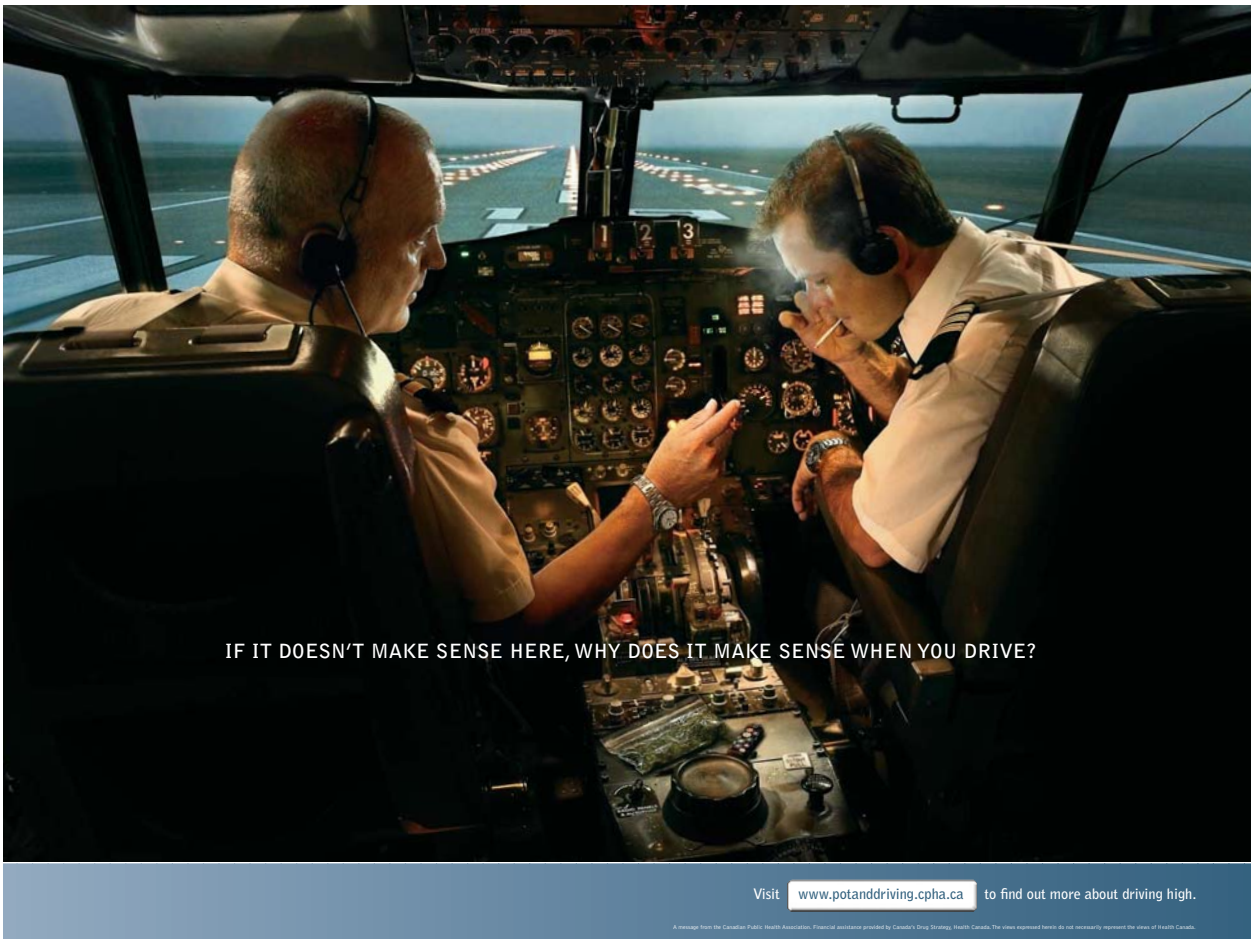

Frequently Asked Questions

ABOUT POT & DRIVING

November 2005

Canadian Public Health Association
400-1565 Carling Avenue
Ottawa, Ontario K1Z 8R1
Telephone: 613-725-3769
Fax: 613-725-9826
E-mail: potanddriving@cpha.ca

Visit **www.potanddriving.cpha.ca** to find about more about driving high.

