



European Monitoring Centre  
for Drugs and Drug Addiction

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# SELECTED ISSUES 2007

DRUGS AND DRIVING





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European Monitoring Centre  
for Drugs and Drug Addiction

Rua da Cruz de Santa Apolónia, 23–25, 1149-045 Lisbon, Portugal

Tel. (351) 218 11 30 00 • Fax (351) 218 13 17 11

[info@emcdda.europa.eu](mailto:info@emcdda.europa.eu) • <http://www.emcdda.europa.eu>

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### Reitox national focal points

Reitox is the European information network on drugs and drug addiction. The network is comprised of national focal points in the EU Member States, Norway, the candidate countries and the European Commission. Under the responsibility of their governments, the focal points are the national authorities providing drug information to the EMCDDA.

The contact details of the national focal points may be found at <http://www.emcdda.europa.eu/?nnodeid=1596>





## Introductory note

Three in-depth reviews of topical interest are published as 'Selected issues' in conjunction with the annual report each year. These selected issues are based on information provided to the EMCDDA by the EU Member States and candidate countries and Norway (participating in the work of the EMCDDA since 2001) as part of the national reporting process.

The three selected issues for 2007 are:

- Drugs and driving;
- Drug use and related problems among very young people (under 15 years old);
- Cocaine and crack cocaine: a growing public health issue.

Online versions of the 2007 selected issues (in English) and summaries (in 23 languages) are available at <http://issues07.emcdda.europa.eu>

The national reports of the Reitox focal points are available on the EMCDDA website (<http://www.emcdda.europa.eu/?nnodeid=435>).

The 2007 'Annual report on the state of the drugs problem in Europe' is available in 23 languages and may be found at: <http://annualreport.emcdda.europa.eu>

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# Drugs and driving

## Introduction

As the use of illicit drugs increased towards the end of the 20th century, most noticeably among young adults, so too did concern over the effects of such substances on the driving population as illicit drugs affect various motor control and perception skills, as well as behaviour and attitudes to risk. Studies designed to measure the prevalence of drug use among drivers were largely based on the results of toxicological analyses, and therefore focused on groups of drugs categorised according to their molecular structure, generally opioids, cannabis, benzodiazepines, amphetamines and cocaine, although other classes, such as antihistamines, antidepressants and other synthetic drugs, also emerged.

However, as the number of such studies grew, it became clear that illicit drugs were not the only psychoactive substances used by drivers: a significant number were found to have psychoactive medicines in their bloodstream, including opioid painkillers such as codeine, antidepressants and sedatives. By the end of the 1990s, it was becoming increasingly clear that road traffic safety depended on controlling consumption not only of illicit substances such as cannabis and amphetamines, but also of certain medicines (whether legally prescribed or not). In 1999, a study of drug use among drivers in different European countries concluded that the prevalence of drug use was probably in the range of 1 % to 5 % for illicit drugs and of 5 % to 15 % for licit drugs. The most commonly used medicines were benzodiazepines, which were prioritised within the Certified project as one of the substances associated with the highest relative accident risk — higher than that of cannabis (Verstraete, 2003).

Since then, considerable European and world research has addressed the issue. An EMCDDA literature review in 1999 summarised the information then available on the effects of drug use on driving, and this has been updated in 2007. Comprehensive questionnaires from the Pompidou Group in 1999, 2002 and 2005 on drugs and road safety provided material for discussions at seminars hosted by that organisation. The International Conference on Alcohol, Drugs

and Traffic Safety (ICADTS) is held every 2 to 3 years, and at each of the last two conferences, in 2004 and 2007, over 200 papers were presented. EU projects have also been carried out: Rosita and Rosita-2 examined roadside drug testing devices, Certified assessed which drugs carry the highest risk of impairment and Immortal studied various types of impairment and their related aspects (laws, epidemiology, accident risk, testing) and their effects on driver licensing.

Coordinated by the European Commission's Directorate-General for Energy and Transport, the EU road safety action programme 2003–10 (COM(2003)311, s.5.1.1) encourages continuation of work on the effects of drugs and medicines, with appropriate classification and labelling of medicines that affect driving ability. Meanwhile, the Council Resolution of 27 November 2003 on combating the impact of psychoactive substances use on road accidents recommends increased epidemiological monitoring, the exchange of information on best practice by providing information to the EMCDDA, targeted prevention campaigns and appropriate measures against drivers found to be under the influence of psychoactive substances. The Commission expert group on drugs, medicines and driving has already made various recommendations and continues to study the matter. The EU drugs action plan 2005–08 looks at health risks in specific situations, such as driving under the influence of drugs (paragraph 24). Finally, the European Commission is co-financing project DRUID (Driving under the influence of drugs, alcohol and medicine) from 2006 to 2010. The objective of this project is to provide scientific support to the EU transport policy to reach the 2010 road safety target. The consortium comprises 37 partners from 18 Member States and Norway. The total cost of the project is EUR 23 933 860 and the EC contribution is EUR 18 932 265 (!).

In the light of the prevalence findings and other research, the EMCDDA chose to study countries' experiences of people driving after taking (a) cannabis and (b) benzodiazepines, examining the similarities and the differences between them. The responses were then analysed regarding legislation, law enforcement and prevention, and differences between the two substances were identified whenever possible.

(!) <http://www.druid-project.eu>

## Situation analysis

There are several methods of assessing the relation between drug use and driving, but they largely fall into two groups: experimental studies and epidemiological studies. Experimental studies aim to assess impairment caused by drugs consumption through performance tests (measure of effects), whereas epidemiological studies estimate either the prevalence or the risk associated with drug use.

Prevalence studies aim to determine the proportion of the general population driving under the influence of drugs (roadside surveys) or the proportion of a subset of drivers under the influence of drugs (drivers suspected of driving under the influence of drugs and/or alcohol or drivers injured, killed or involved in a traffic accident). Risk assessment investigates the risk associated with driving under the influence of drugs; accident risk studies estimate the risk of being involved in a traffic accident whereas responsibility studies investigate the risk of being responsible for a traffic accident.

Taking all of the above research as a starting point, countries were asked to supply any more recent statistics on drug prevalence in drivers, with the aim of observing how and where cannabis and benzodiazepines were found, and at what levels. Unfortunately, in the sphere of drugs and driving, this type of prevalence study is greatly influenced by the legislation of the country. For this reason, studies carried out in the different European countries to gauge the prevalence have taken a variety of forms. Therefore, before examining these as a whole, the reader should keep three main caveats in mind:

- First, the results of the studies quoted are not scientifically comparable. As well as differing in general study design, methodologies and sample groups, they are likely to vary in terms of the type of biological sample analysed (e.g. blood, urine, saliva, sweat, even hair) and the cut-off levels of drug considered significant.
- Second, samples are rarely, if ever, truly representative of the general driving population. Random roadside testing carried out at all times of the day and night and applied to all types of drivers (including commercial drivers) in various different locations in the country might be sufficient to give a conclusive picture. However, in practice, study samples are not usually so comprehensive.
- Finally, it should be remembered that the identification of drug metabolites in urine does not necessarily mean that a driver was under the influence of the drug at the time of sampling: metabolites can be detected up to one week after consumption. Prevalence results from surveys that measure such metabolites in urine should be interpreted accordingly.

## Prevalence studies

The aim of this section is not to compare prevalence by country but to determine if cannabis and benzodiazepines are indeed the two most prevalent substances used in Europe and whether one is more prevalent than the other. For this reason, studies that reported on only one of these two drugs have generally been excluded.

Tests may vary in setting — at the roadside, in hospitals or post-mortem — as well as in form and in the control groups. Random roadside tests aim to give a picture of the percentage of the general driving population who are under the influence, but the study methods used may nevertheless give unrepresentative samples and may be hampered by legal obstacles in some countries. Testing on suspicion will clearly result in considerably higher prevalence estimates than random testing. Further, if the suspicion is of drug use, i.e. following a negative alcohol test with a breathalyser, the rates will be higher than for pre-breathalyser suspicion of intoxicated driving (alcohol or drug use). Testing of killed or injured drivers may also be undertaken after an accident, although a driver who is injured is likely to be in a far more severe accident than a driver who causes injury (for example, to a pedestrian or cyclist), when the driver may remain unhurt.

