

DRUG COURT PRACTITIONER FACT SHEET

URINE DRUG CONCENTRATIONS: THE SCIENTIFIC RATIONALE FOR ELIMINATING THE USE OF DRUG TEST LEVELS IN DRUG COURT PROCEEDINGS

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PREFACE

As the title implies, the objective of this fact sheet is to provide drug court professionals with a scientifically based justification for discontinuing the interpretation of urine drug levels in an effort to define client drug use behavior. As the premise of this document is not without some controversy, clarification of its intent seems warranted.

This fact sheet is intended for drug court practitioners who are routinely engaged in the interpretation and evaluation of urine drug testing results for the purpose of participant case adjudication, particularly client sanctioning. Given that most drug courts do not have routine access to biomedical or pharmacological expertise, this fact sheet recommends that the use of urine drug concentrations be eliminated from the court's decision-making process in order to protect client rights and ensure that evidentiary standards are maintained.

It is not the intention of this document to prohibit the interpretation of laboratory data by qualified scientists. Nor is it the objective of this fact sheet to assert that urine drug levels have no interpretative value. However, drug court practitioners are cautioned that the interpretation of urine drug levels is highly complex and even under the best of circumstances provides only limited information regarding a participant's drug use patterns. Further, such interpretations can be a matter of disagreement even between experts with the requisite knowledge and training to render such opinions.

It is for these stated reasons that the NDCI strongly encourages drug court programs to utilize the information contained herein to evaluate their drug testing result interpretation practices. This organization recognizes that the use of urine drug levels to assess client behavior may be widespread and longstanding. However, because courts rarely have the necessary toxicology expertise, the routine use of urine drug levels by court personnel in formulating drug court decisions is a practice that in most cases would not withstand scientific or judicial scrutiny. It is hoped that this fact sheet will serve as the foundation for those drug court programs routinely interpreting urine drug levels to transition to a strictly qualitative (positive or negative only) result format. Drug courts are also encouraged to seek expert toxicology advice when necessary and appropriate to assist in the interpretation of testing data associated with challenging cases.

INTRODUCTION

While urine drug testing remains the primary strategy for the abstinence monitoring of drug court participants, interpretation of test results continues to be problematic for many courts. The use of urine drug concentrations (numeric values given with positive results) for the purpose of interpretation remains widespread. Many drug courts utilize urinary drug levels in an attempt to quantify the drug use behavior and patterns of their client population. To make matters worse, absolute drug concentrations are often “interpreted” without adjustments for differences in urine water content. Increases in absolute drug concentrations resulting from changes in urinary output are often mistakenly interpreted as new drug use rather than carryover from previous drug exposure. Decreases in absolute drug concentrations, which can also result from urine volume changes, can be misinterpreted as evidence of continued abstinence. Based upon limited, anecdotal information, urine drug levels are often arbitrarily assigned quantitative labels such as “high” or “very high” or “almost negative” in an effort to categorize laboratory results. Treatment providers monitor falling urine drug concentrations in an effort to substantiate continued elimination. Many drug courts utilize urine drug levels in an effort to define substance abuse behavior and dispense appropriately measured justice.

The fact that urine drug concentrations are of little interpretive value will unfortunately come as a surprise to too many drug court professionals.

At best, these interpretation practices are misguided. At worst, the conclusions reached regarding drug use behavior and patterns using urine drug concentrations are just plain **wrong!** While well intentioned and seemingly logical, the utilization of urine drug test levels

generally produces interpretations that are inappropriate, factually unsupportable, and without scientific foundation. Worst of all for the court system, these interpretations have little, if any, forensic merit.

EVIDENTIARY STANDARDS

The drug court model is built upon an evidentiary foundation that provides maximum flexibility to team members as they apply innovative treatment strategies designed to succeed where other legal remedies have failed. While this flexibility is an important management tool, basic evidentiary standards for the admissibility of scientific data into the proceedings must be maintained. Unfortunately, as drug courts experiment with a variety of therapeutic interventions and struggle with sanction and incentive decisions, this evidentiary foundation sometimes may become compromised. This is particularly true when the interpretation of drug testing results utilizes urine drug levels.

