

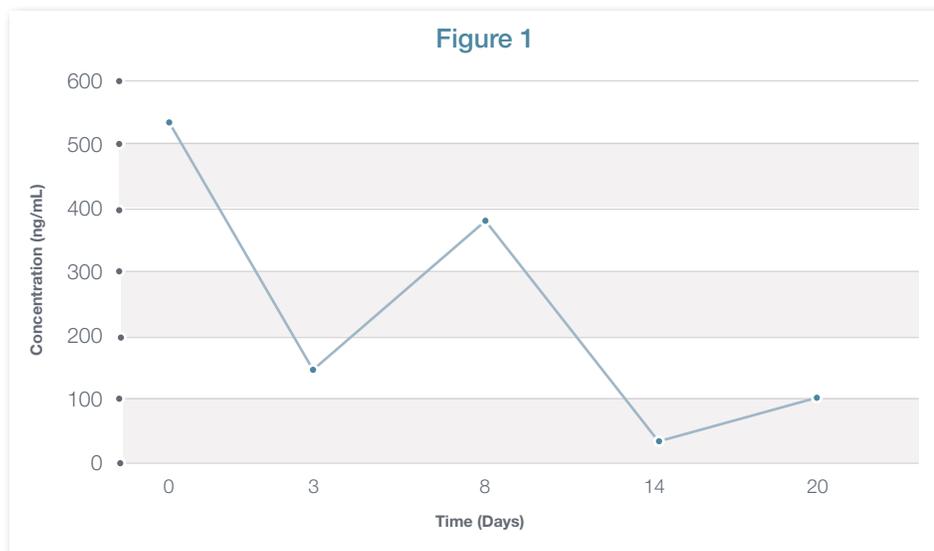
CASE REPORT: CREATININE ADJUSTED VALUES

Creatinine is a product of muscle metabolism that is consistently excreted by the kidneys. Because creatinine eliminates at a constant rate, urine creatinine concentrations can be used to determine the hydration state of a patient at time of collection. Urinary drug concentrations tend to be highly influenced by individual patterns of fluid intake. For example, excess fluids can result in dilution which has become a well-known adulteration tactic among drug abusers.^{1,2} The normalization of urine drug concentrations based on creatinine measurements can account for fluctuation in observed urine concentrations, ultimately enabling healthcare providers to review concentrations over time and minimizing the effect of fluid intake.¹

Case Report: Patient A was admitted for treatment at a local rehabilitation and treatment facility for alcohol dependence. Before entering the program, Patient A completed an alcohol detoxification (detox) after being rushed to the hospital for alcohol poisoning. In detox, Patient A was given Librium (chlordiazepoxide) which metabolizes into nordiazepam and oxazepam.³ For the purpose of this report, we will be evaluating the oxazepam results only.

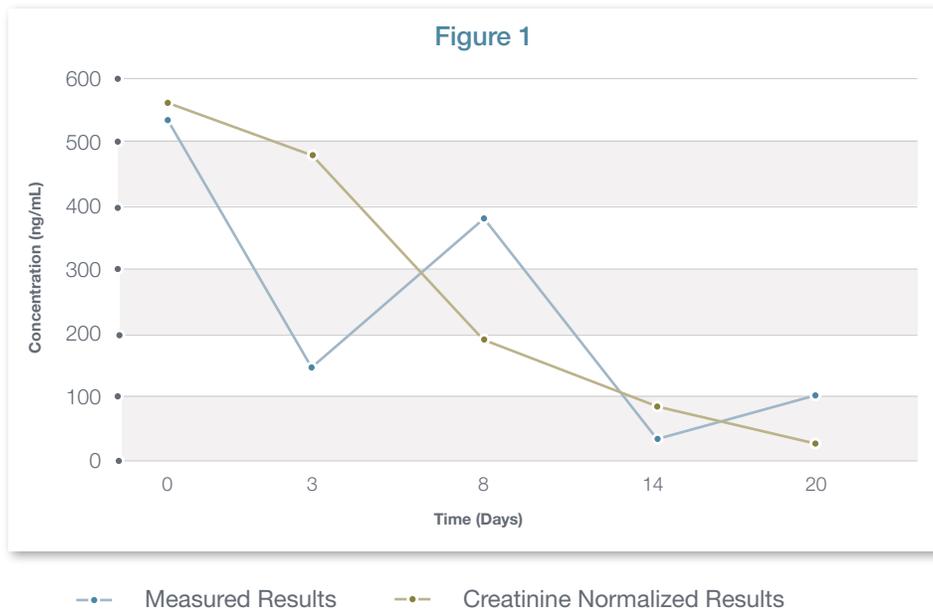
Scenario 1: Testing without Creatinine – Measured Results

Patient A's measured results illustrate increases and decreases in drug concentrations over time, insinuating possible reuse on day 8 and 20 (see Figure 1). Patient A is defensive of their results and insists they are remaining abstinent since being given Librium during the hospital visit.



Scenario 2: Testing with Creatinine - Creatinine Normalized Results

Patient A's urine creatinine concentrations indicate more dilute urine on the third day, while more concentrated urines were observed on days eight and twenty. The patient's creatinine normalized results exhibit a steady decrease of the Librium metabolite oxazepam, indicating a gradual elimination of the drug (see Figure 2). This provides both the patient and the treating clinician reassurance of Patient A's abstinence and continuation in the treatment program.



Calculating for Creatinine Normalized Result¹

$$\frac{\text{Measured Result} \times \text{Average Creatinine} \left(\frac{100\text{mg}}{\text{dL}} \right)}{\text{Measured Creatinine Concentration}}$$

Patient A Example:

The oxazepam measured result on day three was 153.59 ng/mL with a measured creatinine of 32.57 mg/dL. When applied to the above equation (153.59 ng/mL x 100 mg/dL ÷ 32.57 mg/dL), the creatinine normalized result for oxazepam is 471 ng/mL. On day eight, fourteen, and twenty, the measured results were 381, 38, 102 ng/mL with creatinine levels of 194, 51, and 350 mg/dL respectively. Due to the fluctuations of the measured creatinine concentrations, the creatinine normalized results illustrate the gradual elimination of oxazepam with results of 196, 75, and 29 ng/mL.

A Precision Diagnostics trained Clinical Support Specialist can assist with further review of your patient's results

(800) 635-6901 Option 2

References:

1. Cone, E. J., Caplan, Y. H., Moser, F., Robert, T., Shelby, M. K., Black, D. L., (2009). Normalization of urinary drug concentrations with specific gravity and creatinine. *Journal of Analytical Toxicology*. 33: 1-7.
2. Cook, J. D., Caplan, Y. H., LoDico, C. P., Bush, D. M., (2000) The characterization of human urine for specimen validity determination in workplace drug testing: A review. *Journal of Analytical Toxicology*. 34: 579-588.
3. Baselt, Randall C., *Disposition of Toxic Drugs and Chemicals in Man*, 10th ed. Biomedical Publications, Seal Beach, CA. 2014; 415-417.

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Precision Diagnostics 4215 Sorrento Valley Blvd. San Diego, CA 92121 (800) 635-6901
 info@precisiondxlab.com / precisiondxlab.com

