## K45 Instances of Marijuana, Driving, Blood Concentrations, Field Sobriety Tests, and Prediction Models

*Joseph J. Saady, PhD*,and Terri H. Woods, BS, Virginia Department of Forensic Science, 700 North 5th Street, Richmond, VA 23219*

After attending this presentation, attendees will understand some of the difficulties in the correlation of driving related behaviors and blood concentrations of marijuana.

This presentation will impact the forensic community by analyzing various aspects of marijuana and driving, to include the blood concentration, Field Sobriety Test results, the analytical analysis and the timing and manner of the last smoke.

One of the very difficult court testimonies for a forensic toxicologist pertains to marijuana, which is the most frequently encountered drug in the Virginia DUID program, with the exception of ethanol. Some of the issues for consideration in the interpretation of results involve the time of last smoke, the rapid elimination of tetrahydrocannabinol (THC) from the blood, the blood collection time following the incident, the analytical testing and the duration of storage of the blood sample, and physiological effects as close to the time of a suspected driving incident as possible.

The authors will review Virginia DUID cases where there was some reasonable suspicion that smoking occurred close to or at the time of the police stop, as noted by law enforcement personnel. The collection of the blood specimen occurred from one to four hours after the stop. The laboratory typically receives the blood specimen by mail within one week of collection, and stores it refrigerated until analysis. Samples are analyzed by a modified Kemp et.al. method, usually within six weeks of receipt. Briefly, two mL of blood is mixed with THC-d3 and THCA-d3 internal standards, vortexed while adding cold acetonitrile and refrigerated until the phases separate. Acetonitrile is back extracted with 0.2 N NaOH into hexane:ethyl acetate (9:1), evaporated under nitrogen and derivatized with trifluoroacetic acid anhydride., heated, evaporated and reconstituted with heptane, transferred to an autosampler vial for gas chromatography mass spectrometry (GC/MS) for THC selected ion monitoring (SIM) quantitation. The saved NaOH fraction is acidified with 1 N HCl, extracted with hexane:ethyl acetate (9:1), evaporated under nitrogen and derivatized with BSTFA with 1% TMCS, transferred to an autosampler vial for gas chromatography mass spectrometry (GC/MS) for tetrahydrocannabinol carboxylic acid (THCA) selected ion monitoring (SIM) quantitation.

Field sobriety tests (FST) generally consisted of recitation of some portion of the alphabet or counting, Horizontal Gaze Nystagmus (HGN), Walk and Turn and One Leg Stand. Most cases showed a number of errors at nearly all concentrations.

Based on statements by law enforcement, predictive modeling (Huestis Model II) produced reasonable estimates of the smoking time using the average, in most of the cases. In some instances the trooper saw the disposal of the cigarette, or could see smoke in the vehicle. In other instances, statements by the suspect led to the conclusion that smoking occurred recently (e.g., “I smoked marijuana at a friends house 15 or 20 minutes ago”).

In conclusion, blood THC concentrations ranged from 1 to 27.5 ng/mL, while (THCA) ranged from 2 to 343.5 ng/mL. There was a relatively poor correlation between THC concentrations and FST errors. However, there was a good correlation between errors on the FST and the presence of THC in the blood. Using information provided by law enforcement concerning the time of last smoking, Model II produced reasonable estimates.

**Marijuana, DUID, Concentrations**

 ** Presenting Author*