The following are the results of various studies, grouped by the type of sample tested. In this report only controlled drugs are considered, focusing on the relative prevalence of cannabis and benzodiazepines, but it should be assumed that alcohol is the most prevalent substance detected among drivers on European roads.

### Random roadside tests

Only three countries reported studies involving random roadside testing. The studies generally agree that cannabis and benzodiazepines are the two most prevalent controlled substances detected in drivers, but vary regarding which is the most prevalent.

A roadside study in Germany in the mid-1990s tested 3 027 saliva samples from drivers, of which 2.7 % were positive for benzodiazepines and 0.6 % were positive for cannabinoids — the latter showing a similar prevalence to opioids (0.6 %) and barbiturates (0.6 %) (Krüger et al., 2000). In Denmark, a study in Holstebro in 2000 also tested saliva samples, with 0.7 % of the 1 000 drivers stopped testing positive for cannabis and 0.6 % testing positive for benzodiazepines (above 0.3 % who were positive for opioids) (Behrensdoerff and Steentoft, (2002).

In the Netherlands, a study carried out between 2000 and 2004 in one police district collected blood and/or urine samples from a random roadside sample of 3 799 motorists

as a control group for comparison with 184 severely injured drivers. Excluding alcohol, cannabis (4.5 %) and benzodiazepines (2.1 %) were the most prevalent substances in the roadside sample.

### Subsets of drivers

#### *On suspicion*

Among samples taken from drivers stopped on suspicion of drug use, cannabis and benzodiazepines are again generally the most prevalent substances. Benzodiazepines were the most frequently found drug in studies in Luxembourg, Finland, the United Kingdom and Norway, although in three of these countries the second most prevalent substance was not cannabis. In Luxembourg, from 2001 to 2002, a study analysed blood samples from 198 drivers whose blood alcohol concentration had already been measured. Benzodiazepines were detected in 10.6 % of cases and cannabis in 10.1 % of cases (Wennig, 2005).

In Finland in 2005, examination of 3 420 drivers suspected of drug use identified benzodiazepines as the most common group of substances, being detected in 59 % of samples. The main benzodiazepines identified were diazepam, alprazolam, temazepam, oxazepam and clonazepam. Amphetamine was found in 49 % of samples and cannabis in 22 %. Similarly, in Norway, among drivers apprehended on suspicion of drug use, the most frequently detected medicinal drugs were benzodiazepines, represented by diazepam, flunitrazepam, nitrazepam and clonazepam. Benzodiazepines were also detected more frequently than any illicit substance; between 2000 and 2005, 45 to 50 % of all blood samples analysed tested positive for benzodiazepines, compared with 30 to 35 % for both cannabis and amphetamine.

In the United Kingdom, among 166 blood samples from drivers suspected by police of being under the influence of drugs, benzodiazepines were the most frequently found drug (primarily diazepam in 101 samples), followed by opioids and then cannabinoids. Fifty blood samples (30 %) were positive for cannabinoids, although the active component of cannabis, THC, was present in only 18 of them. Polydrug use was evident in 86 (52 %) of the blood samples analysed; of these, 71 included diazepam and 51 were a benzodiazepine and opioid combination (Oliver et al., 2006).

By contrast, cannabis was more prevalent than benzodiazepines in studies conducted in Germany, Ireland, Latvia and Slovenia. In Germany, in 2002, a study of 1 199 drivers suspected of driving under the influence of alcohol found cannabis in 5.3 % of the drivers and benzodiazepines in 1.7 % (higher than amphetamines, 1.3 %) (EMCDDA, in press). In Slovenia, a study of 3 602 drivers suspected of drug consumption between

1994 and 2001 found cannabis in 35.7 % of the drivers and benzodiazepines in 8.2 %; in the same study 15.1 % of the drivers tested positive for opioids (EMCDDA, in press). In Ireland, in 2000 and 2001, 2 000 blood and urine samples taken from drivers nationwide suspected of intoxicated driving were analysed (Fitzpatrick et al., 2006). Among drivers below the legal limit for alcohol ( $n = 1\ 000$ ), 20.9 % and 9 % tested positive for cannabinoids and benzodiazepines, respectively, whereas among drivers over the legal limit for alcohol ( $n = 1\ 000$ ) the corresponding figures were 5.5 % and 3.4 %. The next most prevalent drug was methamphetamine, with positive samples being found in 9 % of drivers under the limit for alcohol and 2 % of drivers over the limit. In Latvia, 383 drivers detained during 2005 for driving under the influence of addictive substances showed evidence of using a combination of drugs. The most frequent combination was amphetamines and cannabis, but combinations including benzodiazepines were also often detected.

In Sweden, in 2000, approximately 29 % of 3 809 blood samples taken from drug-driving suspects contained THC and about 20 % contained diazepam. In 2001, THC was found in 25 % of 4 651 blood samples, while about 19 % contained diazepam. In 2002, the percentage for THC was again 29 % from 5 051 samples, while diazepam continued to decline to 14.6 % (Jones, 2005). In an analysis of 15 707 cases of suspected driving under the influence of drugs (DUID) in the period 2001–03, the most common substance found was amphetamines, identified in approximately 56 % to 61 % of all DUID suspects. The second most frequently encountered illicit drug was THC, found in about 25 % to 30 % of cases. Benzodiazepines were also common, mainly diazepam (16 % to 18 %) and flunitrazepam (6 % to 10 %).

#### *After accidents/injury/damage or in hospital*

In four studies of drivers following accidents or injury, the two most common substances found were cannabis and benzodiazepines. The prevalence of cannabis and benzodiazepines was equal in one study, while in three studies the prevalence of cannabis was higher.

In Denmark, saliva samples from 330 drivers injured in traffic accidents were analysed. Cannabis and benzodiazepines were the most common substances detected, with rates of 3.3 % and 3.0 % respectively (compared with opioids at 1.8 % and cocaine at 0.6 %) (Bernhoft et al., 2005).

In France, a study in 2000 (Kintz et al., 2000) examined 198 drivers involved in injury-causing accidents as part of the European Rosita project. THC was found in 9.6 % of blood samples and benzodiazepines in 6.1 %. These were the most common substances (the next most common

was codeine, found in 1.5 %). A study in Luxembourg in 1999–2002 also looked at samples from 481 drivers involved in traffic accidents and suspected of driving under the influence of drugs. Among the positive samples, the two most common drug classes were cannabinoids (39.9 %) and benzodiazepines (26.2 %). In Greece, a study of 2 712 drivers involved in accidents between 1995 and 2002 found rates of 4.0 % for both cannabinoids and benzodiazepines, just above the rate of 3.7 % for opioids (Maravelias, 2003).

Only one hospital study, a multicentre study in France (Mura et al., 2003), was reported. Blood samples from 900 drivers involved in an injury-causing accident and subsequently hospitalised were compared with blood samples from 900 patients hospitalised for other reasons. The most prevalent drug in the drivers was benzodiazepines, being found in 14 % of samples (compared with 12.6 % in the control group); 10 % of the drivers tested positive for THC compared with 5 % of the control group.

In Austria, among 269 people who had been admitted to hospital after a road traffic accident, 27.5 % of plasma samples tested positive for alcohol, 5.2 % for benzodiazepines and 1.9 % for both. Cannabis was not tested in the study. In all cases plasma concentrations of benzodiazepines were within the subtherapeutic or therapeutic range. Evaluation of the severity of injuries revealed that polytrauma was significantly more common among those whose plasma sample was positive for benzodiazepines.

### **Drivers killed in road accidents**

Of the eight European studies of drivers killed, four found benzodiazepines to be the most common class of drug present, compared with two in which cannabis was found to be more prevalent. Two studies found other substances to be the most prevalent.

