

**DRUG FREE AUSTRALIA**

## **Beyond the Smoke-Screen**

Examining Proposals for Legalisation of Marijuana as Medicine

**Central Issues  
&  
Compiled Evidence**

---

# DRUG FREE AUSTRALIA

## Five Central Issues for Australian Legislators

1. 'Medical Marijuana', (which is a misnomer) has been legally used in Australia since the mid-1990s, when the THC capsule developed in the US called Marinol was imported into Australia under TGA Special Access for 100 patients. Marinol can be imported today under the same arrangement. Alternatively, the whole-leaf extract of cannabis, called Sativex, was approved by the Australian TGA in 2012 for MS spasticity. Both medications are pharmaceutically standardised in terms of dosage, strength and purity, which crude cannabis products are not. A third pharmaceutical medicine which is high in CBD, Epidiolex, is currently being tested in the US and could be tested here under similar arrangements – CBD is the element within cannabis believed to be responsible for the relief of severe seizures in epilepsy-like syndromes for some sufferers. There is consequently no need to legalise crude cannabis grow-sites in Australia
2. It is not Australia's medical establishment that is asking for crude cannabis to be used here as medicine. The push for smoked marijuana by drug legalisation lobbyists who publicly support NSW media-showcase Dan Haslam's use of smoked cannabis for chemotherapy-induced nausea, militates against everything that calls itself 'medical'. The harms of smoking as a delivery system are self-evident – no medicine is ever smoked

Cannabinoids are not a first-line drug for any medical condition. Other legally available drugs are better for each of the few conditions which cannabinoids have been found to alleviate

Various medical treatments for cancer or other ailments can be prohibitively expensive for suffering Australians, and PBS subsidies make them available to those that need them. If it is argued that pharmaceutical cannabinoids are expensive, PBS subsidies should likewise be sought according to the same criteria as other needed treatments - if it can be demonstrated that significant numbers of Australians need and would use them

---

In the most extensive scientific review of ‘medical marijuana’ to date by the US Academies of Science’s Institute of Medicine, 95% of ‘medical marijuana’ users in the US were previously recreational cannabis users. Many of the patients who are brought along to parliamentary inquiries, and who offer public testimony of the wonderful effects of cannabis are actually speaking from a background of pre-existing cannabis dependency and addiction, where cannabis alleviates many of the very conditions it itself causes, often as part of a well-documented withdrawal syndrome

3. Those working to legalise the recreational use of cannabis worldwide by seeking to destroy the United Nations’ International Drug Conventions use ‘medical marijuana’ as a Trojan horse to introduce the full legalisation of cannabis for recreational use. In one US State with ‘medical marijuana’ laws, almost 50% of young people entering treatment for cannabis addiction sourced their cannabis from people with ‘medical marijuana’ prescriptions, demonstrating that diversion to recreational users will always be a problem under such provisions
4. The harms of recreational cannabis use are so substantial and substantiated that giving any leeway to Trojan horse strategies of the drug legalisation lobby should never be contemplated. Such strategies give a green light to public mischief-making as is evidenced in those US States where crude cannabis has been approved for medical use, particularly where trafficable quantities of ‘medical cannabis’ are made available to sufferers
5. According to the 2010 National Drug Strategy Household Survey, a survey of more than 24,000 Australians, 92% of Australians do not approve the recreational use of cannabis, which is precisely what Australia21’s lobbyists are seeking to legalise. While 69% of Australians support ‘medical marijuana’ in the same study, Drug Free Australia believes very few of these Australians would be able to specify the handful of medical indications attributed to cannabis

*The evidence supporting each of the five central issues nominated here is found in the following pages.*

