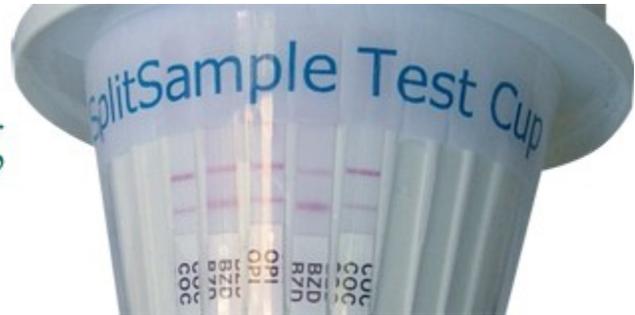


About Drug Testing



General information

In general, drug tests are divided into two groups. The first group is sophisticated lab drug tests. In this type of testing the donor gives a sample of urine, blood, hair, or saliva/oral fluid or hair to an employer, doctor, law enforcement official, or a dedicated testing center. After collection from the donor, the sample with a tamper-evident seal / integrity seal is sent for laboratory analysis. The primary advantages of this type of test are accuracy, legal defensibility, and the ability to customize tests for a particular demographic group. The disadvantages are typically costs associated with the need for collection sites (urine, blood), and the delay in receiving results (up to 5 days). The other type, on-site screens, done with an inexpensive kit, allow results within minutes. Besides urine, urine alternative samples, such as saliva or oral fluid have been used in on-site testing in order to eliminate the problem of "beating the tests" (otherwise known as sample adulteration or substitution). Unfortunately, current saliva/ oral fluid test methods are not sensitive enough to detect many drugs of abuse. Another improvement in on-site screen, is urine test cup that collects and detects in the same container device.

On-site Screen Test and Lab-analysis

On-site screens provide rapid qualitative results, and when supplemented with laboratory-based confirmation tests, such as GC/MS analysis, can be defended in a court of law. On-site rapid test results are in most states NOT used as evidence. However, the quick screen result determines if a lab analysis is needed. Usually, presumptive positive specimens are sent for lab analysis and a positive drug use is determined by the lab analysis result.

Personal Rights

The test subject should have the right to request a split sample to be sent to a lab of his or her choice for re-analysis. It is required that the re-analysis specimens must be uncontaminated by the initial screen test reagents. In most common dip-and-read type of tests and many urine test cup tests, the specimen is contaminated by the test reagent. To avoid re-sampling, the urine specimen should be pre-slit prior to testing with these devices. [CupLab urine test cup](#), however, splits urine specimen automatically when it is collected.

The NIDA 5

1. Cannabinoids ([marijuana](#), [hashish](#))
2. [Cocaine](#) (cocaine, benzoylecognine, cocaethylene)
3. [Amphetamines](#) (amphetamine, [methamphetamine](#))
4. [Opiates](#) ([heroin](#), [opium](#), [codeine](#), [morphine](#))
5. [Phencyclidine](#) (PCP)

Drug testing in the United States began in the late 1980s with the testing of certain federal employees and specified DOT regulated occupations. Drug testing guidelines and processes, in these areas exclusively, are established and regulated (by the [Substance Abuse and Mental Health Services Administration](#) or SAMHSA, formerly under the direction of the [National Institute on Drug Abuse](#) or NIDA) require that companies who use professional drivers, specified safety sensitive transportation and/or oil and gas related occupations, and certain federal employers, test them for the presence of certain [drugs](#). These test classes were established decades ago, and include five specific drug groups. They do *not* account for current drug usage patterns. For example, the tests do not include semi-synthetic opioids, such as oxycodone, oxymorphone, hydrocodone, hydromorphone, etc., compounds that are highly abused in America.