In the Czech Republic, out of 633 drivers killed in traffic accidents in the period 2003–05, the most common substances found, after alcohol, were benzodiazepines (3.0 %) and THC (2.4 %), followed by stimulants (1.9 %). In one region, Southern Bohemia, a study was carried out in 1998–2005 on a sample of 412 drivers who died in traffic accidents (338 of whom were subjected to toxicological examination). Benzodiazepines were found in five (1.5 %) and THC was detected in three (0.9 %) (V. Mravčík, F. Vorel and T. Záborský, unpublished observations).

A study in five Nordic countries of drivers who died within 24 hours of an accident in 2001–02 aimed to investigate the prevalence of alcohol and other drugs using the same protocol, to enable comparison, and with a focus on single-vehicle accidents (Christophersen, 2006). The countries

involved were Denmark, Finland, Iceland, Norway and Sweden. Overall, toxicological analysis was performed in more than 70 % of the cases, except in Denmark. In Norway, from a total of 243 drivers killed in accidents during the study period, benzodiazepines were detected almost as often as alcohol (21.4 % and 22.2 % respectively). THC and amphetamines were found in 10.5 % and 10.1 % of drivers respectively. Drivers killed in single-vehicle accidents were studied during 1989–90 ( $n = 79$ ) and 2001–02 ( $n = 92$ ). The most frequently detected substances were alcohol, benzodiazepines (23.9 %; primarily diazepam, flunitrazepam), THC (15.2 %) and amphetamines. In Finland, 427 analyses were performed on a total of 463 deceased drivers and, as in Norway, benzodiazepines were the most prevalent drugs. Cannabinoids were found in urine samples in seven cases (1.6 %), whereas benzodiazepines were detected in blood in 37 cases (8.6 %) (E. Vuori, personal communication). In Sweden, the study was extended for an additional year, and results are for the period 2000–02. Out of 920 drivers killed in road accidents during this period, blood and urine samples from 855 subjects were toxicologically tested (Holmgren et al., 2005). Excluding alcohol, amphetamines were the most common substance found throughout the period, with a prevalence of 5.1 %, followed by benzodiazepines at 4.6 % and cannabis at 3.7 %.

In two other studies of drivers killed, cannabis was the most prevalent drug found. Among blood samples from 458 fatally injured drivers in northern Greece in the period 1999–2002, 4.3 % tested positive for THC and 3.3 % for opioids, with 1.3 % testing positive for benzodiazepines. In the United Kingdom, the Transport Research Laboratory investigated the presence of drugs in 1 184 road traffic fatalities between 1985 and 1987, and then again between 1996 and 1999. The proportion testing positive for cannabis increased from 2.6 % to 11.9 %, while the corresponding figure for medicinal drugs was stable at 5.5 %.

As an exception to the above pattern (other than as reported for Sweden in the multicountry study), a study of 5 745 drivers killed in the period 1991–2000 in Spain revealed that 5.2 % had consumed cocaine, 3.4 % benzodiazepines, 3.2 % opioids and 2.2 % cannabis (Del Río et al., 2002). Although these two studies again show the prevalence of benzodiazepines to be higher than that of cannabis, what is striking is the relatively high prevalence of cocaine in the Spanish sample; the study authors themselves wrote, ‘We can find no explanation for this greater frequency of cocaine with respect to cannabis’.

### **Characteristics of drug drivers**

Available demographic findings universally suggest that cannabis-using drivers are most likely to be young men.

Despite the use of different age groupings, the predominant age of cannabis users (18–24 in the Netherlands, under 27 in France, 22–44 in Denmark), can generally be described as young. In contrast, survey results from Denmark, Ireland, Luxembourg and the Netherlands suggest that benzodiazepine users who drive are more likely to middle-aged (in the Netherlands and Denmark the results identified them as middle-aged or even elderly drivers). Benzodiazepine users are also more likely than cannabis users to be female.

These findings appear to be in line with general population surveys and EMCDDA data showing that young men are the most likely group to take drugs, and other statistical evidence of the young male as a risk-taker. Although there may be a certain data bias in 'suspicion' statistics, in that traffic officers are more likely to suspect young male drivers of having taken drugs and so test them more, analyses of hospital and fatality statistics are less likely to suffer this bias and yet still corroborate the data. The demography of the drivers is an important consideration when planning effective prevention campaigns.

### Risks associated with drugs: results from experimental studies and epidemiological risk studies

Although a drug may be found in the blood, it does not always follow that the influence of the drug was the cause of the accident. Two different methods are being used in current research to define the likelihood of drugs adversely affecting driving and therefore increasing the probability of causing or being otherwise involved in an accident; experimental and epidemiological studies.

Experimental studies measure the influence of drugs on driving performance using a large range of different tests (assessing psychomotor and cognitive functions): a drug is administered in different doses to volunteers and the effects on performance are measured and compared with those of a placebo-treated group or other positive control group (for example, alcohol). In this type of study, both the acute and chronic effects of the administered drug may be estimated. The effects of drugs vary with dose and route of administration, as well as with the susceptibility and tolerance of the user.

Experimental studies focusing on cannabis indicate that this drug has detrimental effects on driving ability (cognitive and psychomotor skills) and that most of these effects are dose-dependent. The combination of cannabis and alcohol results not only in the prolongation and enhancement of effects (decrease in lateral control) but also causes additional

impairment (for example, lack of attention to traffic at the side). For benzodiazepines, depending on the type (long-acting, medium-acting, short-acting), a correlation between dose and degree of impairment of memory or of psychomotor performance has been demonstrated (EMCDDA, in press).

Using epidemiological data to conduct case control studies, the risks associated with consumption of drugs can also be assessed: the risk of being involved in a traffic accident while driving under the influence of a drug and, more importantly, the risk of being responsible for such an accident. In the first calculation, the number of people involved, injured or killed in a traffic accident who are found to be drug positive (cases) are compared with the number of persons who are positive in the general driving population (control group). In the second calculation, the study investigates if there is an association between driving under the influence of drugs and responsibility for a traffic accident. Thus, these studies compare the prevalence of drugs in drivers who were responsible (cases) for an accident with the prevalence of drugs among drivers who were involved in one but were not responsible for it (control group). Some of the prevalence studies mentioned above came to conclusions about the impact of drug-taking on driving skills, based on behavioural and/or medical observations.

In Denmark, in the roadside study of 1 000 drivers, despite limited knowledge about the link between drug concentrations in saliva and those in blood, it was estimated that the results indicated reduced road safety in about half of the drivers who tested positive. A similar conclusion was reached by the Institute of Forensic Medicine when the saliva samples from 333 injured drivers were analysed to determine if the concentrations of drugs found could be considered to have influenced driving ability. In half of the positive samples, the concentrations were judged to indicate that drug taking had somehow contributed to the accident.

In France, a study comparing 900 drivers with 900 control subjects (?) found that, among drivers under the age of 27, driving under the influence of cannabis alone (> 1 ng/ml) was associated with a relative risk of an accident of 2.5. For the same group, driving under the influence of cannabis and alcohol (> 0.5 g/l) resulted in a relative risk of 4.6. For all drivers, regardless of age, driving when testing positive for benzodiazepines was associated with a relative risk of 1.7. However, assumptions about accident risk based on these findings alone are of limited use because of a lack of information about the representativeness of the drivers' and control patients' samples.

(?) A total of 900 drivers involved in a non-fatal accident were compared with 900 patients (control) who attended the same emergency units for non-trauma reasons.

As part of the Immortal project, injury risk associated with drug use has been computed in the Netherlands; it found that no significantly increased risk of injury was associated with the use of cannabis when taken alone.

Single-vehicle accidents are becoming a focus of studies on driver culpability, as in such cases there is a high probability that the driver was at fault. In Norway, blood samples from drivers killed in single-vehicle accidents were studied in 1989–90 ( $n = 79$ ) and 2001–02 ( $n = 92$ ). The most frequently detected substances, apart from alcohol, were benzodiazepines (primarily diazepam, flunitrazepam) and THC, with amphetamines more prominent in the more recent study.