The fact that urine drug concentrations are of little interpretive value will unfortunately come as a surprise to too many drug court professionals. The use of urine drug levels for evaluating patterns of substance abuse is commonplace and has deep roots in the criminal justice system. Court programs have been adjudicating cases based on urine drug levels for years. That fact does not make the practice any more legitimate. If the use of urine drug levels cannot be supported scientifically, then the validity of decisions based upon these levels is questionable. Accordingly, the more often a court utilizes drug test results in a manner that is not scientifically valid, the farther it strays from its evidentiary foundation – thus undermining the forensic defensibility of its decisions.

It has even been reported that some jurisdictions interpret urine drug levels that fall **below** the testing cutoff point (i.e., samples that have tested negative). Presumably, the evaluation of levels under the assay threshold is an effort to uncover potential covert drug

use. It is further reported that increases in these levels (still below the testing cutoff) are used to sanction drug court clients. Not only is the evaluation of urine drug levels in a negative sample the antithesis of the intent of drug testing, but it also violates standards of evidence admissibility. In short, this practice is unethical. A negative test result cannot be interpreted in any other manner than negative. Court-affiliated attorneys, both prosecution and defense counsel, entrusted with the protection of client rights are obligated to abolish this practice.

An unambiguous evidentiary foundation that will pass scientific and legal scrutiny is crucial for the continued success of drug courts. For those drug courts utilizing urine drug levels to formulate court-related judgments, this fact sheet is designed to provide sufficient objective information to support the reevaluation of those result interpretation practices that allow the introduction of unscientific evidence into the courtroom.

LABORATORY/COURT RELATIONSHIP

The controversy associated with urine drug concentrations is complicated by the relationship between drug testing laboratories and the courts. The reporting of urine drug concentrations as part of the drug test result receives little attention within the drug testing industry itself. And if the issue does surface, the discussion often focuses on economic rather than scientific or ethical issues.

In performing a drug test, laboratories must determine the concentration of drug in urine in order to differentiate between samples that are reported as either positive or negative. Testing methodologies require that urine samples producing a drug concentration at or above the cutoff level of the drug test be classified as “positive” and that samples yielding a drug concentration below the cutoff level of the test be defined as “negative” (or none detected). In other words, the sole purpose for determining a urine drug level is to allow the assignment of a **qualitative**

result—positive or negative. The dilemma for the laboratory is what to do with the numeric result (drug concentration) that has been generated during the testing process.

Some laboratories do not report this value even if requested, believing that the urine drug concentration serves no useful purpose or could result in the misapplication of the data. On the other hand, many drug testing laboratories do provide the urine drug concentrations as part of their result report. When asked about the practice of reporting urine drug concentrations, most laboratories admit that these values are not useful for interpretation purposes; however, numerical results continue to be reported because of customer demand. Put another way, laboratories report drug levels because court professionals request those values. Laboratories that report concentrations routinely cite customer surveys that indicate that court programs would be dissatisfied with the lab services if drug concentrations were not provided (i.e., not getting their money’s worth). These surveys further suggest that merely reporting “positive” or “negative” results would be viewed as insufficient to meet the court’s needs.

The vicious cycle begins. Regardless of their negligible merit, urine drug levels reported to the court beg for interpretation and many courts are all too eager to oblige. Courts become dependent upon the drug levels provided by the laboratories for client adjudication and laboratories feel compelled to provide the concentrations to avoid the potential adverse economic repercussions associated with losing business due to not providing the levels. This results in an apparent institutional reluctance

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by both the laboratory industry and the criminal justice system to change current practices—even in the face of solid scientific evidence. Drug testing laboratories yield to the obvious economic forces and drug courts relying on urine drug levels for the dispensation of sanctions and rewards are not inclined to change or find the practice difficult to eliminate.

DRUG TEST MANUFACTURERS' RECOMMENDATIONS

By way of review, the drug tests used by drug courts are **qualitative**. That means that the purpose of the test is to determine the presence or the absence of a drug in a urine sample being tested – period. Either a drug test is positive (drug presence at or above the cutoff concentration) or negative (none detected; drug level below the cutoff concentration). These tests were not designed or marketed to produce quantitative results – how ***much*** drug is present in the sample.