Contents

Introduction

On November 21, 2005, the Canadian Public Health Association, with funding from Canada's Drug Strategy, Health Canada[1], launched a Pot and Driving campaign (http://potanddriving.cpha.ca) to raise awareness among young Canadian drivers and passengers of the risks of cannabis-impaired driving. Campaign materials include:

- A poster of airplane pilots smoking up with the campaign message, "If it doesn't make sense here, why does it make sense when you drive?"
- 10 Questions (to provoke thought and dialogue)
- The thinking behind the questions (to encourage discussion)
- This FAQ (to inform the discussion)

This FAQ provides information on a range of issues related to cannabis use in the context of driving. It draws on up-to-date, relevant studies and surveys, insights given by key informants from Canada and several other countries, and the opinions of young Canadians who took part in focus groups held in several locations across the country.

1. The views expressed herein do not necessarily express the views of Health Canada

1. Why a pot and driving focus?

Canadians between the ages of 14 to 25 have one of the highest rates of pot use in the world. Many young Canadians who use pot see it as a mild, mainstream drug with no significant negative consequences. While most young drivers and passengers have little tolerance for alcohol-impaired driving, they commonly regard pot and driving as risk free.

Recent research on pot is showing that it can play an important role in road vehicle crashes, especially when combined with driver inexperience and difficult road conditions. Road accidents are often the result of a combination of factors and pot can be one of them.

Pot is the most popular drug used by Canadians 14 to 25 years-of-age, after alcohol and tobacco. Drug-use surveys indicate that the rate of driving under the influence of pot surpasses that of alcohol. Alcohol has been the subject of impaired-driving awareness efforts for several decades and tobacco is not a risk for driving. It is time to put the focus on pot.

What do we mean by 'pot'?

We use the word 'pot' in our materials to refer to any drug derived from the cannabis plant, including marijuana (which is made from the leaves and buds), as well as hashish and hashish oil (made from plant resin). We chose this word because it is short and easy to say; more importantly we chose it because focus group participants were unanimous in saying that along with the word 'weed', 'pot' is the most common word used to refer to cannabis in both English and French Canada.

2. How does cannabis affect driving ability?

Driving skills are affected in specific ways when a person has consumed a certain amount of pot. This impairment increases with the amount of THC (the compound that gives pot its high) a person has in his/her system. While drivers have been found to do certain things to adapt to their impairment, like slowing down, this attempt to compensate does not eliminate the risks of driving high.

It has long been established that pot affects tracking ability, meaning that drivers who are under the influence of a certain dose of THC have been found to have a harder time following their lane. Pot reduces a driver's ability to perceive changes in the relative speed of other vehicles and to adjust his/her own speed accordingly.

Pot has been found to increase the reaction time needed to respond to an emergency decision-making task, such as adapting to changes in speed of the vehicle ahead or to the vehicle's brake lights. A driver needs to notice something in order to respond to it and that has to do with the driver's attention. Because pot disturbs concentration and short-term memory, a driver has a harder time being attentive to events and situations on the road that can have important consequences for road safety.

3. Who drives under the influence of pot?

Several student surveys in Canada have found a high rate of pot use among students in high school, with the rate increasing with age/grade. Male students have a higher rate of use than female students. The likelihood that a person will drive high depends on how frequently they use pot. Daily pot users have the highest rate of driving high while occasional users have the lowest rate.

