Drug Testing

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Recommended Cut-Offs, Metabolites, and Cross-Reactors in Urine Drug Tests

Recommended Cut-Offs for Substances and Metabolites in Hair to Identify Use

1. ## Basic Data

Drug Positivity Rates Of US Employees Subjected to Urine Drug Tests, by Worker Category

Testing Category	2008	2009	2010	2011	2012	2013
Federally Mandated, Safety-Sensitive Workforce	1.6%	1.5%	1.5%	1.7%	1.6%	1.7%

General US Workforce

4.2%

4.2%

4.2%

4.1%

4.1%

4.3%

Combined US Workforce

3.6%

3.6%

3.5%

3.5%

3.5%

3.7%

Source:

"Workforce Drug Test Positivity Rate Increases for the First Time in 10 Years, Driven by Marijuana and Amphetamines, Find Quest Diagnostics Drug Testing Indextm Analysis of Employment Drug Tests," Quest Diagnostics, September 11, 2014, last accessed March 6, 2015.

http://www.questdiagnostics.com/home/physicians/health-trends/drug-testi...

"Drug Use Among American Workers Declined 74% Over Past 25 Years, Finds Unprecedented Analysis of More Than 125 Million Workplace Urine Drug Tests," Quest Diagnostics, November 18, 2013. Last accessed March 6, 2015.

http://blog.employersolutions.com/wp-content/uploads/2013/11/dti25-press...

2.

(Metabolites) "A drug's metabolite is the compound produced when the body processes a particular drug. Identifying these compounds is the focus of workplace drug testing analysis. Marijuana possesses the greatest total number of detectable metabolites at 31 but fewer major components. For amphetamines, no metabolites are identified because these substances normally pass through the body essentially unchanged in chemical structure."

Source:

"Drug Retention Times," Prepared for US Dept. of Energy Office of Security Policy, by the Center for Human Reliability Studies (Oak Ridge, TN: Oak Ridge Institute for Science and Education, May 2007), p. 1.

http://www.osti.gov/scitech/biblio/908420

http://www.osti.gov/scitech/servlets/purl/908420

3.

(Positivity Rate for Marijuana Use Among US Workers Subjected to Drug Testing) "Marijuana continues to be the most commonly detected illicit drug, according to the DTI analysis of urine drug tests. Marijuana positivity in the combined U.S. workforce increased 6.2 percent, to 1.7 percent in 2013 compared to 1.6 percent in 2012. In the safety-sensitive workforce, marijuana positivity increased 5.6 percent (0.67% vs. 0.63%). In the general U.S. workforce, the positivity rate increased 5 percent, to 2.1 percent in 2013 compared to 2.0 percent in the prior year. These increased positivity rates are consistent with findings from the 2012 National Survey on Drug Use and Health (NSDUH), which showed an increase in self-reported past-month marijuana use between 2007 and 2012.

"An analysis of urine drug test data for the combined U.S. workforce from the two states with "recreational" use laws – Colorado and Washington – showed marijuana positivity rates increased 20 and 23 percent, respectively, in the general workforce between 2012 and 2013, compared to the 5 percent average increase among the U.S. general workforce in all fifty states. However, both Colorado and Washington experienced dramatic increases in marijuana positivity rates prior to legalization at the end of 2012. From 2009 to 2010, Colorado experienced a 22 percent increase and Washington a 10 percent decline in positivity. From 2011 to 2012, Colorado experienced a 3 percent increase and Washington an 8 percent increase in positivity."

Source:

"Workforce Drug Test Positivity Rate Increases for the First Time in 10 Years, Driven by Marijuana and Amphetamines, Find Quest Diagnostics Drug Testing Indextm Analysis of Employment Drug Tests," Quest Diagnostics, September 11, 2014, last accessed March 6, 2015.

http://www.questdiagnostics.com/home/physicians/health-trends/drug-testi...

4.

(What Urine Drug Testing Can and Cannot Measure) "Urine drug tests, which are the least expensive and most frequently used form of drug test, can generally detect marijuana use within the past week; cocaine, heroin and other 'hard' drugs used within the past two days; and alcohol use within the past several hours (though alcohol is not often included in drug screens). Drug tests cannot measure frequency of use, nor do they indicate the severity of impairment or whether an individual has a substance use disorder that requires treatment. In addition, without medical review and confirmation testing on initial positive results, [20] urine screens also cannot distinguish between the illicit use of street drugs and the legitimate use of certain prescription and over-the-counter drugs. For instance, a drug test cannot distinguish between prescribed Tylenol with codeine and illicit opiates. Improper testing procedures and mishandling of samples can also produce inaccurate results."

Source:

"ASPE Issue Brief: Drug Testing Welfare Recipients: Recent Proposals and Continuing Controversies," Dept. of Health and Human Services Office of the Assistant Secretary for Planning and Evaluation (Washington, DC: October 2011), p. 4.

http://aspe.hhs.gov/hsp/11/DrugTesting/ib.pdf

5.

(Workplace Drug Test Positivity Rates for Cocaine and Amphetamine)

"Cocaine Use Is Decreasing

"According to the January to June 2012 DTI oral fluid data, the cocaine positivity rate was down 14.6% compared to 2011, continuing a downward trend from previous years; cocaine oral fluid positives in 2011 were down 10.9% compared to 2010. According to SAMHSA, in 2011, there were an estimated 1.4 million current cocaine users aged 12 or older, comprising 0.5% of the population.

"Amphetamines Use Continues Five-Year Upward Trend

"The 2012 DTI urine data further reports that amphetamines positives continue a five-year upward trend. In urine drug testing in the U.S. general workforce, the amphetamines positivity rate increased 11.7%, from 0.77% in 2011 to 0.86% from January to June 2012. In the federally mandated, safety-sensitive workforce, amphetamines positives increased 6.8%, from 0.44% in 2011 to 0.47% in the first half of 2012."

Source:

"Pre-Employment Drug Test Positives Increase More Than 5%, According to New Data from Quest Diagnostics Drug Testing Index," Quest Diagnostics, March 7, 2013. Last accessed May 13, 2013.

http://www.questdiagnostics.com/home/physicians/health-trends/drug-testi...

6.

(Drugs Screened for Under Federal Mandatory Guidelines) "The Federal mandatory guidelines recommended that the initial screening test identify the presence of the following commonly abused drugs or their metabolites (SAMHSA, 2008):

• Amphetamines (amphetamine, methamphetamine)

• Cocaine metabolites

• Marijuana metabolites

• Opiate metabolites (codeine, morphine)

• Phencyclidine (PCP)

"These substances are generally called the “Federal 5,” but over the years they have also been called the “NIDA 5” and “SAMHSA 5.”"

Source:

"Clinical Drug Testing in Primary Care," Technical Assistance Publication (TAP) 32, Substance Abuse and Mental Health Services Administration, Clinical Drug Testing in Primary Care (Rockville, MD: US Department of Health and Human Services, 2012), HHS Publication No. (SMA) 12-4668, p. 4.

http://www.kap.samhsa.gov/products/manuals/pdfs/TAP32.pdf

7.

(Possible Masking Agent: Zinc Found to Produce False Negatives in ELISA [Enzyme-Linked Immunosorbent Assay] Tests) "We conclude that zinc ion (Zn2+) is a potential adulterant in urine samples tested for drugs in routine workplace drug screening under the NIDA-5 panel using ELISA. Its effect in causing potential false-negative results in drug testing is robust and reproducible. This effect appears independent of the mode by which zinc is made available in urine. Although the exact mechanism by which zinc interacts with different components of the ELISA assay is unknown, the enhanced ELISA signal increases in a dose-dependent fashion. As a consequence, it is our conjecture that zinc ion increases the binding of drug conjugate to which the active horseradish peroxidase enzyme is attached, thereby increasing the final output signal.