While SAMHSA/NIDA guidelines only allow labs to report quantitative results for the "NIDA-5" on their official NIDA tests, many drug testing labs and on-site tests also offer a wider or "more appropriate" set of drug screens which are more reflective of current drug abuse patterns. As noted above, these tests include synthetic pain killers such as Oxycodone, Oxymorphone, Hydrocodone, Hydromorphone, [benzodiazepines](#) (Valium, Xanax, Klonopin, Restoril) and [barbiturates](#) in other drug panels (a "panel" is a predetermined list of tests to run). The confirmation test (usually [GCMS](#)) can tell the difference between chemically similar drugs such as methamphetamine and ecstasy, and in the absence of detectable amounts of methamphetamine in the sample, the lab will either report the sample as negative or report it as positive for MDMA. What the lab reports to the client depends upon whether MDMA was included in the panel as something to be tested for.

Gamma-hydroxy-butyrate ([GHB](#)) was not routinely tested for in the early 1990s, but due to increasing use, some labs have added it as an optional test. GHB is rare in pre-employment screening, but is commonly checked for in suspected cases of drug overdose, date rape, and post-mortem toxicology tests. [Ketamine](#) (Special K) may or may not be tested for, depending upon the preferences of the entity paying for the test, though testing for it is uncommon. In general, the greater the number of drugs tested for, the higher the price of the test, so many employers stick to the NIDA 5 for financial reasons.

Other drugs, such as [meperidine](#) (Demerol), [fentanyl](#), [propoxyphene](#), and [methadone](#) are not commonly tested for in most pre-employment situations. These drugs are more likely to be included in tests for certain demographic groups (such as healthcare workers, drug [rehab](#) patients, etc.)

Hallucinogens other than cannabis and PCP, such as mushrooms ([psilocybin](#)), LSD, and

peyote ([mescaline](#)) are rarely tested for.

Detection periods

The following chart from LabCorp gives approximate detection periods for each substance by test type.^[1] The ranges depend on amount and frequency of use, metabolic rate, body mass, age, overall health, and urine pH. For ease of use, the detection times of [metabolites](#) have been incorporated into each parent drug. For example, heroin and cocaine can only be detected for a few hours after use, but their metabolites can be detected for several days in urine. In this type of situation, we will report the (longer) detection times of the metabolites.

- NOTE 1: Oral fluid or saliva testing results for the most part mimic that of blood. The only exception is THC. Oral fluid will likely detect THC from ingestion up to a maximum period of 1 day.
- NOTE 2: Urine can not detect current drug use. It takes approximately 6–8 hrs. or more post-consumption for drug to be metabolized and excreted in urine. Similarly, hair requires two weeks, and sweat, seven days.

approximate values for detection periods			
Substance	Urine	Hair	Blood
Alcohol	3–5 days via Ethyl Gluconoride(EtG) metabolite or 10–12 hours via traditional method		12 hours
Amphetamines (except meth)	1 to 2 days	up to 90 days	12 hours
Methamphetamine	1 to 2 days	up to 90 days	24 hours
Barbiturates (except phenobarbital)	2 to 3 days	up to 90 days	1 to 2 days
Phenobarbital	7 to 14 days	up to 90 days	4 to 7 days
Benzodiazepines	Therapeutic use: 3 days. Chronic use (over one year): 4 to 6 weeks	up to 90 days	6 to 48 hours
Cannabis	<ul style="list-style-type: none"> • Single Use: 2 to 14 days • Prolonged Use: 25 to 60 Days 	up to 90 days	2 days
Cocaine	2 to 4 days	up to 90 days	24 hours
Codeine	2 days	up to 90 days	12 hours
Cotinine (a break-down product of nicotine)	2 to 4 days	up to 90 days	2 to 4 days

<u>Morphine</u>	2 days	up to 90 days	6 hours
<u>Heroin</u>	2 days	up to 90 days	6 hours
<u>LSD</u>	2 to 24 hours	Up to 3 days	0 to 3 hours
<u>Methadone</u>	3 days	Up to 30 days	24 hours
<u>PCP</u>	14 days; up to 30 days in chronic users	up to 90 days	24 hours

