SDRL Laboratory

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Drug-Testing Concepts: Understanding Cut Off Values

A drug-testing "cut off" value represents the smallest concentration of a drug or its metabolites found in a specimen that will yield a positive result. A specimen testing at or above the stated cut off is positive; a specimen testing below the stated cut off is negative.

Cut off values are set according to either state/federal regulations or to specific treatment program needs. SAMHSA's current guidelines suggest a screening cut off value of 50 ng/mL for THC; however, a program may choose either a higher or lower cut off value based on factors such as geographic/demographic drug abuse trends, health concerns or individual patient needs.

It is possible for small amounts of a drug to be present in a specimen yet the results of a drug screen be negative for that drug. This is because the amount of the drug detected in the sample is less than the cut off value established. For example, if Opiates are screened at a cut off value of 300 ng/mL, a sample testing at 450 ng/mL is considered positive. However, a sample testing at 250 ng/mL would be *negative* even though the presence of some Opiate has been detected. In other words, the positive presence of a drug does not necessarily result in a positive test result.

One explanation for this is that the patient has consumed a small dosage of a prescription medication. Other factors that can influence the amount of a drug detected are the amount of the drug consumed, the frequency of consumption, when the drug was consumed, when the specimen was collected, the patient's hydration level and metabolism and the drug's metabolism. Of course, the cut off levels themselves can impact the results directly – using higher cut off levels will generate fewer positive results.

Analytes within a drug class can, and often do, have different cross-reactivity values (that is, a certain detected value that will produce a positive result for the overall drug class). The Opiates drug class is comprised of the following analytes: Morphine, 6-acetylmorphine (6-MAM), Codeine, Hydrocodone, Hydromorphone and Oxycodone. In order to produce a positive test result for Opiates at a 300 ng/mL cut off, a certain amount of each analyte must be detected (the cross-reactivity value). These amounts are different for each analyte because each analyte has a different molecular structure. For example, using 300ng/mL as the cut off for Opiates, Hydromorphone has a cross-reactivity of 1400 ng/mL. This means that a urine sample that has 1400 ng/mL of Hydromorphone (or more) will provide a positive test result for the Opiates class. Similarly, Oxymorphone has a cross-reactivity of 37000 ng/mL. If less than 37000 ng/mL of Oxymorphone is detected in a urine specimen, there is not enough present to trigger a positive result for Opiates at 300 ng/mL.

Ultimately to determine a true positive, a confirmatory test is recommended. The confirmed result will reveal the exact analytes present and the concentration of the drugs in the specimen.

??? Did You Know ???

Color is a key indicator in determining urine specimen validity. The lighter a urine sample's color the more dilute the sample is, which reflects in a low Creatinine value. If a sample is clear with no tint, it is most likely water and it is best to have your patient produce another sample. A darker sample—from dark yellow to brownish/yellow—will reflect higher Creatinine values as the sample is more concentrated. Some medications can turn urine samples orange or even blue in color, but this is extremely rare. Fake urine tends to be very bright yellow and has no odor. Patients who consume large amounts of vitamins can also have bright yellow urine but an ammonia odor is noticeable.

Question of the Month

Question: *How long will urine stay "fresh" for drug-testing purposes? What if I need a confirmation test?*

Answer: At point of collection, a urine sample contains the drugs that have been consumed within the detection period for each particular drug (i.e. Opiates: 2-4 days). Drugs are stable in urine for at least 30 days at room temperature except Alcohol, which can evaporate from urine just like it evaporates from skin, sweat, etc. However, if the sample is frozen Alcohol evaporation is eliminated. All other drugs remain stable in an unfrozen urine sample for 30 days so GC/MS or TLC Confirmatory testing can be performed during this time (GC/MS can detect even very small amounts of the drugs).