The only recent study in Europe that specifically calculated the risk of being responsible for a traffic accident while driving under the influence of drugs was performed in France between 2001 and 2003 on all drivers involved in a fatal crash. The results found a positive association between causing an accident and testing positive for cannabis, and a dose effect (see box 'Cannabis in France'). The risk of causing an accident is considerably higher when cannabis is combined with alcohol (a relative risk of 14 has been estimated).

### Situation analysis — summary

An illustration of the size of the problem relies on the prevalence studies available. Although many countries reported various study results or statistics involving alcohol and 'drugs', not so many were able to comment separately on the relative prevalence of cannabis and benzodiazepines. Cyprus, Lithuania, Poland and Portugal<sup>(2)</sup> did not provide any research that showed the relative extent of the use of these substances in their countries.

From an examination of the prevalence studies that have taken place throughout Europe since the mid-1990s (roadside, suspicion, injury/accident, hospital and involving fatalities), it is clear that, excluding alcohol, cannabis and benzodiazepines are the psychoactive substances most prevalent among the driving population. The results appear to be the same whatever the study setting, and which of the two is the most prevalent appears to be distributed relatively equally among studies. There are a few exceptions: in drivers in the far north, in Finland, Sweden and Latvia (and to a lesser extent Norway), amphetamines are frequently found; in Spanish drivers, cocaine is more prevalent than any other substance; and in drivers in Slovenia, opioids are found more than benzodiazepines. In addition, minor studies from Italy and Slovakia, with small sample sizes, have found cocaine and opioids respectively to be more prevalent than

### Cannabis in France

One study not yet mentioned in this special issue is that which took place in France, the results of which were published at the end of 2005 (Laumon et al., 2005). It has not been mentioned up to now because its terms of reference did not give equal weight to measuring the prevalence of both cannabis and benzodiazepines<sup>(1)</sup>, but nevertheless it is ground-breaking in its preparation, size, quality of study design and conclusions regarding the prevalence of cannabis use and its effects in drivers. In order to ensure the comprehensive representation of the national population in this study, a law was passed in 1999 making it obligatory for all drivers involved in a fatal accident to be tested for cannabis, amphetamines, opioids and cocaine. The SAM study is a population-based case-control study that analysed more than 17 000 accidents and almost 11 000 drivers involved in fatal accidents between September 2001 and September 2003. It was based on a quasi-exhaustive sample of road accidents (all the instantly fatal accidents that took place during the two years studied) and included drivers who were killed, injured or unhurt. A total of 6 766 drivers were considered to be responsible for a crash; the control group comprised 3 006 other drivers involved in accidents during the period.

The research found that 7 % of drivers tested positive for cannabis (blood THC level of more than 1 ng/ml), rising to 17 % among the under-25s. The effects of driving with a blood THC level of 1 ng/ml or higher increased the risk of being responsible for a (fatal) accident by 1.8 times overall (compared with 8.5 times for those with no THC but a blood alcohol concentration of 0.5 g/l or higher).

Knowing that the risk of accidents is higher in some age groups as a result of their behaviour, the risk of being responsible was calculated separately by age range among the control group. The chance of causing an accident was clearly higher in people aged 14 to 24 (1.9 times) and 70+ (2.6 times).

The sample also permitted a calculation of the risk of dying in an accident even if the driver was not responsible for it; this was considered to be 1.5 times above average for a driver under the influence of cannabis (compared with 4 times for alcohol).

(1) The sample was screened for benzodiazepines only if it was primarily positive for another drug.

benzodiazepines. These findings have implications for public safety, for detection methods and for prevention policies.

Results from experimental studies show that consumption of both substances results in impairment of driving ability that may vary according to dose, tolerance and delay after

(2) Two studies are ongoing in Portugal.



intake. Recent risk assessment studies are rare in Europe, and their results are contradictory when taking into account cannabis or benzodiazepines alone; however, when these substances are considered together or in association with alcohol, the risk of being involved in or responsible for a traffic accident increases significantly (EMCDDA, in press).

It is also not clear whether drivers who test positive for benzodiazepines are using these drugs licitly or illicitly. In Austria, Sweden and Finland, analyses found that blood concentrations were frequently at therapeutic levels, whereas in Norway they were clearly higher. The identification of more than one drug in a single sample, e.g. benzodiazepines with THC or amphetamines, suggests misuse. Contrasting inferences about the users could be drawn from the various age/gender profiles identified.

However, the studies identify an additional problem for any evidence-based policy of road safety. Whilst medical science tries to find an efficient and effective rapid screening technique for cannabis or benzodiazepines, and to determine an appropriate cut-off level for legal use, comparable to a blood alcohol concentration, a large number of the above studies report that the substances are not used in isolation — polydrug use is common, with various combinations of various drugs and/or alcohol. Research into the effects of combining either cannabis or benzodiazepines with alcohol has demonstrated that there is a multiplier effect (Laumon et al., 2005; EMCDDA, in press). This can only add further confusion to any calculation of impairment.

## Policy and legislation

Whether prompted by statistical evidence or media anecdotes, the issues of drugs and road travel have received increased attention at a high level in recent years. The most visible changes have been in national legislation, or in national strategies, either road safety strategies or strategies against drugs. In this section, these changes will be examined both generally, and also with a focus on particular laws or strategies that address the problems posed by cannabis and benzodiazepines specifically.

### Laws and penalties

General legal changes to the prosecution of drug driving, and the penalties for it, have been made in a number of countries. Zero tolerance laws for illicit drugs such as cannabis were introduced in Belgium, Portugal and Sweden in 1999, and in France and Finland in 2003. The Swedish and Finnish laws also apply to medicines such as benzodiazepines when consumed without a lawful medical prescription. The changes in Belgium and France were the results of national studies, although in France popular

pressure contributed to the law being passed before the study was completed. In Finland and Sweden, the new laws were based on the observation that the number of drivers under the influence of drugs being involved in accidents was growing, but the offence of impaired driving was extremely difficult to prosecute. In Cyprus, this problem continues, but is addressed by prosecuting such drivers for illegal consumption of drugs — an option specifically prohibited in the Belgian and United Kingdom laws, for example. A law drafted in Luxembourg and under discussion since 2003 foresees possible zero tolerance for illicit substances and an increased fine.

Since 2000, penalties for the offence have been increased in the Czech Republic, Greece, Italy, Lithuania, and Latvia, and the Ministry of Justice is reviewing the current penalties in Denmark. In Slovakia, the new penal code strengthens the offence of endangerment, which may also be used for this subject.

### Roadside testing

To facilitate rapid detection, a considerable number of countries have recently passed laws to allow or define roadside drug testing, for example by saliva or sweat testing. Such laws were passed in Italy, Poland and the United Kingdom in 2003, Slovenia in 2004, the Czech Republic, Latvia and Austria in 2005, Lithuania in 2006, and Portugal in 2007. Draft laws have also been prepared or discussed in Luxembourg, the Netherlands and Slovakia, some since 2003, but await reliable test kits before enactment. The feasibility of roadside saliva testing is under consideration in Spain and Ireland. Such testing increasingly is obligatory; for example, since 2005, in Spain and the United Kingdom, drivers who are involved in an accident but fail to provide a sample have received penalty points on their licence, and in Latvia refusal to be tested has been a criminal offence since 2006. Use of roadside testing equipment is also foreseen in the Cyprus national drug strategy 2004–08.

With or without such test kits, national authorities are also recognising the need to train law enforcement officers, particularly those on traffic duties, to recognise the symptoms of drivers who may be under the influence of drugs. This need is acknowledged in the Czech national drugs action plan of 2005–06, the Lithuanian road traffic safety programme 2005–10, the Austrian road safety programme of 2002–10 and the United Kingdom's road safety strategy 2000–10.

### Data collection

As authorities acknowledge the need to monitor the situation more closely, a number of changes have been made or proposed at national level.

