

# The Trail of Saliva

Conventional blood and urine tests are time-consuming and sometimes misleading when it comes to rooting out drug offenders on the roads. In Belgium the police have been sifting woozy drivers out of traffic for some years using **MODERN SALIVA TESTING** – and in Australia you may well be subjected to on-the-spot screening at work.

**R**oss Rebagliati wrote sporting history twice over. The Canadian snowboarder won the giant slalom at the 1998 Winter Olympics in Nagano, Japan, becoming the first Olympic gold medalist in this sport. He also became the first Olympic athlete to be found guilty of cannabis consumption. He got lucky, since at the time of the competition smoking dope had not yet become punishable. Rebagliati remains on the eternal list of winners.

Today the hemp plant called cannabis is firmly on the banned substance blacklist, whether in the form of pressed resin (hashish) or dried buds (marijuana). This is not because it massively enhances the performance of the human body, but because its active substance, tetrahydrocannabinol (THC), makes athletes more willing to take risks. This can be dangerous, especially on steep slopes. “Anyone who smokes pot, skates with more risk!” warned the Swiss Department for Alcohol and other Drug Problems back in the year 2002 in reference to the little intoxicating pipes. Anyhow, fans tease that one of the most attractive snowboard disciplines may still be called the “half-pipe”.

## Limits for Drugs

Cannabis is the most widely consumed ‘illegal’ drug in the world. According to estimates by the United Nations Office on Drugs and Crime (UNODC), up to five percent of all people between the ages of 15 and 64 smoked a joint at least once in the year 2010. That is the

equivalent of one in every 25 people on earth. Hard drugs like heroin, cocaine, and ecstasy are taken by far fewer people (see Table 1).

The highways are another arena where, with the exception of alcohol, no other drug is as widespread as cannabis. This was shown by a study published in 2011 by the German Federal Highway Research Institute and entitled DRUID (Driving Under Influence of Drugs, Alcohol, and Medicines). During the study almost 50,000 automobile drivers in Europe were stopped on the open road and tested for alcohol, illegal drugs, and medications. The authors recommended in the study to introduce limits for the drug-related driving impairments. As there is with alcohol.

But that is easier said than done. As for alcohol, there are not only established limits, but also portable and easy-to-use breath alcohol tests that allow legally actionable analysis directly on-site (see also pages 14-19). On the other hand, for example drug testing by German Police Officers – in cases of suspected drivers – extravagant blood tests are arranged. In contrast, urine samples have only “limited relevance”. Meanwhile the call for new test procedures has become louder in the USA. “While drugged driving arrests are on the rise, our police force needs a breathalyzer-like technology that works to identify drug-impaired drivers, on-the-spot, before they cause irreparable harm,” urged U.S. Senator Charles Schumer in January 2012.

PHOTOS: DRÄGERWERK AG & CO. KGAA



Fresh from the blisterpack: a porous sampler ready for drug testing



**It's enough:**  
A color indicates  
there is enough  
saliva for analysis

**Hygienic in the  
laboratory:  
the DCD 5000  
with sampler  
below and  
holder above**



Although drugs and medicaments leave behind clear traces in the human body, most bodily substances are not suitable for quick mobile testing. In the hair and nails, for example, intoxicating substances can still be proven months afterwards. But they say as little about the exact time at which a substance was swallowed, inhaled, or injected as the sweat plasters that have to be left for days on the skin to take effect.

Human blood, however, is a different matter altogether: it supplies

quick results since it absorbs addictive substances immediately after they have been taken, and distributes them around the whole body. Because every human's blood is very much the same in its chemical composition, and because it cannot be manipulated while it is being sampled, blood analysis is a very reliable technique. Finally, the concentration of a substance in the blood provides a direct statement about the intoxicating effect of the drug in the central nervous system. And yet there is one major drawback when it comes to spontaneous traffic checks: blood sampling is invasive and can only be done by qualified medical personnel.