Cannabis use by Canadian adolescents is reported to be among the highest in the world. The 2002 *Nova Scotia Student Drug Use Survey* found that 22% of students surveyed used marijuana in the month before the survey, while 5% used it every day. The 2002 *Alberta Youth Experience Survey* indicated that cannabis use by Aboriginal youth (52%) was almost twice that of non-aboriginal youth (27%). One in five Ontario high school student respondents in the 2003 *Ontario Student Drug Use Survey* reported driving one hour after using cannabis during the past six months.

Drugged driving is not isolated to young Canadians or to Canadians who use illegal drugs. Older drivers are more likely to drive impaired by prescribed medications; younger drivers are most likely to drive while affected by illegal drugs, including cocaine and pot. It is young, male, frequent pot users, who are most likely to drive high.

What do we mean by 'driving'?

When we use the phrase 'driving a vehicle' we are referring to the use of any kind of motor vehicle, including cars, trucks, motorbikes, ATVs, planes, motorboats and snowmobiles. We generally use the word 'driving' to imply the use of both on and off-road vehicles. We do not wish to suggest that off-road driving is less of a concern when it comes to drug use.

4. Why focus on mainstream teens?

Surveys conducted in Canada and in countries such as Australia have shown that driving under the influence of cannabis is rare in the general population but common among cannabis users, a group concentrated in those 14 to 25 years-of-age. For this campaign, we decided to target mainstream youth since data indicates that the rate of cannabis use is approaching the rate of alcohol consumption among youth in Canada. Pot has become mainstream.

We spoke to several groups of young Canadians 15-25 years-of-age about their experiences with pot and driving. Generally, older participants were convinced that driving high was not a problem and said they were unlikely to change their minds about doing it. Participants who were not yet driving or were anticipating learning how to drive appeared to be more open to the suggestion that mixing pot and driving, like mixing alcohol and driving, could put them and their passengers at risk. So we decided the campaign should focus on mainstream Canadians 14-18 years-of-age.

5. Who is likely to be a passenger of a driver who is high?

Studies have found that a person's likelihood of being a passenger of a driver who has used pot within an hour or two of driving, or uses it while driving, increases with high school grade. Gender does not seem to be a factor, although our focus group participants did provide some indications that female passengers may be more likely to be a passenger with a boyfriend who is high than a female friend.

6. How long after using pot are driving skills affected?

Cannabis impairs driving skills most severely during what is known as the acute phase, which typically lasts for up to 60 minutes after smoking. This is followed by post-acute (the phase after the acute one) and residual phases. The residual phase is 150 minutes or more after smoking, during which impairment subsides rapidly. The degree of impairment during the residual phase depends on the amount of THC consumed. After smoking a so-called typical dose (about 20 mg) of THC, the residual phase lasts 2-3 hours.

7. What about 'burnout'?

Burnout is roughly equivalent to the 'hangover' associated with alcohol. Very little is known about the effect of 'burnout' on driving, although some focus group participants flagged it as a significant issue for driving. Some even suggested they felt safer driving high than driving during burnout. Since burnout is characterized by fatigue, studies of the effect of fatigue on driving might be applied to burnout.

8. Does the dose influence the risk?

As is the case with alcohol, risk increases with dose. However, regular users have been found to experience less effect from the same dose. Pot's THC concentrations can vary significantly from batch to batch.

Since cannabis is illegal and unregulated, there is no standardized consumption limit as there is for drinking alcohol and driving. In experimental research, drivers are given what would be considered an 'average' dose of THC and then observed as they perform a number of driving tasks on the road under controlled conditions. For the sake of safety, these tests cannot put drivers in situations that would likely lead to accidents.

So the variation of pot's THC content, the widely varying effects of pot on individuals, the different contexts in which it is used, and the difficulty in testing dose in actual driving conditions lead to the conclusion that the relationship between dose and risk is not entirely clear.

What is drugged-driving?

If your ability to drive a motor vehicle is affected because you have taken a drug, a combination of drugs, or drugs and alcohol (which is also a drug although it is usually referred to separately), you are drugged-driving. A number of medications prescribed by doctors as well as some over-the-counter remedies are known to affect a person's ability to drive safely. Several illegal drugs are also known to affect driving skills.

