A114 Using Analytical Techniques to Distinguish Illicit and Over-the-Counter Drugs in Trace Evidence

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After attending this presentation, attendees will understand the difference between the data obtained from analytical techniques utilized to identify over-the-counter and illicit drugs.

The presentation will impact the forensic science community by providing an in depth comparison of techniques which can enhance the analysis of data obtained from crime scenes.

The illegal drug trade consists of the manufacturing, distribution, and sale of controlled substances. The most recent annual data from the Federal Bureau of Investigation (FBI) show that 12.2 percent of more than 14 million arrests in 2008 were for drug violations, the most common arrest crime category. Additionally, the abuse of common over-the-counter pain medication drugs has also escalated in the past decade. The drugs with the highest dependence or abuse levels were marijuana, prescription pain relievers, and cocaine. Many of these drugs are considered "controlled substances" that have a legally recognized potential for abuse. Officials responding to crime scenes (e.g., firefighters, police, and hazmat teams) are often ill equipped to handle the ever growing magnitude of drugs that are encountered at crime scenes. These samples generally are collected and sent to crime labs for extensive analysis which can be time consuming and impede the criminal justice system. However, recently several analytical techniques have been developed which can be used in a portable mode. These techniques can be used to identify white powders which are otherwise indistinguishable based on color, texture, and odor. The present study examines the different analytical techniques that can be used to identify the unknown compounds frequently encountered by first responders in the field. The two analytical techniques for chemical identification which can be used in the portable mode include Fourier transform infrared spectroscopy (FTIR) and Raman Spectroscopy. While infrared spectroscopy utilizes infrared radiation to probe the chemical structure of the drug/compound, Raman spectroscopy utilizes a monochromatic light source (e.g., a laser) focusing onto a sample and analyzing the resulting scattered light. In both cases, the radiation interacts with the bonds of the compound producing a unique spectral fingerprint of the drug. The identity of the compound is determined by comparing spectra against a database of FTIR or Raman spectra of known spectra present in a library. In this study, different drugs (Aspirin, Acetaminophen, Caffeine, and Excedrin) were tested and compared with common household materials, such as talcum powder, using the two different analytical methods. Specifically, data was compared data from the above mentioned techniques for Excedrin and its individual components: caffeine, acetaminophen, and aspirin. Raman spectroscopy had the advantage of providing sharper peaks for symmetric bonds in aromatic compounds and those that contain double bonds, while FT-IR showed stronger peaks for asymmetric hydroxyl and carbonyl groups. In addition, fewer peaks of interest in Raman spectra may facilitate mixture analysis. Even though both techniques probe the structures using molecular vibrations, they did differ in the information that they provide. In conclusion, it was found that these two methods are also easy to use, give quick results, and are now available in a portable form which can be used for detection at crime scenes.

OTC Drugs, Illicit Drugs, Analytical Techniques

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