**Table 1:**  
Global consumption of illegal drugs

Drug	Consumption [In Percent: 1.), 2.)]
Cannabis	2.5–5.0
Opioids (e.g. heroin)	0.6–0.8
Opiates	0.3–0.5
Cocaine	0.3–0.4
Amphetamine-like stimulants	0.3–1.2
Ecstasy	0.2–0.4
Other drugs	3.4–6.6

Source: UNODC 2012

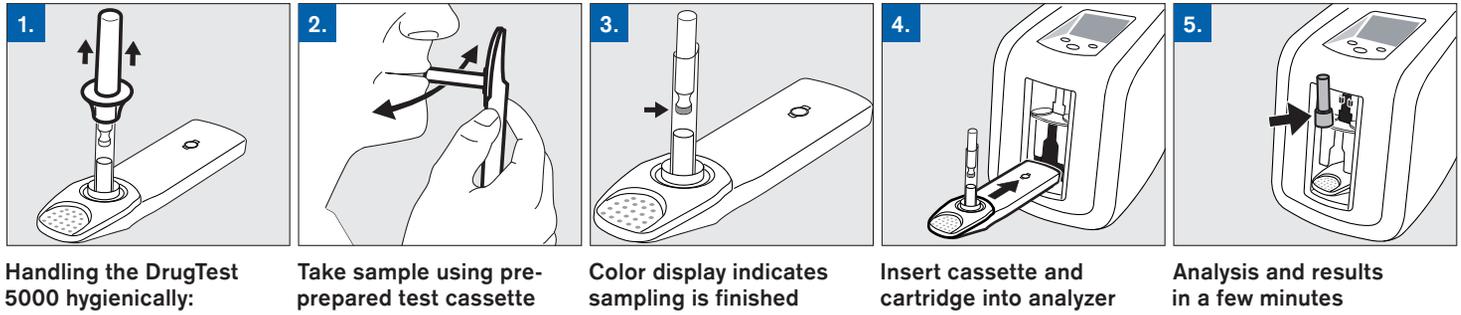
1.) = key question: what proportion of people between the ages of 15 and 64 consumed this drug during the past 12 months?

2.) = minimum and maximum estimates

**Cannabis is the most widely consumed 'illegal' drug in the world. According to estimates, as many as five percent of all adults worldwide have smoked at least one joint in their lives. Hard drugs like heroin, cocaine, and ecstasy are taken much less widely**

### Efficient Saliva Testing

Urine sampling, which is often used as a pretest before blood sampling, is only of limited use when it comes to reliable and quick drug screening. It must be done out of sight in order to protect the person's privacy, so it is easy to manipulate. Another problem is that it produces a lot of false-positive results which then cause unnecessary blood tests. The reason for this is that the metabolic byproduct of the active ingredient in cannabis (THC) produces a positive result in a urine test for much longer than the active substance itself. This means a greater risk that the subsequent blood test will have no legal validity, since courts only recognize direct evidence of THC as proof of somebody's inability to drive. Demonstrating the metabolic byproduct alone is legally irrelevant. >



> In Belgium, the false-positive rate caused by urine testing rose at a certain point to 15 percent. This meant, strictly speaking, that traffic police were taking one in seven blood samples for nothing – a troublesome fact for drivers and officers alike. For many years there wasn't an alternative to this practice. But the country is now pioneering a new approach, having established saliva testing legally in 2010. Since then, traffic checks on suspected drug consumers in Belgium have followed a strict procedure: if a driver attracts attention then a saliva test is performed on the spot. If the concentration of a particular substance exceeds a certain threshold (see Table 2) then a second saliva sample is taken and sent to a laboratory for confirmative analysis. If the driver refuses to cooperate or is unable to perform the test, then a blood sample is taken at the nearest hospital. Studies show that the number of drivers proven to be incapable of driving has risen since the introduction of the saliva test. Also in France, the saliva test has now been established into law. Likewise in Spain, where there are currently no mandatory limits.

