G59 Levorphanol, Dextromethorphan, and a Case of (Probable) Mistaken Identity

Philip Croft, MD, Sparrow Health Systems, 1215 East Michigan Avenue, Lansing, MI 48912; Joyce L. de Jong, DO, Sparrow Forensic Pathology, 1215 East Michigan Avenue, Lansing, MI 48909; Michael A. Markey, MD, Sparrow Hospital, Sparrow Forensic Services, 1215 East Michigan Avenue, Lansing, MI 48909; and Michael Smith, PhD, Sparrow Health Systems, 1215 East Michigan Avenue, Lansing, MI 48912*

After attending this presentation, attendees will recognize that levorphanol and dextrorphan, a metabolite of dextromethorphan, are stereoisomers that cannot be distinguished from each other by routine toxicology testing, and that forensic pathologists and others in receipt of toxicology reports should be cognizant of this when interpreting toxicology results.

This presentation will impact the forensic community by raising awareness among both forensic pathologists and toxicologists of the laboratory's limitations regarding levorphanol and dextrorphan discrimination, thereby leading to improved communication between pathologists and the laboratory along with a reduction in instances of misinterpreted toxicology results involving these compounds.

Appropriate evaluation of toxicology results within the context of a forensic autopsy is vital, and relies, in part, on a laboratory's ability to detect, differentiate, and report individual compounds contained within specimens collected during a postmortem examination. The existence of pharmacologically active stereoisomers poses an additional challenge to both toxicologists and pathologists, as they cannot be differentiated in the laboratory by routine methods. This is the case with levorphanol, a relatively potent prescription narcotic, and dextrorphan, the active metabolite of the commonly used over-the-counter antitussive dextromethorphan.

A case involving a 70-year-old man with pneumonia and a history of chronic ethanol abuse is presented to illustrate the importance of recognizing the laboratory's general inability to differentiate levorphanol from dextrorphan. Laboratory testing in this case showed a relatively high level of levorphanol along with other medications commonly found in over-the-counter cold medications. The presence of levorphanol was unexpected within the context of the case, as the decedent was taking no prescription medications and had not seen a physician for years. The levorphanol was initially considered a significant contributing factor in the man's death.

Re-evaluation of the toxicology findings, spurred by a second case with similar toxicology results under equally incongruous circumstances, uncovered the difficulty posed to toxicology testing by the structural similarity between levorphanol and dextrorphan. Given this insight, the circumstances of both of these cases suggested that the compound originally reported to be levorphanol was considered more likely to be the metabolite of dextromethorphan. Subsequently, "levorphanol intoxication" was discounted as a factor contributing to death in the first case. The original toxicology reports were amended to reflect the inability to distinguish between levorphanol and dextrorphan.

Subsequent review of in-house case files since 1999 revealed 13 more cases in which levorphanol was reported to be in blood and/or urine along with other compounds often admixed with dextromethorphan in over-the-counter cold medications. These findings suggest that some, if not all, of these earlier cases were more likely to represent the detection of dextrorphan and not levorphanol.

Toxicologists and pathologists should be aware that levorphanol and dextromethorphan's metabolite dextrorphan are stereoisomers, and that their structural similarity renders them indistinguishable by routine laboratory testing. An understanding of these limitations is critical to the interpretation of toxicology results that may indicate the presence of one or both of these compounds.

Levorphanol, Dextromethorphan, Isomers

 ** Presenting Author*