K46 The Prevalence of Cannabidiol (CBD) and Tetrahydrocannabinol (THC) in Federally Regulated Workplace Drug Testing Urine Specimens

Ruth E. Winecker, PhD, RTI International, Research Triangle Park, NC 27709; Edward J. Cone, PhD, Cone Chem Research, LLC, Mobile, AL 36695; David J. Kuntz, PhD, Clinical Reference Laboratory, Lenexa, KS 66215; Ron R. Flegel, MS, SAMHSA - Workplace Programs, Rockville, MD 20857; Eugene Hayes, PhD, Division of Workplace Programs, Rockville, MD 20857*

Learning Overview: The goals of this presentation are for attendees to understand the prevalence of THC, CBD, and their metabolites in federally regulated workplace specimens and to relate the prevalence of these analytes in workplace drug testing specimens to the consequence of passage of the 2018 Federal Farm bill.

Impact on the Forensic Science Community: This presentation will impact the forensic science community by demonstrating the impact of federal legalization of hemp containing <0.3% THC on federally regulated workplace urine drug testing results.

Background/Introduction: The non-psychoactive cannabinoid, CBD, is marketed as a remedy for a wide array of medical conditions. Consequently, there is growing use of CBD-containing products by the general public that may have unintended consequences to the consumer. Of concern is that CBD supplements are not subject to active regulatory oversight so their composition may deviate widely from the products' labelling and may contain Δ-9-THC, a psychoactive component of the cannabis plant. This puts the consumer in a buyer beware situation and presents a dilemma to the laboratory or medical review officer if the donor asserts legal CBD use as the reason for a positive drug test. To better understand the prevalence of THC, CBD, and their metabolites in federally regulated workplace specimens, a pulse testing study of 2,000 urine specimens was undertaken.

Objective: Determine the positivity rate of 11 cannabinoids and cannabinoid metabolites in regulated workplace drug testing specimens by screening and confirmation methods.

Methods: In the normal course of workplace testing, specimens are aliquoted into test tubes and loaded onto automated instruments for screening by Immunoassay (IA); after review, these aliquots are discarded. This study utilized 2,000 de-identified urine aliquots scheduled for discard to screen for 7-Hydroxy Cannabidiol (7-OH-CBD) and 11-nor-9-Carboxy-Δ-9-Tetrahydrocannabinol (Δ-9-THC-COOH) using a fast Liquid Chromatography/ Tandem Mass Spectrometry (LC/MS/MS) technique with a 2ng/mL cutoff. Further, specimens positive using the fast chromatographic screen were analyzed by IA for THC-COOH at 20, 50, and 100ng/mL cutoffs. Positive specimens were then confirmed for THC, CBD, and nine other cannabinoids and/or metabolites by LC/MS/MS following sequential enzymatic and basic hydrolysis.

Results: Of the 2,000 urine specimens initially screened by fast LC/MS/MS (Limit of Detection [LOD]=2ng/mL) for 7-OHCBD and Δ9-THCCOOH, 186 (9.3%) specimens were identified and further analyzed by LC/MS/MS. The percent samples (based on *n*=2,000) that screened positive by IA were as follows: 20ng/mL cutoff, 1.45%; 5 ng/mL cutoff, 0.9%; and 100ng/mL cutoff, 0.55%. The percent prevalence of the 11 analytes (LOD=1ng/mL) in order of highest abundance was as follows: Δ-9-THC-COOH, 4.9%; 11-OHTHC, 2.85%; 7-OHCBD, 2.8%; CBDA, 1.7%; CBD, 1.55%; THCVA, 0.9%; Δ-9-THC, 0.45%; Δ-8-THC-COOH, 0.4%; CBN, 0.15%; and THCV, 0.05%. Five specimens screened positive by IA (20ng/mL cutoff) but tested negative (<15 ng/mL) for Δ-9-THC-COOH. Of these, one specimen contained 41.0ng/mL of Δ-8-THC-COOH and 1.9ng/mL of Δ-9-THC-COOH.

Specimens confirming positive for one or more studied analytes (*n*=137) are ranked by CBD and combinations of CBD analytes as follows: all negative, 56.2%; positive CBDA/7-OHCBD/CBD, 17.5%; positive 7-OHCBD, 15.3%; positive CBDA/7-OHCBD, 5.1%; positive 7-OHCBD/CBD, 3.6%; positive CBDA/CBD, 1.5%; and positive CBDA, 0.7%.

Conclusions: A total of 98 (4.9%) specimens had Δ-9-THC-COOH concentrations ≥1ng/mL and 60 (3.0%) specimens contained CBD and/or CBD metabolites. It is unsurprising that THC analyte-positive specimens were also positive for CBD analytes as both are present to varying degrees in cannabis variants. Positivity rates by IA were similar to previously published results. It is concluded that there is widespread use of cannabis and CBD products in this population.

Hemp, Cannabis, Workplace Drug Testing

*Presenting Author