



SPECIMEN VALIDITY TESTING IN DRUGS OF ABUSE PANELS

Patients with aberrant drug-taking behaviors often seek to thwart laboratory testing for drugs of abuse in one of three ways: 1) dilution, 2) adulteration, and 3) substitution.

Dilution

The laboratory defines dilute specimens as those that have urinary Creatinine < 20 mg/dL.

Dilution is important because it can lower drug or drug metabolite concentrations in urine below the cutoff used for detection. There are two categories of dilution: 1) in vivo and 2) in vitro. In vivo dilution occurs when a patient consumes excess fluids. Individuals who drink “normal” amounts of fluids will not produce dilute urine. For example, two 8 oz. glasses of water, coffee or juice in the AM will typically produce normal urine. In vivo dilution can be intentional or unintentional. Intentional dilution occurs when a person knowingly drinks large volumes of fluid in attempt to defeat a drug test or consumes commercial products that claim to “rid the system of toxins.” These products often contain mild diuretics and patients will produce dilute urine when they use them. Unintentional dilution may occur when a person innocently consumes a lot of water routinely during the day (e.g. a construction worker working in a hot climate). In order to avoid dilute specimens we recommend AM urine collections.

In vitro dilution occurs when a patient adds fluids such as toilet water or other liquids to a voided urine specimen. This attempt to dilute the specimen can be detected by monitoring the urine temperature. The acceptable urine specimen range for workplace drug testing is 90 –100°F testing measured within 3 minutes of voiding.

Adulteration

The laboratory recommends that you follow established urine specimen collection procedures, which include removal of chemicals and water sources from the rest room and evaluation of the specimen upon receipt.

Adulteration is the additional of chemicals or other substances to the urine specimen in an attempt to interfere with the drug test. In the early days of drug testing, patients used chemicals typically found under a bathroom or kitchen sink as adulterants. Typical “kitchen sink” chemicals included cleansers, soaps, disinfectants, drain cleaners, bleach, and deodorants. Many of these chemicals did in fact interfere with the drug tests.

Today, patients purchase chemicals on the internet or at local “head shops” and these chemicals are quite sophisticated. The most effective chemicals for interfering with drug tests are oxidants. These oxidizing chemicals work by chemically oxidizing drug / drug metabolites into a different form that is not detectable or cannot be confirmed in the confirmatory test. Some of the chemicals that are oxidizing adulterants include nitrite, chromate, iodate and bleach.

A test for general oxidants is included as a component of all medical urine drugs of abuse panels with the exception of the Neonatal / Endangered Child and the STAT ED panel.



Substitution

Substitution occurs when a patient submits a specimen that is not urine.

In the early days of drug testing patients simply submitted yellow liquids that were easily obtainable such as Mountain Dew, beer or mouthwash.

Today substitution is very sophisticated. Patients can purchase synthetic urine on the internet or at local head shops. Synthetic urine ranges from a very simple formula of water, creatinine, and table salt to more complex formulas. These products typically come in 50 mL plastic bottles that can be hidden easily in clothing and taken into the rest room. Once in the rest room the patient can pour the synthetic urine from the bottle into the specimen cup and then use a hand warmer product (also easily concealed in clothing) to heat the specimen to body temperature. While these specimens may pass laboratory criteria (acceptable pH, negative oxidants, and Creatinine ≥ 20 mg/dL) they do not really look, smell or foam like real urine. Detecting synthetic urine is best done at the collection site by the Medical Assistant, nurse or physician.

Conclusion

Specimen validity testing (SVT) is an important quality component when testing for drugs of abuse.

SVTs Included in all Indicated Urine Drugs of Abuse Panels

SVT	Pass	Fail	Dilute
Creatinine	≥ 20.0 mg/dL	< 5.0 mg/dL	5.0 – 19.9 mg/dL
pH	4.5 – 8.9	< 4.5 or > 8.9	
Oxidants*	< 200 μ g/mL	≥ 200 μ g/mL	

*Nitrite Equivalents

Other SVTs are performed for normal urine constituents and/or preservatives as well to improve the chance of detecting synthetic urine.