---

# Table of Contents

<b>FIVE CENTRAL ISSUES FOR AUSTRALIAN LEGISLATORS.....</b>	<b>1</b>
--	----------

## *Compiled Evidence*

<b>Pharmaceutical Cannabinoids Legally in Australia since Mid-1990s .....</b>	<b>4</b>
MARINOL legally used since mid-1990s.....	4
MARINOL still legal in 2014.....	4
SATIVEX TGA registered in 2012 .....	6
EPIDIOLEX being trialled by US FDA for severe epilepsy seizures .....	6
Crude cannabis not medical .....	6
DFA gives qualified support to use of pharmaceutic cannabinoids.....	7
 <b>Australia's Medical Establishment not Seeking 'Medical Marijuana' .....</b>	<b>8</b>
Medical Associations not supportive of smoked marijuana.....	8
Australia21 drug legalisation lobby backing smoked cannabis, not medicos .....	9
Almost every international review condemns smoking as delivery system.....	10
Crude cannabis not possibly a medicine .....	13
'Medical Cannabis' – only a handful of demonstrated medical uses.....	16
. . . and a confounding issue – it alleviates its own withdrawal symptoms.....	17
Side-effects limit its usefulness .....	18
Tables of all scientific studies on 'medical cannabis' from the extensive IOM review .....	18
Cost of pharmaceutical cannabinoids may need PBS subsidy .....	48
95% of 'medical cannabis' users are recreational users .....	48
Most uses of 'medical cannabis' are objectively unverifiable .....	52
 <b>Crude 'Medical Cannabis' a Trojan Horse to Legalise Recreational Use .....</b>	<b>53</b>
Drug legalisation strategies .....	53
Massive, trafficable quantities recommended for medical use.....	54
And a green light for public mischief .....	54
Diversion to Minors for recreational use documented .....	55
'Medical cannabis' facilitating the avoidance of taxation in Colorado .....	56
Damning evidence against the drug legalisation lobby .....	56
Road deaths – increased consequence of adding another legal drug .....	60
 <b>Substantial Harms Must Keep Cannabis Use from Proliferating .....</b>	<b>61</b>
Summary of harms .....	61
DFA publication – Cannabis – suicide, schizophrenia and other ill-effects.....	63
 <b>92% of Australians do not Approve of Cannabis Use.....</b>	<b>114</b>
Cannabis use not acceptable to most Australians .....	114
DFA conjecture – most Australians ignorant of 'medical cannabis' background .....	115

## CENTRAL ISSUES FOR AUSTRALIAN LEGISLATORS - 1

### Pharmaceutical Cannabinoids Legally in Australia since Mid-1990s

'Medical Marijuana', (which is a misnomer) has been legally used in Australia since the mid-1990s, when the THC capsule developed in the US called Marinol was imported into Australia under TGA Special Access for 100 patients. Marinol can be imported today under the same arrangement. Alternatively, the whole-leaf extract of cannabis, called Sativex, was approved by the Australian TGA in 2012 for MS spasticity. Both medications are pharmaceutically standardised in terms of dosage, strength and purity, which crude cannabis products are not. A third pharmaceutical medicine which is high in CBD, Epidiolex, is currently being tested in the US and could be tested here under similar arrangements – CBD is the element within cannabis believed to be responsible for the relief of severe seizures in epilepsy-like syndromes for some sufferers. There is consequently no need to legalise crude cannabis grow-sites in Australia

### MARINOL legally used since mid-1990s

The following text is taken from page 32 of a paper in the NSW Parliamentary Library Research Service titled 'The Medical Use of Cannabis – Recent Developments' by Gareth Griffith and Marie Swain (1999) which accurately reflects the legal status of Marinol, a THC capsule developed more than 30 years ago in the United States:

**The use of dronabinol in Australia:** A 1997 paper commented that, while cannabis is not currently registered as a therapeutic agent in Australia, the synthetic cannabinoid, Marinol (the trade name under which dronabinol is marketed) is 'available to some 100 people in NSW and a register of prescribing doctors has been established through a **special access scheme**'. However, according to Dr Julian Gold, Director of the Albion St Clinic, Marinol is no longer used on a prescription basis in NSW, primarily because it proved too costly (around \$2,500 - \$3,000 per month).

### MARINOL still legal in 2014

In 2014 the advice from Australia's Therapeutic Goods Administration (TGA) regarding importation of online generic or brand Marinol medication is as follows:

Marinol (dronabinol) does not appear on the Australian Register of Therapeutic Goods (ARTG) and so is not available for supply in Australia.

