The role of medicines in traffic accidents in the European countries

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Abstract
The prevalence of medicines in the driving population and their role in traffic accidents is mostly unknown in the European countries. Larger roadside studies focusing on medicines with detrimental effects on road traffic safety should be organised, so results could be compared to the corresponding compounds detected in samples from accident drivers. In order to perform such studies, equipment with necessary sensitivity for detection of the most relevant compounds in appropriate biological media (e.g. saliva or sweat) is highly needed. Further studies on blood/saliva (or sweat) concentration ratios are therefore recommended.

Collaboration studies with participation from different countries are thus important in order to obtain sufficient data for the calculation of reliable risk factors. Standard protocols covering biological medium to be used for analyses, compounds covered by the analytical program and their cut-off limits are thus recommended. Sub-division by groups of drivers responsible for the accidents (responsibility analysis) gives the most valuable data for accident risk calculations. Special focus must be paid to accident-involved drivers with more than one compound detected in their blood samples, or to those with blood drug concentrations reflecting doses higher than normally recommended for therapeutic use.

Organisation of a common European database covering the prevalence of alcohol, illegal drugs and medicines among injured and fatal accident drivers provided by the different countries would be highly valuable. Routines should be considered for the exchange of information from accident studies to uncover "new" medicines that may have detrimental effects on traffic safety.

Introduction
Statistics on traffic accidents in the European Union (EU) show that more than 40 000 people are killed every year and that 1,7 million persons need medical treatment (1). For those between 15 and 24 years old, fatal traffic accident is the major cause of death. An important contributing factor to the accidents, is the use of alcohol and/or drugs combined with driving. The goal for EU’s new road safety action plan is to halve the number of fatalities within 2010 (1).

The focus on drugs as an important accident risk factor has received considerable attention during the last years. Several studies have been carried out in order to document the prevalence of drugs and among accident drivers and other group of drivers, in order to calculate risk factors. Other activities include working groups represented by members from several European countries, seminars and information campaigns focusing on the hazards of drugs combined with driving (2, 3). Research projects on drugs and driving have been/are
supported by EU, including partners from several European countries. One example is the ROSITA-project with participants from eight countries, which has received considerable attention (4).

So far, several studies have documented that numbers of psychoactive medicinal drugs may have a negative effect on road traffic safety (5). As medicines are used by a larger group of the driving population compared to illegal drugs, their contribution to road accidents might be larger than expected. An increasing number of apprehended drugged drivers have been reported from several countries and medicinal compounds have played a major role in many cases (6,7,8).

In order to increase the knowledge of sign and symptoms among drugged drivers, training programs have been organised for the police in several countries. One main requirement demanded both from the police and research groups performing epidemiological studies is the need for equipment to be used roadside for primary drug screening.

The purpose of this report is to give a short overview of the situation of medicinal drugs among drivers involved in traffic accidents in the European countries and among apprehended drivers, followed by some recommendation for future studies. Examples will be given from Norway, where a high rate of drugged driving has been detected for many years.

Medicinal drugs detected among accident drivers
The medicinal drugs with the most negative effect documented for road traffic safety seem to be benzodiazepines (BZDs). From several studies, increased risk factors have been documented when BZDs are used both therapeutically and probably with a higher risk when misused at higher dose (5). One problem connected to the accident studies and risk factor calculations is that the prevalence of BZDs in the general diving population is not well known, except for some estimations given from Germany and Norway (approximately 3-4 %) (9,10). On the background of these figures, most accident studies have shown that the prevalence of BZDs is higher among accident drivers. In some studies, the prevalence of BZDs has been next to alcohol, ranging from 7 - 14% and 41%, respectively, among accident and fatal accident drivers (7, 9,11,12). From a Norwegian study, it was found than BZDs were more often related to traffic accidents compared to tetrahydrocannabinol and amphetamines (13). Among all fatal and injured accident drivers reported during 10 years (1990 – 1999) to the National Institute of Forensic Toxicology in Norway (n= 9500), BZDs were the most frequently detected drugs after alcohol (15%, n= 1050). Several studies using responsibility factors have also documented increased accident risks for BZDs (14). For patients using BZDs, the odds ratios for traffic accidents within four weeks after the first prescription, were reported to rage from 2,5 – 3,9 (15).

Increased risk factors have also been documented for other drugs; e.g. opioiodes, first generation antihistamines, muscle relaxants and barbiturates (5). However, the presence of these drugs among accident and apprehended drivers, seems to be much lower compared to BZDs. For opiates, the prevalence has varied from 1 to 4% (9, 10). Another frequently used drugs are cyclic antidepressants; however, these compounds are not often detected among accident drivers. Patients who have used these drugs for a short time only, might be a risk to traffic safety (5). One general problem connected to epidemiological accident studies is that these drugs are rarely included in the analytical program.