Common types of drug tests

Urine drug screen

Also known as [urinalysis](#), this procedure requires that one provide a sample of [urine](#). Either a test card is used on site for immediate results (see "General" section), or the sample is sent away to a lab to undergo [gas chromatography/mass spectrometry](#) (also known as GCMS), [high performance liquid chromatography](#) or [immunoassay](#) analysis. Sample substitution or adulteration have become a significant issue in the United States due to the prevalence of synthetic and/or drug-free urine and a wide range of adulterants on the internet. Some people attempt to defeat a urine test by drinking copious amounts of water, however, a sufficiently diluted sample may be rejected due to its clear color. Samples that are too clear may be flagged and tested for [specific gravity](#). If the sample fails the specific gravity test, the sample is rejected and the dilution is reported to the entity that ordered the test. Some [diuretics](#) and herbal extracts, such as [caffeine](#) and [goldenseal](#), are marketed as a quick "[detox](#)" from [controlled substances](#), but their efficacy is questionable. Some types of urinalysis can even detect the use of these "detox" products. One of the methods to test for adulterants is to add some amount of an actual drug to a small portion of the sample and then retest that portion. If a masking agent is present in the urine, the resulting drug test will have a negative result despite the fact that a drug was added. This situation is also usually reported to whomever ordered the test.

Hair drug testing

Hair testing is quite accurate and can go back normally 3 months (6 months or longer possible with specialty tests), showing any drugs of abuse used in the detection window. As hair grows out, any drugs used are encased in the hair shaft, so the longer the hair, the longer back in the individual's drug history the lab can detect. Accredited hair drug testing labs, however, only use hair within about 2.5–4 cm of the scalp, and discard the rest. With head hair each 0.5 inch (1.27 cm) corresponds to about 30 days. This limits the detection history to about 90 days, depending upon the rate at which the individual's hair grows. Some people attempt to circumvent this through [shaving](#) their heads. In the absence of the required amount of hair on the scalp, body hair can be used as an acceptable substitute. It is also

possible to use body hair to do hair drug testing, but since body hair grows slower, the head hair window of detection measures will not apply to body hair.

Additionally, for pre-employment hair testing, the inability to obtain a sample may be grounds for not hiring the individual. Hair Testing labs are regulated by [CLIA](#) or [SAMHSA](#) (not FDA). There is a growing trend in major companies and law enforcement agencies to utilize hair analysis on account of its efficiency and reputation as the gold standard when considering test accuracy. This technology makes use of radioimmunoassay technology with subsequent confirmation by mass spectrometry.

In recent years hair testing has been the subject of a number of law suits. Studies have shown that different ethnic groups have different hair structure leading to false-positives.

Saliva drug screen / Oral fluid-based drug screen

[Saliva](#) / oral fluid-based drug tests can generally detect use during the previous few days. Saliva or oral fluid based drug tests are becoming more prevalent because of their convenience and the fact that they can not be adulterated. Furthermore, on-site oral based tests in particular enable the implementation of random testing programs, proven to be the most effective type of drug screening. Oral fluid based tests are as accurate as urine and can be obtained from quality suppliers in the United States. Testing is usually performed by employers, for either pre-employment, random, post-accident, reasonable suspicion, or return-to-duty testing. Oral fluid based testing most closely mimics results found with blood and is preferable for detecting on-the-job drug use or in post-accident applications in this case because the degree of intoxication can be approximated based on the amount of substance in the blood. The Victorian Police in Australia are also using random saliva-tests to detect drivers under the influence of amphetamines and cannabis. South Australian police were also given the power to drug-test drivers from 2006.