"Although some urine samples containing added zinc sulfate may show signs of abnormal levels of chromate ions when tested using Adultacheck10 urine test strips, urine samples containing zinc by ingesting zinc supplements do not show any sign of adulteration whatsoever. In addition, such samples do not exhibit turbidity as observed with urine samples to which zinc sulfate has been directly added. Thus, we are aware of no suitable test to determine zinc adulteration in urine and conclude that zinc supplements are effective at subverting routine drug testing and undetectable by standard means."

Source:

Abhishek Venkatratnam and Nathan H. Lents. Zinc Reduces the Detection of Cocaine, Methamphetamine, and THC by ELISA Urine Testing. Journal of Analytical Toxicology (July/August 2011) 35(6):333-340 doi:10.1093/anatox/35.6.333.

http://jat.oxfordjournals.org/content/35/6/333.long

http://jat.oxfordjournals.org/content/35/6/333.abstract

8.

(Effectiveness of Drug Testing vs. Management and Supervision) "While the inquiry team could see a role for employee drug testing within safety-critical areas (although even here they were far from convinced that such drug testing was effective), there was deep scepticism as to the value of such testing more broadly. Indeed, the inquiry team noted that 'For the most part, it is unclear that anything can be achieved through drug and alcohol testing that could not be done better through other managerial and supervisory processes'"

Source:

Lloyd, Charlie and McKeganey, Neil, "Drugs Research: An overview of evidence and questions for policy," Joseph Rowntree Foundation (London, United Kingdom: June 2010), p. 54.

http://www.jrf.org.uk/sites/files/jrf/drugs-research-overview-full.pdf

9.

(Drug Testing of Arrestees in the US) "Illegal drugs are widely used among the arrestee population. Two thirds of all arrestees tested positive for at least one substance in their system at the time of arrest and 15 percent or more in all sites test positive for more than one substance. The most common substances in all but three sites are marijuana, cocaine, opiates and methamphetamine."

Source:

Office of National Drug Control Policy. ADAM II Annual Report (Arrestee Drug Abuse Monitoring Program). Washington DC: Office of the President. p. 37.

http://www.ibhinc.org/pdfs/ADAM2008.pdf

10.

(Cost of TANF Drug Screening Programs) "The estimated cost of drug testing TANF applicants and recipients varies by State and proposed law, depending on the proposed number of individuals who would be tested and the range of activities for which costs were estimated. Aggregate cost estimates of proposed welfare drug testing legislation were identified for twelve States (see Appendix C for details). The estimated costs in these States ranged from $92,487, for drug testing 20% of recipients and treating 2% of those tested in Louisiana, to $20 million, for just the testing of all public assistance applicants and recipients in New York. Other estimates include the cost of increasing staff to monitor or administer the tests, as in Maryland and

Missouri. Idaho's estimate includes the cost of making programming changes to the State's information system. Florida's law and Alabama's proposal require the applicant or recipient to pay for the up front costs of the drug test, though both would reimburse those who test negative. Most estimates do not incorporate costs relating to increased substance abuse treatment utilization or to increased child welfare interventions."

Source:

"Drug Testing Welfare Recipients: Recent Proposals and Continuing Controversies," Office of the Assistant Secretary for Planning and Evaluation (Washington, DC: October 2011), pp. 6-7.

http://aspe.hhs.gov/hsp/11/DrugTesting/ib.pdf

11.

(Testing Costs) "None of the State cost estimates identified for this paper showed net savings resulting from proposed drug testing programs, though these are all legislative cost estimates rather than rigorous cost benefit analyses. Also, none of the State cost estimates identified described anticipated unit costs of drug testing programs. However, an article from a magazine published by The Society for Human Resources Management reported in 2005 that, "testing an applicant or employee ranges from $25 to $44 for urinalysis... [while] hair follicle testing costs $75 to $150 per test." [35] News reports regarding the implementation of Florida's new drug testing policy have cited an estimate of $30 per TANF recipient for the drug tests being required of applicants, [36] though the State's drug testing pilot program in the early 2000s cost $90 per test once staff costs and other program costs were included. [37] Testing costs among the Indian Tribes that currently administer drug tests in their TANF programs ranges from $15 per client to $89 per client, with most reporting unit costs in the range of $30 to $50. [38] "

Source:

"Drug Testing Welfare Recipients: Recent Proposals and Continuing Controversies," Office of the Assistant Secretary for Planning and Evaluation (Washington, DC: October 2011), p. 7.

http://aspe.hhs.gov/hsp/11/DrugTesting/ib.pdf

12.

(TANF Drug Testing Legislation) "During 2010 and the first half of 2011, legislators in 31 states have proposed 82 bills that would require drug tests of TANF applicants and/or recipients. [31] There was also one proposal each in the U.S. House of Representatives and Senate."

"The legislative proposals identified differ in the populations that would be subject to drug testing. Of the bills, 50 State bills plus the two congressional bills would require that applicants be tested, 35 State bills would require suspicionless testing of current recipients, and an additional 26 would test current recipients for cause. In addition, while nearly all bills focus on testing adult applicants or recipients, a small minority of State bills would require youth aged 13 or older be tested and proposed legislation in one State would require that all benefit recipients, including children under 12, be tested."

Note: The source for this fact also contains a list of 2010 and 2011 federal and state legislative proposals concerning TANF drug testing and legislative cost estimates from 12 states.

Source:

"Drug Testing Welfare Recipients: Recent Proposals and Continuing Controversies," Office of the Assistant Secretary for Planning and Evaluation (Washington, DC: October 2011), p. 5.

http://aspe.hhs.gov/hsp/11/DrugTesting/ib.pdf

13.

(Possibility of Positive THC Test Through Exposure to Hemp Products) "Results of the hemp products tested indicate the amount of THC present in commercially available products is significantly less in products available today than those reported in the past (15-22). As a result, the probability that these products will produce urine THC metabolite levelsgreater than the DoD and HHS confirmation cutoff of 15 ng/mL is significantly reduced and should not be considered as a realistic cause for a positive urine analysis result."

Source:

Holler, Justin M., Bosy, Thomas Z., et al., "Delta9-Tetrahydrocannabinol Content of Commercially Available Hemp Products," Journal of Analytical Toxicology, Vol. 32, July/August 2008, p. 431.

http://jat.oxfordjournals.org/content/32/6/428.full.pdf

14.

(Hemp and Detection of THC Through Urinalysis) "Hemp seeds represent the manufacturing starting point for the vast majority of hemp products marketed since the mid-1990s. Hemp seeds are a good source of essential fatty acids, primarily alpha-linolenic acid (omega-3) and]inoleic acid (omega-6). They are also found in fish, flaxseed, rapeseed oil, pumpkin seeds, and sunflowerseeds. Essential fatty acids (EFA) are necessary fats that humans cannot synthesize, so they must be obtained through diet. EFAs support the cardiovascular, reproductive,immune, and nervous systems. The human body needs EFAs to manufacture and repair cell membranes, enabling the cells to obtain optimum nutrition and expel harmful waste products (9). THC found in manufactured products is present via contamination from resin produced in the leaves and buds that come into contact with the seed shell. Seed decontamination and manufacturing processes including wash steps and cold pressing for hemp products have improved since the mid-1990s, leading to the much lower THC concentrations currently found in today's commercial products.

"The presence of THC in these products has been a source of concern for the military and other workplace drug-testing programs. Ingestion of hemp products has been historically used as a defense in military and civilian trials for many years and continues today despite decreased concentrations of THC in hemp products (10-12). The Division of Forensic Toxicology, Armed Forces Institute of Pathology is often asked to analyze hemp products to determine their THC content in addition to rendering an opinion as to whether or not this THC concentration could be a reasonable cause for a positive THC metabolite urine analysis result."

Source:

Holler, Justin M., Bosy, Thomas Z., et al., "Delta9-Tetrahydrocannabinol Content of Commercially Available Hemp Products," Journal of Analytical Toxicology, Vol. 32, July/August 2008, pp. 428-429.

http://jat.oxfordjournals.org/content/32/6/428.full.pdf

15.

