A207 Extracting and Characterizing Cannabinoids From Cellusose Storage Cards – A Convenient Sampling Method for Marijuana Samples

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After attending this presentation, attendees will be aware that marijuana vegetable matter can be simply sampled by rubbing on cellulose collection cards, compact and stable for extended periods. Chemical constituents can be recovered from these cards and characterized using GC/MS.

This presentation will impact the forensic science community by affecting the way large marijuana submissions are stored, with cellulose storage cards providing reference samples that can yield useful comparative intellegence data even years after the initial sampling.

Cellulose-based cards are known to serve as compact and stable storage media for many types of biological fluids and plant samples. The utility of such storage has been demonstrated for *Cannabis sativa* by successful recovery and genotyping of DNA from plant material rubbed on such cards.[1] The sampling is done by rubbing the leafy material directly on the card and later recovery can be done by punching small plugs out of the stained cellulose sampling area. The study demonstrates that such plugs could also be used to look at the chemical constituents (cannabinoids) such as tetrahydrocannibinol (THC) that can be recovered from this type of storage. Recovery of THC would indicate that such samples came from material that had some drug potency and qualitative examination of other recoverable cannabis plant components might aid in comparing and sourcing of the sampled plant material.

The study initially concentrated on developing an efficient recovery scheme for cannabinoids from the storage cards. Several difference solvents including petroleum ether, petroleum ether/ethyl acetate, acetonitrile, dimethylformamide (DMF), and tetrahydrofuran were examined.[2] Cards supplied by the National Marijuana Initiative (NMI) of the High Intensity Drug Trafficking Authority were used.[3] These were cards that had been examined for DNA by Dr. Coyle and her students here at the University of New Haven.[1] An extraction scheme was developed that successfully recovered small amounts of cannabinoids from the cards.

Nineteen cards received from National Marijuana Initiative (NMI) that had been used to sample drug grade cannabis vegetable matter were first examined.[3] Peaks in the gas chromatograms at the retention times of THC and cannabinol were observed. These were also examined using Gas Chromatography/Mass Spectrometry (GC/MS) and the peaks were confirmed to be THC and cannabinol. The chromatographic programs on the two instruments were adjusted so that retention times were almost identical on each instrument. Cards sampled at Nebraska Wesleyan using local wild cannabis, assumed to be hemp type, were also tested.[4] These cards showed a significant peak, in most cases, at the retention time of cannabidiol. This peak was too weak to confirm in all cases but did show, in the majority, a mass spectrum consistent with cannabidiol.

It was found that Gas Chromatography (GC) of the card extracts provided chromatograms with better signal to noise ratio than the Total Ion (TI) chromatograms obtained on GC/MS. However, mass spectra that allowed identification of the primary cannabinoid peaks were obtained.

A Single-Ion Monitoring scheme that shows promise to extend the sensitivity of our GC/MS instrument for such samples was developed. This should allow identification of other naturally occurring cannabinoids, the presence of which should allow comparison of plant samples preserved on cards to gain some useful intelligence information. Because many of the samples were at or near detection limits, the researchers are also looking for ways to improve recovery or chromatographic behavior.

References:

1. Allgeier L, Hemenway J, Shirley N, LaNier T, Coyle HM. Field testing of collection cards for Cannabis sativa samples with a single hexanucleotide DNA Marker. J Forensic Sci 2011;56(5):1245 – 49.
2. Honors Thesis; Ashli Ridolfi University of New Haven, 2011.
3. Received from Dr. Heather Coyle Miller courtesy of the National Marijuana Initiative, Tommy LaNier, Director; working with the High Intensity Drug Trafficking Authority; San Diego, California.
4. Received from Dr. Heather Coyle Miller courtesy of Dr. Jerry Bricker, Biology Department, Nebraska Wesleyan University, Lincoln, Nebraska.

Marijuana, Sampling, GC/MS

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