

A Case in which a Patient Intoxicated by Synthetic Cannabinoids was Diagnosed by a Mass Spectrometry Analysis

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Abstract: A 20-year-old man who was accompanied by another man who was sitting in the passenger seat, bumped into a guardrail while driving a car at low speed. When the emergency medical technician checked them, the passenger regained consciousness and refused to be transported to a medical facility. A cinder was observed on the vehicle's dashboard. The driver remained unconscious and was transported to our department. Upon arrival, he had a Glasgow Coma Scale of E3V4M6 and his pupils were 2 mm in diameter. A physiological examination revealed no remarkable findings. The same cinders that had been observed on the vehicle's dashboard were found attached to his clothes. He regained clear consciousness but had a complete loss of memory in relation to the traffic accident. As he refused to undergo clinical examinations and studies, the local police arrested him based on the suspicion that he had been using designer drugs. The police could not reveal information about the case, including the results of a drug test that had been performed by the Crime Laboratory Center. Instead, Hoshi University perform an analysis of the cinder attached to his clothes. As a result, AB-CHMINACA (N-[1-amino-3-methyl-oxobutan-2-yl]-1-[cyclohexylmethyl]-1H-indazole-3-carboxamide), which was an indazole-based synthetic cannabinoid, was detected. In Japan, no commercially-available screening tests for synthetic cannabinoids are available in general hospitals. A commercial system that can be used to detect the use of synthetic cannabinoids is required in Japan. Alternatively, the Crime Research Center should analyze samples from general hospitals and inform clients of their results.

Keywords: synthetic cannabinoids; Crime Research Center; screening tests; designer drug; intoxication

INTRODUCTION

Synthetic cannabinoids and synthetic cathinones are classified as "designated substances", and comprise a new class of illegal drugs in Japan [1]. Synthetic cannabinoids have been emerging as recreational drugs because they mimic the euphoria effect of cannabis [2, 3]. However, users often report cardiovascular, gastrointestinal, and psychiatric/neurological side effects. An ever increasing number of compounds, of different chemical classes, have been promoted and now represent a large assortment of new popular drugs of abuse, which are difficult to properly identify [3]. There are no rapid screening tests to diagnose patients who are intoxicated by synthetic cannabinoids or cathinones in general hospitals. In order to offer rapid and expert testimony on these drugs, a screening method using a direct analysis in real time (DART TM) with time-of-flight (TOF) mass spectrometry (MS) is generally required. We report a case in which a patient, who was intoxicated by synthetic cannabinoids, was diagnosed by mass spectrometry.

CASE REPORT

A 20-year-old man who was accompanied by another man who was sitting in the passenger seat, bumped into a guardrail while driving a car at low speed. A witness who checked on them observed that they had lost consciousness and called an ambulance. When the emergency medical technician checked them, the passenger regained consciousness and refused to be transported to a medical facility. A cinder was observed on the vehicle's dashboard. The driver remained unconscious and was transported to our department. Upon arrival, he had a Glasgow Coma Scale of E3V4M6 and his pupils were 2 mm in diameter. A physical examination revealed the following: blood pressure, 140/72 mmHg; heart rate, 65 beats per minute; oxygen saturation, 98% under room air. A physiological examination revealed no remarkable findings. The same cinders that had been observed on the vehicle's dashboard were found attached to his clothes. An electrocardiogram, chest roentgen and a biochemical analysis of the patient's blood revealed no specific findings. During these studies, he regained clear consciousness and refused to undergo a computed tomography scan of his head. He had a complete loss of memory in relation to the traffic accident. As he refused

further to undergo further clinical examinations and studies, the local police arrested him based on the suspicion that he had been using designer drugs. We requested information about the outcome from the police. The police could not reveal information about the case, including the results of a drug test that had been performed by the Crime Laboratory Center. We requested that the Department of Analytical Chemistry, Faculty of Pharmaceutical Sciences, Hoshi University perform an analysis of the cinder attached to his clothes. As a result, AB-CHMINACA (N-[1-amino-3-methyl-oxobutan-2-yl]-1-[cyclohexylmethyl]-1H-indazole-3-carboxamide), which was an indazole-based synthetic cannabinoid, was detected.

