B21 A Comparison of Headspace Cannabinoid Profiles Detected From Different Structures of Dried Cannabis Inflorescences

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After attending this presentation, attendees will better understand the variations in cannabinoid profiles detected from different structures of dried cannabis inflorescences as well as the effect of homogenizing the plant matter on intra-sample variation.

This presentation will impact the forensic science community by providing evidence that homogenization of plant material samples for marijuana yields profile results with less variation when generating headspace cannabinoid profiles.

Marijuana is one of the most common drugs analyzed in a forensic laboratory. When analyzing marijuana, which may be composed of dried plant materials of *Cannabis sativa*, there are several structures of the plant that can be sampled for chemical analysis. The leaves, stems, and buds are the main structures present in the majority of both legal and illegal marijuana samples; however, not all of these dried cannabis plant materials have the same concentration of cannabinoids, such as Δ9-tetrahydrocannabinol (Δ9-THC), Cannabinol (CBN), and Cannabidiol (CBD). Marijuana in its natural state is not a homogenous sample. Sampling from different plant structures within the same marijuana sample may lead to various cannabinoid profiles for that sample. A solution to reduce intra-sample variation is to make the plant material more homogenous by grinding the sample.

In this research, reference marijuana samples (N=14) obtained from the National Institute of Drug Abuse (NIDA) with known concentrations of Δ9-THC and CBD were tested. Headspace cannabinoids of marijuana were extracted by Heated Headspace/Solid-Phase Microextraction (HHS-SPME) and headspace cannabinoid profiles were then obtained by using Gas Chromatography/Mass Spectrometry (GC/MS). Each reference marijuana sample was divided into two groups. Group A was analyzed by HHS/SPME-GC/MS without any sample preparation. Group B samples were homogenized using an herb grinder before HHS/SPME-GC/MS. Using a stereomicroscope, samples in group A were first divided into sub groups of stems and leaves. Each of these structures was documented and verified. Plant materials containing only one type of structure collected from different structures of cannabis inflorescences were weighted (10mg) and transferred to the headspace vials for HHS/SPME-GC/MS. The peak area of major cannabinoids, Δ9-THC, CBD, and CBN, were recorded for comparison. Finally, each sample in group A was also run as a mixture of structures (leaves, buds, and stems) and the cannabinoid profiles of each were compared to the profiles of group B.

The results of the experiment illustrate that samples collected from different plant structures in the same batch of dried cannabis inflorescences exhibited variations of headspace cannabinoid profiles. The whole sample containing both stems, leaves, and other structures presented a higher level of intra-sample variation in Δ9-THC peak areas compared to the samples containing only one type of plant structure. The ground sample registered the lowest level of intra-sample variation in Δ9-THC peak areas when compared to the single-structure samples and the multiple-structure samples. In order to obtain more consistent headspace cannabinoid profiles for marijuana by the HHS/

SPME-GC/MS approach, the selection of single structures of cannabis inflorescences from marijuana samples will be discussed in this presentation.

Marijuana, Homogenization, Headspace SPME