Detection in saliva tests begins immediately upon use:

- [Marijuana](#) and [Hashish \(THC\)](#): 1 hour after ingestion, up to 1 day.
- [Cocaine](#) (including [crack](#)): From time of ingestion up to 2 to 3 days.
- [Opiates](#): From time of ingestion up to 2 to 3 days
- [Methamphetamine](#) and [Ecstasy](#) (MDMA, "Crank," "Ice"): From time of ingestion up to 2 to 3 days.
- [Benzodiazepines](#): From time of ingestion up to 2 to 3 days.

Sweat drug screen

[Sweat](#) tests are patches attached to the skin to collect sweat over a long period of time (10–14 days). These are almost exclusively used by child protective services, parole departments, and other government institutions concerned with drug use over long periods, when urine testing is not practical. The patches have security features that keep them from being covertly removed and then reapplied without the knowledge of the testing agency. At the end of the test period, the patch is removed by a social worker or parole officer and sent

to a lab for analysis. If the person has used any drugs during the period that the patch was in place, they will test positive for that drug. This type of testing has fallen out of favor with government agencies due to documented problems with certain drugs^[2].

Drug testing methodologies

The different types of drug tests are tested in very similar ways. Before testing the sample, the [tamper-evident](#) seal is checked for integrity. If it appears to have been tampered with or was damaged in transit, the lab rejects the sample and does not test it.

One of the first steps for all drug tests is to make the sample testable. Urine and oral fluid can be used "as is" for some tests, but other tests require the drugs to be extracted from urine beforehand. Strands of hair, patches, and blood must be prepared before testing. Hair is washed in order to eliminate second-hand sources of drugs on the surface of the hair, then the [keratin](#) is broken down using [enzymes](#). [Blood plasma](#) may need to be separated by [centrifuge](#) from [blood cells](#) prior to testing. Sweat patches are opened up and the sweat collection component is soaked in a [solvent](#) to dissolve any drugs present.

Laboratory-based drug testing is done in a two-tiered fashion using two different types of detection methods. The first is known as the **screening test**, and this is applied to all samples that go through the lab. The second, known as the confirmation test, is only applied to samples that test positive during the screening test. Screening tests are usually done by [immunoassay](#) ([EMIT](#), [ELISA](#), and RIA are the most common). A "[dipstick](#)" drug testing method which could at some future time provide screening test capabilities to field investigators has been developed at the [University of Illinois](#).^[3] Screening tests are typically less sensitive and more prone to [false positives](#) and [false negatives](#) than the confirmation test.

Once a suspected positive sample is detected during screening, the sample is flagged and tested using the **confirmation test**. Samples that are negative on the screening test are discarded and reported as negative. The confirmation test in most labs (and all [SAMHSA](#) certified labs) is performed using [mass spectrometry](#), and is extremely precise but also fairly expensive to run. False positive samples from the screening test will be negative on the confirmation test. Samples testing positive during both screening and confirmation tests are reported as positive to the entity that ordered the test. Most labs save positive samples for some period of months or years in the event of a disputed result or lawsuit. [needs citation as to accuracy of tests]

Types of testing

Pre-employment drug testing

This is by far the most common type of drug test used by businesses. It has the advantage of being inexpensive, since only one test per employee needs to be paid for by the company. However, since most pre-employment drug testing is urine-based and subject to sample

adulteration or substitution, the effectiveness of this approach has been questioned by federal legislators. Some organizations have a witness in the room at the time of the testing, but the privacy implications of this, as well as the potential for [shy bladder syndrome](#) has limited the use of witnesses outside jails and drug treatment programs. Companies and testing centers that do not use witnesses normally disconnect sources of water from the testing room to discourage dilution, and if there is water in the toilet, it is dyed blue. Other countermeasures, such as making the donor change into a gown, may also be used.