DISCUSSION

In Japan, no commercially-available screening tests for synthetic cannabinoids are available in general hospitals. Experimentally, methods of detecting synthetic cannabinoids have been developed [4-8]. To diagnose intoxication after the use of synthetic cannabinoids, physicians should first suspect their use and ask the patient whether or not he or she has used such substances. If the patient denies the use of synthetic cannabinoids, there has been no way to identify the substance that they have been used. The Japanese Crime Research Center can examine whether or not synthetic cannabinoids have been used for police investigations; however, these methods are not applied to the diagnosis of patients in hospitals. In addition, the results of examinations executed by the Japanese Crime Research Center are not open to healthcare providers. Accordingly, physicians cannot usually obtain a definite diagnosis of intoxication by synthetic cannabinoids when a patient denies their use. Fortunately, the research center was able to analyze the cinder at its own expense. However, the research center has no obligation to respond to all requests for an analysis. Synthetic cannabinoid users may have not present with serious symptoms; however, severe adverse events that occur in association with their use (stroke, seizure, myocardial infarction, rhabdomyolysis, acute kidney injury, psychosis and hyperemesis) have the potential to result in a fatal outcome [9]. In addition, synthetic cannabinoid users may suffer severe health consequences, including anxiety, tachycardia, hallucinations, violent behavior, and psychosis [10]. Accordingly, a commercial system that can be used to detect the use of synthetic cannabinoids is required in Japan. Alternatively, the Crime Research Center could analyze samples from general hospitals and inform clients of their results.

REFERENCES

1. Higuchi M, Saito K. Rapid screening for synthetic cannabinoids and cathinones using direct analysis in real time (DART)-TOF-MS. *Bunseki Kagaku*. 2012; 61(8):705-11.
2. Karila L, Benyamina A, Blecha L, Cottencin O, Billieux J. The Synthetic Cannabinoids

- Phenomenon. *Curr Pharm Des*. 2016;22(42):6420-5.
3. Debruyne D, Le Boisselier R. Emerging drugs of abuse: current perspectives on synthetic cannabinoids. *Subst Abuse Rehabil*. 2015;6:113-29.
4. Tynon M, Homan J, Kacinko S, Ervin A, McMullin M, Logan BK. Rapid and sensitive screening and confirmation of thirty-four aminocarbonyl/carboxamide (NACA) and arylindole synthetic cannabinoid drugs in human whole blood. *Drug Test Anal*. 2016 Sep 21.
5. Hess C, Murach J, Krueger L, Scharrenbroch L, Unger M, Madea B, Sydow K. Simultaneous detection of 93 synthetic cannabinoids by liquid chromatography-tandem mass spectrometry and retrospective application to real forensic samples. *Drug Test Anal*. 2016 Jul 12.
6. Berg T, Kaur L, Risnes A, Havig SM, Karinen R. Determination of a selection of synthetic cannabinoids and metabolites in urine by UHPSFC-MS/MS and by UHPLC-MS/MS. *Drug Test Anal*. 2016;8(7):708-22.
7. Adamowicz P, Tokarczyk B. Simple and rapid screening procedure for 143 new psychoactive substances by liquid chromatography-tandem mass spectrometry. *Drug Test Anal*. 2016;8(7):652-67.
8. Uchiyama N, Kikura-Hanajiri R, Hakamatsuka T. Evaluation of an on-site drug-testing device for the detection of synthetic cannabinoids in illegal herbal products. *Yakugaku Zasshi*. 2015;135(3):535-41. [Article in Japanese]
9. Tait RJ, Caldicott D, Mountain D, Hill SL, Lenton S. A systematic review of adverse events arising from the use of synthetic cannabinoids and their associated treatment. *Clin Toxicol (Phila)*. 2016;54(1):1-13.
10. Fattore L. Synthetic Cannabinoids-Further Evidence Supporting the Relationship Between Cannabinoids and Psychosis. *Biol Psychiatry*. 2016;79(7):539-48.