Dilute Urine Samples: Response to Low Creatinine Specimens

By: Paul L. Cary
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“Bright” Line Issue
Creatinine testing is a specimen validity issue!

The most common form of specimen tampering is sample dilution.
EVERY urine sample collected for drug detection should be tested for creatinine!

You can’t intervene to change behavior if you don’t know a client has relapsed!
Why Use Urine for Drug Testing?

- generally readily available in large quantities
- drug & metabolites are highly concentrated
- extensive scientific basis for methodology
- results accepted in court
- provides both recent and past usage
- uniform testing criteria (established cutoffs)
- easily tested (laboratory & on-site)
- quality assurance practices well-established
Problems With Urine as a Specimen:

- YUCK factor!
  - biological waste product
  - distasteful qualities & invasive collection
- NOT QUANTITATIVE – cannot use concentration to evaluate client drug use history
- drug concentration influenced by fluid intake
- necessities witnessed collection
- susceptible to tampering
The Internet - keyword search

- beat drug test
- piss test
- bladder cop
- NORML
- high times
- pass that test
- hemp
- cannabis
Urine Creatinine & Dilute Samples
What is creatinine?

- Creatinine is produced as a result of muscle metabolism.
- Creatinine is produced by the body at a relatively constant rate throughout the day.
- Creatinine is a compound that is unique to biological material (i.e. urine, other body fluids).
- Creatinine measurements can:
  - Determine the “strength” or concentration of a urine sample.
  - Ensure the sample being tested is urine.
EVERY urine sample used for drug detection should be tested for creatinine!
Two Types of Urine Specimen Dilution

- pre collection dilution
  - consumption of large quantities of fluids prior to collection
- post collection dilution
  - adding fluid to specimen post collection
Post-Collection Dilution

- agents added after sample collection designed to dilute drug concentration in the sample
- diluting agents (water, clean urine, other fluids)
- sole purpose of direct observation at collection
Pre-Collection Dilution

- high-volume ingestion of fluids (water loading, flushing, hydrating, etc.)
- may be in conjunction with products designed to “enhance” drug elimination or removal of drugs (Gold Seal, Clean ‘n Clear, Test-Free, Naturally Klean, etc.)
- no evidence these products have any additional effect on drug elimination
Water contains no drugs!

- easiest, cheapest, simplest
- urines with a creatinines of less than 20 mg/dL are considered “dilute” and rarely reflect an accurate picture of recent drug use
- dilute samples are more like water than like urine
- all drug court/criminal justice samples should be screened for creatinine
How are creatinine measurements used?

- Normal human creatinine levels will vary during the day based upon fluid intake - healthy individuals will rarely produce urine samples with creatinines of less than 20 mg/dL.
- Incidence of creatinines less than 20 mg/dL in a “normal” population is approximately 1%.
- Urines with a creatinines of less than 20 mg/dL are considered “dilute” and often do not reflect an accurate picture of recent drug use.
The “Normal” Creatinine

- normal urine creatinine: 2005 study “Urinary Creatinine Concentrations in the U.S. Population” determine the mean (based upon 22,245 participants) was 130 mg/dL
  - less than 1% below 20 mg/dL
  - less than 1% greater than 400 mg/dL
- incidence of low creatinines in a population undergoing random drug testing is significantly (up to 10 times) greater than a non-drug tested population
Creatinine Facts

- some diseases that produce low urinary creatinines
  - muscle wasting disease, Anorexia Nervosa
  - some kidney ailments - RARE
- low creatinines ARE NOT routinely associated with:
  - pregnancy
  - diabetes
  - obesity
  - hepatitis
  - exercise
  - high-blood pressure
  - being vegetarian
More Creatinine Issues

- rapid ingestion (90 minutes) of 2-4 quarts of fluid will almost always produce low creatinines & negative urine drug tests within one hour
- recovery time of urine creatinine and drug concentrations can take up to 10 hours
- next morning collection
“Dilute” Result Interpretation:

■ negative or none detected results should never be interpreted as indicating no drug use (abstinence), because if, in fact, drugs were present, they probably could not be detected by the test

■ positive drug test results from a dilute sample however, are considered valid (donor was not able to dilute the sample sufficiently to deceive the test)
The “Inadverventent” Dilute

■ “My sample is dilute because I work as a roofer, on a black roof, in the middle of August when the temperature is 400° F.”