9. Can a drug that is used to treat disease also affect driving?

Although pot is usually thought of as a recreational drug in North America, it is also used for medical purposes. Drugs that can help reduce the symptoms of a disease can also affect a person's ability to drive safely. That is why some prescription drugs come with warnings not to drive for a certain amount of time after taking them.

10. How does pot compare with alcohol as a threat to road safety?

In Canada, driving under the influence of alcohol is widely regarded as both dangerous and socially unacceptable. The evidence to date supports the claim that alcohol is still one of the most important contributors to crash risk injury or death. The increasing evidence of the contribution of drugs other than alcohol to road crashes, whether they are consumed with alcohol or by themselves, has led to a number of efforts to increase awareness of the potential road safety hazards of these drugs. The perception that pot is relatively risk-free when compared to alcohol may help explain why recent drug use surveys in Canada have found that the rate of driving under the influence of pot surpasses the rate of driving under the influence of alcohol among young drivers and passengers.

Why the term pot and driving?

Phrases like alcohol-impaired driving, drunk-driving, drinking and driving or driving under the influence of alcohol (DUIA) are well known. Equivalent terms referring to drug use and driving—including drug-impaired driving, drugged driving and driving under the influence of drugs (DUID)—are less well known, although that is changing. We have chosen to use more informal phrases such as driving high, mixing pot and driving or simply pot and driving.

11. Why not adopt a law enforcement message?

Law enforcement has played an important role in changing attitudes about alcohol-impaired driving. However, fear of being caught and prosecuted for driving high seems not to be a significant concern for many young people.

Focus group participants indicated that parents could be a deterrent if for no other reason than they usually control the keys to the car. Focus group participants also indicated that it is tougher to fool parents: "When I'm driving high I'm more afraid of my mom because cops have no way of telling. Whereas if my mum says 'You're high', I'm not going to say 'I'm not" because I know she's not going to believe me."

12. What does Canadian law say about drugs and driving?

It is the effects of pot on driving—not the legal status of pot—that makes its use illegal both before or while taking control of a motor vehicle.

Article S. 253 of the Canadian Criminal Code says that: "Everyone commits an offence who operates a motor vehicle or operates or assists in the operation of an aircraft or railway equipment or has the care or control of a motor vehicle, vessel, aircraft or railway equipment, whether it is in motion or not, (a) while the person's ability to operate the vehicle, vessel, aircraft or railway equipment is impaired by alcohol or a drug."

In the Canadian Criminal Code, laws on impaired driving are distinct from laws that say whether it is legal or not to produce, sell or use a particular drug. In other words, the fact that a drug is legal or illegal has nothing to do with the issue of driver impairment. As an example, it is legal to drink alcohol for age-of-majority Canadians but it is illegal to drive while impaired by alcohol.

13. Can law enforcement officers identify and charge drivers who are impaired by cannabis?

As noted above, current law makes it a criminal offense to drive while impaired by cannabis and other drugs. The federal government is considering tabling Bill C-16, which would amend the Impaired Driving section of the Canadian Criminal Code in order to allow police officers to require drivers to undergo a Standardized Field Sobriety Test if the officer believes the person is driving under the influence of a drug. If a driver fails the sobriety test, the officer would have reasonable grounds to believe the driver has committed a drug-impaired offence and can require the driver to submit to a Drug Recognition Expert (DRE) evaluation at the police station. Police departments across the country have begun to train officers to conduct DRE assessments.

What is THC?

THC is the primary psychoactive compound found in cannabis. A psychoactive drug is one that alters brain function, resulting in temporary changes in perception, mood, consciousness, and behaviour.

