



# Oral Fluid Drug Screening

## Key Considerations

- Screening for drugs in samples of oral fluid (saliva) collected at roadside provides a viable means of enhancing the detection of drug use by drivers.
- The validity of oral fluid drug screening devices has improved to the point where it is reasonable to pursue their use in Canada to detect drug-impaired drivers.
- Oral fluid screening devices are currently only valid for the detection of a limited number of substances and will not eliminate the need for behavioural testing for impairment and the Drug Evaluation and Classification program.
- The introduction of oral fluid screening at roadside will require new legislation, policies and procedures.

## The Issue

In July 2008, revisions to the *Criminal Code* of Canada were implemented that provided police with the tools and powers to enhance the enforcement of laws against drug-impaired driving. Police were given the authority to demand a suspected drug-impaired driver submit to a Standardized Field Sobriety Test (SFST) and a drug influence evaluation by a Drug Recognition Evaluator (DRE), and to provide a sample of blood, urine or oral fluid to test for the presence of impairing substances.

Although these changes were widely regarded as an improvement to the system and would enhance the likelihood of drug-impaired drivers being detected and arrested, several challenges remained. For example, the number of officers trained and certified as DREs in Canada is well below the estimated 1,800 to 2,000 required to meet demand.<sup>1</sup> Other issues have been raised, including concern about the expense of training DREs, the length of time required to conduct a drug influence evaluation, and the apparent hesitancy of the courts to accept evidence of drug influence collected by a DRE. Anticipated changes to policies about the use of cannabis suggest the need for further improvements and greater efficiency in the detection of suspected drug-impaired drivers.

One suggestion for improvement has been a call for a point-of-contact (POC) drug screening device that could be used at roadside to collect and screen a sample of oral fluid to provide a preliminary indication of drug use. Such a device could be used in a manner similar to that of an approved breath alcohol screening device currently used to detect driver alcohol use. The widespread use of such a drug screening device would facilitate the detection and apprehension of drug-impaired drivers.



## Background

The search for a rapid drug screening device has been ongoing for many years. Ideally, drug tests should be based on a sample of blood that is analyzed in a toxicology laboratory. Obtaining a blood sample from a driver is an intrusive procedure that must be conducted by a trained medical professional. The collection and analysis of blood samples is intrusive and time-consuming, and not appropriate for roadside applications. Hence, initial drug screening tests were based on urine samples. Although urine tests were shown to have a high degree of accuracy,<sup>2</sup> the collection of urine samples required special facilities be available at roadside; otherwise, the driver had to be taken to a suitable facility. In addition, the interpretation of positive urine test results could be challenged on the basis that urine tests typically detect the presence of drug metabolites, which can persist in the urine long after the active drug has disappeared from the body. The presence of metabolites does not provide conclusive evidence that the driver was impaired by drugs at the time of arrest.

The next generation of on-site drug screening devices were developed to detect drugs in oral fluid (saliva) samples. Oral fluid is produced primarily by three pairs of salivary glands (i.e., parotid, submandibular and sublingual) in the oral cavity.

A number of minor salivary glands are also located in the lining of the mouth and throat. The main constituent of oral fluid is water, but it also contains electrolytes such as sodium, calcium and magnesium, along with small amounts of proteins.

Drugs in the body can enter the oral fluid through a process of diffusion. The extent to which this occurs depends on the chemical properties of the drug and the oral fluid itself. Hence, the rate and extent of transfer of different drugs into oral fluid varies.

A key advantage of oral fluid over urine as a testing medium is that it is the active drug that is transferred to oral fluid, whereas drug metabolites are more likely to be found in urine. Detection of the active drug provides a good indication of recent drug use, whereas metabolites represent drug use that has occurred sometime in the past. Also, oral fluid is less intrusive to collect at roadside than urine.