The product information materials for the most popular laboratory-based drug test method in use in the U.S. (available since 1974) states the following:

- *“A positive result from the assay indicates the presence of drug but does not indicate or measure intoxication.”*
- *“Interpretation of results must take into account that urine concentrations can vary extensively with fluid intake and other biological variables.”*
- *“Immunoassays that produce a single result in the presence of a drug and its metabolites cannot fully quantitate the concentration of individual components.”*
- *“When the test is used as a qualitative assay, the amount of drugs and metabolites detected by the assay in any given specimen cannot be estimated. The assay results distinguish between positive and negative specimens only (Dade Behring, SYVA®, 2003).”*

This product information unequivocally established the qualitative nature of urine drug testing. Similar directives may be found in the product literature of essentially all drug testing products. The basis for this product

guidance is both technical (issues associated with the testing methodologies) and physiological (how the human body processes drugs).

TECHNICAL ISSUES AFFECTING INTERPRETATION OF DRUG LEVELS

First, qualitative drug tests are generally not linear. That means that the urine drug concentration being reported may not be precise because the testing instrument's response to varying drug concentrations is not a straight line. At high drug concentrations or low drug concentrations the values produced may not accurately reflect the actual concentration of drug in urine. Qualitative tests are not designed to accurately quantitate drug concentrations; the purpose of these tests is to determine whether the drug level in urine is greater than or less than the cutoff – positive or negative. Therefore, at the high concentrations (well above the cutoff) or at the low concentrations (significantly below the cutoff) the drug levels determined by the test may be skewed simply due to the concentration of the drug itself and the inability of the test to measure that concentration accurately.

Second, many initial screening tests detect both the presence of parent drug(s) and their metabolites (chemical breakdown products) simultaneously. That means that the numeric result reported represents a total concentration of the mixture of similar drug components (i.e., total amount of vegetables in a soup). These drug and drug metabolites are detected by the tests differentially. In other words, each individual component produces a distinct and dissimilar reaction (i.e., the peas in the soup produce a greater response when counted than the same number of carrots). With a qualitative test it is impossible to determine what portion of the total drug concentration being measured is associated with the primary drug and what portion is associated with the metabolites (i.e., what portion of the total measured vegetables in the soup is peas and what portion is carrots). Therefore, attempting to evaluate a urine drug level based upon a

result that measures total drug concentration (of continually changing concentrations of drug and drug metabolites levels) is not possible.

PHYSIOLOGICAL ISSUES AFFECTING INTERPRETATION OF DRUG LEVELS

Drug concentrations in the urine are present in proportion to the total amount of liquid. If the urine is diluted, the concentration of the drug is reduced and when the urine is more concentrated the drug concentration is increased. Urine volume or output is highly variable (both from person to person and within the same person at different times during the day) and is influenced by a variety of factors, including: liquid, salt and protein intake, exercise, and age. The variability of drug concentrations due to changes in urine volume is significant. Drug levels may vary widely within a day or between days even with no additional drug exposure as a result of fluid intake alone. Without some form of normalization technique (some drug courts use creatinine concentrations to correct for the variations that occur in urine volume) the interpretation of urine drug levels is fraught with inaccuracy.¹

As mentioned in the previous section, initial screening tests for drugs detect both the presence of parent drug(s) and their metabolites (chemical breakdown products) simultaneously. As drugs and their breakdown products are eliminated from the body they are excreted at differing rates – those that are less water-soluble are often eliminated more slowly than those that are more water-soluble. This results in a continually changing ratio of compounds that are reacting to the test (i.e., peas are eliminated more quickly than carrots; subsequent tests measure greater amounts of carrots). Due to the fact that these components are eliminated from the body at different rates, thus varying the overall test response,

any attempt to evaluate changing urine drug levels that are based upon a result that measures total drug concentration (drug and drug metabolites) becomes extremely problematic.

THE BLOOD ALCOHOL MODEL

Judges and courts have relied on quantitative (numeric) testing data for decades in making sentencing decisions; most notably, the interpretation of blood alcohol levels for the purposes of establishing intoxication and impairment. Unfortunately, the interpretation of blood alcohol concentrations cannot serve as a model for evaluating urine drug levels. In fact, the ease with which society legislates and litigates around BAC's has likely exacerbated the problem associated with understanding the limitations of urine drug levels. The blood alcohol model may have inadvertently led to the fallacy that drug levels in any biological fluid can and should be interpreted.

