

The effect of creatinine normalization (THC Norm¹) of positive marijuana results is the elimination of the sample's concentration effect on the marijuana level. One would expect a highly concentrated urine sample to contain an increased amount of drug metabolites compared to a less concentrated sample. Creatinine normalization "levels the playing field" by standardizing the sample concentration and allows toxicologists and clinicians to draw better conclusions from drug test results. The effect of creatinine concentration on drug levels present in urine, if uncorrected, can lead to errors in accurately distinguishing between successive samples in which the client has maintained abstinence and those in which they have renewed their use of marijuana. For example, a patient may provide a sample on day one of treatment with a creatinine result = 100 mg/dL and a THC level = 50 ng/ml. Another sample is obtained on day seven of treatment, this time the creatinine = 300 mg/dL and the THC result = 100 ng/ml. Without correcting for the creatinine effect (in this case, the sample for day 7 is 3 times as concentrated as that obtained on day 1), a treatment provider would wrongly accuse the client of a relapse or new marijuana use. Creatinine correction of these samples would actually show a decrease in THC levels from day 1 (THC Norm=50 ng/mg) to day 7 (THC Norm=33.3 ng/mg).

This practice can also expose renewals in marijuana use that may be hidden by clients who try to dilute their sample to avoid detection. For instance, on day one of treatment we obtain a sample for a patient with a creatinine = 100 mg/dL and THC value = 50 ng/ml. The client is tested on day 7 of treatment and the lab finds the following: creatinine = 20 mg/dL and THC=50 ng/ml. Without accounting for the creatinine effect, it appears that this client has maintained abstinence and their THC levels have decreased by 50%. The creatinine corrected values show, however, this client has used marijuana in between tests as their level actually increased when the creatinine effect is removed by normalization (day 1, THC norm=50 ng/mg, day 7, THC norm=250 ng/mg). Without creatinine normalization, this client's relapse would have gone undetected.

Creatinine normalization is very useful tool for accurate interpretation of marijuana positive results on successive urine samples. This practice is also crucial in therapeutic drug monitoring to obtain accurate drug levels to determine medication compliance. Creatinine concentration should also be taken in account when interpreting levels of other drugs of abuse, however, its application in these situations isn't as well studied as with marijuana.

1 $THC\ Norm = (THC\ concentration\ (ng/ml) / Creatinine\ concentration\ (mg/dL)) * 100\ mg/dL = ng\ THC/mg\ Creatinine$

For additional information on this topic, please
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