K18   Kava Impairment in Drivers

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Learning Overview: After attending this presentation, attendees will better understand the impact of kava on Driving Under the Influence of Drugs (DUID) cases.

Impact on the Forensic Science Community: This presentation will impact the forensic science community by strengthening the evidence that chronic or larger dosages of kava have detrimental effects on driving performance. To date, few reports investigate the impact of recreational use of kava on the cognitive and motor skills related to driving ability.

Kava, or *Piper methysticum*, is an Oceanic plant that is often consumed as a beverage. When consumed in therapeutic doses, kava has anti-anxiety effects. However, when consumed at high dosages, kava has been reported to produce sedation, tremors, and even a few cases of choreoathetosis. According to drug forums, recreational use of kava gives users a feeling of euphoria and heavy limbs. Despite being native to the Pacific islands, kava is becoming more and more popular in the United States, with kava bars popping up in various cities throughout the country. Kava teas, capsules, and powders are available for purchase at supermarkets and drug stores. Reports have shown that there does not appear to be significant impairment on cognition at acute, therapeutic doses of kava. However, there is evidence of the impairment of motor coordination and visual attention at larger chronic doses.

The psychoactive properties of kava have been attributed to lactone molecules primarily found within the root. Six kavalactones contribute to most of the pharmacological activity: kavain, 7,8-diydrokavain, methysticin, 7,8-dihydromethysiticin, yangonin, and desmethoxyyangonin. Many different modes of action have been suggested for the kavalactones. The main modes of action reported are the interaction of kavain on Gamma-Aminobutyric Acid (GABA) receptors, the interaction of yangonin on cannabinoid receptors, and blockage of voltage-gated Na^+ and Ca^{2+} ion channels. It is these interactions that result in an effect similar to that of Central Nervous System (CNS) depressants and cannabis.

The Iowa Division of Criminal Investigation (DCI) Criminalistics Laboratory examined the data collected from suspected kava-impaired drivers. Four cases between November 2011 and April 2018 were reported by Drug Recognition Experts (DREs) for suspected kava use. Of the four cases, two urine samples were positive by Gas Chromatography/Mass Spectrometry (GC/MS) and Liquid Chromatography/Tandem Mass Spectrometry (LC/MS/MS) for the kavalactones yangonin and methysticin. Ethanol was detected in one case, but at <0.02g/dL. No blood samples were available for testing. DRE reports were provided for all four cases. Each of the four drivers admitted to drinking kava prior to driving and no other drugs were found during the toxicology analysis. In all four cases, DRE reports revealed that the kava-inhibited drivers did not pass the standardized field sobriety tests, and horizontal gaze nystagmus was present. The DRE officers in each case deemed the driver under the influence of a CNS depressant and unable to safely operate a motor vehicle. Until recently, no quantitative method was available in this laboratory for kavalactones. However, a new quantitative method was developed for yangonin and methysticin in urine by LC/MS/MS. The administrative cutoff was set to 10ng/mL, which was above the limit of quantification for both yangonin and methysticin in this study. The most recent kava case was analyzed with the new method, but significant degradation of kavalactones was noted, indicating possible instability within a urine sample. Analysis of the DRE and toxicology reports suggest that kava has an impairing effect on the motor skills required for driving.

Kava, Drug Recognition Expert (DRE), DUID