If a person fails these procedures, police would have reasonable grounds to demand a sample of bodily fluids, whether blood, urine or saliva. Charges can only be laid after the presence of drugs in bodily fluids is confirmed by laboratory analysis. A driver who refuses to complete the sobriety test or provide bodily fluid samples would be criminally charged, as is the case for drivers who refuse sobriety test and breathalyzers when they are suspected of driving while impaired by alcohol.

14. Will changes to the Criminal Code relating to cannabis possession and use (Bill C-17) affect laws and law enforcement relating to cannabis-impaired driving?

Under the legislative changes proposed in Bill C-17, possession and use of cannabis will remain illegal, but anyone found to have small amounts of cannabis for personal use would only be fined. If these proposed changes to the Criminal Code become law, driving high will likely be more, not less, subject to penalty than it is today. For example, possession of 15 grams or less of cannabis will be punishable by a fine of $150 for an adult and $100 for a person under the age of 18. However, where aggravating factors such as driving a car exist (even if the driver is not high), the fine would be $400 for an adult and $250 for a person under the age of 18.

Cannabis and Driving: Key Points of Reference and Bibliography

1. "Educational and policy initiatives directed at new drivers have failed to adequately inform new drivers about the potential consequences of driving under the influence of cannabis…This speaks to the role of organizations involved in health promotion and education around impaired driving who have, until recently, focused almost exclusively on the issue of drinking and driving and paid less attention to the drug-driving issue." (7-8)

   "Among the general adolescent population in Atlantic Canada, driving under the influence of cannabis has become a prevalent activity surpassing driving under the influence of alcohol, and it has played an important role in motor vehicle collision risk, independent of drinking and driving, driver experience, and other risk factors." (8)

   Asbridge et al. (2005) Motor vehicle collision risk and driving under the influence of cannabis: Evidence from adolescents in Atlantic Canada

   ……………………………………………………………………………………………………….....

2. "The present study presents good evidence that drivers killed in motor vehicle crashes and taking psychoactive drugs, particularly cannabis and strong stimulants, or two or more drugs in combination were more likely to be responsible for the crash than those taking neither drugs nor alcohol. Moreover, the combination of psychoactive drugs with alcohol further increased the likelihood that drivers caused the crash in which they died. We conclude that THC, amphetamines and combinations of psychoactive drugs significantly increase drivers' risk of a serious road crash." (247)

   Drummer et al. (2004) The involvement of drugs in drivers of motor vehicles killed in Australian road traffic crashes

   ……………………………………………………………………………………………………….....

3. "There is considerable evidence that cannabis does impair ability to perform the multiple functions required to drive a car safely. Although the deleterious effects of cannabis are manifestly not as severe as those of alcohol, they are more complex due to its sedative and stimulant properties; nevertheless several countries have proscribed the use of cannabis by drivers and have introduced legislation to that effect. The impetus behind these measures seems to be several fold – the increasing use of cannabis, especially by younger and therefore more inexperienced drivers; the increasing volume of traffic, dependence on personal vehicles for transport and concomitant increase in accidents; studies highlighting the effects of cannabis on brain function and increased public awareness of the hazards associated with driving and substance abuse; and not least the costs to society and individuals of road traffic casualties." (330)

   Hadorn. (2004) A review of cannabis and driving skills

   ……………………………………………………………………………………………………….....

4. "One of the clear messages to emerge from the research reviewed is that there is a need to examine the effects of cannabis in situations where the driver is required to perform several tasks simultaneously or when confronted with a situation that requires a rapid adaptive response. Furthermore, there has been little research examining the effects of cannabis, alone and in combination with alcohol and other drugs, across a range of levels of driving experience." (xii)

   "As previous researchers have suggested, it is critical to examine the effects of cannabis when the driver in placed in situations involving increased mental load. This represents a shift in the experimental research

away from looking simply at the effects of cannabis on traditional measures of driving performance such as lateral placement and speed, and a move towards supplementing traditional measures with investigation of the effects of cannabis when a driver is placed in an unexpected high accident risk situation that requires an immediate decision and response." (31)

Lenné et al. (2004) Cannabis and Road Safety: A Review of Recent Epidemiological, Driver Impairment, and Drug Screening Literature

……………………………………………………………………………………………..