■ it is possible for a client to achieve a urine creatinine of less than 20 mg/dL under extreme conditions

■ court needs to develop creative solutions:
  ◆ collect samples before work
  ◆ collect samples on days off
  ◆ use alternative specimens
Participants are going to deny “dilutes” with the same intensity as they deny “positives”
Creatinine Sanctions

■ no national standard
■ a range of sanctions of varying magnitudes that may be administered in response to infractions
■ sanctions increase progressively in magnitude over successive infractions
■ for goals that are relatively easy for participants to accomplish, such as being truthful higher magnitude sanctions may be administered after only a few infractions
Creatinine Sanctions

- verbal warning
- community service
- write paper on how the kidney works
- increased surveillance (therapeutic response)
- loss of privileges
- jail time
Dilutes & Therapeutic Goals

- honesty - touchstone concept
- dishonesty is a “learned behavior”
- honesty - proximal goal
  - easiest goals to achieve
  - proximal goals create a sense of immediacy
  - reduces procrastination
  - proximal goal attainment increases feelings of accomplishment
  - increases motivation
  - increases perceived efficacy for attaining the distal goals
Dilutes & Therapeutic Goals

- honesty - behavior that clients CAN and SHOULD control
- dilute samples represent an attempt to defraud the court’s recovery goals
- dilute samples = dishonesty
- honesty is a proximal goal
- thinking beyond sanctions
- honesty should be a critical goal for phase advancement
- Do you want a client advancing who has not mastered honesty?
Tracking Urine Creatinine Test Data

- for problematic participants - consider tracking urine creatinine levels
- graphing or tabulating urine creatinine levels over time
- comparing results to “normal” statistics
- create a powerful therapeutic tool to confront denial
Urine Creatinine Data - February - May, 2013

Average Urine Creatinine Level for US Population: 130 mg/dL
Average Urine Creatinine Level for Client N: 106 mg/dL
Dilute Urine Threshold Level: 20 mg/dL

Sample Collection Dates:
How Do I Handle A Participant Who Always Produces Dilute Samples?
Always Dilute Client:

■ is my client capable of producing “normal” urine samples?
■ require participant see a nephrologist (kidney doctor)
■ win for client if kidney dysfunction identified
■ win for the court if no kidney problems detected
■ removes potential client excuses
Urine Creatinine Testing
On-Site Drug Testing

- Creatinine
- Nitrite
- Glutaraldehyde
- pH
- Specific Gravity
- Bleach
- Pyridinium Chlorochromate

Color Coded Results Guide

[Image of drug testing cup and results chart]
### Alcohol

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<tr>
<th>Alcohol</th>
<th>Test Name</th>
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<tr>
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<td>Abnormal (Low)</td>
</tr>
<tr>
<td>0.0</td>
<td>Normal</td>
</tr>
<tr>
<td>20</td>
<td>Abnormal (High)</td>
</tr>
<tr>
<td>80</td>
<td>Abnormal (High)</td>
</tr>
<tr>
<td>300</td>
<td>Abnormal (High)</td>
</tr>
</tbody>
</table>

### UrineCheck (Adulteration)

<table>
<thead>
<tr>
<th>Oxidants</th>
<th>Glutaraldehyde</th>
<th>Nitrite</th>
<th>Specific Gravity</th>
<th>pH</th>
<th>Creatinine</th>
</tr>
</thead>
<tbody>
<tr>
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<td>Negative</td>
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<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>

### Test Name

- Abnormal (Low)
- Normal
- Abnormal (High)
The Creatine Supplement Issue:

■ creatine is the pre-cursor of creatinine

■ creatine supplements may increase the amount of creatine in the muscles

■ muscles may be able to generate more energy or generate energy at a faster rate

■ creatine supplements (along with training) may improve performance by increasing energy for activities such as sprinting and weightlifting

■ but that’s NOT why our clients take it!
The Creatine Supplement Issue:

- consuming over-the-counter creatine can disguise pre-collection hydration and a diluted urine
- creatine converted to creatinine will mask the dilution efforts
- in reality - very difficult to coordinate the intake timing and volume of creatine and dilution liquid
- creatinine greater than 300 mg/dL - increased monitoring
- creatinine greater than 400 mg/dL - sanctionable
What is Specific Gravity?

- measure of total dissolved solids in a liquid
- urine SpGr includes creatinine
- alternative method of determining sample dilution
- introduced in 1988 with federal workplace drug testing
- common test performed by “forensic” labs
My Advice on Specific Gravity

- use creatinine levels only to define “dilute” samples
  - samples less than 20 mg/dL
  - science-based approach
  - very defendable policy
  - easier to understand & explain to both clients & court professionals than SpGr
Controlling Specimen Tampering

- develop challenging collection strategy - ie. make the testing unannounced and RANDOM!
- directly observed collections is the most effective approach to preventing adulteration and substitution
- inspect sample - train collection staff
- keep abreast of tampering techniques
- take temperature measurements (90° - 100° F)
- use laboratory employs specimen validity tests & use with on-site devices
“Witnessed” collection (for urine)