Random drug testing

This is both the most effective drug deterrence method and the most controversial type of drug testing. Random drug testing is mandated by the U.S. Department of Transportation, which means that many employers in the USA have no choice but to implement random drug testing programs. Even when random drug testing is not legally required, many organizations use small scale random drug testing as an effective deterrence. At face value in the USA, random drug testing appears to be a violation of the Fourth Amendment to the United States Constitution that protects the right of citizens *"to be secure in their persons, houses, papers, and effects, against unreasonable searches and seizures."* In addition, the Fourth Amendment states that *"no Warrants shall issue, but upon probable cause, supported by Oath or affirmation, and particularly describing the place to be searched, and the persons or things to be seized."* Regardless, the United States Supreme Court ruled in *Skinner v. Railway Labor Assn.*, 489 U.S. 602 (1989) that random drug testing is permissible for employees in safety sensitive positions. Justice Kennedy, speaking for the majority, wrote:

[T]he Government interest in testing without a showing of individualized suspicion is compelling. Employees subject to the tests discharge duties fraught with such risks of injury to others that even a momentary lapse of attention can have disastrous consequences based on the interest of the general public [...] While no procedure can identify all impaired employees with ease and perfect accuracy, the FRA regulations supply an effective means of deterring employees engaged in safety-sensitive tasks from using controlled substances or alcohol in the first place.

The dissenting opinion by Justices Marshall and Brennan illustrates the other side of the controversy:

The issue in this case is not whether declaring a war on illegal drugs is good public policy. The importance of ridding our society of such drugs is, by now, apparent to all. Rather, the issue here is whether the Government's deployment in that war of a particularly Draconian weapon - the compulsory collection and chemical testing of railroad workers' blood and urine - comports with the Fourth Amendment. Precisely because the need for action against the drug scourge is manifest, the need for vigilance against unconstitutional excess is great. History teaches that grave threats to liberty often come in times of urgency, when constitutional rights seem too extravagant to endure. The World War II relocation-camp cases, *Hirabayashi v. United States*, 320 U.S. 81 (1943); *Korematsu v. United States*, 323 U.S. 214 (1944), and the Red scare and McCarthy-era internal subversion cases, *Schenck v.*

United States, 249 U.S. 47 (1919); *Dennis v. United States*, 341 U.S. 494 (1951), are only the most extreme reminders that when we allow fundamental freedoms to be sacrificed in the name of real or perceived exigency, we invariably come to regret it.

In the United States today, random drug testing is used by corporations, drug rehab centers, prisons, the military, police and fire departments, government agencies, and more recently, schools. This method may also be used on teens by their parents, or mandated to be performed on teens at school. The point of a random drug test is deterrence, as the threat of detection is much higher versus other testing methods. Various questionable methods are utilized to determine who gets tested, ranging from drawing names out of a hat, to using more defensible methods such as robust random number generators. However, many random drug testing selection systems are legally indefensible because there is nothing to prevent users from targeting individuals by regenerating names with the random generator until the desired result is produced. Most systems have no tamper-proof audit trail (database records are easy to change, so employers or their testing agents must not have access to the audit trail records for the random selection to be defensible). Finally, hiring third parties to randomly select drug testing subjects is not legally defensible because there is no way of proving that there was no collusion to select a specific individual.

The goal of random testing is to discourage drug use among employees, inmates, or students by not telling anyone who or when they are to be tested in advance. However, critics claim that random testing introduces a presumption of guilt, and is a violation of privacy if the user is not actually intoxicated during working hours. In addition, random testing is more likely to catch [cannabis](#) users, since [THC](#) metabolites have a longer duration in the body than those of many other drugs.

Post-incident drug testing

This is not a very commonly administered test compared to the other two, but the financial ramifications of **not** testing employees after an accident (or other incident) on the job makes this test worthwhile for most businesses. The point of this test isn't necessarily to cause the employee to lose his or her job, but rather to protect the company from liability in the event that the individual is under the influence at the time of the accident. If drugs or alcohol are detected in any significant quantity, the argument can be made in court that the individual was intoxicated on the job, and for that reason, the company should not be held liable for injuries sustained by the employee. This argument, however, can only reasonably be made if blood or oral fluid / saliva testing is used. Urine, hair, or sweat based testing can only detect past drug use. Depending upon the facts of each case, this may help a company avoid litigation completely or may do nothing to help their case. DUI testing would also fall into this category. Another time this type of test may be used is if an employee shows up for work intoxicated, has alcohol on his or her breath, or appears to be impaired in some other way. The goal of these tests is to protect the entity from litigation, so they are only given on an as needed basis.

