 years old. 12 patients were under the age of 15, including one reported accidental exposure in a 2 year old. The rest of the patients were mainly in their 20's. 142 out of 154 patients (92%) were already in a hospital when RMPDC was contacted, or were referred to a hospital for treatment.

8. The majority of calls regarding patients who had ingested synthetic cannabinoids reported symptoms such as agitation/irritability, increased heart rate, drowsiness/lethargy, confusion, and hallucinations/delusions.

9. RMPDC also had a cluster of 5 patients who came from the same party where they smoked "spice" and suffered acute kidney damage.

10. Kidney damage is evidenced by increased accumulation of waste products in the blood. If this waste is not removed, patients feel extremely ill. Continued use of spice can lead to kidney failure. During acute kidney failure, the kidneys are operating at less than 10 percent of normal function. Acute kidney failure can be fatal and requires intensive treatment.

Sarah Bruhn

Sarah Bruhn, AFFIANT

CITY OF Denver)
) ss.
STATE OF COLORADO)

The foregoing Affidavit is SUBSCRIBED and sworn to before me by Sarah Bruhn this 18th day of September, 2013. Witness my hand and official seal.

My commission expires: June 23, 2015.

JEAN M. HOLZWART NOTARY PUBLIC STATE OF COLORADO

Jean M Holzwart

Notary Public
660 Bannock St.
Denver, CO

AFFIDAVIT OF CHRIS HOLMES, M.D.

The undersigned, Chris Holmes, having been first duly sworn, states the following:

1. I am a board certified emergency physician and currently practice medicine at Swedish Medical Center in Englewood, Colorado. I completed my residency at Denver General, now Denver Health, in 2000.

2. Since 2010, I have treated patients who suffered adverse effects after ingesting synthetic cannabinoids, or "spice" products.

3. Typically, I am made aware that the patient has ingested a spice product through the patient's own admission or from an accompanying friend or family member.

4. Patients under the influence of spice products frequently display symptoms such as agitation, anxiousness, paranoia, hallucinations, seizures, aggression, memory problems and kidney complications, including renal failure.

5. I have also routinely seen patients under the influence of marijuana. Patients who have ingested spice products display much more aggression than patients who have ingested marijuana. Patients who have ingested spice products often have to be physically restrained to keep from hurting themselves or medical staff.

6. Based on the age of patients impacted, the seriousness of the effects, and the safety impact on staff and medical personnel, I believe that spice products are harmful and pose a threat to those who ingest them.

Chris Holmes, AFFIANT

CITY OF Evergreen)
) ss.
STATE OF COLORADO)

The foregoing Affidavit is SUBSCRIBED and sworn to before me by Chris Holmes this 10th day of September, 2013. Witness my hand and official seal.

My commission expires: 6/21/17

Notary Public

TYE A. DIPIRRO
NOTARY PUBLIC
STATE OF COLORADO
NOTARY ID 20134039643
MY COMMISSION EXPIRES JUNE 21, 2017

Exhibit I

AFFIDAVIT OF CAREY FERGUSON

The undersigned, Carey Ferguson, having been first duly sworn, states the following:

1. I currently live at 2457 5th Street SW, Longmont, Colorado 80537, and can be reached at (303)931-9940.

2. Around July of 2012, I became aware them my son was smoking a product called "Black Magic."

3. My son had been smoking Black Magic product because he had been in trouble for smoking regular marijuana. He switched to Black Magic after he was told it would be undetectable in his urinalysis samples.

4. From speaking with my son I believe that my son was 17 years old when he began smoking Black Magic and that he smoked it for a period of several months.

5. During the time my son was smoking Black Magic, I observed that he had become increasingly withdrawn and isolated, and sometimes would come home in the afternoon and go straight to bed. I observed that he very interrupted sleep, and would sleep intermittently or for short durations.

6. During this same time, I would frequently hear him vomiting during the night. I observed that he would have vomiting attacks that come on suddenly and for no apparent reason. I observed that my son had lack of appetite and severe headaches.

7. My son told me that the "high" on Black Magic was at least "ten times" more potent than regular marijuana.

8. I had heard from others that the Tobacco King in Longmont, Colorado was selling Black Magic. On July 10, 2012, I went to the Tobacco King to verify that the store was selling Black Magic.

9. At the Tobacco King, I asked the clerk for Black Magic. The clerk brought a package to the counter and sold to me.

10. After purchasing the Black Magic, I left the store and called the Longmont Police Department.

11. I was very happy that my son was able to stop using products like Black Magic and I am actively involved in my community to prevent stores from selling these harmful products.

Carey Ferguson

Carey Ferguson, AFFIANT

CITY OF Boulder)
) ss.
STATE OF COLORADO)

The foregoing Affidavit is SUBSCRIBED and sworn to before me by Carey Ferguson this 10th day of September, 2013. Witness my hand and official seal.