(Testing in the Context of Drug Courts) "For a drug court program, drug testing is conducted primarily to monitor a defendant's progress in treatment — to determine whether he or she has been using drugs and, if so, the type and quantity of substances being ingested. The drug test result may be used as a basis for imposing sanctions and/or enhancing treatment services, on the one hand, or reducing treatment service requirements, on the other. Drug test results may also indicate a participant's progress in reducing drug use when he or she has not eliminated it altogether.

"Although drug test results are frequently reported in terms of 'positive' or 'negative,' in reality, the determination of the presence or absence of a particular drug in the system is not always a black-and-white determination. Ultimately, for a drug court program, a positive or negative result reflects the presence or absence of certain drug metabolites in the sample at a concentration above or below the established cutoff concentration."

Source:

Robinson, Jerome J. and Jones, James W., "Drug Testing in a Drug Court Environment: Common Issues to Address," part of the Drug Court Resource Series, Drug Court Clearinghouse and Technical Assistance Project of American University (Washington, DC: Office of Justice Programs, U.S. Department of Justice, May 2000), p. 2.

https://www.ncjrs.gov/pdffiles1/ojp/181103.pdf

16.

(Disincentive to Report Accidents) "Occupational safety and health stakeholders we interviewed and occupational health practitioners we surveyed told us that primary factors affecting the accuracy of injury and illness data include disincentives that affect workers' decisions to report work-related injuries and illnesses and employers' decisions to record them. ... Workers' fear of disciplinary actions may be compounded by policies at some worksites that require workers to undergo mandatory drug testing following incidents resulting in reported injuries or illnesses, regardless of any evidence of drug use. Several labor representatives described mandatory drug testing policies as a disincentive that affects workers' decisions to report injuries and illnesses, and 67 percent of health practitioners reported they were aware of this practice at the worksites where they treated workers in 2008."

Source:

"Report to Congressional Requesters: Workplace Safety and Health: Enhancing OSHA's Records Audit Process Could Improve the Accuracy of Worker Injury and Illness Data" United States General Accountability Office, (Washington, DC: October 2009), pp. 17-18.

http://www.gao.gov/new.items/d1010.pdf

17. **Roadside Drug Testing Devices**

(DRUID Project Evaluation of Oral Fluid (Saliva) Testing Devices for DUI Enforcement) "Using the above model of evaluation it can be seen that the DrugWipe 5 delivers the best results for sensitivity (91%) whilst also performing very highly in terms of specificity (95%). However the margins of error (95% confidence interval) displayed in Figure 43 show that this value could vary between 78-97%, this margin of error would seem to be due to the size of the study population (135 tests performed) since the device was only tested in Finland. The strong results for this device probably reflect largely on the device‟s high performing individual amphetamines test in a country with a relatively high prevalence for amphetamines. However, this overall sensitivity is still higher than the individual sensitivity of the amphetamines test for DrugWipe 5 (87%) indicating that the device was successful in screening for other drugs. Both DrugTest 5000 and Rapid STAT also performed strongly in this evaluation both for sensitivity (85% and 82% respectively) and specificity (86% and 88% respectively), which is a reflection of their generally relatively good performance for each individual substance test. The sensitivity error margins are also somewhat narrower for these two devices that were tested on a greater number of subjects (220 and 342 tests performed respectively). The OrAlert device also performs at a high level of sensitivity (81%) in this evaluation, however the specificity is somewhat lower at 70% - which is the lowest score for any of the devices. The sensitivities of the other four devices included in the study range between 64% and 32%, which are quite low values. The specificities are, however, very high, or excellent, at between 93% and 100%. The relatively large error bars for the Oratect III device and BIOSENS can be attributed to the number of successful evaluations (58 and 25 respectively)."

Source:

Tom Blencowe, Anna Pehrsson and Pirjo Lillsunde, Editors. "Analytical evaluation of oral fluid screening devices and preceding selection procedures." Project Funded by the European Commission under the Transport RTD Programme of the 6th Framework Program, Project No: TREN-05-FP6TR-S07.61320-518404-DRUID (National Institute For Health and Welfare, Finland, Sept. 2010), pp. 93-94.

http://www.druid-project.eu/Druid/EN/deliverales-list/downloads/Delivera...

18.

(DRUID Project Evaluation of Oral Fluid (Saliva) Testing Devices for DUI Enforcement) "It is disturbing that the sensitivities of the cannabis and cocaine tests were all quite low, although further testing of the cocaine tests is desirable due to the low prevalences and the low concentrations encountered in this study. There are several countries in Central and Southern Europe for which these two substance classes are of special interest. On the other hand, it seems the sensitivities of the devices are generally better for amphetamines, a frequently encountered drug class among the DUI drivers in the Nordic countries. The suitability of the device for the intended national DUI population should also be considered, for example, PCP is rarely, if ever, found in Europe, therefore at the current time utilising a PCP test is unnecessary. Since the on-site tests are relatively

expensive the suitability of all the individual substance tests incorporated in the device should be considered.

"The evaluation showed that none of the evaluated tests is on a desirable level (>80% for sensitivity, specificity and accuracy) for all of the separate tests that they comprised. However, there were tests that performed already on a promising level for one or more substance classes. The DrugTest 5000 had the best overall results. The next best device was Rapid STAT, which performed at a similar level, except for the cocaine test which was somewhat less sensitive. Clearly the best device in terms of sensitivity for amphetamines was the DrugWipe 5."

Source:

Tom Blencowe, Anna Pehrsson and Pirjo Lillsunde, Editors. "Analytical evaluation of oral fluid screening devices and preceding selection procedures." Project Funded by the European Commission under the Transport RTD Programme of the 6th Framework Program, Project No: TREN-05-FP6TR-S07.61320-518404-DRUID (National Institute For Health and Welfare, Finland, Sept. 2010), p. 95.

http://www.druid-project.eu/Druid/EN/deliverales-list/downloads/Delivera...

19.

(Sheriffs Departments) "Nearly all officers were employed by a sheriff's office that used criminal record checks (99%), personal interviews (98%), background investigations (98%), and driving record checks (95%) (figure 4). More than 4 in 5 officers were employed by an office that used medical exams (87%), and drug tests (85%). More than two-thirds were employed by one using psychological evaluations (72%) and credit checks (69%). More than half of officers worked in sheriffs' offices using written aptitude tests (58%) and physical agility tests (54%)."

Source:

Hickman, Matthew J. and Reaves, Brian A., "Sheriffs' Offices 2003" (Washington, DC: USDOJ, Bureau of Justice Statistics, May. 2006), NCJ 211361, p. 8.

http://www.bjs.gov/content/pub/pdf/so03.pdf

20.

(Accuracy of Certified Labs Not Verified) "The accuracy of certified labs has never been tested. Not a single study of the accuracy of HHS certified laboratories has ever been conducted. The National Academy of Sciences and other experts have urged HHS to conduct such tests, [6] but HHS has never done so. Nor has HHS allowed independent researchers to see its data. HHS' failure to conduct or allow accuracy studies of certified labs is especially troubling in light of the federal government's assurances that the labs it used were reliable prior to the CDC study.

"The only relevant study actually indicates that certified labs are not reliable. In 2007, the United States General Accountability Office (GAO) studied 23 labs, all of whom were federally certified. The GAO found that not one of these labs consistently followed federally mandated procedures for lab accuracy. [7] "

Source:

Maltby, Lewis, "Latest Research Reveals New Problems with Drug Testing," National Workrights Institute (Princeton, NJ: March 2012), p. 2.

http://workrights.us/wp-content/uploads/2012/03/NewInformationDrugTestin...

21.

