

Utilizing the THC/Creatinine Ratio (part 2)

NOTE: Part 1 of this article appeared in the January issue of Toxicology Times.

When abnormally large quantities of fluids are consumed, the urine becomes diluted and the creatinine levels are substantially reduced, as well as the levels of the drugs and their metabolites. This fluctuation in the amount of creatinine in each sample allows for a correction of the drug excreted in that same sample. The ratio of the THC to creatinine should be the same, independent of the dilution of the sample due to water intake. If the patient does smoke marijuana, then the value for THC or more specifically the ratio of THC/Creatinine, when measured on different days, should be useful in determining continued smoking of marijuana.

As an example, if a patient gives a sample on Intake (A), and has reported chronic use, it is expected that the sample will be positive for THC. For this patient, there will be a sample collected on Intake (A), and once a week for the following four weeks (B, C, D, E), for a total of five samples collected.

Sample	THC Value	Creatinine	THC/C Ratio
A	86	152.4	56.43
B	74	180	41.1
C	52	140.3	37.06
D	24	35.2	68.18
E	18	20.8	86.5

The **THC/Creatinine Ratio** is calculated as follows: **(THC Value/Creatinine)*100**

The way to monitor if the patient has ceased use is to monitor the ratio, not the actual values. In the example, it is expected that sample A will be positive for THC. The ratio for sample A is the baseline. If the person has discontinued use, it is expected that the sample will likely continue to be positive for THC, but that the ratio will decrease. In the example, the ratio decreases between samples A, B and C. However, a noticeable spike (or increase) occurs in the ratio between testing events C and D, indicating new THC use between these two testing events. The ratio for sample D would be the new baseline, and you would expect a decrease in the ratio from that testing event on as

the drug metabolizes. But, in the example, there is a second spike in the ratio between samples D and E. This would indicate, again, new use between testing events D and E.

Further, in samples D and E, the THC values are 24 and 18. In almost any state, these screening values would be considered negative. (Most clients honor a cutoff level of 50 in screening for THC.) In this example, the patient's counselor notices the discrepancy between a negative result for THC, a creatinine level that is on the lower side (but still normal), and a THC/Creatinine ratio that is numerically higher than event C. Upon discussing with the patient, the patient admits to consuming an excess amount of fluids prior to submitting the test.

The intent of the ratio is to monitor ongoing positive results over time as the drug metabolizes out of the body, to verify cessation or ongoing use, and to help in the treatment of patients.

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Question of the Month

Two patients, taking an identical dose of the same medication, can (and most likely will) produce different urine screening results. There are many variables that can influence urine drug levels and they differ from patient to patient. Some of these variables include the patient's metabolism, drug absorption and excretion rates; the patient's hydration level; when the drug was consumed; and when the urine sample was produced. While some factors can be neutralized such as having patients consume their doses and produce their urine samples at similar times, other physical and physiological factors prohibit making direct comparisons between patient UA results, even those patients consuming the same drugs and doses. Interpretation of results should be based strictly on a patient-by-patient basis.

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Question: *Can urine be tested specifically for heroin?*

Answer: Heroin itself is not tested for in urine; however, 6-Monoacetylmorphine (6MAM), which is often referred to as Heroin because it is a specific biomarker for the consumption of Heroin, can be tested for. Heroin first metabolizes into 6MAM which is quickly eliminated from the system – within 24 hours of ingestion – even in higher drug concentrations. Due to 6MAM's fast metabolism it is difficult to specifically detect. However, 6MAM metabolizes into Morphine which can be detected in urine for up to 4 days from last use. Since Morphine can be identified for a longer period of time, it is the primary drug tested for in Heroin abuse. Morphine can also be a prescription for pain. The only way to decipher Morphine prescriptions from Heroin use is testing for 6MAM. If 6MAM is found negative, it does not indicate lack of Heroin use; it simply means it is not present in the sample or a Morphine prescription was used.