B145 The Validation of Gas Chromatography With Flame Ionization Detection (GC/FID) and Development of a Method to Quantitate Δ9-Tetrahydrocannabinol (THC)

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Learning Overview: After attending this presentation, attendees will understand how to validate a GC/FID to detect and quantitate THC in marijuana samples. GC/FID is ideal for detecting THC due to its fast analysis and simple sample preparation. Currently, there is no method for quantitating THC at the District of Columbia Department of Forensic Sciences.

Impact on the Forensic Science Community: This presentation will impact the forensic science community by furthering the methodology of quantifying THC using GC/FID.

Both hemp and marijuana originate from the plant, *Cannabis sativa*, differing only in the amount of THC contained within the plant.[1] Federally, marijuana is still a Schedule 1 controlled substance, whereas hemp has now been legalized.[1] Due to this distinction, quantifying the amount of THC in plant samples submitted to the laboratory is crucial.

Two GC/FIDs were validated following the procedures and validation process already in place at the District of Columbia Department of Forensic Sciences Forensic Chemistry Unit. Following instrument validation, liquid samples of various THC concentrations were analyzed using a quantitative method developed by the Forensic Chemistry Unit at the District of Columbia Department of Forensic Sciences. A calibration model was determined, then used to quantitate quality control samples prepared by fortifying oregano with known concentrations of THC. Extraction was performed by grinding the plant material with a mortar and pestle, using a sieve, then extracted with hexane. THC was successfully detected; however, the percent recovery was too low for quantification.

A marijuana sample was analyzed using the same method on the GC/FID using petroleum ether and hexane separately for the extraction. The GC/FID was able to detect THC without interference from other cannabinoids, but because the concentration of THC in the sample is unknown, the percent recovery could not be determined.

Future research will focus on obtaining quality control samples of marijuana with known amounts of Δ^9-THC to quantify using the calibration model created in this study. Extraction methods should also be studied in order to increase percent recovery. Two different calibration curves should be developed so that one can be used for hemp samples and the other can be used for plant material with a higher concentration of THC.

Reference(s):

1. Hewavitharana, A.K., G. Golding, G. Tempany, G. King, and N. Holling. Quantitative GC-MS Analysis Of Δ9-Tetrahydrocannabinol In Fiber Hemp Varieties. *Journal of Analytical Toxicology* 29, no. 4 (2005): 258-261. doi:10.1093/jat/29.4.258.

Δ9-Tetrahydrocannibinol, Quantify THC, Gas Chromatography

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