Drug Free Australia  
**EVIDENCE**

---

Australian residents and visitors to Australia can legally import certain therapeutic goods for personal use under the personal import exemption which exists under the *Therapeutic Goods Act 1989* and its associated regulations. This exemption does not allow the personal importation of either substances or drugs prohibited by Customs legislation, or, injectable drugs that contain material of human or animal origin (except insulin), unless an import permit has been obtained.

Marinol (Dronabinol) (& indeed all cannabinoids) appears in Schedule 4 of the *Customs (Prohibited Imports) Regulations 1956*. Therefore, such substances cannot be imported without an import permit being issued beforehand.

Please note that an import permit is required prior to importing cannabinoids by post. For a permit to be issued:

1. An Australian registered medical practitioner will firstly need to obtain authority to prescribe this medication from the relevant State Health Department.
2. The Australian registered medical practitioner must then apply to the TGA for Special Access Scheme (SAS) approval to treat the patient with this medicine. The doctor must provide strong clinical justification for treating you with this product (over those medicines that are registered and available in Australia) as well as detailed evidence of it's (sic) efficacy and safety in regard to the disease being treated. SAS applications are assessed on a patient by patient basis to reflect the needs of different patients. The major criteria for determining whether approval should be given relate to the patient, the product and the prescriber, there is no guarantee of approval. Most medical practitioners in Australia are aware of the SAS and it's (sic) workings and I have attached a link to our website which explains the SAS:

<http://www.tga.gov.au/hp/access-sas.htm>

3. If the application is approved, a letter of approval will be forwarded to the doctor, which may then be used to apply for a permit to import. Permits for these medicines are issued by the Office of Chemical Safety ([tmu@health.gov.au](mailto:tmu@health.gov.au)):

<http://www.health.gov.au/internet/main/publishing.nsf/Content/application-forms-and-guidelines>

The permit must be presented to Australian Customs Service to import the medication into Australia. Please note that the import permit will be issued in your doctor's name. Please also note that a permit will only be issued if SAS approval is granted.

If you require further information on the subject of personal importation, may I direct you to our website. There is a TGA publication on bringing medicines into Australia which can be found at the following link:

<http://www.health.gov.au/tga/docs/html/bringmed/intoaust.htm>

## **SATIVEX TGA registered in 2012**

Sativex is a pharmaceutical whole-leaf extract of cannabis of standardised dose, strength and purity containing both THC and CBD. As a pharmaceutical-grade oral spray it is quick acting and importantly is clearly separated from the recreational use of cannabis, as well as avoiding some specific harms that come from smoking cannabis. From the Australian PBS website:

### **Nabiximols, oral spray, 10 mL (90 actuations of 100 microlitres), Sativex® - July 2013**

[PDF printable version of this page \(PDF 104 KB\)](#)

#### **Public Summary Document**

**Product:** Nabiximols, oral spray, 10 mL (90 actuations of 100 microlitres), Sativex®

**Sponsor:** Novartis Pharmaceuticals Australia Pty Ltd

**Date of PBAC Consideration:** July 2013

#### **1. Purpose of Application**

The submission sought an Authority required listing for the treatment of moderate to severe spasticity due to multiple sclerosis in a patient who is intolerant to anti-spasticity medication and/or has not adequately responded to anti-spasticity medication.

#### **3. Registration Status**

Nabiximols was TGA registered on 26 November 2012 as treatment for symptom improvement in patients with moderate to severe spasticity due to multiple sclerosis who have not responded adequately to other anti-spasticity medication and who demonstrate clinically significant improvement in spasticity related symptoms during an initial trial of therapy.

## **EPIDIOLEX being trialed by US FDA for severe epilepsy seizures**

Much publicity has been given to pediatric epilepsy syndromes where some, certainly not all, children respond positively to cannabis high in cannabidiol or CBD. GW Pharmaceuticals, who manufactures Sativex as described above, has developed Epidiolex, a pharmaceutical-quality formulation high in CBD. It is anticipated that Australia could make Epidiolex available to families of children with pediatric epilepsy syndromes on a similar basis as in the United States.

