

# ADULTERATION AND DILUTION CHECKS

People usually do one of three things when trying to beat a test. They add a substance to their urine sample after voiding (external adulteration), they ingest something reputed to disguise the drugs in their system (internal adulteration), or they substitute someone else's clean urine for their own.

## Internal Adulteration

Internal adulteration is the most common form of tampering, which causes specimen dilution. Dilution increases the volume of urine produced which results in a much higher incidence of specimens with drugs in amounts below the cutoff level.

Drinking large volumes of just about any non-toxic water-based liquid will dilute urine. Drinking two or three 12-ounce glasses of water at the same time can produce 10-fold diluted urine within only half an hour and the dilution effect may last for hours. In most cases, this will successfully lower the concentration of some drugs (mainly marijuana) in the urine enough to produce a negative test result.

Dilution is not effective for defeating alcohol test. One cannot significantly alter the alcohol concentration in urine even by drinking a large amount of water.

A list of supposedly drug-test beating substances might include: vitamin C (ascorbic acid), fruit juices (cranberry, lemon, apple, vinegar, pickles, pickle juice, Hawaiian Punch, salted cold coffee, aspirin, herbal teas, pectin (a citrus product used in combination with kaolin to treat diarrhea), golden seal root, lecithin, penlight batteries (swallowed- presumably because they contain acid), and a host of commercial preparations claiming to fool drug tests. It is believed that by drinking acidic beverages or vinegar, one can change the pH of urine enough to render an immunoassay incapable of drug detection. In truth, the slight pH changes caused by drinking vinegar or fruit juice are easily adjusted by the kidney's buffering system. A substance capable of causing that degree of pH shift would be highly toxic.

Pre-Collection Dilution is achieved by the following methods:

- Hydration
- Water-loading
- Diuretics- products designed to 'enhance' drug elimination or removal of drugs (Golden Seal, Clean 'n' Clear, Test Free, Naturally Klean)

Post-Collection Dilution is achieved by the following methods:

- Addition of water from sink or toilet
- Addition of diluting agent designed to 'thin' drug concentration in the urine to fall below the cutoff level (bleach, ammonia, juices)

Labs using specimen 'validity' or 'adulta-checks' can detect pre-collection and post-collection dilution.

## External Adulteration

External adulteration is achieved by adding a substance to the urine during the collection process, once the urine is safely outside the body. Chemical agents capable of disrupting drug

tests are easily obtained, and unless a sample collection is directly observed, easily added to a sample cup.

Very caustic substances such as Lime-A-Way, Drano, Detergent, or Methanol can interfere with the analytic or screening chemistry performance. Other substances like blood or soap even in tiny amounts can cause viscosity or cloudiness in the sample to the degree that the system cannot take a correct reading. The instrument readings may alert the operator that the sample is faulty or has been tampered with.

## **Substitution**

Substitution is the third way people try to beat the drug test. Some drug problems are so out of control that desperate users will try virtually anything to conceal them. There have been reports of people who catheterize themselves just before collection and fill their bladders with other people's urine.

Listed below are some of the substances people use for substitution:

- Replacing donor urine specimen with drug-free specimen
- Biological substitution – someone else's 'clean' specimen
- Non-biological substitution – replacing urine with urine 'look-a-like' sample such as diet Mountain Dew, water with food coloring, beer, tea, apple juice, and cologne.

## **Prevention**

Stop adulteration at the point of collection. You can prevent specimen tampering and adulteration by following some effective preventive measures.

- Develop tamper-proof collection site
- Limit access to water (8oz per hour)
- Directly observe the collection which is the most effective approach to preventing substitution and adulteration
- Visually inspect sample prior to submission to lab
- Check specimen temperature
- Do not announce or post random screenings in advance
- Use a lab that employs specimen validity checks

## **Comments on Your Drug Screen Result**

You will see one or more of the following comments on your drug screen result in relation to the adulteration checks:

- Indistinguishable from water
- Inconsistent with normal urine
- Consistent with normal urine
- Possible Adulteration
- Adulteration

## FOUR COMMON ADULTERANTS THAT ARE SOLD MOSTLY ON THE INTERNET

1. **Urinaid** – active ingredient “gluteraldehyde”
  - Normally used as a sterilization chemical
  - Deactivates most screening methodologies
  - Produces false/negative results
  - Can be identified by specimen validity checks
  - Effect can NOT be reversed
  
2. **Klear and Whizzies** – active ingredient “potassium and sodium nitrite”
  - Used in analytical chemistry
  - Effects the GC/MS confirmation of some drugs – notably THC
  - Oxidizes drug and standards
  - Can be identified by specimen validity checks
  - Effects CAN be reversed
  
3. **Urine Luck** – active ingredient “pyridium chlorochromate”
  - Chemical used as an oxidizing agent in organic synthesis
  - Effects the GC/MS confirmation of THC and Opiates
  - Can also effect screening methodologies
  - Oxidizes drug and standards
  - Can be identified by specimen validity checks
  - Effects can NOT be reversed
  
4. **Stealth** – active ingredient “peroxidase” (vegetable source and peroxide)
  - Oxidizing agent
  - Effects the GC/MS confirmation of THC and Opiates
  - Can also effect screening methodologies
  - Oxidizes drug and standards
  - Difficult to identify
  - Effects can NOT be reversed
  