Medicinal drugs detected among apprehended drivers.
The number of drivers apprehended by the police in Norway was more than doubled during the 90-ies (1990: n= 2050, 1999: n=4800), approaching the level of drunken drivers (1999: n= 4960) (Norway: 4,3 mill inhabitants). The main reason for apprehension was accident, dangerous or reckless driving. The program used to handle the drugged driving cases during
these years was approximately unchanged. BZDs have represented some of the most frequently detected drugs among these cases.

In 2001, flunitrazepam and diazepam were detected in 30% and 25% of the drug positive cases, respectively. The prevalence of flunitrazepam increased approximately 90% from 2000 to 2001, while the total number of cases from apprehended drugged drivers increased approximately 10%. All together, one or more BZDs were found in more than 50% of the cases received during 2001. Most of the BZDs detected were represented by doses above normally recommended therapeutic use, often combined with illegal drugs or other psychoactive medicinal drugs (up to 90%) (8). A study comparing the prevalence of different drugs among apprehended drivers in the Nordic countries, using the same analytical program and cut-off levels in all countries, showed that BZDs represented the most frequently detected drugs (16). Other medicinal drugs with high prevalence among apprehended drivers, have been codeine, meprobamate and zopiclone. The majority of the drivers are men (85 – 88%), age 20 – 35 years, often with earlier arrest due to drunken or drugged driving recorded, and a high probability to be arrested again (approximately 50% within three years) (17). The statistics on drug seizure from the police and customs in Norway show similar pattern as the prevalence among drugged drivers. Thus, the drugs detected among drivers seem to reveal the drug use situation in the country. The high occurrence of BZDs among apprehended drivers in Norway may indicate that the situation is similar in other countries.

**Important factors for comparison of drugs among accident and apprehended drivers.**

For most of the studies cited above, case-control groups are lacking. Thus random roadside studies are highly needed to calculate more reliable accident risk factors, similar to what has been performed for alcohol. However, such studies have until now been difficult to perform as many different drugs have to be detected in blood from a large number of control persons. Thus, such studies are both difficult and expensive to organise roadside, as relevant test equipment for invasive biological media covering the most relevant medicinal drugs is lacking. In order to compare different studies, standardised guidelines are necessary, e. g. selection criteria, biological medium, analytical program and drugs included, and the cut-off limits used.

**The need for screening devices**

There is a need for valid, rapid and inexpensive tests, covering the major drugs of interests, using invasive matrix like saliva or sweat. Such equipment would also be very helpful for the police, in order to confirm their primary suspicion of drugged driving before further action is taken. Different equipment for drug screening in urine samples is already available, but not very suitable for roadside use without special police-cars with lavatory etc. In addition, many medicinal drugs of interest are not covered by on-side tests. It is also important to be aware of that urine samples may be positive for a long time after drug intake, not reflecting the occurrence in blood and possible impairment. The evaluation of screening devices for drug testing road-side, was the primary task during the ROSITA-project (4). However, equipment for saliva or sweat needs improvement, as they did not satisfy the requirement for medicinal drugs. For the most important drugs, (e.g. BZDs) the concentrations in saliva are low compared to blood, requiring drug-tests with high sensitivity. It is also important that implementation of drug screening equipment, does not result in that the police overlook other impairing drugs not covered by the tests. Therefore, police training programs including evaluation of possible impairment must continue in order to maintain their experience.
Activities in the European countries with focus on drugs and driving.
The workinggroup on “Alcohol, illicit drugs, medicines and traffic safety”, representing 13 different countries, has received the mandate to describe the situation related to traffic safety, alcohol and other drugs in the European countries, proposing activities for the new “Road Safety Action Plan”. Research projects and other actions, which might increase the knowledge and contribute to decreased alcohol and drug related accidents are recommended. For medicinal drugs, epidemiological surveys on accident drivers, larger roadside drug screening studies are mandatory, including a need for standardisation of accident study protocols. Information campaigns and improved categorisation system for medicinal drugs are ongoing in several countries and recommended for other countries. These topics, among several others, have also been recommended by one of the ICADTS’ workinggroups, and described in “Prescribing and dispensing guidelines for medicinal drugs affecting driving performance” (3).

The Pompidou Group of the Council of Europe has also focused on studies to record the situation on drugs and traffic safety, including reports on the harm of medicinal drugs associated with driving and accident risks (18,19).

Conclusion
The occurrence of driving combined with illegal drugs and psychoactive medicines seems to be a growing problem in the European countries, probable responsible for many serious traffic accidents. The attention paid to clarify the reason for the accidents and the role of medicinal drugs has so far been too low. Therefore, a register based on data from several countries showing the prevalence of alcohol and drug related accidents, is highly recommended. The efficacy of all kinds of road safety actions against drugs combined with driving may thus be possible to evaluate. It is then important that the valuable ongoing collaborating work between the European countries will continue in order to exchange safety action experiences and information of new medicinal drugs with negative effect on traffic safety.

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