(Testing for Drug Use by Drivers) "Evidence-gathering technology for drugs is not as advanced in terms of ease of use and noninvasiveness as it is for alcohol. Until recently, no simple test police officers could administer to obtain an indication of drug use similar to the preliminary breath test for alcohol has been available. Rather, samples of urine or blood typically must be sent away for laboratory analysis to determine the presence of drugs and their quantification. Screening tests using urine, which can be used by officers in the police station, have been field tested by NHTSA. The technology is also developing for using saliva, sweat, and hair samples to detect drug use (Hersch, Crouch, & Cook, 2000).

"As said earlier, NHTSA has funded the Drug Evaluation and Classification (DEC) program, which equips specially trained officers, known as Drug Recognition Experts (DREs), to observe and record behavioral evidence of drug use to assess potential drug impairment among persons suspected of drug-impaired driving, and guide chemical testing and expert testimony for DUID trials. Currently, more than 40 States have officially adopted DEC programs to train DRE personnel."

Source:

Lacey, John, Brainard, Katharine, and Snitow, Samantha. (2010). Drug Per Se Laws: A Review of Their Use in States. (DOT HS 811 317). Washington, DC: National Highway Traffic Safety Administration, pp. 5-6.

http://www.nhtsa.gov/staticfiles/nti/impaired_driving/pdf/811317.pdf

22. **Types of Tests**

(Urine) "Urine is the most rigorously evaluated and most commonly used matrix for drug testing (Watson et al., 2006). All results are affected by laboratory test or point-of-care test (POCT) cutoff concentrations. Therefore, practitioners should always consult with laboratory staff when ordering laboratory tests or carefully read POCT package inserts before using the test. Numerous POCTs are available for urine drug testing.

"Window of Detection

"The window of detection for urine falls in the intermediate range, compared with the detection period or window for other matrices. Many factors influence the window of detection for a substance. Factors include, but are not limited to, the frequency

of use (chronic or acute), amount taken, rate at which the substance is metabolized, cutoff concentration of the test, patient's physical condition and, in many cases, body fat. Some hepatic, renal, endocrine, and other pathologies may extend the detection window."

"Drugs are present in urine from within minutes of use to several days after, depending on the substance; quantity ingested; the degree to which the bladder was filled with drug-free urine at the start of drug use; the patient's hepatic, cardiac, and renal function; the patient's state of hydration; and drug type. Drugs that are smoked or injected are detectable in urine samples almost immediately. Detection rates for drugs taken orally are slower, taking up to several hours and peaking at about 6 hours (Dolan et al., 2004).

"The window-of-detection estimates used in this chapter are from several sources: Cone (1997), Dasgupta (2008), Verstraete (2004), Warner (2003), White and Black (2007), Wolff et al. (1999), and Wong and Tse (2005).

"Many urine drug tests detect the drug metabolite, rather than the drug itself. As a general rule, drug metabolites remain in the body for a longer period than does the parent drug, allowing for a longer detection period. For example, when the test is for cocaine using urine, the target compound is usually the metabolite, benzoylecgonine, rather than the parent cocaine molecule."

Source:

"Clinical Drug Testing in Primary Care," Technical Assistance Publication (TAP) 32, Substance Abuse and Mental Health Services Administration, Clinical Drug Testing in Primary Care (Rockville, MD: U.S. Department of Health and Human Services, 2012), p. 51.

http://www.kap.samhsa.gov/products/manuals/pdfs/TAP32.pdf

23.

(Urine Tests for Alcohol) "After years of research, Ethyl Glucuronide (EtG) was found to be a direct metabolite of the alcohol (ethanol). EtG has emerged as the marker of choice for alcohol and due to the advances in technologies is now routinely available. Its presence in urine may be used to detect recent alcohol consumption, even after ethanol is no longer measurable using the older methods. The presence of EtG in urine is a definitive indicator that alcohol was ingested. Other types of alcohol, such a stearyl, acetyl and dodecanol, metabolizes differently and will not cause a positive result on an EtG test.

"The EtG test has become known as the "80 hour test" for detecting any amount of consumed ethyl alcohol. This is not totally true. It is true that EtG can be detected in chronic drinkers for 80 hours or even up to 5 days. During this period of chronic use, the EtG level can exceed 100,000 ng/mL. Two primary factors to determine the window of detection is based on volume of alcohol consumed and the time between each drink. A person that consumes 3 drinks can only have a detectable level of EtG for approximately 20 to 24 hours and peaks at approximately 9 hours with an EtG level around 15,000 ng/mL.

"Therefore, the presence of EtG in urine indicates that ethanol was ingested. EtG is a more accurate indicator of recent consumption of alcohol than measuring for the presence of ethanol itself."

Source:

Turnage, Jim, "Innovations in Substance Abuse Testing," presented for the State Bar of Texas (Dallax, TX: Forensic DNA & Drug Testing Services, Inc., April 17, 2011), p. 17.

http://www.dallasbar.org/sites/default/files/innovations_in_substance_ab...

24.

(Hair) "Testing of hair rather than urine is often promoted because it is less invasive and can detect drug use over longer time periods. Hair tests cannot detect very recent drug use but do detect use that has occurred between (approximately) 10 and 90 days prior to the test (depending on the length of the hair). In addition to being more expensive than urine testing, however, hair testing raises several important concerns. As compared with urine drug tests, hair testing may more frequently result in positive results because of external (i.e. passive) exposure to drugs or chemicals. Hair treatments, such as coloring or straightening, can also affect the results of hair tests, making it more difficult to detect drug use. In addition, hair testing is not used in some Federal criminal justice proceedings because there is some evidence that naturally dark hair (e.g. that of African Americans and Asians) is more likely to test positive than lighter hair, leading to concerns of racial bias in the effects of testing programs."

Source:

"Drug Testing Welfare Recipients: Recent Proposals and Continuing Controversies," Office of the Assistant Secretary for Planning and Evaluation (Washington, DC: October 2011), p. 4.

http://aspe.hhs.gov/hsp/11/DrugTesting/ib.pdf

25.

(Evaluation of Draeger DrugTest 5000 for Detecting Drugs Through Oral Fluid) "DrugTest 5000 screening results were evaluated against Quantisal confirmation data to determine TP [True Positive], TN [True Negative], FP [False Positive], FN [False Negative], diagnostic sensitivity and specificity, and efficiency at various cutoffs (Tables 1 and 2). When compared to THC alone, the diagnostic sensitivity and specificity and efficiency were 86.2%–90.7%, 75.0%–77.8%, and 84.8%– 87.9% at the 5-μg/L cutoff and 75.9%–92.7%, 76.0%–100.0%, and 78.8%– 86.4% at the 10-μg/L DrugTest 5000 cutoffs. Overall, the DrugTest 5000 performed better with the 5-μg/L screening cutoff, with diagnostic sensitivity and efficiency above the DRUID-recommended 80%. There were few FP and FN tests, and when they occurred, concentrations were at or near the confirmation cut-off. A limitation of this study was the inclusion of a small number of TN samples, only 6 –12 with the 5-μg/L DrugTest 5000 and 1- and 2-μg/L confirmation cutoffs, to adequately evaluate diagnostic specificity. On the basis of previous reports, more TN samples were expected over the 22-h collection period. Detection rates were highest and windows of detection were longest when we confirmed for THC alone (Fig. 1 and 2). However, the recent report of THC concentrations in OF following 3 h of passive exposure to cannabis smoke advocate for the inclusion of THCCOOH in confirmation criteria, because this analyte is not present in cannabis smoke and was not found in any OF [Oral Fluid] samples following passive exposure (18)."

Source:

Nathalie A. Desrosiers, et al., "On-Site Test for Cannabinoids in Oral Fluid," Clinical Chemistry, Oct. 2012, 58(10):1418-25.

http://www.ncbi.nlm.nih.gov/pubmed/22912396

http://www.clinchem.org/content/early/2012/08/20/clinchem.2012.189001.fu...

26.