Exhibit J

My commission expires:

RHIANNA GRAY
NOTARY PUBLIC
STATE OF COLORADO
MY COMMISSION EXPIRES 03/21/2015

Notary Public

12-6051
07.10.12 CB

#1

AIBioTech™
AMERICAN INTERNATIONAL BIOTECHNOLOGY, LLC

601 Biotech Dr., Richmond, VA 23235
phone: 804-521-7369
fax: 804-648-2641
www.aibiotech.com
email: kcarter@aibiotech.com

Karen M. Carter, Ph.D.
Group Leader, Bioorganic Chemistry

02/10/12

Smart Smokes LLC
3 Bawson St. #2
Albany, NY 12206

RE: Analysis of your test sample for the presence of synthetic cannabinoids

Dear Charles:

The sample you provided has been analyzed according to our Standard Operating Protocol ANALCHEM00065 "Detection of Cannabinoids by GC/MS." Effective March 1, 2011, the Administrator of the Drug Enforcement Administration (DEA) placed five synthetic cannabinoids into the Controlled Substances Act (CSA) pursuant to temporary scheduling provisions. The substances are

- 1-pentyl-3-(1- naphthoyl)indole (JWH-018),
- 1-butyl-3-(1-naphthoyl)indole (JWH-073),
- 1- [2-(4-morpholinyl)ethyl]-3-(1-naphthoyl)indole (JWH-200),
- 5-(1,1- dimethylheptyl)-2-[(1R,3S)-3-hydroxycyclohexyl]-phenol (CP-47,497), and
- 5-(1,1-dimethyloctyl)-2-[(1R,3S)-3-hydroxycyclohexyl]-phenol (cannabicyclohexanol; CP-47,497 C8 homologue).

The DEA asserts it is necessary to place these compounds into Schedule I of the CSA to avoid an imminent hazard to the public safety. As a result of this order, the full effect of the CSA and its implementing regulations including criminal, civil and administrative penalties, sanctions and regulatory controls of Schedule I substances are imposed on the manufacture, distribution, possession, importation, and exportation of these synthetic cannabinoids.

AI BioTech makes no claims as to the legality or use of the test substance provided for analysis. This report is for informational purposes only. Be advised that the results obtained with these particular test samples cannot be generalized to other lots of batches of the same or similar materials. AI BioTech recommends that all individual lots of suspect samples be tested.

This report cannot be used for commercial purposes, nor can it be modified in any way. AI BioTech cannot be held responsible for misuse of this report, or misrepresentation of the findings presented in this report.

The Illinois Attorney General's Office does not accept these results as valid and shall not be used as evidence of compliance with the Illinois Controlled Substances Act, 720 ILCS 570/1 et seq.

A more detailed report of the experimental findings can be obtained on written request. The results of our analyses can be summarized as follows:

Bag A

By comparison with various reference standards (Table 1), Sample Bag A (Dead Man Walking Prism, Extreme, Dead Man Walking, Funky Monkey, and Jamaican) was found not to contain any of the synthetic cannabinoids listed.

Table 1. Synthetic Cannabinoids Tested for in Sample:

Bag A (Dead Man Walking Prism, Extreme, Dead Man Walking, Funky Monkey, and Jamaican)	Sample Date 02/09/2012	JWH133	Not Detected
		CP 47,497	Not Detected
		CP 47,497-C6	Not Detected
		CP 47,497-C8	Not Detected
		CP 47,497-C9	Not Detected
		HU 308	Not Detected
		JWH 251	Not Detected
		JWH 203	Not Detected
		JWH 250	Not Detected
		CP 55,940	Not Detected
		RCS-4	Not Detected
		HU-210	Not Detected
		JWH 073	Not Detected
		JWH 015	Not Detected
		AM 694	Not Detected
		JWH-073 3-metyhylbutylhomolog	Not Detected
		AM-3102	Not Detected
		JWH 018	Not Detected
		JWH 007	Not Detected
		JWH 019	Not Detected
		AM-2201	Not Detected
		JWH 122	Not Detected
		RCS-8	Not Detected
		JWH 398	Not Detected
		JWH 210	Not Detected
		Pravadoline	Not Detected
		JWH 081	Not Detected
		HU - 243	Not Detected
		JWH 200	Not Detected
		WIN 55212-2	Not Detected
		JWH – 366	Not Detected
		AM – 1220	Not Detected
		Salvinorn A	Not Detected
		AM - 2233	Not Detected

Thank you for your use of our facilities. Please call or email with questions, and please let us know if we can be of further assistance.

Sincerely,

#2 12-6091
07-10-12

3 Rawson Street
Albany, NY 12206
(518)285-1862

Invoice: Tobacco King 6/25/12

Product	Quantity	Price	Total
Prism 2x Md	100	$17.00	$1,700.00
2012 4x Md	39	$10.25	$399.75
			$0.00
			$0.00
			$0.00
			$0.00
			$0.00
			$0.00
			$0.00
			$0.00
			$0.00
			$0.00
			$0.00
		Credit	-$2,099.75
		Shipping	Free
		Total	$0.00

Please Make Checks Payable to: SmartSmokes LLC. Thank You!