The law passed in 1999 in France made it obligatory to test for drugs all drivers involved in a fatal accident (i.e. even if it was not the driver who was killed), thus giving comprehensive data for the SAM study discussed above; it is perhaps remarkable in that a national law was passed specifically in order to assist a research project. In 2004, an order of the chief of police in Poland instructed that drivers involved in fatal accidents be tested. The Portuguese regulation currently mandates routine screening for drivers injured in an accident, or under suspicion, but an aim of the national plan of prevention and road safety 2003 is for routine controls of drivers involved in accidents or exhibiting dangerous driving. The draft law in Luxembourg also foresees systematic testing in accidents resulting in injuries. The Austrian law of 2002 introduced mandatory blood tests if there was suspicion. In Ireland, since 2002 the medical bureau of road safety has routinely tested all samples under the blood alcohol concentration limit; previously, this was done only on request.

### Prevention strategies

Prevention measures are also legislated or foreseen at national level, commonly either in driving schools or in the medicinal sphere. In fact, actions addressing both feature in the Czech road safety strategy and the Slovakian national plan for increasing road safety 2005–10. The Italian road safety plan 2003–05 promotes training of driving school operators in drug-driving issues, and the collaboration agreement for the prevention of traffic accidents, drawn up between the Spanish Ministries of Interior and Health and Consumer Affairs, considers prevention by appropriate driving qualifications as a top priority. In Sweden, it has been proposed that drug-awareness training should be a compulsory part of the driving licence course.

A decree in France in 2005 introduced clear pictograms on medicinal packaging, and several decrees of the State Council oblige doctors to provide full and appropriate information to patients about the risks of secondary effects of any medicine prescribed. In Portugal, the Directorate-General for Traffic plans to implement a system of pictograms for medicine labelling. Although a law in Sweden in 2005 abolished the existing pictogram system, due to inconsistencies, an earlier law of 1997 obliges the doctor, prescriber and pharmacy to warn a patient of the effects of a medicine. In Norway, Ministry of Transport proposals made in 2006 included the need for better information to be given by prescribing doctors and pharmacists.

### Policy and legislation — summary

Countries have reacted at the highest level to the possible threats posed by psychoactive drugs in drivers, with recent legislative and policy developments clearly visible in all areas. Illicit drugs such as cannabis are the subject of new zero-tolerance laws, whereas psychoactive medicines such as benzodiazepines are more often permitted provided they do not impair the user. Prevention actions are being mandated that separately target young people and users of medicines. New laws define the data collection systems, with the aim of informing the policy and refining it in future.

Nevertheless, there is a great variation in individual countries' legal responses to drug-driving, between zero-tolerance or impairment laws, and the range of penalties available to the judiciary across Europe remains remarkably wide. For a more detailed overview of the scope and penalties of Member States' legislation on drugs and driving, see the ELDD topic overview (<http://eldd.emcdda.europa.eu/?nodeid=5036>).

### Law enforcement procedures

Drafting and passing national legislation is one stage of the policy response process, but implementing it is not always easy, and this certainly seems to be the case in the emerging field of drug-driving. This section attempts to identify the commonalities of and differences in the procedures laid down for (traffic) police, doctors and laboratories, as the criminal justice system aims to apprehend and prosecute those drivers found to be driving after taking drugs, with a focus on any differences in detection procedures for cannabis and benzodiazepines in each country.

Although information on the areas below was not always provided by the countries, it is clear that various typologies exist between them. The first stage of contact between the driver and the law is usually the (traffic) police officer, who may need to attempt to establish if drug use has taken place. This process will be framed by some form of rules of procedure. Some countries have the detection procedures established by law (Belgium, Latvia), regulation (Lithuania, Luxembourg, Slovenia, Sweden) or guidelines (Czech Republic, United Kingdom). In a few countries<sup>(4)</sup>, detection procedures should take place in a certain order, with the next step taking place only if the previous one confirms a suspicion; others do not report this hierarchy of tests. The detection procedures as a whole are broadly comparable, with observations and behavioural tests being followed by urine and blood samples, but what appears to differ is their location and the person executing them.

(4) Belgium, the Czech Republic, Austria, Portugal, Slovenia, Sweden.

### Progress towards mandatory testing of drivers involved in fatalities?

To increase knowledge of the situation, the European Commission's expert working group on drugs, medicines and driving recommended in 2002 that all drivers involved in a fatal accident should be tested for alcohol and drug use. Some, but not all, countries report that testing is mandatory or systematic in certain situations involving fatal accidents, injuries, or even suspicion. In Poland and Finland, drivers involved in fatal accidents must be tested. Testing drivers involved in an accident that caused injury is reported as systematic in Denmark, Portugal and Norway (serious injury), and is proposed in the draft law in Luxembourg. Drug testing when there is suspicion is reported to be systematic in Estonia, France (in cases of physical harm), Ireland, Latvia and Slovakia (after an accident). There is some variance as to whether involvement in an accident is grounds for suspicion.

Nevertheless, a legal obligation for testing is not always easy to enforce nationally. Of the abovementioned countries listing systematic testing, Denmark, Estonia, Ireland and Portugal report that a drug test will not be carried out routinely if the driver is found to be over the blood alcohol concentration limit, as in terms of cost and evidence required for prosecution there is no reason for such a test. During a multicountry study of all drivers killed in 2001 and 2002, the percentage of toxicological analyses of such cases were 96 % and 92 % in Sweden and Finland respectively, 70 % in Norway, but only 17 % in Denmark (Christophersen, 2006) (consistent with the policy mentioned above). A 1993 study in Norway showed that blood samples for drug and alcohol analysis were secured from less than 10 % of drivers involved in accidents resulting in personal injury, and improvement since then is reported to be unlikely. In Portugal, in 2001, about 25 % of drivers having accidents were not even checked for alcohol, although the national legislation prescribes a compulsory analysis in case of accident resulting in injuries or other damages; this is attributed to the lack of communication between law enforcement officers and practitioners in hospitals. In the Czech Republic, approximately 50 % of the people killed in traffic accidents were tested toxicologically in 2003–05.

### Testing at random or on suspicion?

The primary distinction between detection procedures appears to be the legal ability to test at random or only in case of suspicion. However, at the side of a busy road, three issues appear to be interconnected at the beginning of the detection procedure. These are the result of a positive alcohol test; the authority of law enforcement to perform random

### Roadside testing for drug use

In humans, hair is the 'long-term metabolic memory' of what has been consumed, and urine is a shorter-term index. However, many laws require proof that the person was actually impaired at the time of driving, as opposed to proof of past drug consumption. The first Rosita project in 1999–2000 established criteria for acceptable tests (sensitivity and specificity > 90 %, accuracy > 95 %) for amphetamines, benzodiazepines and cannabis. As rapid screening in a roadside situation should aim to be as non-invasive as possible, the Rosita-2 project aimed to evaluate the usability and analytical reliability of nine on-site oral fluid (saliva) drug testing devices between 2003 and 2005. Six European countries and four states in the USA took part.

At the end of the period, none of those devices met the criteria proposed during the Rosita-1 project. Six devices registered a failure rate of greater than 25 %. The procedure for obtaining the saliva samples varied greatly in terms of handling, quantities and acceptance by officials testing and persons tested, sometimes easy to perform, sometimes difficult to follow. Another problem found was that smokers and amphetamine users produce less saliva, and so there were difficulties in obtaining the necessary sample quantities in a reasonable time interval. As samples are temperature-dependent, it was also stated that '... use of some devices in cold and rainy weather was a problem'. Thus, at the end of the study 'no device was considered to be reliable enough in order to be recommended for roadside screening of drivers'.

The authors therefore recommended that government officials should carefully weigh the pros and cons when considering introduction of random roadside drug testing. Further development and laboratory analytical work was seen as necessary to improve this method of multiple substance screening.

drug testing; authorisation for use of rapid screening devices (usually for oral fluid).

