

# Creatinine Normalization of Urine Drug Concentrations

Urine drug concentrations are affected by a person’s hydration status. Drinking large or small amounts of fluid can dilute or concentrate urine, which changes drug levels measured in **ng/mL** even when drug use is the same. To account for this, drug results are **normalized to urine creatinine**, a naturally occurring waste product excreted at a relatively consistent rate.

**1. Why are creatinine corrected results meaningful?**

**A:** In urine drug testing, laboratories first measure the absolute drug concentration in the specimen (ng/mL) and then normalize that value to the urine creatinine concentration (ng/mg creat) to account for dilution or concentration of the urine using the following calculation:

- Absolute concentration (ng/mL) / urine creatinine (mg/dL) x 100 = creatinine-corrected concentration (ng/mg creat)

This creatinine correction adjusts for differences in hydration and allows for more accurate interpretation and meaningful comparison of results over time within a particular patient.

**2. Why does the creatinine-corrected result sometimes look lower than the test’s reporting threshold?**

**A:** Drug testing thresholds are validated on **absolute concentrations (ng/mL)**.

When urine creatinine is **high**, dividing the drug concentration by creatinine can produce a **numerically smaller normalized value**, even though the drug is truly present at a concentration greater than the reporting threshold.

This does **not negate a positive result**—it reflects mathematical normalization, not incorrect application of the reporting threshold.

Example	Drug Detection Threshold, ng/mL	Drug Concentration, ng/mL	Creatinine, mg/dL	Normalized Drug Concentration, ng/mg creatinine
A	100	150	50	300
B	100	150	200	75*
C	100	150	600	25*

\*Normalized concentration is numerically lower than the detection threshold.

### 3. Why does the creatinine-corrected result appear to change the upper reporting limit of a test?

**A:** Similar to a low reporting threshold, the upper reporting limit of a test is validated on absolute concentrations (ng/mL).

When a specimen has an absolute drug concentration above the upper reporting limit, the creatinine-correction is applied to the upper reporting limit absolute concentration, and a greater than sign (>) is applied to the result.

The creatinine-corrected result will calculate to different values above or below the absolute upper reporting threshold based on high or low creatinine values.

Specimen results with a ">" should be interpreted as strong positive results.

Example	Validated Upper Reporting Limit, ng/mL	Drug Concentration, ng/mL	Creatinine, mg/dL	Normalized Drug Concentration, ng/mg creatinine
D	1000	>1000	50	>2000
E	1000	>1000	200	>500
F	1000	>1000	600	>167

### 4. How can I estimate the absolute concentration (reverse calculation)?

**A:** If needed, the approximate absolute drug concentration can be calculated as:

- Absolute concentration (ng/mL)  $\approx$  creatinine corrected value (ng/mg creatinine)  $\times$  urine creatinine (mg/dL)  $\div$  100

Example	Reported creatinine-corrected value (ng/mg creat)	Creatinine value (mg/dL)	Reverse calculation	Absolute concentration (ng/mL)
A	300	50	$300 \times 50 / 100$	150
B	75	200	$75 \times 200 / 100$	150
C	25	600	$25 \times 600 / 100$	150
D	>2000	50	$>2000 \times 50 / 100$	>1000
E	>500	200	$>500 \times 200 / 100$	>1000
F	>167	600	$>167 \times 600 / 100$	>1000

**Note:** This calculation is for explanation only; clinical interpretation should rely on the reported laboratory result.

### 5. How can serial creatinine corrected results be used to assess new drug use?

**A:** Following **creatinine corrected urine concentrations over time** allows clinicians and programs to better assess **new or continued use** of some drugs with long terminal half-lives such as **marijuana (THC) or fentanyl**.

Because creatinine normalization adjusts for changes in hydration, **rising normalized concentrations on sequential specimens are more consistent with new or repeated use**, while stable or declining concentrations are more consistent with residual drug elimination rather than new exposure. **Note:** This does not apply to drugs with short detection windows.

For additional information please contact our clinical drug testing client support team at (877) 474-5767/clinicaldrugtesting@labcorp.com or your local sales representative.