(Racial Bias in Hair Tests) "Additional controversies exist about whether biophysical attributes affect hair analysis. Studies have shown that concentrations of drugs in hair can be affected by variations in hair structure, growth rate, melanin content, hygiene, and cosmetic hair treatments, such as bleaching (Dasgupta, 2008). Although there have been a limited number of human clinical controlled studies, data show that higher concentrations of some drugs (e.g., codeine, cocaine, amphetamine) are found in dark hair compared with concentrations found in blond or red hair (SAMHSA, 2004). Cone and Joseph (1996) reviewed several articles and found that hair testing may be biased toward some hair types. Drugs of abuse bind more readily to Africoid and Mongoloid types of hair compared with Caucasoid hair. Cosmetic hair treatments also affect the binding of drugs to hair. For example, bleaching of the hair can reduce drug content, but it also can damage the hair to the extent that bleaching may increase binding of the drug to the hair (Skopp, Pötsch, & Moeller, 1997). Some drugs (i.e., THC) do not differentially distribute into hair based on melanin content (Smeal, 2007). Therefore, hair testing may not be the most equitable drug testing matrix. Hair rinses, bleaches, and shampoos that claim to interfere with drug tests are advertised on the Internet and in magazines."

Source:

"Clinical Drug Testing in Primary Care," Technical Assistance Publication (TAP) 32, Substance Abuse and Mental Health Services Administration, Clinical Drug Testing in Primary Care (Rockville, MD: U.S. Departent of Health and Human Services, 2012), p. 22.

http://www.kap.samhsa.gov/products/manuals/pdfs/TAP32.pdf

27.

(Hair "Detection Window) "An advantage of drug testing with hair is the longer window of detection compared with other matrices (Boumba, Ziavrou, & Vougiouklakis, 2006). The detection period for hair is limited only by the length of the hair sample and the degree of deposition in the hair. Cannabinoids have been shown to deposit less readily than basic drugs in hair (Huestis et al., 2007). Some laboratories typically restrict analysis to a hair segment representing about 3 months of growth. However, this long window period is also a disadvantage; hair testing is not useful in substance abuse treatment or monitoring opioid pain or other addictive medications when frequent (weekly or monthly) drug testing is desired. Because the timing of the drug use is difficult to determine by testing hair, it is not very useful clinically."

Source:

"Clinical Drug Testing in Primary Care," Technical Assistance Publication (TAP) 32, Substance Abuse and Mental Health Services Administration, Clinical Drug Testing in Primary Care (Rockville, MD: U.S. Department of Health and Human Services, 2012), p. 22.

http://www.kap.samhsa.gov/products/manuals/pdfs/TAP32.pdf

28.

(Hair Testing Disadvantgages) "Disadvantages for testing for drugs in hair are the high costs and the longer time needed to obtain results, compared with the time required by other matrices. Analysis of the hair specimen is a complex process that involves breaking down the hair to free the drugs trapped in it. This chemical process requires a longer time of analyses than other matrixes. It can be done only in a laboratory; no POCTs [Point Of Care Tests] are available for testing hair samples."

Source:

"Clinical Drug Testing in Primary Care," Technical Assistance Publication (TAP) 32, Substance Abuse and Mental Health Services Administration, Clinical Drug Testing in Primary Care (Rockville, MD: U.S. Departent of Health and Human Services, 2012), p. 22.

http://www.kap.samhsa.gov/products/manuals/pdfs/TAP32.pdf

29.

(Oral Fluid (Saliva) Testing) "The parent drug is usually found in oral fluids, although the metabolite(s) may be present and quite useful. The parent drug is generally found in higher concentrations in oral fluids than are drug metabolites. Compared with urine specimens, oral fluid specimens present fewer opportunities for adulteration or substitution (Dams, Choo, Lambert, Jones, & Huestis, 2007). Use of commercial adulterants or mouthwashes were not found to interfere with the immunoassay (Bosker & Huestis, 2009), or they did not affect test results if the products are used more than 30 minutes before specimen collection (Drummer, 2006; Niedbala, Kardos, & Fries, et al., 2001; Niedbala, Kardos, Fritch, Cannon & Davis, 2001). The window of detection for oral fluid is narrower than it is for urine, and drug concentrations are generally lower (Warner, 2003). In general, drug testing of oral fluids detects drug use during the previous 24–48 hours, regardless of the route of administration (Cone, 2006), although the selection of cutoffs plays an important role in the length of the detection window.

"Oral fluid collection devices vary, but the most common version is a swab or absorbent pad on a stick that is placed between the lower cheek and gums to collect fluid and is left in place for a few minutes. It is then inserted into a vial containing a buffer solution for shipment to the laboratory. POCTs [Point Of Care Tests] are also available for oral fluid testing."

Source:

"Clinical Drug Testing in Primary Care," Technical Assistance Publication (TAP) 32, Substance Abuse and Mental Health Services Administration, Clinical Drug Testing in Primary Care (Rockville, MD: U.S. Department of Health and Human Services, 2012), p. 20.

http://www.kap.samhsa.gov/products/manuals/pdfs/TAP32.pdf

30.

(Oral Fluid Test Evaluations for DUI Enforcement) "It is disturbing that the sensitivities of the cannabis and cocaine tests were all quite low, although further testing of the cocaine tests is desirable due to the low prevalences and the low concentrations encountered in this study. There are several countries in Central and Southern Europe for which these two substance classes are of special interest. On the other hand, it seems the sensitivities of the devices are generally better for amphetamines, a frequently encountered drug class among the DUI drivers in the Nordic countries. The suitability of the device for the intended national DUI population should also be considered, for example, PCP is rarely, if ever, found in Europe, therefore at the current time utilising a PCP test is unnecessary. Since the on-site tests are relatively expensive the suitability of all the individual substance tests incorporated in the device should be considered.

"The evaluation showed that none of the evaluated tests is on a desirable level (>80% for sensitivity, specificity and accuracy) for all of the separate tests that they comprised. However, there were tests that performed already on a promising level for one or more substance classes. The DrugTest 5000 had the best overall results. The next best device was Rapid STAT, which

performed at a similar level, except for the cocaine test which was somewhat less sensitive. Clearly the best device in terms of sensitivity for amphetamines was the DrugWipe 5+."

Source:

Driving under the Influence of Drugs, Alcohol and Medicines (DRUID Project) 6th Framework Programme, "Analytical evaluation of oral fluid screening devices and preceding selection procedures," Deliverable 3.2.2 (Finland: National Institute for Health and Welfare, March 30, 2010), p. 95.

http://www.druid-project.eu/Druid/EN/deliverales-list/downloads/Delivera...

31.

(Breath Testing for Other Drugs in DUI Enforcement) "The results of this investigation provide further support to the possibility of using exhaled breath as a readily available specimen for drugs of abuse testing. There is a possibility that exhaled breath will develop into a new matrix for routine drug testing and present an alternative to already used matrices like urine, blood, oral fluid, sweat and hair. Each matrix may have its specific advantages and disadvantages. Since exhaled breath may be as easy to collect as in alcohol breath testing, it may present a new, more accessible matrix than blood at the roadside and elsewhere when the sampling procedure is an obstacle. We previously observed that exhaled breath methadone increases after intake [2]. If a correlation to blood concentration can be shown for exhaled breath levels, it may become a substitute matrix for monitoring impairment. One advantage of exhaled breath may be the detection of 6-AM, which is problematic in blood."

Source:

Olof Beck, et al., "Detection of drugs of abuse in exhaled breath using a device for rapid collection: comparison with plasma, urine and self-reporting in 47 drug users," Journal of Breath Research, 7 (2013) 026006 (11pp), http://dx.doi.org/10.1088/1752-7155/7/2/026006

http://iopscience.iop.org/1752-7163/7/2/026006

http://iopscience.iop.org/1752-7163/7/2/026006/pdf/1752-7163_7_2_026006....

32.