Rapid roadside drug testing, for example by saliva or sweat testing, is legally permitted in the Czech Republic, Italy, Lithuania, Latvia, Austria, Poland, Slovenia and the United Kingdom, and draft laws have been under consideration in recent years in Luxembourg, the Netherlands, Slovakia, and Portugal. However, the two Rosita projects have been unable to recommend a screening device suitable for such a purpose (see box 'Roadside testing for drug use'), and so most countries that have taken part in these tests report that they will not use such devices yet. Other forms of roadside screening, for example the Belgian tests for physical signs, and then an immunoassay of a urine sample, may take 30 to 45 minutes to perform for each driver.

At the same time, a number of countries report that a drug test will not routinely be carried out if the driver is found to be over the blood-alcohol concentration limit, as, in terms of evidence required for prosecution, there is no reason for such a test. The cost is also a factor; in Austria, following a two-step screening, a subject still considered impaired must pay the cost of the subsequent blood test, which is approximately EUR 500.

Thus, for practical purposes, truly random drug tests of drivers by police are likely to remain theoretical for the moment, whether or not permitted in a country's laws, and tests will most likely be carried out on those drivers who arouse suspicion because of their behaviour or appearance, whether as a result of committing a traffic offence or during a random stop and check for alcohol. Random tests may also be carried out in areas with a high likelihood of positive results, such as near discos or nightclubs on weekend nights.

### Behavioural tests and medical observations

With the lack of a universally accepted roadside test kit, different countries have different procedures to identify an impaired driver. In some, a considerable amount of testing is carried out by the police themselves; in others, the police will refer the driver to medical staff to carry out similar (as well as more thorough) tests.

### Training police to recognise impairment

As already stated, the first point of detection will usually be the police. With this in mind, in February 2002, the European Commission expert working group on drugs, medicines and driving recommended mandatory training of police involved in traffic control, to recognise signs of impairment due to drugs. These tests may include examination of the size of the eyes, coordination tests, behavioural tests, reactions, manner of speaking, etc. In the United Kingdom, the Department for Transport investigated the utility of the Field Impairment Test (FIT), a five-step procedure, by roadside officers, and found use of FIT had an accuracy of 66 % (i.e. the proportion of cases correctly identified as being drug free or drug positive). And in Norway, the police achieve high accuracy of recognition (approximately 80 % of those suspected), though they believe that benzodiazepines, in particular, may be difficult to detect, and so have expressed a wish for detection equipment.

Countries in Europe report various levels of training: obligatory, ad hoc or only general training. They can be summarised as follows:

Obligatory training — only trained officers are permitted to carry out the examination of drivers (Belgium, Portugal, Sweden, the United Kingdom).

Ad hoc training — various supplementary training programmes are reported for traffic police (Latvia, Lithuania, Luxembourg, Austria, Poland, Slovakia, Norway).

General — all officers, traffic or otherwise, receive basic training to recognise signs of drug consumption/impairment (Spain, Cyprus, Hungary, the Netherlands).

### Behavioural tests leading directly to blood tests

Three countries, Belgium, the Netherlands and Sweden, reported that the results of behavioural tests carried out by the police could lead the latter to call directly for a blood test. In Belgium and Sweden, the basis for testing is laid down in the regulations (and, as described above, should be carried out only by specifically trained officers), whereas in the Netherlands the justification for testing is not specified: police officers are expected to follow their basic training to recognise the use of drugs and medicines. In Sweden, if behaviour and breath testing give rise to the suspicion of drug-taking, the first test is an eye examination, whereas in Belgium a battery of tests is available, consisting of tests for physical signs, concentration and behaviour (Romberg, finger to nose, etc.).

### Behavioural tests with medical confirmation

The majority of countries report that police carry out certain behavioural tests but that further examination should be carried out by a medical professional — usually in medical premises — before blood samples are taken. These police tests appear to fall into two subgroups, general and specific. Countries which rely on general or non-standardised police observations of behaviour to send a driver for further examination include the Czech Republic, Denmark, Spain, Greece, Italy, Lithuania and Slovakia.

By contrast, other countries require their police to complete specific forms or tests before referring the driver to a medical professional. In Austria and Finland, traffic officers complete a drug-checking form, which may include questions about driving behaviour, the accident situation, responses, disposition, manner of speaking and walking as well as the results of the alcohol test. Tests in Portugal and Norway are similar, and in the United Kingdom qualified police officers will carry out the five-step field impairment test. In Slovenia, police must check the eyes for specified abnormalities.

Medical staff who carry out subsequent tests may also use similar standardised procedures.

### Blood and urine samples

#### Location of sample deliveries

Following a behavioural test, urine and/or blood samples may be taken. Although not all countries gave this information, the information available from the reporting countries suggests

some differences in where these samples can be taken. This could be important, for example, in rural areas.

In Belgium, the urine sample may be ordered by the police at the roadside, but in other countries the urine sample will probably be taken at the same time as the blood sample in a non-roadside location. In Austria, the blood sample must be brought to the nearest police station without undue delay. In Luxembourg, the Netherlands, and Sweden, samples should be taken at a police station, whereas in other countries samples must be taken at some sort of health facility: medical premises in France (hospital, doctor's surgery, clinic), a healthcare institution in Lithuania, a public hospital in Portugal. In Hungary, urine samples can be taken at police official rooms or any other room that suffices for this purpose, whereas blood samples can be taken either in police official rooms or in medical rooms, but only by a professional (accredited doctor).

### Laboratory procedures and results

Blood and urine samples will be sent to laboratories for testing by various chemical analysis methods, the most common being gas chromatography–mass spectrometry (GC–MS).

Not many countries reported official threshold values for an offence, and those that did reported somewhat different thresholds. In Belgium, the level of cannabis in a blood sample from a driver that constitutes an offence is 2 ng/ml. In France, the minimum detection threshold of THC in a blood sample is set at 1 ng/ml, below which the presence of drugs is judged as insignificant (uncertainty in measurement). In Portugal, the legal limit for blood is zero, but for urine is 50 ng/ml for cannabis and metabolites. In Germany, a 2005 recommendation based on a meta-analysis recommended setting the limit value for the THC concentration in the blood at 3.5–5 ng/ml (lower if combined with alcohol); this followed a January 2005 ruling by the Constitutional Court that 1 ng/ml would be a reasonable cut-off for zero tolerance <sup>(9)</sup>. In Finland, no clear limit was reported for benzodiazepines, but the measuring ranges for pharmaceuticals hazardous to traffic safety have been set to cover the concentration levels at which each pharmaceutical has been proven to impair driving ability. Similarly, a committee appointed by the Norwegian Ministry of Transport and Communication recently proposed the setting of fixed limits for some of the most frequently occurring illicit and medicinal substances, which could save considerable police and judicial resources.

However, many countries reported that the decision as to whether an offence has been committed would be left to the medical professionals (or the judge who read the medical

reports), based on both the amount found in the blood and the results of the behavioural tests. This is perhaps to be expected when many countries operate an 'impairment' principle, and do not penalise the presence of the substance in the blood per se, but the fact that the individual was no longer in a fit state to drive.

A few countries reported different laboratory procedures for cannabis and benzodiazepines. In France, in certain situations, the current system allows for urinary screening for illicit drugs, including cannabis. If the screening is positive (immediate result), or if a urine test is refused or impossible, a blood sample is taken and sent to a laboratory. Within the framework of this system, testing for possible consumption of benzodiazepines is carried out only in the event of a positive result for an illicit drugs test, via the examination of the blood sample taken.

In Finland, a case-specific expert statement is issued on the results of laboratory analyses, signed by a chemist. When pharmaceuticals or high concentrations of drugs are found, an expert physician also signs the statement. The laboratory cannot know whether a person has a prescription for the detected pharmaceutical. Therefore, any such findings will include the following text: 'If the driver is not entitled to use the aforementioned pharmaceuticals, zero tolerance for drugs may be applied.'

In Sweden, legislation in place since 1999 lays down a zero-concentration limit for driving with measurable amounts of controlled scheduled narcotics in the blood. Prescription narcotics are an exception if taken according to a certified personal prescription. However, a person with a prescription for a drug can be convicted if he or she has not been able to drive in a secure manner.