The GW Pharmaceuticals website describes FDA availability in the United States:

Epidiolex is GW's proprietary product candidate that contains a liquid formulation of highly purified plant-derived cannabidiol (CBD) as its active ingredient in development as a treatment for various orphan pediatric epilepsy syndromes. Epidiolex has been granted Orphan Drug Designation by the FDA in the treatment of Dravet and Lennox-Gastaut syndromes, each of which are severe infantile-onset, drug-resistant epilepsy syndromes. The FDA has granted expanded access INDs to several independent investigators in the U.S. to allow treatment of pediatric epilepsy patients with Epidiolex. These patients suffer from Dravet syndrome, Lennox-Gastaut, and other pediatric epilepsy syndromes.

## **Crude cannabis not medical**

Crude cannabis contains hundreds of chemicals and is an impure substance. After burning, as in smoking, the products of full and partial oxidation form thousands of

chemicals, many of them highly toxic and carcinogenic including similar tars, polycyclic hydrocarbons and aromatic amines as those found in tobacco smoke. No regulatory authority in the world (e.g. FDA in USA or TGA in Australia) acknowledges any smoked preparation as a valid form of dosing of any medicine. The term 'medical cannabis' is therefore in strictly medical terms a misnomer which has been strategically designed to confuse and mislead people as part of the clever public relations marketing campaign of the big cannabis industrial developers (by analogy with big tobacco interests), as have now developed in California, Colorado, Oregon, Washington state and elsewhere.

### **DFA gives qualified support to use of pharmaceutical cannabinoids**

With the availability of a variety of cannabinoids of pharmaceutical quality to Australians, there is clearly no need for legislators to consider the smoking of cannabis or use of other raw cannabis preparations, entailing grow-sites throughout Australia. Pharmaceutical treatments deriving from cannabis are clearly separated from the social use of cannabis, thereby avoiding the blurring of boundaries between medicine and recreational use of an illegal substance.

Despite the usefulness of pharmaceutical-quality cannabinoids, caution still needs to be expressed concerning the side-effect profiles and as yet not fully understood long-term effects of these medications. The use of cannabinoids for children with severe seizures from epilepsy has many unknowns, considering the effect of cannabis on adolescent brain development.



## CENTRAL ISSUES FOR AUSTRALIAN LEGISLATORS – 2

### Australia's Medical Establishment not Seeking 'Medical Marijuana'

6. It is not Australia's medical establishment that is asking for crude cannabis to be used here as medicine. The push for smoked marijuana by drug legalisation lobbyists who publicly support NSW media-showcase Dan Haslan's use of smoked cannabis for chemotherapy-induced nausea, militates against everything that calls itself 'medical'. The harms of smoking as a delivery system are self-evident – no medicine is ever smoked

Cannabinoids are not a first-line drug for any medical condition. Other legally available drugs are better for each of the few conditions which cannabinoids have been found to alleviate

Various medical treatments for cancer or other ailments can be prohibitively expensive for suffering Australians, and PBS subsidies make them available to those that need them. If it is argued that pharmaceutical cannabinoids are expensive, PBS subsidies should likewise be sought according to the same criteria as other needed treatments - if it can be demonstrated that significant numbers of Australians need and would use them

In the most extensive scientific review of 'medical marijuana' to date by the US Academies of Science's Institute of Medicine, 95% of 'medical marijuana' users in the US were previously recreational cannabis users. Many of the patients who are brought along to parliamentary inquiries, and who offer public testimony of the wonderful effects of cannabis are actually speaking from a background of pre-existing cannabis dependency and addiction, where cannabis alleviates many of the very conditions it itself causes, often as part of a well-documented withdrawal syndrome

### Medical Associations not supportive of smoked marijuana

Dr Saxon Smith, for the **Australian Medical Association** said, 'The AMA's position on medical marijuana is one of caution in the space of needing some more information about the benefits and negatives of it.'

<http://www.canberratimes.com.au/act-news/act-minister-shane-rattenbury-smokes-out-attitudes-to-medical-marijuana-20140724-zwdyo.html>

From the **Epilepsy Action Australia** [www.epilepsy.org.au](http://www.epilepsy.org.au)

Is it (marijuana) a useful antiepileptic medication?

Research into the effects of marijuana on seizure activity is inconclusive. Some animal models and some uncontrolled clinical human studies do suggest that marijuana has antiepileptic effects in humans but this may be specific to certain seizure types. Overall, there is insufficient clinical data to conclude if recreational or regular use of marijuana has any influence on seizures. As the data remains limited, and in some cases conflicting, caution is needed if using cannabis and cannabinoids to control seizures.