5. **Other Adulterants**
  - Mary Jane Superclean 13 (surfactant)
  - Clear Choice (gluteraldehyde)
  - Amber 13 (acid)
  - THC Free (acid)
  - Lucky Labs 418 (oxidant)
  - Sweet Pee’s Spoiler (oxidant)
  - Randy’s Klear and Klear II (oxidant)

## **ADULTERATION/SPECIMEN VALIDITY CHECKS**

Information about so called “adulterants” that are sold commercially is spread through word-of-mouth or through formal advertising. These adulterants are designed to nullify the result and disrupt the screening chemistry in order to render the immunoassay screening test used by most laboratories ineffective. If they cannot interrupt the testing process, the secondary purpose is to cause the concentration of the drug to fall below the cutoff level, even though the donor has taken or used the drug within the normal detection period. In the following text, you will read about some of the tests/methods used to assist Laboratories in determining adulteration.

### **pH**

pH is a measure of the alkalinity of a specimen. Normal urine is fairly neutral and, depending on the person’s diet, has a pH of around 7.0. The normal accepted range of testing is a pH between 4.5 and 8.0. A pH below this range is usually “flagged by” the analyzer as adulterated as it affects the absorption values generated in the screening test.

Urine becomes more alkaline, that is the pH may be higher than 8, as the specimen sits around after the collection. Generally, fluctuation in pH towards the alkaline side does not affect test results.

The lower the pH of a specimen, the greater the likelihood that someone adulterated the specimen to make it more acidic. A person would have great difficulty passing a highly acidic specimen due to extreme burning and bladder irritation caused by the acidity.

### **Specific Gravity**

Specific Gravity is a comparison of the weight of a drop of urine to of a drop of distilled water. Distilled water weighs 1.000. If the specimen submitted is urine, then it should be somewhat heavier than water and within a “normal” range for specific gravity. For laboratory purposes, the range for normal specific gravity is 1.003 to 1.040.

If urine is heavier than 1.040, the interpretation is ambiguous. A heavier than normal specific gravity can come from a bladder infection, bacteria in the urine which causes excess sedimentation, or from the addition of an adulterant. The laboratory is not able to discern intent when a higher than normal specific gravity is observed.

Similarly, while a specific gravity of less than 1.003 indicates that the specimen is dilute, the interpretation of the cause of the dilution must be considered. For example, if a person has consumed a large amount of liquid all day or is using a diuretic and the specimen is collected at the end of the day, the specimen may register below 1.003 when specific gravity is measured. While it is evident that the specific gravity is low, further investigation would be needed to determine whether a person intentionally hydrated himself/herself to beat the test or was just thirsty and consumed a lot of liquid.

The laboratory is not able to discern intent when a low reading is present. It is also doubtful that an officer would hear an admission from the offender that he/she drank liquid to "beat the test."

### **Creatinine**

Creatinine is a metabolic by-product formed primarily from the breakdown of protein within the body and eliminated in the urine. Creatinine is produced by the body at a constant rate and is eliminated into the urine each day in about the same total amount. Its concentration in the urine, therefore, can be used as a marker for detecting urine dilution.

There are a number of factors, including diet and pancreatic problems that can cause a creatinine level higher than the upper end of the normal range (typical urine creatinine concentrations are around 150mg/dl). There is no evidence to indicate that a high creatinine level affects the ability of the screening or confirmation test to detect drugs. A specimen reading less than 20 mg/dl, may be considered adulterated or diluted, but a low creatinine reading does not constitute proof that the specimen donor diluted the specimen to beat the test. Other conditions (physiological and chemical) may cause false creatinine readings as described by Young. (Young DS, et al., *Clinical Chemistry*. 21 (9), 1975.)

The laboratory toxicologist would have no difficulty preparing an affidavit indicating that a specimen with a pH below 5 is not normal. The laboratory toxicologist would also not have difficulty attesting to the fact that a specific gravity of 1.000 or creatinine of zero is not consistent with normal human urine. However, great caution should be exercised in any other low values as "intentional dilution" or adulteration.

### **Temperature**

There is one more important deterrent to adulteration – the taking of specimen temperature within four minutes of urination. Factors such as those discussed above are affected by unintentional hydration or normal body functioning, the temperature of urine is affected only by a person's body temperature. If urine temperature differs by two degrees or more from body temperature and the specimen temperature has been taken within four minutes or less of urination, the difference in temperature is due to adulteration. That is, the specimen donor added something to the specimen to cause it to be below or above normal urine temperature or substituted a specimen from someone else.

### **Gluteraldehyde**

Gluteraldehyde is the active ingredient in a commercial adulterant called "UrinAid." It is also found in cleaning and sterilizing solutions. The presence of gluteraldehyde in a urine specimen is indicative of adulteration. Normal urine value is zero (0) detected.

### **Nitrite**

Nitrite is the active ingredient in two well known commercial adulterants (Whizzies and Klear). It is not normally found in random urine. Nitrite values of 1 to 499ug/dl may

indicate a urinary tract infection or bacterial growth following improper storage. If nitrite is present above or equal to 500ug/ml, it is an indication of adulteration of the urine sample.