Drugs in oral fluid can be detected using commonly used toxicological methods known as immunoassays. This process uses antibodies to recognize chemical configurations to identify various drugs. Over the past several years, this method has been used to develop portable, easy-to-use devices to screen for drug use wherever an individual happens to be – for example, in a workplace, at a police station or at the side of a road. The accuracy of these devices has improved dramatically and available devices can reliably detect recent use of certain drugs at clinically relevant concentrations.

## What the Evidence Says

The first major study of oral fluid drug screening devices was conducted in Europe and the United States and concluded that none was sufficiently accurate to be recommended for drug screening at roadside. In addition, the failure rate of the screening devices was high, exceeding 25% for six of the nine devices tested.<sup>3</sup>

### Standardized Field Sobriety Test

The Standardized Field Sobriety Test (SFST) is a validated test of driver impairment that consists of three tests administered the same way by all officers. The three tests are (1) Horizontal Gaze Nystagmus, which is an assessment of the movement of the eyes as they move to the side; (2) One Leg Stand, a test of the ability to balance on one leg; and (3) Walk and Turn, which involves walking heel to toe along a line, turning around and returning to the starting point. The SFST is widely used in the United States and Canada, as well as many other countries around the world.



The most recent large-scale evaluation of oral fluid screening devices was conducted as part of the DRUID (Driving Under the Influence of Drugs, Alcohol and Medicines) project in Europe.<sup>4,5</sup> Eight on-site devices were evaluated for their ability to accurately detect amphetamines, cannabis, cocaine, opiates, benzodiazepines (e.g., anxiety medication), methamphetamine, MDMA and phencyclidine (i.e., PCP). The accuracy for different drug types and the various devices varied considerably. Some of the devices showed good performance characteristics for several drugs, but no device was deemed adequate for all drugs.

Over the past ten years, the technology has continued to improve. For example, a recent study found one device had acceptable performance characteristics for the detection of cannabis at relatively low levels (5 ng/mL).<sup>6</sup> Although the results are specific to only one substance, cannabis has traditionally been difficult to detect at low threshold values. This finding enhanced optimism in the search for a suitable device that can accurately detect primary drugs of interest at concentrations relevant to driver safety.

As the technology improves and demand grows for a more efficient and effective approach to the enforcement of drug-impaired driving, POC oral fluid drug screening devices need to be evaluated for possible use in Canada.

### **Limitations and Gaps**

At present, there is a limited number of drugs that can be accurately detected by oral fluid screening devices: cannabis, cocaine, methamphetamine and opioids. This limitation means that tests of behavioural impairment (i.e., SFST) will still be required to establish grounds for further evidential drug testing when the officer suspects drug use but the oral fluid screening test is negative.

Although the accuracy of oral fluid screening devices has been improving, they are not perfect. Some drivers who have used drugs will test negative and there remains a small probability that some drug-free drivers will test positive. When a driver who has used drugs is missed by the screening procedure, it has implications for road safety; if a drug-free driver tests positive, it can result in a false accusation of drug use and an inefficient use of officer time and resources.

Oral fluid drug screening is significantly more expensive than breath testing for alcohol. Once specific devices have been approved for use, police services will need to become familiar with new policies and procedures for use, acquire testing equipment and supplies, and train officers in their use. Each stage in this process will require significant investments of time and money.

### **What Other Countries Are Doing**

POC oral fluid screening devices are currently being used in several countries to identify drivers who have been using specific substances. Most notable is the state of Victoria in Australia, which has operated a high visibility program of random drug testing using oral fluid screening for many years. Initial observations suggest that this program has resulted in considerable behaviour change because a high level of awareness about it among the public has increased the perceived probability of detection.<sup>7</sup> However, the detection thresholds for the three drugs of interest (cannabis, amphetamines and ecstasy) have been set relatively high to avoid false positives. The liability of this approach is that some drivers who have used these substances might not be detected.

