

Urine Drug Testing: Controlling for Alteration

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Adulteration methods can be classified into three different methods:

1. those that seek to dilute the urine to make the concentration of drug so low as not to be detected
2. those that seek to substitute the urine with different urine or another fluid
3. those that seek to destroy the ability of the test to accurately detect the drug

Methods to attempt dilution of the urine:

Department of Transportation (DOT) Definition: Dilute Urine – The measured creatinine is greater than or equal to 2 mg/dL but less than 20 mg/dL AND the specific gravity is greater than 1.0010 but less than 1.0030.

The most straight forward way in which clients will try to dilute the urine will be to add water or another liquid. This is usually done by adding water from the toilet bowl or faucet. The best way to deter this activity is to have the urine monitored by a same sex individual that is trained in how to observe the specimen being given. An observation method frequently employed (but not as good) is to have a monitor observe through a one-way mirror. If there is no monitor, then as a minimum, there should be bluing agent added to the toilet bowl and the water pipes to the faucets turned off. The addition of other fluids at the time of testing can be detected by analysis of the sample for specific gravity and creatinine (see standards for “dilute” and “substituted”).

Another method that clients frequently try is to over-hydrate themselves prior to giving a sample by drinking large amounts of water. This method can actually work if the drug use is only moderate to small. Fortunately, this method can be detected by a routine clinical urinalysis (UA) that will report the specific gravity and creatinine level, as well as other indicators of kidney function.

Always check the color. The color of the urine is often a giveaway that can indicate dilution. Normal urine is most often light to dark yellow or orange. Taking note of the odor is also important as one can often detect the addition of ammonia, vinegar, and other volatile additives.

Methods to attempt substitution of urine:

DOT Definition: Substituted Urine – The measured creatinine is less than 2 mg/dL AND the specific gravity is less than or equal to 1.0010 or greater than or equal to 1.0200. Also, if the pH is less than 4 or greater than 9, the sample is considered substituted. (This applies only to substitution with fluids other than urine)

Clients may try to bring in some other fluid like Mountain Dew, apple juice, beer, or cologne, all of which visually look similar to urine, and attempt to submit them as a sample. It is important to take precautions against allowing this by preventing clients from taking in any backpacks, purses, coats or other items in which they can hide these. They should be warned not to dress in bulky clothes, if possible, and can be asked to empty their pockets.

Clients can buy various devices on the internet, one of which is a prosthetic penis, through which fluid from a bag on their leg or around their waist can pass. These are also frequently outfitted with heaters that can bring the fluid to physiological temperature.

Methods to attempt invalidation of the testing by adulteration:

To understand how the screening test can be invalidated, one needs to understand the mechanism by which the drug is tested in the urine. Screening tests are done by an immunological and enzymatic method. Anything that will interfere with this reaction can negatively affect it and invalidate the test. It is immunologic because it incorporates anti-

bodies that are raised against the drug one wants to analyze for. Proteins can be destroyed through denaturing by fixatives like Glutaraldehyde or formaldehyde and broken up by proteolytic enzymes such as papain (meat tenderizer). The activity of both the enzyme necessary to create the color reaction as well as the attachment of the drug to the antibody are dependent on the pH of the solution as well as the ionic content. As such, any acid or base can destroy the reaction and any addition of a salt can as well. As one can see with the examples below, there are many substances that can be found readily available to anyone seeking to invalidate their urine test.

Here is a list of common examples of adulterants.

- “UrinAide” and “ClearChoice” (Glutaraldehyde) - fixative
- Formaldehyde - fixative, preservative
- “Klear” or “Whizzies” - nitrites
- “UrineLuck” (Pyridinium Chlorochromate) - oxidant
- Oxycleanse (sodium percarbonate) - oxidant, hydrogen peroxide
- Clorox/Ajax/Comet - pH,acid (chlorine bleach)
- Adolf’s meat tenderizer (papain) - proteolytic enzyme
- Salt Petre (sodium nitrate) - oxidant
- Morton Tender Quick Meat Cure - nitrites (sodium nitrate / nitrite)
- Prague Powder (Pink Curing Salt) - nitrites (sodium nitrate / nitrite)
- Lye (pellets) - pH, alkaline (sodium hydroxide)
- Pool Shock Oxidizer (potassium monopersulfate) - oxidant
- Super ShockWave (calcium hypochlorite) - pH, oxidant
- Vinegar - pH

Next month’s issue: Clinician Guidelines for the Collection of Urine Drug Tests