

# Drug Testing – summary

**Drug testing is a fast-moving area of applied science. Testing has been getting quicker and easier, and the equipment required has become smaller. In future, these trends could continue to the point where we would see a single probe which could give instant information on drug use, when placed on someone's skin.**

The Foresight project on Brain Science, Addiction and Drugs asked David Osselton and Steven Robinson of the Forensic Science Service and David Cowan of King's College, London, to look at the future of drug testing.

They point out that drugs capable of exerting psychotropic effects vary enormously in their chemical structure, from simple molecules such as ethanol to elaborate ones such as many synthetic drugs. There is also a range of reasons why a test for drug use might be needed. One is in the context of the workplace, including testing for possible drug use by athletes. Another is forensic, when drugs may be associated with a criminal offence such as driving while intoxicated. A third is to ensure compliance with a treatment regime.

## Sources

The authors point to several sources of materials (matrixes) for drug tests. Urine is usually available in large amounts, which is why it has traditionally been preferred for many tests. It can reveal drug use after several days. By contrast, blood provides a snapshot of drugs in the body at the time of its collection. But it is intrusive to sample and trained medical staff are required to collect it. Oral fluid is becoming more popular as a test medium as technology reduces the amount of fluid needed. Oral fluid methods are likely to come to the forefront in the next 5–10 years. Sweat samples have the disadvantage that they can become contaminated by pollutants in the local environment. Hair is a valuable test medium because it retains traces of drugs for up to several months. Finally a specific technology, or for example using different types of spectrometry, can detect volatile substances, such as alcohol in breath.

## Methods

Detection of drug use is typically a two-stage process comprising a preliminary screening test and a confirmatory test. Samples that fail the preliminary screening test are submitted to further confirmatory tests that are capable of identifying exactly which drugs or their metabolite substances are present.

Many classes of drugs – for example opiates – share common chemical characteristics. A screening test can indicate whether a person has used an opiate, but not necessarily which one or in what quantity. Immunoassay screening tests are capable of analysing hundreds of tests per hour but may only be capable of indicating which family of drug is present rather than giving a specific answer.

Confirmatory tests provide a greater degree of certainty, especially when a mass spectrometer is used. A number of techniques have been developed for separating the chemical of interest for analysis from multi-component mixtures.

The time spans over which psychotropic drugs are detectable in body tissues is variable. They range between 1–3 days for cocaine and opiates and up to several weeks for fat-soluble substances such as cannabis derivatives.

## **The future**

It is envisaged that future trends in the development of drug testing technologies will focus increasingly on the miniaturisation of testing equipment. This will allow testing to be undertaken for more substances without the need for samples to be sent to specialist laboratories. In time, nanotechnology could allow a very small detector to test for hundreds of chemicals of interest. This technology is currently under development. Micro-sized beads coated with antibodies for a wide range of drugs are already entering use as a detector technology.

But the Foresight authors warn that drug testing innovation calls for substantial investment and needs large teams of scientists and engineers. Detection technology directed towards employers, clinicians and law enforcement agencies is likely to receive most attention.

**The full version of this review is on [www.foresight.gov.uk](http://www.foresight.gov.uk)**