B120 Analysis of Prescription Drugs With Abuse-Deterrent Properties

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After attending this presentation, attendees will better understand the analysis of drugs with abuse-deterrent properties.

This presentation will impact the forensic science community by improving the efficiency of controlled drug analysis.

Prescription drug abuse is sweeping the nation faster than ever before. In 2012, an estimated 2.4 million Americans used prescription drugs non-medically for the first time within the past year, which averages approximately 6,700 new users per day, according to the 2012 National Survey on Drug Use and Health.[1] Prescription drug abuse is the non-medical use of a medication without a prescription, in a way other than as prescribed, or for the experience or feelings elicited.

In 2013, an estimated 24.6 million or 9.4% of the American population aged 12 or older were currently illicit drug users. Marijuana remains the most commonly used illicit drug with 19.8 million users (more than heroin and cocaine combined). Non-medical use of prescription drugs is the second-largest category of abused drugs at 6.5 million users or 2.5% of the population. Centers for Disease Control and Prevention classified this phenomenon as an epidemic.

The classes of prescription drugs most commonly abused are: opioid pain relievers, such as Vicodin® or OxyContin®; stimulants for treating Attention Deficit Hyperactivity Disorder (ADHD), such as Adderall®, Concerta®, or Ritalin®; and Central Nervous System (CNS) depressants for relieving anxiety, such as Valium® or Xanax®.

The pharmaceutical industry and government agencies have embarked on an initiative to reduce prescription drug abuse by making the formulations more difficult to abuse. The advent of abuse-deterrent formulations is creating new challenges for the forensic community. Abuse-deterrent formulations of interest have in part been categorized by the Food and Drug Administration (FDA) as follows: (1) Physical/chemical barriers — Physical barriers can prevent chewing, crushing, cutting, grating, or grinding of the dosage form. Chemical barriers, such as gelling agents, can resist extraction of the opioid using common solvents like water, simulated biological media, alcohol, or other organic solvents. Physical and chemical barriers can limit drug release following mechanical manipulation or change the physical form of a drug, rendering it less amenable to abuse. (e.g., reformulated OxyContin®); (2) Agonist/antagonist combinations — An opioid antagonist can be added to interfere with, reduce, or defeat the euphoria associated with abuse. The antagonist can be sequestered and released only upon manipulation of the product; (3) Aversion — Substances can be added to the product to produce an unpleasant effect if the dosage form is manipulated or is used at a higher dosage than directed; and, (4) New molecular entities and prodrugs — The properties of a new molecular entity or prodrug could include the need for enzymatic activation, different receptor binding profiles, slower penetration into the central nervous system, or other novel effects.

These new formulations are designed to make extraction by abusers more difficult; however, they also make it more complicated for analysts in a laboratory. Forensic chemists have always been challenged by prescription drug exhibits and the advent of abuse-deterrent formulations makes analysis more difficult. Heroin, cocaine, and methamphetamine exhibits are routine and easier to characterize, while abuse-deterrent prescription drugs present unique challenges. The presence of certain ingredients will dictate how the analysis should be approached. For example, the presence of Polyethylene Oxide (POLYOX), which is used as a binding, thickening, or water-retention agent, will inhibit solvent extraction. Analysts should determine the ingredients contained in a prescription drug by visiting internet sites or published dosage form descriptions such as http://www.drugs.com/pill-logo-identification.html, http://www.rxlist.com/pill-identification-tool/article.htm, or the *Physician's Desk Reference*. Once the formulation is known, then the analytical approach can be developed. This is especially important if there is a legal requirement to report the amount of controlled substance present.

Reference(s):

1. Substance Abuse and Mental Health Services Administration, Results from the 2012 National Survey on Drug Use and Health: Mental Health Findings, NSDUH Series H-47, HHS Publication No. (SMA) 13-4805. Rockville, MD: Substance Abuse and Mental Health Services Administration, 2013.

Abuse Deterrent, Prescription Drugs, Forensic Analysis