A203 HPLC-UV Determination of Synthetic Cannabinoids in Herbal Products

Laura A. Ciolino, PhD, FDA, Forensic Chemistry Center, 6751 Steger Dr, Cincinnati, OH 45237*

After attending this presentation, attendees will learn about a validated HPLC-UV method for the determination of synthetic cannabinoids in various sample matrices including bulk plant materials and powders will be fully described. Suitability of the HPLC-UV method has been demonstrated for compounds representing several structural classes of synthetic cannabinoids, including the naphthoylindoles (JWH-018, JWH-073, JWH-200, AM-2201, JWH-122), cyclohexylphenols (CP 47,497 and CP 47, 497-C8 homolog), benzoylindoles (RCS-4), phenylacetylindoles (JWH-250), and others (HU210, UR144, XLR11). Quantitative results for a series of herbal product forensic samples will be presented.

This presentation will impact the forensic science community by providing the forensic chemist with an analytical method for determinating synthetic cannabinoids in herbal smoking products.

A validated HPLC-UV method for the determination of synthetic cannabinoids in various sample matrices including bulk plant materials and powders will be fully described. Suitability of the HPLC-UV method has been demonstrated for compounds representing several structural classes of synthetic cannabinoids, including the naphthoylindoles (JWH-018, JWH-073, JWH-200, AM-2201, JWH-122), cyclohexylphenols (CP 47,497 and CP 47, 497-C_8 homolog), benzoylindoles (RCS-4), phenylacetylindoles (JWH-250), and others (HU210, UR144, XLR11). Quantitative results for a series of herbal product forensic samples will be presented.

In 1990, it was discovered that a receptor found in brain cells mediates the CNS effects of Δ^9-tetrahydrocannabinol including mood and cognition, and this cannabinoid receptor was designated CB1.[1,2] In 1993, a second cannabinod receptor (CB2) was identified, with CB2 receptors being associated with immune cells and their modulation.[2,3] Over the last 20 years, hundreds of cannabinoids have been synthesized by various pharmaceutical or university scientists as part of drug development efforts or pharmacological studies involving CB1 and CB2 receptors. From a chemical standpoint, the synthetic cannabinoids comprise several structural classes including naphthoylindoles, cyclohexylphenols, benzoylindoles, phenylacetylindoles, and others.

Herbal smoking products with added synthetic cannabinoids have emerged as common substances of abuse within the last decade. The EMCDDA reported that sales of these products commenced in Europe during the years spanning 2004 – 2006, while CBP reported the first U.S. occurrence in 2008 as a formal import entry.[4,5] Reports from DEA and the UNODC have shown marked increases in the sales and abuse of cannabinoid-laced herbal products in the years which followed.[6,7] The products have been sold via the internet or specialty stores under a variety of names, among which “Spice” and “K2” are two well-known examples. The products are frequently labeled to contain “aromatic potpourri” or “incense,” and consist of dried plant leaves loosely packaged in foil packs. Damiana leaf, marshmallow leaf, and mullein leaf are among the plant materials commonly used. Investigation into the product sources indicates that the cannabinoids are deposited onto plant surfaces via spraying, soaking, and/or mixing with cannabinoid solutions, after which the solvent(s) are evaporated. In July 2012, the FDA Safety and Innovation Act was signed into law, making several classes of cannabimimetic agents (with CB1 receptor activity) Schedule 1 substances in the US.[8]

In this work, an HPLC-UV method for determination of synthetic cannabinoids in bulk plant materials and powders was developed and validated. The method uses acetonitrile for extraction/dissolution, followed by separation on a commercial phenylhexyl stationary phase. UV detection provides excellent sensitivity with limits of detection (LODs) less than 10mg/g for many synthetic cannabinoids which possess highly conjugated chromophores. Spike/recovery studies demonstrate good to excellent recovery (75 -110%) for synthetic cannabinoids from damiana leaf, marshmallow leaf, and mullein leaf over a wide range of cannabinoid content (0.1 – 75mg/g). The method has been applied to a series of case-related herbal products with determined amounts ranging from <0.1mg/g to >100mg/g.

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 ** Presenting Author*