It should be noted that in most areas, blood testing is the only legally defensible means for detecting drug use after an incident, although saliva testing is gaining acceptance. The

sample should follow chain of custody requirements and should *always* be sent to a lab after collection. Positive on-site tests that may affect an employee's position or situation should always be followed up with a laboratory test before any action is taken against the employee. Laboratory tests (urine or blood) are the only legally recognized tests in most states as well as in most non-U.S. countries.

Pros and Cons of Drug Testing Methods

There is no perfect drug testing method. Each method has some advantages and disadvantages. What makes a drug testing method good or not so good is more related to the needs of the person.

Urine Drug Testing

Pros: Urine drug test kits are available as on-site tests, or laboratory analysis. Referred to as "the gold standard", urinalysis is the most common test type and used by federally mandated drug testing programs.

Cons: The main disadvantages of urine-based drug test kits is are (1.) the ease at which they can be "cheated" via sample adulteraion or substitution, unless specimen collection is directly observed, (2.) inability to detect current / on-the-job drug abuse, and (3.) the need for bathroom facilities.

Saliva Drug Testing

Pros: Saliva (Oral) drug test kits are very donor friendly, non-invasive and easy to collect the specimen. There is no need for a bathroom to administer the tests. Saliva drug testing is great at detecting very recent drug use. Also these drug tests are harder to adulterate than the urine drug tests since the sample can be obtained under direct supervision. Results can be read in minutes and there is no need for a lab. Depending on the test, up to 8 (5 or 6 at a time) different drugs could be detected. This method is the best method for determining current use and impairment. Saliva testing has a hard time finding marijuana.

Cons: The main disadvantage of saliva based drug test kits is their detection window. Depending on the variation of the rate of saliva production of the person or the type/density of the drug used ranges from a few hours to at most 2-3 days.

Hair Drug Testing

Pros: Very long detection window. Hair drug test is by many called a drug use recorder. traces of drugs in hair lasts for months. For most drugs it can detect drug use more than 90 days. This testing method is donor friendly. Adulteration is far more difficult in hair drug testing than other test methods. The hair test is dependable and accurate.

Cons: The main disadvantages of hair drug testing is the fact that you need a lab to run the

test and generate the results, and it can only detect historical drug use. Hair drug test kits are usually the most expensive drug test kits due to the need for lab testing. Also, subjects may easily avoid detection of past drug use by shaving off hair. Lastly, drug abusers with darker hair provide a higher rate of positives.

Spray (Sweat) Drug Testing

Pros: Most people think spray (Sweat) drug test kits are non-invasive and donor friendly. It is easy to collect sweat specimen and no bathroom is needed. The detection window is long - detects drug use up to a couple of weeks. Such drug tests are more tamper proof since they are hard to manipulate.

Cons: The main problem of spray/ sweat drug testing is the fact that they are open to contamination. Also large variations of sweat secretion rates of possible donors make many results inconclusive. There is not much variety in these drug tests since they are not as popular as urine or saliva drug testing kits. Their prices tend to be higher per test conducted. Another main disadvantage of this testing method is the small specimen volume that limits the number of tests conducted.

Legality and ethics of mandatory drugs testing

United Kingdom

The legal position of drug tests on the UK is not clear. A recent study by the independent Inquiry into Drug Testing at Work found that attempts by employers to force drug testing could be challenged as a violation of privacy under the Human Rights Act 1998 as well as Article 8 of the European Convention of Human Rights. However, this may not extend to those industries where drug testing is a matter of safety rather than productivity.