Marijuana use in Australia is not legal and therefore not recommended for use as an anti-epileptic agent.

Peak US organisations:

***the American Medical Association  
the American College of Physicians  
the American Nurses Association  
the American Cancer Society  
the American Glaucoma Foundation  
the National Multiple Sclerosis Society  
the American Academy of Pediatrics  
the American Society of Addiction Medicine***

all support the US FDA approval process and have expressed either opposition to or concern over the use of smoked marijuana as a therapeutic product.

## **Australia21 drug legalisation lobby backing smoked cannabis, not medicos**

Australia21, a drug legalisation lobby pushing for the legalisation of all currently illicit drugs, is pushing in NSW for smoked marijuana via the publicity of media-showcase cancer victim, Dan Haslan, and his use of smoked cannabis. Australia21 lobby group members, Mick Palmer and Alex Wodak, who back Dan Haslan's smoking of cannabis, neither condemn his smoking of the substance nor reflect that this cancer victim has had legal access to Marinol and Sativex on prescription under Special Access arrangements with the Australian TGA.

See for instance:

<http://www.dailytelegraph.com.au/news/tough-on-drugs-cop-allow-cannabis-for-the-ill/story-fni0cx4q-1226930222887>

Australia21 seeks to legalise all currently illicit drugs, as indicated in citations from their two publications in 2012 making questionable all of their pronouncements on the benefits of smoked cannabis:

The Australian group agreed with the Global Commission that the international and Australian prohibition of the use of certain "illicit" drugs has failed comprehensively. By

making the supply and use of certain drugs criminal acts, governments everywhere have driven their production and consumption underground and have fostered the development of a criminal industry that is corrupting civil society and governments and killing our children. By defining the personal use and possession of certain psychoactive drugs as criminal acts, governments have also avoided any responsibility to regulate and control the quality of substances that are in widespread use. Some of these illicit drugs have demonstrable health benefits. Many are highly addictive and harmful when used repeatedly. In that respect they are comparable to alcohol and nicotine, which are legal in Australia and, as a result, are under society's control for quality, distribution, marketing and taxation. <http://www.australia21.org.au/wp-content/uploads/2013/11/ASillicitDrugsR1.pdf> p 4

Many participants in both Australia21 Roundtables expressed strong support for a long-term policy of treating these currently illicit substances in the same way as we currently treat other pharmaceutically active agents. This involves mechanisms of regulated production, distribution, marketing and taxation but with different approaches used for different drugs. Under the international treaties, as they are currently interpreted, such a course of action may not be presently practicable, but it is likely to become so in the future. <http://www.australia21.org.au/wp-content/uploads/2012/09/Alternatives-to-Prohibition-Final.pdf> p 40

### **Almost every international review condemns smoking as a delivery system**

All 6 international reviews by medical authorities in the last 15 years have failed to back smoking as a delivery system for cannabinoids. Only the 1998 British House of Lords review, which relied heavily on questionable anecdotal evidence and not scientific studies, recommended smoked 'medical marijuana.'

The international reviews were:

- the Health Council of the Netherlands (1996)
- the American Medical Association House of Delegates (1997)
- the British Medical Association (1997)
- the US National Institute of Health (1997)
- the World Health Organization (1997)
- the British House of Lords (1998)
- the United States Institute of Medicine report (1999)

A summary of relevant conclusions from the five other medical reports were included in the Institute of Medicine's 1999 report, as is printed below. While all reports noted the benefits of clinical trials into possible medical uses for cannabinoids, only the British House of Lords report recommended loosely regulated use of smoked marijuana.

#### *Smoked Marijuana and Use of Plants as Medicine*

##### US Institute of Medicine

In deciding whether marijuana should be smoked as medicine, society must weigh the reality of this crude drug-delivery system against the benefits it might bestow. Chronic smoking of marijuana increases a person's chances

## EVIDENCE

---

of developing cancer, lung damage, and problems with pregnancies, including low birth weight. Therefore, it simply is not an acceptable long-term option. Smoking should be allowed only for short-term use among patients with debilitating symptoms, or who are terminally ill and do not respond well to approved medications.

