B20 The Detection of Phytocannabinoids From Buccal Swabs Using One Vial Headspace Vaporization Derivatization Coupled With Solid-Phase Microextraction-Gas Chromatography/Mass Spectrometry (SPME-GC/MS)

Lauren M. Perry, BS, 2902 Whispering Winds Drive, Apt 802, Pearland, TX 77581; Sun Yi Li, BSc, Sam Houston State University, Chemistry and Forensic Science, Bldg 221A, 1003 Bowers, Box 2525, Huntsville, TX 77341; and Jorn Chi-Chung Yu, PhD, Sam Houston State University, Dept of Forensic Science, Box 2525, Huntsville, TX 77341*

After attending this presentation, attendees will better understand the application of Heated Headspace/Solid Phase Microextraction (HHS/SPME) for the extraction of phytocannabinoids from the headspace of air-dried buccal swabs.

This presentation will impact the forensic science community by providing a novel methodology for the detection of phytocannabinoids from buccal swabs. This HHS/SPME-GC/MS analytical platform potentially can be used to non-destructively extract phytocannabinoids from buccal swabs. Further chemical or biological testing of the HHS/SPME processed buccal swab evidence can still be conducted when needed.

Headspace derivatization of phytocannabinoids will also be discussed for the qualitative and quantitative phytocannabinoids analysis using GC/MS.

Marijuana is classified federally as a Schedule I controlled substance and is becoming a prevalent controlled substance reported in motor vehicle accidents. In order to screen for target drugs in evidence, samples undergo preparation to concentrate the drug of interest and remove interferences before instrumental analysis. SPME is a versatile alternative to Liquid-Liquid Extraction (LLE) and Solid Phase Extraction (SPE). This study combined the Total Vaporization Technique (TVT), high-temperature technique, and in-vial derivatization with SPME in one single step to facilitate the extraction and detection of phytocannabinoids from buccal swabs.

One vial headspace vaporization derivatization of phytocannabinoids was achieved by placing a 250uL glass insert containing a derivatization reagent inside a 20mL headspace sample vial. In order to determine the interferences level from buccal swabs using HHS/SPME, five different swab sources were tested. Each swab had 0.4µg of Δ9-THC added onto it for the test. Approximately 5mg of each swab material was placed into a 20mL headspace vial and sealed with a silicone septum and a magnetic cap for automated HHS/SPME-GC/MS. To determine the optimal headspace derivatization and extraction in one HHS/SPME step, varying amounts of derivatization reagent were evaluated. First, 4µL aliquots of Δ9-THC standard solution (100µg/mL) were placed in eight separate 20mL headspace vials. After drying the solvent, 1µL, 2.5µL, 5µL, 7.5µL, 12.5µL, 15µL, 20µL, and 25µL of N-Methyl-N-(trimethylsilyl)trifluoroacetamide (MSTFA) were added to the inserts inside headspace vials. HHS/SPME-SPME conditions had been optimized for the separation and detection of phytocannabinoids and their derivatized products.

This technique allowed for the detection of seven phytocannabinoids on buccal swabs, including Cannabichromene (CBC), Cannabidiol (CBD), Cannabigerol (CBG), Cannabinol (CBN), delta-8-Tetrahydrocannabinol (Δ-8-THC), delta-9-Tetrahydrocannabinol (Δ-9-THC), and Tetrahydrocannabivarin (THCV), at sub-microgram levels. This new approach not only improved sensitivity and selectivity through the successful derivatization of phytocannabinoids from sample headspace but also facilitated automation of HHS/SPME-GC/MS. This methodology has the potential for the forensic application to detect phytocannabinoids from swab samples.

Marijuana, Buccal Swab, HS/SPME

*Presenting Author