(Breath Testing for Alcohol) "The body metabolizes alcohol rapidly, but alcohol will be detectable in breath as long as it is present in blood. The detection period for ethyl alcohol itself is hours (not days) after the last alcohol use. The metabolism of alcohol varies considerably by the person's gender, age, physical condition (especially the condition of the liver), and weight.

"Easily administered breath alcohol tests are available to confirm alcohol ingestion within the past several hours. When a breath alcohol analyzer test is conducted properly, it gives an accurate measurement of breath alcohol content (BrAC). The BrAC gives an estimate of blood alcohol level (BAL) (Watson et al., 2006). Body temperature and breathing patterns can affect breath alcohol test results. Compared with blood and urine tests, breath tests are less precise. Some evidence suggests that breath tests may underestimate BALs by approximately 8.5 percent (Garriott, 2008).

"The breath alcohol analyzer (such as the best-known version, Breathalyzer) is a device that gives an accurate BrAC."

Source:

"Clinical Drug Testing in Primary Care," Technical Assistance Publication (TAP) 32, Substance Abuse and Mental Health Services Administration, Clinical Drug Testing in Primary Care (Rockville, MD: U.S. Department of Health and Human Services, 2012), p. 23.

http://www.kap.samhsa.gov/products/manuals/pdfs/TAP32.pdf

33.

(Finger and Toe Nails) "Like hair, fingernails and toenails are composed of a hard protein called keratin. Drugs are incorporated into nails from the blood stream and remain locked in the nail as it grows. Nails grow in both length and thickness. Drugs enter the nail from the base (cuticle end) as the keratin is formed and via the nail bed that extends under the full length of nail.

"The distal end or free end of the fingernails and toenails are clipped for testing. If length does not allow, the surface can be shaved but is not the preferred sample. If the surface is scrapped using a razor blade (a medical device) then this one procedure probably requires the collector to follow HIPAA requirements. Nail polish and acrylic nails must be removed prior to collecting the nail sample.

"The method of screening for drug use in nail tests is the same as hair, Immunoassay. The nail is put in a chemical solution to remove external contaminants and then liquefied. All drugs found in the initial screen are confirmed by one of the methods previously explained.

"Drugs can be identified in nail clippings 2-4 weeks following ingestion and can be detected from 3 to 8 months or longer. The broad range is based on numerous factors. Fingernails grow (approximately .12 inches per month) faster than toenails (approximately .042 inches per month), longer fingers grow faster than short fingers, age and gender of the person, the time of year, the food the person eats, the dominant hand grows faster than the other hand, etc."

Source:

Turnage, Jim, "Innovations in Substance Abuse Testing," presented for the State Bar of Texas (Dallax, TX: Forensic DNA & Drug Testing Services, Inc., April 17, 2011), p. 16.

http://www.dallasbar.org/sites/default/files/innovations_in_substance_ab...

34.

(Sweat) "Several collection devices have been manufactured for collecting sweat specimens. The two most common are the patch and the swipe; however, the sweat patch is the only device approved by the U.S. Food and Drug Administration (FDA). The quantity of sweat collected is determined by the length of time the patch is worn and the physiology of the person wearing the patch. The patch should be worn for at least 3 days, but no longer than 7 days, although most drugs will have been excreted within the first 48 hours (Barnes et al., 2009; Huestis et al., 2008; Kacinko et al., 2005; Schwilke et al., 2006). This ensures that a sufficient amount of sweat is collected for testing. The sweat collected with the patch detects drug use that occurred shortly before the patch was applied and while the device remains on the skin."

Source:

"Clinical Drug Testing in Primary Care," Technical Assistance Publication (TAP) 32, Substance Abuse and Mental Health Services Administration, Clinical Drug Testing in Primary Care (Rockville, MD: U.S. Departent of Health and Human Services, 2012), p. 21.

http://www.kap.samhsa.gov/products/manuals/pdfs/TAP32.pdf

35.

(Sweat Test Accuracy) "Because sweat can be collected only in limited quantities, there may not be sufficient specimen for repeat or confirmatory testing. Sweat is less susceptible to tampering or adulteration than is urine. The accuracy of sweat testing is not standardized. Its accuracy remains somewhat controversial (Watson et al., 2006). However, the sweat patch is used extensively in the criminal justice system, and its use to identify relapse or violations of conditions of probation has been upheld by the courts."

Source:

"Clinical Drug Testing in Primary Care," Technical Assistance Publication (TAP) 32, Substance Abuse and Mental Health Services Administration, Clinical Drug Testing in Primary Care (Rockville, MD: U.S. Departent of Health and Human Services, 2012), p. 22.

http://www.kap.samhsa.gov/products/manuals/pdfs/TAP32.pdf

36.

(Psychological Testing) "There is no psychological test that can reliably screen for substance abuse. The MAC-R Index on the Minnesota Multiphasic Personality Inventory 2 (MMPI-2) detects only addiction potential, not current use. If someone has been addicted in the past but is currently living a sober lifestyle, that person is still likely to test positive for addiction potential as this is more a personality style instead of a measure of current status (Friedman, Lewak, Nichols, & Webb, 2001). The idea behind the Substance Abuse Subtle Screening Inventory (SASSI) (Miller, 1994) is a good one. Essentially, it is an attempt to identify substance abuse through a self-report of symptoms that are associated with substance abuse without directly asking the central question. The Michigan Alcohol Screening Test (MAST) (Selzer, 197 1) is considerably less subtle, asking questions more directly. NCS also has an Alcohol Use Inventory (Horn, Wanberg, & Foster, 1987) that it markets."

Source:

Schleuderer, Claude and Campagna, Vicky, "Assessing Substance Abuse Questions in Child Custody Evaluations," Family Court Review (Madison, WI: Association of Family and Conciliation Courts, April 2004) Vol. 42, No. 2, p. 380.

http://207.56.97.118/2011_schleud_assess.pdf

37. Impairment Testing

(Drug Testing vs Impairment Testing) "Few employers have used impairment testing, and information concerning that experience is very limited and extremely difficult to obtain. The available information, however, indicates that impairment testing is not just a better answer on paper, but in practice as well. Employers who have used impairment testing consistently found that it reduced accidents and was accepted by employees. Moreover, these employers consistently found that it was superior to urine testing in achieving both of these objectives."

Source:

National Workrights Institute, "Impairment Testing: Does It Work?" (Princeton, NJ: NWI, undated).

http://workrights.us/?products=impairment-testing-does-it-work

38.

(Limited Use, Availability of Impairment Testing) "Collecting information about the performance of impairment testing proved extremely difficult because the field is so small. Only a handful of companies have ever marketed impairment testing systems and there is no list of their names. However, the Institute conducted an extensive networking program based on our contacts in the field that identified what we believe to be every company that has ever marketed impairment tests. There are only 10 such companies. Of these, only 6 manufactured systems for employers. Three of these 6 are now out of business. This means that there are only 3 companies currently in business that provide impairment testing systems for employers.

"By contacting these employers, we were able to identify 18 employers who had used impairment testing. Of these, 14 employers participated in our study. One employer that had used impairment testing is now out of business. The remaining 3 employers declined to participate."

Source:

National Workrights Institute, "Impairment Testing: Does It Work?" (Princeton, NJ: NWI, undated).

http://workrights.us/?products=impairment-testing-does-it-work

39. Laws & Policies

(Federal Rules Allowing or Mandating Drug Testing) "The federal government does not impose rules regulating or prohibiting testing in the private sector and instead gives direct governance to specific agencies for employees under their jurisdictions and to the states. Two federal departments (Department of Transportation and Department of Defense) require random drug testing for contractors and employees holding certain jobs and in certain circumstances (e.g., after an accident). In addition, there is a federal law (the Omnibus Transportation Employee Testing Act, Pub. L. No. 102-143) that requires testing for specific types of transit operators. For private industries, state laws cover drug testing for both job applicants and employees. The details of laws across states vary: Random testing may be explicitly prohibited but may also be required for certain jobs, such as school-bus drivers. Some states also have conditions detailing the confidentiality afforded to test results or the policies and procedures for conducting such tests (ACLU, 2000)."