5. "Surveys that established recent use of cannabis by directly measuring THC in blood showed that THC positives, particularly at higher doses, are about three to seven times more likely to be responsible for their crash as compared to drivers that had not used drugs or alcohol. Together these epidemiological data suggests that recent use of cannabis may increase crash risk, whereas past use of cannabis does not." (109)

   Ramaekers et al. (2004) Dose related risk of motor vehicle crashes after cannabis use

……………………………………………………………………………………………..

6. "In terms of road safety the results show a clear worsening of driver capability following the ingestion of cannabis or the ingestion of cannabis and alcohol together at the doses used, in comparison with placebo (i.e. having taken neither). Within the sample of drivers, the effects of alcohol (at a dose of just more than half of the UK legal limit) and cannabis taken together were slightly greater than with cannabis alone. Given that other research has extensively shown the rapid increase in the risk of accident, particularly fatal accident, with increasing blood alcohol level, the present results show how important it is to avoid any combination of alcohol and cannabis, as well as avoiding alcohol and cannabis taken on their own, before driving or riding." (2)

   "Drivers under the influence of cannabis seem to attempt to compensate to some extent for the impairment (that they recognise) by driving more slowly, but there are some aspects of the driving task where cannabis-impaired drivers cannot compensate and where their performance deteriorates (e.g. staying in lane on a bend)." (2)

   Sexton et al. (2002) The influence of cannabis and alcohol on driving

……………………………………………………………………………………………..

7. "To the extent that drivers compensate for the effect of cannabis, they appear to be able to manage routine and low demand tasks, but the remaining cognitive resources may not sufficient to cope with peak and unexpected demands."

   Smiley. (1999) Marijuana: On-road and driving simulator studies

……………………………………………………………………………………………..

Canadian Drug Use Surveys

ADLAF, E. M. and A. Paglia. (2003) Drug Use Among Ontario Students 1977-2003: Ontario Student Drug Use Survey (OSDUS) Highlights. Toronto: Centre for Addiction and Mental Health.

Alberta Youth Experience Survey 2002 Summary Report. (2003) Alberta Alcohol and Drug Abuse Commission.

Centre for Addiction and Mental Health (2003). Cannabis Use and Driving Among Ontario Adults. CAMH Population Studies eBulletin, May/June, No. 20.

Alcohol et drogues: portrait de la situation en 2002 et principales compariasons avec 2000. (2002) Enquête québécoise sur le tabagisme chez les élèves du secondaire. Institue de la statistique. Gouvernement du Québec.

2002 North West Territories Alcohol and Drug Survey. (2003) Northwest Territories Bureau of Statistics.

POULIN, Christiane. (2002) Nova Scotia Student Drug Use Survey: Highlights Report. Halifax: Nova Scotia Department of Health Addiction Services and Dalhousie University Community Health and Epidemiology. 1-16.

PATTON, D., D. Brown, B. Brozeit and J. Dhaliwal. (2001) Substance Use among Manitoba High School Students. Addictions Foundation of Manitoba.

TJEPKEMA, Michael. (2004) Use of Cannabis and Other Illicit Drugs. *Health Reports*, Vol. 15, No. 4, 43.

World Health Organization. (1997). Cannabis: A Health Perspective and Research Agenda. WHO Division of Mental Health and Prevention of Substance Abuse, Geneva: World Health Organization.

Cannabis and Driving Studies

ADAMS, I. B. and B. R. Martin. (1996) Cannabis: pharmacology and toxicology in animals and humans. *Addiction, 91*(11), 1585-1614.

ASBRIDGE, Mark, Christiane Poulin and Andrea Donato. (2005) Motor vehicle collision risk and driving under the influence of cannabis: Evidence from adolescents in Atlantic Canada. *Accident Analysis and* Prevention. (In press)

ASHTON, C. H. (1999) Adverse effects of cannabis and cannabinoids. *British Journal of Anaestheasia, 83*(4), 637-649.