When it comes to the testing of urine, it may seem logical to make the assumption that drug concentrations are related to either a specific physiological response or that urine drug levels correlate with drug usage patterns. But the correlation between blood (as a specimen) and alcohol (as a drug) from an interpretation perspective could not be more different from the interpretation of urine drug testing results. The interpretation of blood alcohol concentrations is relatively straightforward because: (1) alcohol is a simple molecule, (2) blood is the biological specimen most closely associated with the site of drug action (receptor), and (3) the study of alcohol levels and their effects on humans spans nearly 100 years. By contrast: (1) abused drugs have very complex chemical structures, (2) urine is a waste specimen not associated with the pharmacological activity of the drug, and (3) research associated with abused drug concentrations and physiological response is in its infancy (compared to alco-

1. For additional information on the use of creatinine to normalize results, see also: "The Use Creatinine-Normalized Cannabinoid Results to Determine Continued Abstinence or to Differentiate Between New Marijuana Use and Continuing Drug Excretion From Previous Exposure", *Drug Court Review*, Volume IV, Issue 1, Summer 2002, pages 83-103.

hol). It is for these reasons that eleven noted toxicologists, in a consensus report regarding the interpretation of urine drug testing results in a forensic context, wrote:

“Testing of drugs or drug metabolites in urine is only of qualitative value in indicating some prior exposure to specific drugs. Inferences regarding the presence or systemic concentration of the drug at the time of driving or impairment from drug use are generally unwarranted (Consensus Development Panel, 1985).”

Few outside the scientific community realize that even when measuring drugs in blood (as opposed to urine), that many of the abused drug levels commonly quantitated are extremely difficult to interpret or even to correlate with specific physiological responses. Not surprisingly, scientists generally agree that there is no correlation between urine drug levels and pharmacological action. Since there is no recognized correlation between urine drug levels and drug action, it is not difficult to understand why attempting to interpret urine drug levels is not scientifically valid.

The blood alcohol model may have inadvertently led to the fallacy that drug levels in any biological fluid can and should be interpreted.

A urine drug level does not indicate whether the drug has been used frequently or only a single time. Levels do not indicate the strength of the drug being used or when the drug was last used. Urine drug levels do not indicate whether a person was under the influence or intoxicated by the drug at the time of the sample collection. Urine drug concentrations cannot tell the drug court whether new drug use has occurred or the value is associated with continued elimination from a previous exposure. Numeric results do not accurately discriminate between whether a participant's overall drug level is increasing or decreasing –

even if compared to previous urine drug concentrations from the same client, for the same drug. (This excludes those courts that have adjusted drug levels based upon urine creatinine concentrations.) Without extensive study under controlled conditions, no single urine drug test can reliably answer any of these questions.

WHAT INFORMATION CAN BE OBTAINED FROM A URINE DRUG TEST?

A positive drug test indicates prior exposure to the drug detected. A negative drug test indicates either the specimen does not contain the drug or the drug is present in concentrations below the cutoff level of the assay. Repeat testing of clients at regular intervals can improve the interpretation of positive results. Multiple positives over a period of time reinforce that an individual may be regularly using the drug(s) being detected. For individuals known to have chronically used drugs prior to the start of urine drug testing, collection of multiple urine samples over a period of time requires special attention. While continued drug excretion from previous exposure is a factor in multiple positive tests, this explanation is only valid until such time as the drug being detected should have been eliminated from the body. Accordingly, continuing positive drug test results cannot be related to drug excretion from previous exposure indefinitely. Multiple negative or “none detected” results provide evidence that an individual is maintaining abstinence and not using drugs on a regular basis. As mentioned earlier, the use of creatinine-normalized urine results may enhance interpretation. For cannabinoids, this approach allows the differentiation between new marijuana use and positive test results associated with continued drug excretion from previous marijuana exposure.

