A154 Analysis of Fatty Acid Amide Hydrolase (FAAH) Inhibitors in the URB Series in Botanical Materials by GC/MS and LC/MS

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After attending this presentation, attendees will be able to evaluate methods for analysis of Fatty Acid Amide Hydrolase (FAAH) inhibitors in the URB series, in botanical materials using Gas Chromatography/Mass Spectrometry (GC/MS), and Liquid Chromatography/Mass Spectrometry (LC/MS).

This presentation will impact the forensic science community by describing a screening process to identify a novel class of synthetic drugs with effects on the endocannabinoid system in botanical materials.

FAAH's compounds inhibit the enzyme Fatty Acid Amide Hydrolase (FAAH), which is believed to be responsible for, among other things, the degradation of the endogenous cannabinoid receptor ligand, anandamide. Anandamide is linked to pathways responsible for mediating anxiolytic, antidepressant, and analgesic effects. In particular, a series of FAAH inhibitors developed at the University of Urbino in Italy, and designated URB, followed by a series number, have been detected in "legal high" products being sold over the Internet. Although these compounds don't act directly on the cannabinoid receptor, they produce similar effects to marijuana by increasing the levels of the endogenous levels of anandamide. In theory, this may result in cannabis-like effects including euphoria and intoxication.

Five compounds from this series, URB-597, URB-602, URB-447, URB-754, and URB-937 were selected for study. The neutral character of URB 602, URB 597, and URB 937 is due to the presence of the carbamate group in their structure, which tends to make them subject to hydrolysis and consequently unstable.

Standards were prepared in methanol and analyzed by GC/MS. Gas Chromatography conditions included the use of a 15m Phenomenex Zebron ZB-5MS, 0.25mm ID column, with a temperature program from 150°C to 325°C at 18 degrees/minute.

URB-602, URB-447, and URB-754 were determined to be stable under these conditions. URB-602 produced major ions at m/z 195, 169, 213, and molecular ion of 295, while URB-447 produced fragments at m/z 400 (molecular ion), 275, 105, and 125. URB-754 had masses as follows; 160, 266 (molecular ion), 104, and 77.

URB-597 and URB-937 showed the presence of degradation products by GC. The peak corresponding to URB-597 showed fragments at m/z 213, 197, 169, and 139, while URB-937 gave fragments with m/z 212, 184, 229, and 128. These degradation products most likely represent hydrolysis of the molecule at its carbamate bridge. URB-597 shares components of its structure with another FAAH inhibitor, JP-104.

Standards were also analyzed by single quadrupole LC/MS. The mobile phase used was 65% Acetonitrile: Isopropanol and 35% 0.1 TFA in water, analyzed on an Eclipse plus 4.6x100mm C-18 column (Agilent). Chromatography was consistent by LC/MS with no evidence of degradation or breakdown.

Extraction procedures were evaluated for URB-602, URB-447, and URB-754. Acid, neutral, and basic extraction procedures were evaluated using pH 7.4 potassium phosphate buffer and 90/10 methylene chloride/ isopropanol. GC data from the analysis of several "legal high" products indicated the presence of URB 754 in products including Kush Hypnotic 20XXX, White Widow 5X, B2 Da Bomb Blueberry Potpourri, Conviction 20XXX, and Dank 15X botanical materials. URB-754 was present in each case with a synthetic cannabinoid compound including AM-2201, JWH-022, and JWH-018 Chloropentyl analog.

URB Compounds, FAAH Inhibitors, Botanical Material

 ** Presenting Author*