SDRL Laboratory

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Benzodiazepines (part 2) - Interpreting Laboratory Results

It can be very difficult to accurately interpret a Benzodiazepines (Benzo) class result. Very little data can be determined from a screening test alone; in most cases, additional confirmatory testing by GC/MS or LC/MS is required for accurate interpretation.

The Benzo class is vast and complicated; there are 36 compounds that make up the Benzo class. Of those 36, only 20 are approved for use in the USA (for detailed list, see chart in Part 1 of article). With every class screen, there is a target compound. For Benzos, the target compound is Oxazepam. As a separate example, the target compound for the Opiate class is Morphine. In addition, a cutoff level is always referenced. Most Benzo screens (either by onsite device or laboratory) are validated to Oxazepam at 300 ng/mL. What this means is that the target drug will be detected at 100% of its value and at its actual concentration (i.e. a 300 ng/mL solution of Oxazepam will give a positive result at a cutoff of 300 ng/mL).

On a Benzo class screen, the test can respond to the chemical structure that **ANY** of the drugs in the Benzo category have in common. The test is designed to indicate a positive value in every case where the target compound (Oxazepam) is present at the defined concentration. This means that all true positives must be positive. However, due to the complexity of the testing drug matrix, and considering all of the biological background, some true negative samples will result as positive. There can also be medication cross reactions. The drug test is designed to minimize this false positive, but with the requirement that all true positives must be positive, a certain amount of these false positives are allowed in the screen.

When reviewing class data, compounds other than the target compound may be more or less sensitive to the test. The extreme examples are Xanax (Alprazolam) and Ativan (Lorazepam). A urine concentration of 300 ng/ml of Xanax will give a positive result with an apparent screening concentration of greater than 2500 ng/ml and Ativan at 300 ng/mL will be virtually undetectable by the same test. Klonopin (Clonazepam) at 300 ng/mL will generally yield a screening value lower than the cutoff level. Many treatment programs elect to lower their Benzo screening level to 200 ng/mL in efforts to capture illicit Klonopin use. This is something to take into consideration before lowering a cutoff level. A lower cutoff level will result in more data, but not all the data is useful and can be frustrating.

With the vast variety of Benzos available, both licit and illicit, it is nearly impossible to accurately correlate an immunoassay screening value back to a single Benzo. It is understood within the laboratory community that particular medications generally yield screening results in a certain range for certain medications, but not definitively. For example, a patient taking a Lorazepam source is not expected to trigger a positive result in the screening test; patients taking a Clonazepam source may be positive or may be negative and generally have a screening value around the cutoff level. Patients taking Diazepam or Alprazolam are always expected to yield a positive result.

However, where the danger lies is this: a screening result of 2250 ng/mL for the Benzodiazepines may be from Alprazolam; it also may be from a patient taking a combination Diazepam and Clonazepam; or it could be from Temazepam and Lorazepam. Point being, the combinations are endless. Interpreting an immunoassay value relies on assumptions and generalizations. To definitively interpret a Benzo result, a confirmation test should be performed to accurately identify the individual Benzo analytes present and defined concentrations.

??? Did You Know ???

Hydrocodone (i.e. Hydrocodone-containing products such as Vicodin and Lortab) is the most prescribed drug in the United States. Over 131 million Hydrocodone prescriptions were written in 2010 (a 17% increase since 2006) and more than 36 million prescriptions were written in the first quarter of 2011, putting it on pace for a 10% year-over-year increase. It is estimated that 23.5 million Americans aged 12 and older have used Hydrocodone for non-medical purposes in their lifetime. With just 4.6% of the world's population, the U.S. consumes 99% of the world's Hydrocodone. No other prescription drug was prescribed more than 100 million times in the United States in 2010. (**Sources: DEA, WebMD and ABC News.)**

Question of the Month

Question: *What is the difference between Amphetamine and Methamphetamine? How can I tell which drug was consumed?*

Answer: Amphetamine and Methamphetamine are both stimulants of the central nervous system and are similar in many ways, although chemically they are different compounds. Amphetamine, while potent and potentially addictive, is prescribed to treat specific conditions such as ADHD and can be safe if used as directed. Methamphetamine, highly addictive itself, is widely considered too dangerous to be prescribed. Methamphetamine is the parent drug and after consumption a portion metabolizes into Amphetamine. A person consuming Methamphetamine would excrete both Methamphetamine and Amphetamine in their urine. A positive Amphetamine result due to Methamphetamine would only be possible if the Methamphetamine result was also positive. A positive Amphetamine result alone would only be possible if the person consumed an Amphetamine.