K5 The Analysis of Oral Swabs by F-SPE/ Fast LC-MSMS for Low Level THC

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After attending this presentation, attendees will learn how useful oral swabs taken from living individuals can be for the analysis of tetrahydrocannabinol (THC). This situation may arise when other samples are limited or are unavailable. The data presented in this presentation should add another technique for THC analysis in facilities providing toxicological services.

This presentation will impact the forensic science community by demonstrating how useful F-SPE and LC-MS/MS in the confirmation/ quantification of low level THC in oral swabs.

Methods: Over 10 consecutive days, oral swabs were taken from a donor (who used THC) 1 hour after smoking. The swabs were individually air dried, packaged and submitted to NTR/MSPCL. The samples were extracted in a glass tube with 500 µL of methanol (containng THC-D3) by soaking for 30 minutes. Before removal from the tube, each swab was washed with a further 100 µL of methanol. Each sample was evaporated to approximately 200 µL before 5 mL of phosphate buffer (pH 7) was added. This solution was extracted by fluorous solid phase extraction (F-SPE). The columns were conditioned with methanol, deionized water, and pH 7 phosphate buffer (3 mL, 3 mL, and 1 mL, respectively). After washing with deionized water and pH 7 buffer (3 mL of each), the columns were dried and eluted with hexane: ethyl acetate (50:50 v/v) containing 2% acetic acid. The eluates were evaporated to dryness under nitrogen and reconstituted in 50 µL of mobile phase for analysis by fast LC-MSMS using 20µL for injection.

Chromatographic analysis was performed on a 50 x 2.0 mm (5 µm) C_{18} column, with a gradient program of acetonitrile and 0.1% aqueous formic acid that ran for 4.5 minutes. Tandem mass spectrometry was performed in postive and negative MRM mode (to screen for any THC- acid present)

THC / THC-acid calibrators were set up by extracting 0.25, 1, 2, 5, 10, and 50 ng/ mL, controls were set up at 4 and 15 ng/ mL from aqueous buffer samples (5 mL). From the analysis of the calbrators and controls: r^2 value> 0.995, recoveries > 85% were obtained. Limits of detection/ quantification of 0.1 and 0.25 ng/mL, respectively were acheived.

Result: Of the 10 oral swabs where oral swabs taken 1 hour after administration, 9 were found to be postive (THC). The levels of THC ranged from 0.5 ng to 2.5 ng/ mL. None of the swabs contained the THC-acid metabolite.

Conclusions: Based on data presented, the use of oral swabs may be used to extract, confirm, and quantify low levels of THC. The employment of both F-SPE and fast LC-MS/MS shows that this procedure can be performed efficiently and rapidly, which is to the benefit of all scientists in forensic toxicology.

THC, F-SPE, LC-MS/MS

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