



STERLING NEWS & NOTES

A Report from Sterling Reference Laboratories

Third Quarter, 2008 – TECHNICAL CONTENT

Technical Information from STERLING Reference Laboratories

Everyday Toxicology 101

Case #1 - What do low creatinine and specific gravity levels mean?

Urine creatinine levels are an indicator of the relative concentration or dilution of a urine specimen. Creatinine is a normal metabolite of skeletal muscle. The daily 24 hour excretion of creatinine is very consistent in any one individual from day to day. It is not affected by diet. The main determinant of creatinine concentration is an individual's hydration status.

Specific Gravity (S.G.) is a measure of the amount of dissolved solids in urine. S.G. is only determined when the creatinine concentration is less than 20 mg/dL. S.G. can be considered an additional test of dilution. For reference, distilled water, which has no dissolved solids, has a SG = 1.000.

Official SAMHSA definitions:

Dilute Specimen:

Creatinine <20 mg/dL and Specific Gravity <1.003

Substituted Specimen:

Creatinine <2 mg/dL and
Specific Gravity <1.002 or >1.020

Dilute specimens are usually caused by an excessive intake of fluids prior to specimen collection.

A substituted specimen is one which has been tampered with or adulterated in some manner. It is physiologically impossible to produce urine with a creatinine levels less than 2 mg/dL. The most common method of adulterating a sample is the addition of fluids, usually water, which results in a low creatinine and specific gravity. Addition of either salt water or sugar water results in a low creatinine and an elevated s.g. due to the dissolved salt or sugar.

Regardless of the specific gravity, a creatinine level less than 20 mg/dL is an indication of a relatively dilute specimen. Negative screening results in a dilute should be interpreted with caution, the specimen may be negative because the donor abstained from drug use or the sample is negative because of the dilute nature of the specimen.

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An elevated creatinine level, greater than 500 mg/dL, is an indication of dehydration.

Based on 11,431 samples analyzed at STERLING, the median and mean creatinine concentration were 119.3 mg/dl and 130.3 mg/dL, respectively. Approximately 75 % of the samples had creatinine levels between 50 and 300 mg/dL. Less than 5% of specimens were below 20 mg/dL and less than 0.04% were below 2 mg/dL. Only 4% of specimens had creatinine levels above 300 mg/dL.

Case #2

A donor tested POSITIVE for the presence of Cocaine Metabolite (benzoylecgonine). She claims that she tested positive because her partner used cocaine before they engaged in sexual activity.

Cocaine is present in semen, as well as other body fluids, but the concentration of cocaine is sufficiently low that it will not result in a positive test result in the recipient.

Case #3

Client tested POSITIVE for THC. The donor claims that he tested positive for THC because he was in a small car with three friends who were smoking pot. It was cold outside, all the windows were rolled up and he was exposed to second hand smoke, hence the positive test result.

Exhaled smoke does contain a small amount of tetrahydrocannabinol (THC), the active compound in marijuana. However, using the SAMHSA recommended cut-off levels for THC, 50 ng/mL for screening and 15 ng/mL for confirmation, passive inhalation of THC will not result in a positive THC test result.

As an aside, if the donor is not allowed to use marijuana, why was he in the company of marijuana users?

Case #4

A client tested POSITIVE for morphine at a concentration of 739 ng/mL. The donor does not have a history of opiate abuse. He claims that he tested positive for morphine because he ate a large poppy seed muffin for breakfast on the day of specimen collection.

SAMHSA mandates use of a 2,000 ng/mL cut-off for opiate screening to minimize the “poppy seed” issue. Treatment and corrections programs are better served staying with the 300 ng/mL cutoff to maximize the window of detection for opiate abuse. The caveat is that any level of morphine in a specimen could be evidence of heroin use. It is not possible to isolate the source of the morphine; so all sources of morphine (heroin, morphine, codeine, poppy seeds) need to be considered as a possible explanation for low level morphine results. Because of these issues, it is recommended that any program that deals with potential opiate abusers establish a “no poppy seeds” policy that has enforceable sanctions.

A note of caution, even though a positive morphine result could be related to poppy seed use, that result does not necessarily exclude the other sources of morphine, which are heroin, morphine and codeine.

As always, if you have any questions on interpretation, a consulting scientist is available at (800) 442-0438, (253) 552-1551, or via e-mail at certifying@regtox.com.

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