BIERNESS, Douglas J., Herb M. Simpson and Katharine Desmond. (2003) Drugs and Driving 2002. *The Road Safety Monitor.* Traffic Injury Research Foundation. (TIRF)

BLOWS, S., R. Q. Ivers, J. Connor, S. Ameratunga, M. Woodward and R. Norton. (2005) Marijuana use and car crash injury. *Addiction*, 100: 605-611.

CHAIT, L. D. and J. L. Perry. (1994) Acute and residual effects of alcohol and marijuana, alone and in combination, on mood and performance. *Psychopharmacology (Berl), 115*(3), 340-349;

CHESHER, G. B. (2003) Cannabis and road safety: An outline of the research studies to examine the effects of cannabis on driving skills and actual driving performance. www.druglibrary.org/schaffer/MISC/driving/driving2.htm.

CHESHER et al. (2002) Cannabis and alcohol in motor vehicle accidents. In Grotenhermen and Russo (Eds). *Cannabis and Cannabinoids: Pharmacology, Toxicology, and Therapeutic Potential*. New York: Haworth Press, 313-323.

CIMBURA, G., D. M. Lucas, R. C. Bennett, R. A. Warren and H. M. Simpson. (1982) Incidence and toxicological aspects of drugs detected in 484 fatally injured drivers and pedestrians in Ontario. *Journal of Forensic Sciences, 27,* 855-867.

DOUGHERTY, D. M., D. R. Cherek and J. D. Roache. (1994) The effects of smoked marijuana on progressive-interval schedule performance in humans. *Journal of the Experimental Analysis of Behavior*, *62* (1), 73-87.

DRUMMER, Olaf H., Jim Gerostamoulos, Helen Batziris, Mark Chu, John Caplehorn, Michael D. Robertson, Philip Swann. (2004) The involvement of drugs in drivers of motor vehicles killed in Australian road traffic crashes. *Accident Analysis and Prevention* 36: 239–248.

DUSSAULT, C., M. Brault, M. Brault, J. Bouchard and A. M. Lemire. (2002) The contribution of alcohol and other drugs among fatally injured drivers in Quebec: Some preliminary findings. In Mayhew, D. R., & Dussault, C. (Eds.), Proceedings of the 16th International conference on alcohol, drugs, and traffic safety, 423-430.

European Monitoring Centre for Drugs and Drug Addiction. (1999) Literature Review on the Relation between Drug Use, Impaired Driving and Traffic Accidents. (CT.97.EP.14) Lisbon: EMCDDA.

GROTENHERMEN, Franjo, Gero Leson, Günter Berghaus, Olaf H. Drummer, Hans-Peter Krüger, Marie Longo, Herbert Moskowitz, Bud Perrine, Jan Ramaekers, Alison Smiley and Rob Tunbridge. (2005) Developing Science-Based Per Se Limits for Driving under the Influence of Cannabis (DUIC). Paper presented at the 17th International Conference on Alcohol, Drugs and Traffic Safety. August 2004.

HADORN, David. (2004) A review of cannabis and driving skills. In *The Medicinal Uses of Cannabis and Cannabinoids.* Geoffrey Guy, Brian Whittle and Philip Robson Eds., London: Pharmaceutical Press Publications, 329-368.

HARDER, S. and S. Reitbrock. (1997) Concentration-effect relationship of delta-9 tetrahydrocannabinol and prediction of psychotropic effects after smoking marijuana. *International Journal of Clinical Pharmacology and Therapeutics*, 35(4): 155-159.

JONES, Craig, Karen Freeman and Don Weatherburn. (2003) Driving Under the Influence of Cannabis in New South Whales rural area. *Crime and Justice Bulletin: Contemporary Issues in Crime and Justice*. Number 75 (May 2003), 1-5.