Source:

Ramchand, Rajeev; Pomeroy, Amanda; Arkes, Jeremy, "The Effects of Substance Use on Workplace Injuries" (Santa Monica, CA: RAND Corporation, Center for Health and Safety in the Workplace, 2009), pp. 26-27.

http://www.rand.org/pubs/occasional_papers/2009/RAND_OP247.pdf

40.

(Constitutional Issues Involving Drug Testing as a Condition of Receiving Federal Benefits) "Based on the case law analyzed above, state or federal laws that require drug tests as a condition of receiving governmental benefits without regard to an individualized suspicion of illicit drug use may be susceptible to constitutional challenge. Drug tests historically have been considered searches for the purposes of the Fourth Amendment. The reasonableness of searches generally requires individualized suspicion, unless the government can show a special need warranting a deviation from the norm. However, governmental benefit programs like TANF, SNAP, unemployment compensation, and housing assistance do not naturally evoke the special needs that the Supreme Court has recognized in the past.

"The implementation of governmental assistance programs and the receipt of their benefits do not raise similar public safety concerns as those at issue in Skinner and Von Raab. In implementing these programs, the government also does not clearly act as tutor or guardian for minors, as the Court considered important in Earls and Vernonia. Finally, the evidence, at least thus far, in Lebron has failed to show a pervasive drug problem in the subset of the population subjected to suspicionless testing that strengthened the government's interests in Earls and Vernonia. Thus, if lawmakers wish to pursue the objective of reducing the likelihood of taxpayer funds going to individuals who abuse drugs through drug testing, legislation that only requires individuals to submit to a drug test based on an individualized suspicion of drug use is less likely to run afoul of the Fourth Amendment. [94] "

Source:

Carpenter, David H., "Constitutional Analysis of Suspicionless Drug Testing Requirements for the Receipt of Governmental Benefits," Congressional Research Service (Washington, DC: Library of Congress, January 19, 2012), p. 12.

http://www.fas.org/sgp/crs/misc/R42326.pdf

41.

(Drug Testing as a Condition of Receiving Federal Benefits) "The Supreme Court, on a number of occasions, has held that government-administered drug tests are searches under the Fourth Amendment. [14] Therefore, the constitutionality of a law that requires an individual to pass a drug test before he may receive federal benefits likely will turn on whether the drug test is reasonable under the circumstances."

Source:

Carpenter, David H., "Constitutional Analysis of Suspicionless Drug Testing Requirements for the Receipt of Governmental Benefits," Congressional Research Service (Washington, DC: Library of Congress, January 19, 2012), p. 2.

http://www.fas.org/sgp/crs/misc/R42326.pdf

42.

(Drug Testing, Alcohol Testing, and the ADA) "Although most laws concerning drug testing are at the state level, federal law must be considered when employers do test for ethanol (i.e., alcohol). The Americans with Disabilities Act (ADA) (Pub. L. No. 101-336) protects individuals with disabilities from discrimination in the workplace. Individuals with current alcohol-induced impairments and past alcohol problems are covered under the ADA. Thus, applicants cannot be tested or questioned about alcohol-use disorders until after a job offer has been made, and, even then, the law restricts when and under what conditions employees can be tested for alcohol use and other alcohol-use disorders. Moreover, employment decisions, particularly negative ones, cannot be based on these test results unless the employer can establish impairment caused by alcohol use (Hartwell, Steele, and Rodman, 1998). On the other hand, use of illegal drugs and of prescribed drugs used illegally and the drug-use disorders associated with such use are not covered under the ADA."

Source:

Ramchand, Rajeev; Pomeroy, Amanda; Arkes, Jeremy, "The Effects of Substance Use on Workplace Injuries" Center for Health and Safety in the Workplace (Santa Monica, CA: RAND Corporation, 2009), p. 27.

http://www.rand.org/pubs/occasional_papers/2009/RAND_OP247.pdf

43.

(Impact of Drug Testing for TANF Benefits) "Few proposals [to drug test applicants and recipients of TANF - Temporary Assistance for Needy Families] suggest child well-being improvements as a result of drug testing, though provisions for protective payees for children's benefits are intended to ensure funds are spent on children's needs. Proposals that sanction families by definition reduce the income available to the family and may therefore decrease child well being. Sanctions and benefit decreases have been shown to increase the risk that children will be hospitalized and face food insecurity. [42] An Idaho analysis also suggests that children may be harmed unintentionally by drug testing programs because parents may refuse to apply for benefits knowing they will face drug testing or may refuse to complete treatment. [43] On the other hand, deterrent effects of drug testing may lead welfare applicants to reduce drug use, with potential positive effects for children."

Source:

"Drug Testing Welfare Recipients: Recent Proposals and Continuing Controversies," Office of the Assistant Secretary for Planning and Evaluation (Washington, DC: October 2011), p. 8.

http://aspe.hhs.gov/hsp/11/DrugTesting/ib.pdf

44.

(Ferguson Case) " *Ferguson v. City of Charleston* (2001) is an important case in the family law domain because MUSC's [Medical University of South Carolina] policy of testing pregnant women for illegal drugs raises issues at the intersection of public health and constitutional law. The public-health aspects concern the very real and significant risks to maternal, fetal, and societal well-being of drug use during pregnancy; in addition, the policy raises constitutional questions about what constitutes a reasonable search and seizure and women' s privacy right to reproductive autonomy. Ultimately, the case addresses how best to strike the sometimes competing interests between mothers and their unborn children.

"Although the policy was discontinued before the Supreme Court's ruling and the Court held the policy to be unconstitutional, all the components of the decision—majority, concurring, and dissenting opinions—point to ways in which a similar policy could be designed so as to avoid the constitutional pitfalls encountered by the policy in *Ferguson* (2001). The petitioners won, but their victory is likely to be short lived. Recent developments in a number of states, combined with ongoing public concern about drug abuse, especially by pregnant women, suggest that despite *Ferguson's* outcome, pregnant women should not feel too secure from state intervention when receiving prenatal care. Such interventions are likely to have significant consequences for pregnant women's legal rights, as well as for their health, their fetuses' health, and their behavior during pregnancy."

Source:

Brian H. Bornstein, "Pregnancy, Drug Testing, and the Fourth Amendment: Legal and Behavioral Implications," Journal of Family Psychology (American Psychological Association, Inc: 2003), Vol. 17, No.2, p. 227.

http://digitalcommons.unl.edu/cgi/viewcontent.cgi?article=1187&context=p...

45.

(Lab Certification Requirement) "In response to well documented quality problems in labs that were previously considered reliable, the federal government established certification programs. The U.S. Department of Health and Human Services has a program to certify laboratories. [3] And the U.S. Department of Transportation has a program. [4] Testing conducted by federal agencies or required by federal law must be conducted by certified labs."

Source:

Maltby, Lewis, "Latest Research Reveals New Problems with Drug Testing," National Workrights Institute (Princeton, NJ: March 2012), p. 1.

http://workrights.us/wp-content/uploads/2012/03/NewInformationDrugTestin...

46. Sociopolitical and Clinical Research

(Effect on Productivity) In a study of high tech industries, researchers found that "drug testing programs do not succeed in improving productivity. Surprisingly, companies adopting drug testing programs are found to exhibit lower levels of productivity than their counterparts that do not. The regression coefficients representing potential effects of drug testing programs on productivity are both negative and significant. Both pre-employment and random testing of workers are found to be associated with lower levels of productivity."

Source:

Shepard, Edward M., and Thomas J. Clifton, Drug Testing and Labor Productivity: Estimates Applying a Production Function Model, Institute of Industrial Relations, Research Paper No. 18, Le Moyne University, Syracuse, NY (1998), p. 1.

http://www.reconsider.org/issues/drug_testing/drugtest.html

47.