In Portugal, if the blood analysis detects certain illicit substances, including cannabis, this can be charged as an administrative offence, or a crime if the driver was impaired and caused danger. Discovery of benzodiazepines or other medicines will result in a criminal conviction only if, following a medical evaluation, the driver had been considered impaired.

All countries that reported on the role of legal evidence (France, Luxembourg, Hungary, Poland, Portugal, Slovenia, Finland) stated that only the results of the blood test would be accepted, or urine tests in certain cases. Although rapid roadside testers had been authorised for use by the traffic police in most of these countries, they are to be used only as auxiliary screening devices. However, in Austria, the Vienna Social Fund has voiced concerns that a driver's licence may be revoked immediately if a urinalysis and clinical examination indicate that the driver was impaired, although

<sup>(9)</sup> <http://stopthedrugwar.org/chronicle-old/371/germany.shtml>

the blood test result, available two weeks later, might not confirm impairment.

### Law enforcement statistics

Law enforcement statistics for the offence of driving after taking psychoactive drugs — as distinct from alcohol — were provided for Denmark (sentences), Estonia (police detection), France (offences concerning illicit substances), Italy (infractions), Latvia (detained drivers), Lithuania (drivers registered and drivers prosecuted), Luxembourg (penalties given), the Netherlands (enrolment for prosecution), Austria (police reports, licences revoked), Poland (blood tests sent for analysis, blood tests proved to be DUI), Slovenia (expert examinations ordered by the police), Hungary ('revealed crimes committed') and Sweden ('convictions and consequences'). By contrast, law enforcement statistics only for impaired driving, with no distinction between made between figures for drugs or alcohol, were reported by Ireland and the United Kingdom (sentencing), and in Slovakia, the statistics only record figures for alcohol.

Statistics recorded by the criminal justice systems, on police reports/arrests, prosecutions or convictions, did not give an insight into which drug was most frequently used by drivers, whether cannabis, benzodiazepines or others. Although the majority of countries reported police report/arrest, prosecution or conviction statistics for the offence of impaired driving, only Belgium provided statistics that identified which drug had been involved, and then only for THC (which, as a zero-tolerance offence, is a different legal offence to driving while impaired by a medicine). In 2000–04, 2 984 zero tolerance offences were sent to the judicial authorities, of which 54 % were based on THC. Finland and Norway reported the statistics kept at the National Institute of Public Health (number of blood tests carried out and the results), therefore results are available by drug.

The law enforcement statistics of the Czech Republic, Germany, Estonia, France and Lithuania (in this case also including alcohol) also included the number of accidents, cases of damage and deaths caused by driving under the influence of a substance.

### Law enforcement — summary

From the above information, it seems that random stopping and drug testing of drivers throughout Europe is still some way off; there remain considerable differences between countries. This is partly due to the laws (even random breath testing for alcohol is only just approaching a pan-European policy) and partly because of the limitations of technology. The use of saliva-testing devices is being treated with caution,

as their accuracy is limited at present. Without such objective devices, specialised training of traffic police to recognise the signs of drug impairment in drivers is increasing but remains somewhat sporadic in most countries; mandatory training, which is recommended, remains rare. At the present time, without the benefit of reliable technology, police at the roadside are not expected to distinguish which particular drug (or combination of drugs) may be affecting the driver.

Medical behavioural tests, by trained police or by medical staff, are becoming more sophisticated and standardised, judging from the countries that provided details on the issue. In the laboratory, more blood tests are requested and cut-offs are being established, though it is illustrative of the scientific debate surrounding the topic that the cut-off levels differ so greatly among only a few countries. There is also the issue of storing meaningful data from the above tests; recording that 'a drug' was involved will not aid policy-making when there are various classes of drug to test for/prevent. Fourteen countries (\*) did not distinguish between drugs in their regular official statistics.

One thing on which the vast majority of countries agreed is that impairment is penalised, whatever the substance involved. Whether or not detection procedures differ according to whether the suspected substance is cannabis or benzodiazepines is determined mainly by the legal framework of the country. Whether there is zero tolerance for drug use or only those people who are impaired should be punished is also reflected in the use of blood analysis results and behavioural tests to convict a driver.

## Prevention approaches and programmes

The above prevalence studies confirm the need for prevention techniques to reduce driving after taking drugs, but such needs can also be derived from the declared intentions of people to drive under the influence of drugs, or from their lack of knowledge about the consequences. For example, in Belgium, people in recreational settings were asked questions on driving risks. In 2004, 15 % of the respondents who had already used an illegal drug during the event declared that they would drive themselves back home, rising to 29 % the following year. Meanwhile, in Denmark, qualitative interviews for the Immortal project revealed a lack of awareness about the influence of illicit drugs on driving ability, about the effect of combining several drugs and/or alcohol and, among people who had retired early, about prescription medicines. In Cyprus, qualitative information collected by the traffic control department of the police revealed lack of awareness of the impairment and other consequences of driving under the influence of cannabis and

(\*) The Czech Republic, Denmark, Ireland, Spain, Italy, Cyprus, Lithuania, Hungary, the Netherlands, Austria, Poland, Portugal, Slovenia, Slovakia and Sweden (though, of these, Lithuania and Poland state that their monitoring will include such distinctions in future).

benzodiazepines, and in Poland a survey of 1 161 drivers questioned in 2001 about driving and prescription drugs found that only a quarter knew that the law does not allow driving under the influence of those drugs mentioned (e.g. benzodiazepines) (Florek et al., 2002).

Media coverage of the problem is reported to be visible only in France, Luxembourg, Sweden and the United Kingdom. In France and Luxembourg, this currently focuses on illicit drugs such as cannabis, rather than benzodiazepines, whereas Sweden and the United Kingdom report no focus on any particular substance. Sporadic coverage, usually in association with young people and alcohol, is more the norm, as noted in Germany, Cyprus, Austria, Poland and Slovakia.

### Mass media campaigns

Since 1999 the majority of countries have carried out mass media campaigns involving the distribution of leaflets and posters and the construction of websites that describe the health risks of drug abuse and driving. Usually they focus on alcohol, though some, such as [www.dont-drug-and-drive.de](http://www.dont-drug-and-drive.de) established by the Association of German Insurers, are drug-specific. An exceptional approach was to focus on the illegality of such driving, stating the laws and penalties, as done in France for cannabis. Most campaigns could be grouped according to the drugs highlighted and target audiences. Some were aimed at the general public and some were aimed at schools, recreational settings and medicines. Research suggests that, as consumers come from different socioeconomic classes and age groups, a 'one size fits all' campaign may not be the most effective (Siebers et al., 2003); older benzodiazepine users will apparently ignore messages aimed at young cannabis users, and vice versa, while neither will feel that warnings about alcohol apply to them.

Nine countries reported publicity campaigns, which could be grouped into those aimed at general users, school pupils, frequenters of recreational settings and users of pharmaceuticals. General campaigns were reported in Belgium, Austria, Portugal and the United Kingdom. Campaigns were run in schools in Belgium, the Czech Republic, Luxembourg, Austria and Poland, whereas campaigns outside schools but aimed at young people took place in France, Sweden and the United Kingdom. Campaigns targeting pharmaceutical drugs or their users were carried out in Belgium, Austria, Portugal and the United Kingdom.

Future campaigns are also foreseen in the Czech Republic, as part of the Road Safety Strategy, for consumers of alcohol and medicines; in Lithuania as part of the Road Traffic Safety Programme generally; and in Slovakia as part

of the National Plan for Increasing Road Safety targeting the use of alcohol and other psychotropic substances in general, and to provide information about pharmaceuticals. Campaigns are also planned in the Netherlands, to be aimed at young men, and in Portugal, regarding pharmaceuticals.

### Driving schools

A number of prevention programmes are carried out in driving schools. In Germany, the project FreD (EDDRA database) uses peer trainers to inform young adults in the course of their driving instruction about the risks of driving under the influence of alcohol and drugs, as does Peer Drive Clean, an EU-funded project in 11 European countries. Both driving school instructors, who often have problems with addressing the subject in the theoretical part of their training, and learners, who appreciated the opportunity to talk openly about the risks and consequences of drink- and drug- driving with peers of their age, generally rated the project positively in the evaluation survey.