Several countries in Europe have also adopted the use of oral fluid screening for drugs (e.g., France, Belgium and Spain). The United Kingdom has recently introduced roadside oral fluid screening for cannabis and cocaine. Depending on the country, a positive oral fluid screening test is followed by impairment testing or a confirmatory blood or oral fluid test or both.



## Current Status

At present, oral fluid screening devices have not been approved for use in Canada. The Drugs and Driving Committee of the Canadian Society of Forensic Science has recently examined the performance of oral fluid screening devices and determined that they have an acceptable degree of accuracy in the detection of cannabis, methamphetamine, cocaine and opioids – some of the major drugs of concern to road safety.<sup>8</sup> Several police departments across Canada are currently conducting field tests of oral fluid drug screening devices to assess their performance under Canadian enforcement conditions. The results of these studies will be used in the preparation of a set of standards that oral fluid screening devices would have to meet to be approved for use in Canada. This process parallels that used for the approval of alcohol test devices in Canada.

## Options for Improvement

The use of oral fluid drug screening devices in Canada would require amendments to the *Criminal Code*. Currently, if a police officer suspects a driver has used drugs, he or she can demand that the driver submit to an SFST. Poor SFST performance can lead to a subsequent evaluation by a DRE. In some provinces, it can result in an immediate short-term license suspension. (See the CCSA Policy Brief, *Short-term Administrative Sanctions for Alcohol and Drug Use by Drivers*.)

It is anticipated that oral fluid screening devices would likely be used in a manner similar to that of alcohol screening devices. Whereas suspicion of alcohol use leads to a request for a breath sample using an approved alcohol screening device, suspicion of drug use would lead to a request for an oral fluid sample that would be analyzed at roadside. A positive result from the screening device could lead to further testing at the police station or immediate short-term administrative licence suspension. This protocol would reduce the need for officers to conduct field sobriety tests at roadside and provide an objective indication of drug use that would be grounds for further investigation.

<sup>1</sup> LeCavalier, J.G., & Beirness, D.J. (2009). *DRE needs assessment model*. Ottawa, Ont.: Canadian Centre on Substance Abuse.

<sup>2</sup> Verstraete, A.G., & Puddu, M. (2001). Evaluation of different roadside drug tests. In A.G. Verstraete (Ed.), *ROSITA roadside testing assessment* (pp. 167–232). Gent, Belgium: ROSITA Consortium.

<sup>3</sup> Verstraete, A.G., & Raes, E. (2006). *ROSITA-2 project: final report*. Gent, Belgium: Academia Press.

<sup>4</sup> Blencowe, T., Pehrsson, A., & Lillsunde, P. (Eds.) (2010). *Analytical evaluation of oral fluid screening devices and preceding selection procedures*. Helsinki, Finland: National Institute for Health and Welfare.

<sup>5</sup> Blencowe, T., Pehrsson, A., Lillsunde, P., Vimpari, K., Houwing, S., Smink, B., ... Verstraete, A. (2011). An analytical evaluation of eight on-site oral fluid drug screening devices using laboratory confirmation results from oral fluid. *Forensic Science International*, 208(1–3), 173–179

<sup>6</sup> Desrosiers, N.A., Lee, D., Schwoppe, E.M., Milman, G., Barnes, A.J., Gorelick, D.A., & Huestis, M.A. (2012). On-site test for cannabinoids in oral fluid. *Clinical Chemistry*, 58(10), 1418–1425.

<sup>7</sup> Boorman, M., & Owens, K. (2009). The Victorian legislative framework for the random testing of drivers at the roadside for the presence of illicit drugs: An evaluation of the characteristics of drivers detected from 2004 to 2006. *Traffic Injury Prevention*, 10(1), 16–22.

<sup>8</sup> Beirness, D.J., & Smith, D. (2017). An assessment of oral fluid drug screening devices. *Canadian Society of Forensic Science Journal*. Advance online publication. doi:10.1080/00085030.2017.1258212.

