A181 Chemical Characterization of Kratom and Associated Alkaloids

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After attending this presentation, attendees will be able to identify the most prevalent and unique alkaloid, mitragynine, present in the plant Kratom and various commercial preparations, using standard forensic chemical testing procedures that meet SWDRUG recommendations.

This presentation will impact the forensic science community by raising awareness of the existence of mitragynine containing products when they are submitted for analysis.

Kratom (*Mitragyna speciosa*) is a tree found mainly in Asian countries whose leaves, when consumed in low doses, provides both a stimulant and analgesic effect. When consumed in high doses, Kratom has a depressant effect and its major alkaloid, mitragynine, has been found in combination with other CNS depressant drugs in a number of fatalities. Although use of Kratom and mitragynine products is not yet widespread in the United States, the alkaloid has been detected in "legal high" products. Increasing numbers of internet sites market a number of different Kratom products including liquid extracts, dried leaves, powdered leaves, and the plants themselves.

An analytical standard of the alkaloid mitragynine was obtained commercially and characterized using various chemical color tests. The tests did not work well when applied directly to the plant material consequently a simple methanolic extraction was required. The botanical material caused the methanol to be tinted green and after addition of the reagents, the colors seen were natural botanical colors (such as greens and browns) making a color change caused by the reaction difficult to visualize. Therefore, the color tests tested thus far are not ideal presumptive tests to utilize for mitragynine.

Following methanolic extraction, Kratom related products were also analyzed by thin layer chromatography (TLC) using a 9:1 chloroform to methanol solvent system which yielded good separation of the components of the botanical material. Viewing under short wave ultra violet light allowed visualization of the mitragynine and final development with iodoplatinate spray produced a mitragynine band initially purple in color, then turning yellow shortly after, and finally turning orange overnight. Retention factors of the bands produced from the methanol extraction of the purchased products were compared to the bands from the standard mitragynine and found to be similar.

Following a mitragynine optimized extraction, confirmatory analysis was performed by gas chromatography/mass spectrometry (GC/MS). Mitragynine has a base peak of 214 and distinctive and prominent fragments of 398, 397, and 383 m/z, and was consistent with the mass spectrum in various mass spectral databases.

Analysis of several commercial products, six products labeled as "Kratom," as well as various products that were believed to be Kratom through appearance, confirmed the presence of mitragynine. Of the thirteen samples for this study, six were purchased over the internet by our laboratory and seven were obtained as evidence submitted to the lab for analysis. The six purchased were obtained from reputable sites from which samples for other research projects have been purchased and all were labeled as Kratom products. Of the seven samples acquired through the lab, one was a bag of capsules each of which contained a green powder, another was a K2 product, and the rest were either silver bags with a zip top or small, plastic containers all appearing to contain a green, botanical powder.

This approach of TLC followed by GCMS meets SWGDRUG requirements for forensic testing and proved suitable for the identification of mitragynine in these products.

Forensic Science, Kratom, Mitragynine

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