**To the Point**

Saliva is similar to blood in its suitability for drug testing. It consists of around 99 percent water, which comes out of the blood vessels into the saliva glands, bringing with it many soluble substances into the mouth and throat – including the active substances in drugs. As with blood, clear indications



0.28 milliliter of saliva will suffice to prove the presence of various drugs, with the Dräger DrugTest 5000 (see below), in a short time – such as here in Australia



The device is designed for simple and hygienic to use, and operates independently – even under harsh conditions

PHOTOS: DRÄGERWERK AG & CO. KGAA

## THC can be detected in the saliva for as long as the effects remain

about the time of drug use, as well as the intoxicating effect can be understood. On top of that, samples are easy, quick, and reliable to take. Even for the drug THC, which passes only a very small amount out of the blood into the saliva; this method is suitable as the active traces of THC accumulate during smoking in the mucus. The proof can it be detected as long as the effect of the drug continues in the body.

### Almost like an Assembly Line

Furthermore, the latest saliva testing equipment, such as the Dräger DrugTest 5000 introduced in 2008, produces very reliable results. This device can detect very small quantities of active substances (THC: five nanograms per milliliter), and it pinpoints the time of drug consumption within a time window of up to eight hours, while only requiring a saliva sample volume of just 0.28 milliliters. “This makes it very easy to determine whether a person has taken one or more drugs recently and is still influenced by them,” says Dr. Stefan Steinmeyer, responsible for the subject matter of “Drug Testing” at Dräger.

As well as the technology, the legal basis has to be right. Saliva testing has so far only been carried out on a mass scale in Australia. There, since 2004, drug testing has been pushed harder by the law than in any other country. But then again, nowhere else is cannabis consumption so high. According to the UNODC, at least one in nine adults smoked at least one

joint in Australia and New Zealand in 2012. No other region ranks so high as this. Checks in Australia start with the highways. Unlike in Belgium, the police do not test on suspicion, but instead systematically as a deterrent. Between 2004 and 2009 in the state of Victoria alone, more than 100,000 drivers were tested for drugs. On-the-spot saliva testing at the roadside is done almost like an assembly line basis (see also Dräger Review 104; page 16 ff.).

Random sampling is also on the rise at work, as Michael Wheeldon explains. He is Managing Director of the drug test service provider Integrity Sampling Pty Ltd. The company was founded in 2001 with the aim of testing employees on behalf of their employers. The proportion of people testing positive is around two percent, much like on the roads. “The number of tests has risen steadily over the past ten years,” says Wheeldon. “In 2012 we used Dräger equipment to perform around 35,000 alcohol and drug tests.” In the beginning it was primarily mine operators who commissioned the company. Nowadays requests come from all kinds of safety-relevant industries.

The manager does not fear a drop in demand. “Australian employers are legally bound to ensure the safety of their employees in the workplace.” This includes seeing that everyone in the team really is sober. **Frank Grünberg**



**The EU DRUID program:**  
On-the-spot drug testing equipment for safer roads  
[www.draeger.com/107/ddt5000](http://www.draeger.com/107/ddt5000)

**Table 2: Drug Testing in Belgium: detection limits (known as 'cutoffs') in ng/ml**

Substance	Confirmation		
	Pretest Saliva	Saliva	Blood (Plasma)
THC (Cannabis)	25	10	1
Amphetamines, Ecstasy	50	25	25
Opiates	10	5	10
Cocaine, benzoylcgonine	20	10	25

Source: DRUID – Oral fluid and blood confirmation compared in Belgium. Van der Linden T, Legrand SA, Silverans P, Verstraete AG. J Anal Toxicol. 2012 Jul;36(6):418-21

**Traffic checks of suspected drug consumers in Belgium follow a strict procedure: if a driver attracts attention then a saliva sample is taken. If substance concentration exceeds a certain threshold then a second, stricter saliva test is performed. If the driver refuses to cooperate then a blood sample is taken at the nearest hospital**

**Table 3: Cannabis consumption by region**

Region	Consumption (%)
Oceania	9.1–14.6
North America	10.8
West/Central Africa	5.2–13.5
Western/Central Europe	7.0
Asia	2.2

Source: UNODC 2012  
Key question: how many people between the ages of 15 and 64 have consumed this drug during the past twelve months?

**In Australia and New Zealand, at least every one in nine adults smoked at least one joint in 2012. No other region has such a high figure**