(Emphasis on Drug Use Ineffective) "An evaluation of a Florida drug testing pilot found that those welfare recipients who tested positive for drugs had similar employment outcomes as others on TANF. Florida's drug screening and testing pilot for TANF was implemented from January 1999 to May 2001. A total of 8,797 applicants and recipients were tested and 335, or 3.8%, tested positive for a controlled substance. Florida State University conducted an evaluation of the pilot and found that there was very little difference in employment and earnings between those who tested positive versus those who tested negative and concluded that the cost of the program did not justify the outcomes achieved and the program did not warrant full implementation. [44, 45] The study's a review of the research evidence concluded that drug use is not a major barrier to employment for welfare recipients. [46] The authors of the Florida study caution that a disproportionate emphasis on drug use as a barrier to employment could be ineffective if other major barriers, such as physical and mental health problems, lack of job skills, and lack of transportation, are ignored."

Source:

"Drug Testing Welfare Recipients: Recent Proposals and Continuing Controversies," Office of the Assistant Secretary for Planning and Evaluation (Washington, DC: October 2011), p. 8.

http://aspe.hhs.gov/hsp/11/DrugTesting/ib.pdf

48. **Tables**

Recommended Cut-Offs, Metabolites, and Cross-Reactors in Urine Drug Tests

Drug (SAMHSA-5)	
# of Metabolites	**1**
Metabolite name(s)	**1**
Detection cutoff levels (ng/ml)	**2**
"Infrequent" use detection window	**1**
"Frequent" use detection window (	**1**
Cross reactants	**3**

Marijuana

31

11-Nor-delta-9-tetrahydrocannabinol; (THC) 9 carboxylic acid; 11-Hydroxy-delta-9-tetrahydrocannabinol; 11-Nor-delta-8-tetrahydrocannabinol; (THC) 9 carboxylic acid

50-(initial)

15-(confirm)

1 – 5

1 – 35

NSAIDs, Marinol, Protonix

Cocaine

4

Benzoylecgonine

150-(initial)

100-(confirm)
1 – 2
1 – 4

Opiates

3

Poppy seeds, chlorpromazine, rifampin, dextromethorphan, quinine

Heroin

6-Acetylmorphine or 6-Monoacetylmorphine

10-(initial)

10-(confirm)
1
1 – 2

Morphine

Morphine-3-beta-d-glucuronide; Morphine-6-glucuronide

2000-(initial)

2000-(confirm)
1 – 2
1 – 4

Codeine

Codeine-6-glucuronide; Morphine-3-glucuronide; Morphine-6-glucuronide

2000-(initial)

2000-(confirm)
1 – 2
1 – 2

Amphetamines

Ephedrine, methylphenidate, trazodone, bupropion, desipramine, amantadine, ranitidine, phenylpropanolamine, Vicks Vapor Spray

Amphetamines †

Unchanged amphetamine

500-(initial)

250-(confirm)
1 - 2
2 - 4

Methamphetamine †

Unchanged methamphetamine	
500-(initial)	
250-(confirm)	
1 - 2	
2 - 4	
MDMA	
Methylenedioxymethamphetamine	
500-(initial)	
250-(confirm)	
1 - 2	
1 - 2	

Phencyclidine (PCP)

1	
Hydroxylated PCP	
25-(initial)	
25-(confirm)	
2 – 8	
7 – 14	
Chlorpromazine, thioridazine, meperidine, dextromethorphan, diphenhydramine, doxylamine	

† No metabolites are identified for amphetamines because these substances normally pass through the body essentially unchanged in chemical structure.

Definitions:

Metabolite - a compound produced when the body processes a particular drug. These are what drug tests identify.

Cutoff level - the lowest concentration (least amount per unit volume) of a particular drug or its resulting metabolite(s) that cause a person to be identified as using a particular substance.

Initial cutoff level - level identifying “negative” results that don't need further analysis.

Confirm cutoff level - a more stringent level used to confirm "positive" results.

Detection window - time frame during which a drug can be detected as measured from the point of ingestion.

Cross reactants - other substances that may have chemical properties similar enough to produce a false positive.

Infrequent use - 'recreational' drug use.

Frequent use - 'chronic' drug use.

Cross reactants - other substances that may have chemical properties similar enough to produce a false positive.

Source:

(1) "Drug Retention Times," Center for Human Reliability Studies (Oak Ridge, TN: Oak Ridge Institute for Science and Education, May 2007), pp. 2-4.

http://www.osti.gov/scitech/biblio/908420

http://www.osti.gov/scitech/servlets/purl/908420

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(2) "Clinical Drug Testing in Primary Care," Technical Assistance Publication (TAP) 32, Substance Abuse and Mental Health Services Administration, Clinical Drug Testing in Primary Care (Rockville, MD: U.S. Departent of Health and Human Services, 2012), p. 5

http://www.kap.samhsa.gov/products/manuals/pdfs/TAP32.pdf

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(3) Christo,Paul J.; Manchikanti, Laxmaiah; Ruan, Xiulu; Bottros, Michael; Hansen, Hans; Solanki, Daneshvari R.; Jordan, Arthur E.; and Colson, James , "Urine Drug Testing In Chronic Pain," Pain Physician (Paducah, KY: American Society of Interventional Pain Physicians, March/April 2011), Vol. 14, Issue 2, p. 130.

http://www.painphysicianjournal.com/2011/march/2011%3B14%3B123-143.pdf

49.

Recommended Cut-Offs for Substances and Metabolites in Hair to Identify Use

Source: Society of Hair Testing

Drug Class	*Initial* Cutoff Level (ng/mg)	*Confirm* Target Analyte	*Confirm* Cutoff Level (ng/mg)
Amphetamines			
	0.2	Amphetamine	0.2
		Methamphetamine	0.2
		MDMA	0.2
Buprenorphine			

0.01
Buprenorphine
0.01

Norbuprenorphine
0.01

Cannibinoids-(marijuana)

0.1
THC
0.005

THC-COOH
0.0002

Cocaine

0.5
Cocaine
0.5

BZE, EME, CE, NC
0.05

Methadone

0.2
Methadone
0.2

EDDP
0.05

Opiates

0.2
Morphine
0.2

Codeine
0.2

6-acetylmorphine
0.2

NOTES :

6-acetylmorphine = heroin

BZE = benzoylecgonine, the primary metabolite of cocaine *(3-Benzoyloxy-8-methyl-8-azabicyclo[3.2.1]octane-4-carboxylic acid)*

CE = cocaethylene, a cocaine metabolite formed only in the presence of ethanol, aka 'alcohol' *(ethyl (2R,3S)-3-benzoyloxy-8-methyl-8-azabicyclo[3.2.1]octane-2-carboxylate)*

EME = ecgonine methyl ester, a more minor metabolite of cocaine

EDDP = an inactive metabolite of methadone (*2-ethylidene-1,5-dimethyl-3,3-diphenylpyrrolidine*)

MDMA = Ecstasy (*3,4-methylenedioxy-N-methylamphetamine*)

NC = norcocaine, a minor metabolite of cocaine *(methyl (1R,2R,3S,5S)-3-(benzoyloxy)-8-azabicyclo[3.2.1]octane-2-carboxylate)*

THC = tetrahydrocannabinol, the psychoactive component of cannabis/marijuana (*delta-9-tetrahydrocannabinol*)

THC-COOH = the main secondary metabolite of THC (*11-nor-9-carboxy-delta-9-tetrahydrocannabinol*)

Source:

Cooper, Gail; Kronstrand, Robert; and Kintz, Pascal, "Society of Hair Testing guidelines for drug testing in hair," Forensic Science International (Oxford, United Kingdom: Elsevier, January 2011), p. 4.

http://www.x-pertise.com/x-pertise.com/News_files/SoHT%20Guidelines%20FS...