Even in these cases, marijuana use should be limited to carefully controlled settings. Patients who are prescribed marijuana should be enrolled in short-term clinical trials that are approved by an oversight strategy such as institutional review boards, and involve only those patients most likely to benefit. They should be fully informed that they are experimental subjects and are using a harmful drug-delivery system, and their condition should be closely monitored and documented under medical supervision.

### Health Council of the Netherlands

The committee believes that physicians cannot accept responsibility for a product of unknown composition that has not been subjected to quality control.

### AMA House of Delegates

No specific recommendations made, but related issues are discussed in the general recommendation and drug development sections.

### British Medical Association

Prescription formulations of cannabinoids or substances acting on the cannabinoid receptors should not include either cigarettes or herbal preparations with unknown concentrations of cannabinoids or other chemicals.

### National Institutes of Health

Smoked marijuana should be held to standards equivalent to other medications for efficacy and safety considerations. There might be some patient populations for whom the inhalation route might offer advantages over the currently available capsule formulation. Smoking plant material poses difficulties in standardizing testing paradigms, and components of the smoke are hazardous, especially in the immunocompromised patient. Therefore, the experts generally favored the development of alternative dosage forms, including an inhaler dosage form into which a controlled unit dose of THC could be placed and volatilized.

### World Health Organization

Not discussed in the context of medical use, although many health hazards associated with chronic marijuana smoking are noted.

### *Drug Development*

#### Health Council of the Netherlands

Not discussed.

#### AMA House of Delegates

The National Institutes of Health should use its resources to support the development of a smoke-free inhaled delivery system for marijuana or THC to reduce the health hazards associated with the combustion and inhalation of marijuana.

#### British Medical Association

Pharmaceutical companies should undertake basic laboratory investigations and develop novel cannabinoid analogs that may lead to new clinical uses.

#### National Institutes of Health

NIH should use its resources and influence to rapidly develop a smoke-free inhaled delivery system for marijuana or THC. A recommendation was made for the development of insufflation/inhalation devices or dosage forms capable of delivering purer THC or cannabinoids to the lungs free of dangerous combustion byproducts.

#### World Health Organization

Not discussed.

### *Physiological Harms*

#### Health Council of the Netherlands

No recommendations made.

#### AMA House of Delegates

No recommendations made.

#### British Medical Association

Further research is needed to establish the suitability of cannabinoids for immunocompromised patients, such as those undergoing cancer chemotherapy or those with HIV/AIDS.

#### National Institutes of Health

Risks associated with smoked marijuana must be considered not only in terms of immediate adverse effects but also long-term effects in patients with

chronic diseases. The possibility that frequent and prolonged marijuana use might lead to clinically significant impairments of immune system function is great enough that relevant studies should be part of any marijuana medication development research.

Additional studies of long-term marijuana use are needed to determine if there are or are not important adverse pulmonary, central nervous system, or immune system problems.

#### World Health Organization

Further studies are needed on the fertility effects in cannabis users in view of the high rate of use during the early reproductive years. Further clinical and experimental research is required on the effects of cannabis on respiratory function and respiratory diseases. More studies are needed to show whether cannabis affects the risk of lung malignancies and at what level of use that may occur. In addition, more studies are needed to clarify the rather different results of pulmonary histopathological studies in animals and man.

More clinical and experimental research is needed on the effects of cannabis on immunological function. More clarity should be sought concerning the molecular mechanisms responsible for immune effects, including both cannabinoid receptor and non-receptor events.

The possibility that chronic cannabis use has adverse effects on the cardiovascular system should have a priority in epidemiological research.

Research on chronic and residual cannabis effects is also needed. The pharmacokinetics of chronic cannabis use in humans are poorly described, and this lack of knowledge restricts the ability of researchers to relate drug concentrations in blood or other fluids and observed effects.

### **Crude cannabis not possibly a medicine**

#### *Criteria for the acceptance of a drug for medical use:*

All active ingredients have to be identified and their chemistry determined. They have to be tested for purity with limits set for all impurities including pesticides, microbe & fungi and their products. These tests have to be validated and reproduced if necessary in an official laboratory.