ELIMINATING DRUG LEVELS

Has the urine drug level increased or decreased since the last test? How positive is he/she? Does this level indicate relapse? The level

continues dropping so that indicates continued elimination, correct? If any of these questions are being asked within the drug court setting, it is almost certain that urine drug levels are being used inappropriately in the court's decision-making processes. For those court programs that use urine drug concentrations to make sentencing decisions, the transition to a non-numerical drug report format (i.e., results simply reported as positive or negative) may be difficult. However, there are benefits. First and foremost, the court moves forward secure in the knowledge that its rulings have a strong scientific basis and are forensically sound. Second, the court no longer has to attempt to interpret data that is not interpretable. Third, courts that have eliminated the use of urine drug concentrations have reported greater confidence in their decision-making process. Making decisions based entirely on either positive or negative reports removes the judicial ambiguity associated with manipulating numbers that few individuals, if any, in the court environment are trained to understand. Lastly, the use of urine drug test results that do not rely on concentrations adds additional fairness and equity to the rewards and sanctions process of the drug court. By removing the unpredictable urine drug levels from the decision-making equation, courts eliminate the unsupportable foundation on which these interpretations are based.

It is noteworthy that in the federal workplace drug testing programs (DOT, DOE, DOD, etc.), the routine reporting of urine drug levels is never permitted. Federally certified laboratories are **never** allowed to report the numerical values generated from initial screening procedures. These protections that are provided to federally regulated employees should serve to further illustrate the validity concerns associated with using urine drug concentrations in the drug court environment.

FINAL THOUGHTS

Mark Stevens and James Addison may have said it best. In an article entitled, "Interface of Science and Law in Drug Testing" they wrote:

"In short, there is a substantial gap between the questions that the legal community would like to have answered by drug testing and the answers that the scientific community is able to provide. The real danger lies in the legal community's failure to "mind the gap" by drawing unwarranted inferences from drug testing results (1999)."

When a drug court uses urine drug concentrations as the evidentiary basis in support of a ruling (a practice that likely would not withstand a serious legal or scientific challenge), the interpretation is performed by court professionals who generally lack background or training in pharmacology, toxicology, or fields related to drug testing. Accordingly, the court cannot be expected to fully comprehend and apply the many physiological variables associated with the pharmacology of abused drugs in the human body or the scientific and technical issues of detecting those drugs in biological fluids. However, by using urine drug concentrations in a forensic context, the drug court assumes and accepts the responsibilities (and liabilities) associated with that scientific knowledge – its use and misuse. Therefore, it is incumbent upon each court to determine the appropriateness of its use of drug tests results in the dispensing of justice. Drug courts have been portrayed as models of effective and appropriate jurisprudence. However, the continued use of urine drug levels in the determination of sentencing decisions represents a practice that is ultimately detrimental to the process of justice.

Making decisions based entirely on either positive or negative reports removes the judicial ambiguity associated with manipulating numbers

Urine drug testing is **qualitative** – the purpose of a drug test is to determine the presence or absence of a drug in a urine sample – nothing more! Eliminating drug levels will not make

urine drug testing results any less reliable or useful. However, the continued use of urine drug levels by drug courts in an attempt to interpret drug test results will likely result in both inappropriate and unfair rewards and sanctions for participants. Attempting to extract information from a drug test result in order to develop conclusions about urine drug concentrations, however well-intentioned, cannot be supported by the science and represents an adjudication practice that is simply not forensically defensible.

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This document was published with support from the Office of National Drug Control Policy, Executive Office of the President and the Bureau of Justice Assistance, U.S. Department of Justice.

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FACT SHEET QUIZ: WHAT DID YOU LEARN?

Test your new knowledge. Answer these true and false questions based on the Fact Sheet text.

☐ T ☐ F 1. Urine drug levels are similar to blood alcohol concentrations in that they may be used to determine the impairment or intoxication status of the individual being tested.

☐ T ☐ F 2. In addressing the complexities associated with various sanction and incentive options, cocaine urine levels may be utilized in the decision making process.

☐ T ☐ F 3. Any fluid intake changes an individual's urine drug level.

☐ T ☐ F 4. Laboratories will not report drug testing results without a numerical value because testing manufacturers have indicated in their product literature that such measurements are important to result interpretation.

☐ T ☐ F 5. Certified laboratories are never allowed to report the numerical values produced by screening procedures for drug tests performed on federally regulated employees.

☐ T ☐ F 6. Evidence admissibility standards for drug courts are less restrictive because in many courts the participants have already pleaded guilty.

Answers: 1. False; 2. False; 3. True; 4. False; 5. True; 6. False