

## Creatinine Testing in Urine Drug Screens

Testing for drugs of abuse is much like the old analogy: to catch a better mouse, you need to build a better mousetrap. Some patients will go to extreme lengths to pass a drug test they know they would otherwise fail. Fortunately, there are measures that treatment programs and laboratories can take to ensure that attempts at circumventing drug tests are not successful.

An observed collection policy is the most certain way to guarantee that a urine sample has in fact been produced by a patient and that the sample has not been tampered with. For a variety of reasons this is not always possible to practice. With unobserved collections, one of the most common ways that donors attempt to pass a drug test is by diluting or altering the composition of the sample, which can change the concentration of drugs in the specimen.

While there are several tests that can be utilized to verify the validity of a specimen, a Creatinine test is one of the most common indicators of sample dilution or substitution.

Creatine is synthesized from amino acids

in the kidney, liver and pancreas. The Creatine is then transported in the blood to other organs where it is synthesized into Creatinine. In the absence of kidney disease, urinary Creatinine is excreted from the body at a constant rate; thus, there are expected values for Creatinine in normal human urine.

Creatinine values are generally altered by two methods: the consumption of an abnormally large quantity of fluids or by adding water, juice, perfume, toilet water, etc., directly to the urine collection device post void. When urine becomes dilute, Creatinine levels are substantially reduced. Subsequently, the dilution of urine reduces the amount of drugs and the metabolites that may be detected.

The following Creatinine value ranges are referenced to help determine if a urine sample has been potentially diluted or substituted:

- Creatinine value is greater than 20 mg/dL: **Consistent with normal human urine**
- Creatinine value is between 2 mg/dL and 20 mg/dL: **Possible diluted urine sample**

- Creatinine value is 2 mg/dL or less: **Possible substituted urine sample**

These values are the guidelines set forth by SAMHSA, and followed for D.O.T. (Department of Transportation) drug testing procedures. The patients found in the drug treatment population, in general, are not typically “good hydrators” and are in a different physiological condition and state of health than a person who is taking a Pre-Employment drug test under Federal Guidelines. While SAMHSA guidelines indicate that a sample is not considered substituted until the Creatinine value is below 2 mg/dL, clinicians are encouraged to review samples with Creatinine levels below 20 mg/dL and consider the reason or method behind the possible dilution.

San Diego Reference Laboratory performs Creatinine testing on all urine drug screens at no cost. If the test results indicate that a sample has been possibly diluted or substituted, SDRL offers a more comprehensive Specimen Validity Test which includes additional tests for Specific Gravity, pH, Nitrites, Pyridinium Chlorchromate, Gluteraldehyde, and Bleach as well as a visual (color) and odor observation.

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### Question of the Month

That an oral fluid sample and a urine sample collected from the same patient on the same day can have two different results? The window of detection (or the period of time after a drug is ingested in which the primary drug and/or its metabolites can be detected) is different for oral fluid and urine. The window of detection (for most drugs) in oral fluid follows that of blood, which is 1-48 hours from use. The window of detection (for most drugs) in urine is 48-96 hours from use. Depending upon when the patient ingested the drug versus when the samples are collected, you could potentially see the drug present in both sample types or only in one.

**Question:** *How much urine is required for a basic drug screen? Why this amount?*

**Answer:** For the initial Immunoassay testing procedure, each drug on a panel (i.e. Opiates, THC, etc.) has its own volume requirement – typically between 10µL (micro liters) and 50µL. A typical 8-panel screen uses 400µL for testing. In addition, the screening machine requires at least 500µL to detect the sample. Therefore, an 8-panel test requires 900µL for the initial screen only. For visual reference, 1000µL is equivalent to 1mL; this is about 10 drops of urine. If only 1mL of urine is provided, no additional testing can be performed beyond the initial screen. Thus, SDRL requests at least 15 mLs of urine in case retests and confirmatory tests (GC/MS, TLC) need to be performed.