In Spain, a project in driving schools in the Galician autonomous region (EDDRA database) involves discussions with psychologists; and in Valladolid driving school instructors are being taught by teachers from the Faculty of Medicine. In Italy, also, under the National Road Safety Plan for 2003–05, two workshops were created to train instructors and develop a package for driving school teachers. Driving instructors were also trained in Austria, and classes in driving schools regarding the influence of substances on driving are now mandatory in Poland and Sweden. For the future, the Czech Republic has identified as a priority interventions in driving schools focusing on the effects of medicines and psychoactive substances.

In Luxembourg, drivers whose licences have been suspended can recover them by taking part in programmes that include awareness raising on the effects of alcohol, medicines and drugs on driving.

### Youth, peer and community approaches

As well as the peer trainers in driving schools mentioned above, programmes involving direct intervention by peers are reported in Belgium, Luxembourg and Portugal. In Belgium and Luxembourg, the NGO Responsible Young Drivers (RYD) scheme, run by volunteers aged 17–29, attends various events and offers saliva tests to young people to detect cannabis and amphetamines use. If the test is positive, drivers are free to decide whether or not to drive home. Also, in Portugal, free breath, urine and saliva tests are available at special events.

One community approach is programmes to encourage, or even provide, a 'designated driver', who would stay sober for the night. These took place in Belgium, Germany, Spain, Estonia, France, Latvia, Lithuania, Luxembourg, the Netherlands and Poland as part of the European Designated Driver Campaign supported by the European Commission (?) (Euro-BOB/NESA). In Portugal, the national motoring association offers a 24-hour service (at a cost) whereby the driver and car can be brought home, and in Germany the 50–50 Taxi project is available to disco-goers in Saxony-Anhalt, who can take a taxi home at half price on Friday and Saturday nights; the other half of the cost is paid by sponsors from industry (Ministerium für Gesundheit und Soziales Sachsen, 2006, personal communication). Separately, many German cities have introduced additional bus routes at night, hourly or on demand for disco-goers, after the end of regular operating hours, though these are rare in rural areas. A night bus system has also been recently introduced in Luxembourg.

As in other fields of prevention, the production and dissemination of information material seems to be the predominant approach, and many projects focus mostly on awareness and consciousness raising, solely through education. However, their effectiveness is usually measured by user appreciation surveys, and only rarely by observing actual changes in behaviour.

### Labelling and prescription of medicines

Clear information given to patients may prevent those taking psychoactive medicines from driving while adversely affected. The majority of countries rely on information on a possible effect on driving being printed in the patient information leaflet inside the packaging. The use of a clear symbol or pictogram on the packaging of medicines that may affect driving ability is currently reported by only five countries: Denmark, France, the Netherlands, Slovakia and Finland. In Austria, 'information' should be given on the outside of the packaging, and in the Czech Republic the ordinance on medicinal preparations permits it, but it is only used exceptionally. The Czech Republic and France report a three-tier classification system of differing degrees of danger.

A red warning triangle was placed on the outside of packaging of psychoactive medicines in Sweden, but the pictogram was removed in 2005 because of inconsistencies in labelling and the risk that patients might not be aware of the effect of the medicine on driving skills if there was no warning triangle. The triangle was replaced with a written

description of the possible impact on driving skills enclosed with the medicine.

Nevertheless, it is not always clear what concentrations merit care, or how many hours after taking the medicine must elapse before the patient is safe to drive. Although the ultimate responsibility may well rest with the patient ('if you feel drowsy, do not drive'), it is known that subjective experiences of fitness to drive often do not correlate with objective performance measures. For example, patients who take benzodiazepines to treat anxiety tend to report feeling much better, even though these drugs objectively cause impairment. Patients who take benzodiazepines as an hypnotic in the evening will clearly feel the effect prior to falling asleep, but have repeatedly reported to feel normal and alert in the morning, whereas objective driving tests did show subtle but clinically relevant impairment.

The other method of delivery of information is via doctors and pharmacists. Prescribing doctors must inform patients of the risks associated with medicines in Germany, Luxembourg, Poland and the United Kingdom, whereas in France, Sweden and Finland both the doctor and the pharmacist are bound to inform the patient of any risks. In France, doctors may be obliged to prove that they have provided their patients with full and appropriate information about the risks (even highly unlikely risks) of secondary effects linked to the medical treatments given or prescribed.

### Prevention — summary

Not all countries reported comprehensive details of prevention actions, but from the examples described here it would seem there is a certain bias towards actions targeted at young people. School campaigns, driving school campaigns and campaigns in discos and nightclubs feature prominently, a logical response to the number of young people who die in traffic accidents in Europe every weekend night, whether through alcohol, drugs or spur-of-the-moment risk-taking. The majority of prevention programmes reported usually addressed alcohol, or simply 'alcohol and drugs', but the effectiveness of such 'one size fits all' campaigns has been challenged. Some actions are being taken to target users of psychoactive medicines, but these seem to be rather rare. Considering the demographic findings reported here, in addition to actions targeting the young, countries could perhaps also keep in mind the older segment of the population, who may use psychoactive medicines for legitimate reasons but are not aware of the possible effects they may have.

(?) [http://ec.europa.eu/transport/roadsafety/publications/projectfiles/nesa\\_en.htm](http://ec.europa.eu/transport/roadsafety/publications/projectfiles/nesa_en.htm)



## Conclusion

Cannabis and benzodiazepines are perhaps the two most significant psychoactive substances consumed by drivers in Europe, apart from alcohol. However, the average profile of consumers, detection methods and the settings of prevention measures (nightclubs and schools compared with doctors and pharmacists) are very different for the two drugs. Public perceptions of the dangers of each substance do not necessarily reflect scientific evidence, and the correction of these perceptions is crucial to the success of future prevention initiatives.

The above studies suggest that drug use in the general population does not always correlate with use among the driving population. To obtain an accurate picture of the prevalence of driving under the influence of drugs, rather than of drug use in the previous week, studies should distinguish between active principles found in blood and metabolites in urine. In the case of benzodiazepines, scientists are beginning to assess the effects of short-acting, medium-acting and long-acting benzodiazepines in terms of implications for road safety. Personal susceptibility and tolerance developed with longer-term use are also factors to consider. Prevention programmes focus on young people but some have started to address users of prescription medicines. The danger of impairment by either illicit drugs or medicines is greatly increased when alcohol is consumed at the same time. Polydrug use among drivers is a phenomenon that demands increased attention.

Although much is being done to address the problem of drug-driving in general, and national laws are being tightened and penalties increased, responses are rarely targeted at

cannabis and benzodiazepines. Behavioural tests for use by police are being designed, evaluated and improved, though the training of traffic police in these tests seems to be rather sporadic. Some criminal justice statistics are recorded to monitor the situation, though not always to the level of detail that could inform future policies. With regard to illicit drugs such as cannabis, it can be unclear as to whether the law prohibiting drug use in drivers is part of road safety policy or of policy regarding the control of illicit drugs. In the case of medicines such as benzodiazepines, there remains discussion in certain quarters as to the trade-off between protecting society by penalising those driving under the influence and permitting normal mobility for individuals who may not be able to function without such medication — some benzodiazepines are anticonvulsants, for example. But the legal status is clear in almost every country in Europe: driving while impaired by benzodiazepines, even if used correctly according to a prescription, is an offence.

International standards for research on drug-driving have been drafted, aiming to make future research comparable and permitting meaningful meta-analyses. These are being implemented to a large extent in the European Commission's four-year EUR 24 million DRUID project; it remains to be seen if this project confirms the results found above, or provides evidence for different conclusions.

Finally, the matter should be always kept in proportion. Although studies were requested for this report to compare and contrast cannabis and benzodiazepines in drivers, from the data submitted there is no doubt that the number one substance endangering lives on European roads today is alcohol.

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