- single most important aspect of effective drug testing program
- urine collections not witnessed are of little or no assessment value
- denial component of substance abuse requires “direct observation” collections of participants
Participant Education
Confront Specimen Tampering with Facts:

■ actively engage clients about tampering issues
  ◆ illustrates court’s tampering knowledge
■ discuss specimen tampering in court
■ prepare a fact-based presentation on the myths of tampering
  ◆ highlights the futility of tampering
■ testimony from former clients
■ constantly reinforce the “honesty” component of drug court
Test pure platinum sucks

I stayed clean for 16 days prior to the test. Two days before the test I started drinking water and cranberry juice. I managed to put down almost three gallons of water, 6 pre-cleanse capsules, and a jug of cranberry juice. I stopped hydrating around 11pm the evening before the test that was scheduled for 10:30 the next morning. I was up at 6:30am and drank one glass of water. At 8:00 I slammed the big bottle of test pure platinum magnum force. I waited the fifteen minutes and refilled with water and casually drank that over the next 45min while urinating as directed at least 3 times. The sample was like a neon yellow! The tester placed the drops on the card and waited the required 5 min max time. I was getting nervous as he kept looking down at the test card. Then he picked it up and went to his supervisor. He explained they would have to send it in for further testing and my pre-employment physical would have to be re-scheduled. They called and told me I failed. I am sending in for a refund on the $50.00 bottle of "Snake Oil". They claim a 300% money back guarantee. We'll see.
Drug Testing Myths: Things That DO NOT Help You Cheat on Drug Tests

Various techniques have been running around for some time on how to beat a urine drug test. Most of these techniques are known and the tests and testing methods have been adjusted to compensate for their use. Let's look at some of the most common techniques that do NOT work!

- Drink Lots of Water
- Drink Cranberry or Fruit Juices
- Take Goldseal
- Drink Pickle Juice
- Force Frequent Urination
- Drink Vinegar
- Excessive Exercise
- Shave Your Scalp
- Take Diuretics
- Take Aspirin
- Place Ammonia in Sample
- Place Bleach in Sample
- Place Drano in Sample
- Place Juice in Sample
- Place Visine in Sample
- Over Consumption of Protein, Fat and/or Carbohydrates
Most Common Ways to Pass a Drug Test for Marijuana Smokers

Do You Make These Mistakes?

The Internet offers a wealth of advice on how to pass a marijuana drug test. Our experts have analyzed the most common practices and now present a brief survey of their findings. The summary includes some tricky methods, but just how effective might these be? Let's look into it.

**Method 1: Abstinence**

**Pros:** Effective for those who have just had their very first few tokes of pot 4 days earlier. No test would find you out. After 24 hours there wouldn't be a trace left in your bloodstream. In 3 days - you've got pure urine.

**Cons:** This method is only useful to those whose consumption is low. A little pot twice a month requires only a few days of abstinence at first. For those smoking more often, however, the length of abstinence increases dramatically. With frequent smoking, marijuana metabolite (THC) in your body will not be eliminated quickly because THC is built up in fatty tissues. Chronic marijuana use can be detectable for as long as 2 months. Overweight users will also need extra downtime.

$7.99 THC/Marijuana One Step Rapid Drug Test

detOKs.com recommends: if you choose this method then double-check that your urine is clean with $7.99 THC/Marijuana One Step Rapid Drug Test
Method 2: Flushing Urinary System

**Pros:** -

**Cons:** Marijuana metabolite levels decreased significantly, and results frequently switched from positive to negative after a volunteer consumed 1 gallon of water. But the creatinine levels dropped below the cutoff after intake of just 2 quarters. (Cone EJ, Lange R, Darwin WD. In vivo adulteration: excess fluid ingestion causes false negative marijuana and cocaine urine test results. J Anal Toxicol. 1998;22:460-473). You should understand that you are very likely to be found out using this unwise method because labs are required to test the creatinine in all regulated specimens, and to test specific gravity for specimens with creatinine less than 20 mg/dL. ([SAMHSA MRO Manual](https://www.samhsa.gov/medication-assisted-treatment/))

detOKs.com recommends: Don't fail because of a "diluted result"
Doctor Relationship

- doctor - patient relationship
- drug court practitioner’s role
  - client monitoring/supervision
- doctor as patient advocate
- doctor as co-dependent
- dynamic for change
- reach out to healthcare professionals
SUMMARY

■ TEST FOR CREATININE!
■ incorporate creatinine guidance in your SOPs and client contract
■ institute a dilute sample prohibition
■ understand low urine creatinine levels are NOT normal
■ dilute samples are nearly always an attempt by the donor to avoid drug use detection
■ progressive sanctioning for repeat dilute tests