LENNÉ, Michael, Tom Triggs, Michael Regan. (2004) Cannabis and Road Safety: A Review of Recent Epidemiological, Driver Impairment, and Drug Screening Literature. Monash University Accident Research Center.

MANN, Robert, Bruna Brands, Scott Macdonald and Gina Stoduto. (2003) Impacts of cannabis on driving: An analysis of current evidence with an emphasis on Canadian data. Prepared for Road Safety and Motor Vehicle Regulation, Transport Canada.

NEALE, Joanne, Neil McKeganey, Gordon Hay and John Oliver. (2000) Recreational Drug Use and Driving: A Qualitative Study. University of Glasgow, Scottish Executive Central Research Unit.

OHLSSON, A., J. E. Lindgren, A. Wahlen, S. Agurell, L. E. Hollister and H. K. Gillespie. (1980) Plasma delta-9 tetrahydrocannabinol concentrations and clinical effects after oral and intravenous administration and smoking. *Clinical Pharmacology Therapy*, 28(3), 409-416.

ROBBE, Hindrick. (1998) Marijuana's impairing effects on driving are moderate when taken alone but severe when combined with alcohol. *Psychopharmacol. Clin. Exp.*, 13: 70-78.

ROBBE, Hindrick and James F. O'Hanlon. (1993) Marijuana, Alcohol and Actual Driving Performance. Institute for Human Psychopharmacology University of Limburg, Netherlands.

RAMAEKERS, J.G., G. Berghaus, M. van Laar and O.H. Drummer. (2004) Dose-related risk of motor vehicle crashes after cannabis use. *Drug and Alcohol Dependence* 73: 109–119. Experimental Psychopharmacology Unit, Department of Neurocognition, Faculty of Psychology, Maastricht University.

———-.———. (2001) A review of epidemiological and experimental studies on marijuana and driver impairment. Experimental Psychopharmacology Unit. Brain and Behavior Institute. Université de Maastricht.

SEXTON, B.F., P. G. Jackson, R.J.Tunbridge and A.Board, K.Wright, M.Stark, K.Englehart. (2002) The influence of cannabis and alcohol on driving. Prepared for Road Safety Division, Department of the Environment, Transport and the Regions, UK, by Transport Research Laboratory, TRL Report 543.

SEXTON et al. (2000) . The influence of cannabis on driving. Prepared for Road Safety Division, Department of the Environment, Transport and the Regions, UK, by Transport Research Laboratory, TRL Report 477.

SMILEY, Alison. (1999) Marijuana: On-road and driving simulator studies. In H. Kalant, W. Corrigall, W. hall and R.G. Smart (Eds). *The Health Effects of Cannabis*. Centre for Addiction and Mental Health, Toronto, 173-191.

WALSH, G.W. and R.E. Mann. (1999) On the high road: Driving under the influence of cannabis in Ontario. *Canadian Journal of Public Health*, vol. 90 no. 4, 260-263.

WEEKES, John. (2005) Drugs and Driving FAQs. Canadian Centre on Substance Abuse.

WHEELOCK. Barbara Buston. (2002) Physiological and Psychological Effects of Cannabis: Review of the Research Findings. Prepared for the Senate Committee on Illegal Drugs. Office of Senator Eileen Rossiter.

Cannabis and Piloting Studies

D.S. Janowsky et al. (1976) Marijuana effects on simulated flying ability. *American Journal of Psychiatry* 133: 384-388 and

——,—— (1976) Simulated flying performance after marijuana intoxication. *Aviation, Space, and Environmental Medicine*, 47: 124-128.

LEIRER, V.O. et al. (1991) Marijuana carry-over effects on aircraft pilot performance. *Aviation, Space, and Environmental Medicine* 62: 221-227.

NEWMAN. David G. (2004) Cannabis and its Effects on Pilot Performance and Flight Safety. Australian Transport Safety Bureau, 1-18.