The cannabis plant contains some 400 chemicals, a multiplicity of ingredients that vary with habitat – impossible to standardise and often contaminated with microbes, fungi or pesticides.<sup>2</sup>

Animal testing will include information on fertility, embryo toxicity, immuno-toxicity, mutagenic and carcinogenic potential. Risks to humans, especially pregnant women and lactating mothers, will be evaluated.

Cannabis has been shown to reduce sperm production.<sup>3</sup> Babies born to cannabis-using mothers are smaller, have learning and behavioural problems and are 10 times more likely to develop one form of leukaemia.<sup>4</sup> The immune system is impaired.<sup>5</sup> Smoking herbal cannabis results in the inhalation of four times as much tar as from a tobacco cigarette.<sup>6</sup>

Adequate safety and efficacy trials must be carried out. They must state the method of administration and report on the results from different groups, i.e. healthy volunteers, patients, special groups of the elderly, people with liver and kidney problems and pregnant women. Adverse drug reactions (ADR) have to be stated and include any effects on driving or operating machinery.

It is envisaged that cannabis would be smoked. No medicine prescribed today is smoked. Concentration, motor-co-ordination and memory are all badly affected.<sup>7</sup> Changes in the brain have been observed<sup>8</sup> and U.S.A. clinics are now coping with more cases of psychosis caused by cannabis than by any other drug.

It is essential to note that the content of THC (Tetrahydrocannabinol – the psychoactive ingredient in cannabis) is on average ten times higher than it was in the 1960s.<sup>9</sup> The fat-soluble THC lingers in the body for weeks<sup>10</sup> and the ability to drive safely is impaired for at least 24 hours after smoking cannabis.<sup>11</sup> Although ten times as many people use alcohol, cannabis is implicated in a similar number of road accidents.<sup>12</sup>

The drug must be accepted by qualified experts. Their detailed reports need to take account of all the relevant scientific literature and the potential of the drug to cause dependence.

There are numerous accounts of both psychological and physical dependencies in cannabis use.<sup>13</sup> Some 77,000 people are admitted annually to hospitals in U.S.A for cannabis dependence, 8,000 of them as emergencies.<sup>14</sup> To date there are over 12,000 scientific publications relating to cannabis.<sup>15</sup>

THC has already undergone all the medical tests. It is available on prescription in tablet form for the relief of nausea from chemotherapy and appetite stimulation in AIDS patients. However marinol (USA) and nabilone (UK), synthetic forms of THC and identical in action to it, are not the first drugs of choice among oncologists in Washington D.C. ranking only 9<sup>th</sup> in the treatment of mild nausea and 6<sup>th</sup> for more severe nausea.<sup>16</sup> The warning on nabilone reads:

"THC encourages both physical and psychological dependence and is highly abusable. It causes mood changes, loss of memory, psychoses, impairment of co-ordination and perception, and complicates pregnancy".

## Drug Free Australia

# EVIDENCE

---

Other Cannabinoids: Cannabis contains around 60 cannabinoids that are unique to the plant. Some of these could be similarly extracted, purified and tested for safety and efficacy. In the report "Therapeutic Uses Of Cannabis" (BMA, 1997) the British Medical Association said:

"It is considered here that cannabis is unsuitable for medical use. Such use should be confined to known dosages of pure or synthetic cannabinoids given singly or sometimes in combination."

(Text taken from "One Cannot Vote for a Medicine – National Drug Prevention Alliance – UK)

### REFERENCES

2. Jenike MA. Drug Abuse. In Rubenstein E, Federman DD (eds) *Scientific American Medicine*, Scientific American Inc. 1993.  
Therapeutic Uses of Cannabis, BMA, 1997.
3. Issidorides MR. Observations in chronic hashish users. In Nahas GG & Paton WDM (Eds). *Marijuana: Biological Effects &c.* 1979. Stephanis CN & Issidorides MR. Cellular effects of chronic cannabis use in man. In Nahas GG & Paton WDM (Eds), *Marijuana: Chemistry, Biochemistry and Cellular Effects.* 1976. Nahas GG & Paton WDM (Eds). *Marijuana: Biological Effects, Analysis, Metabolism, Cellular Responses, Reproduction and Brain.* Pergamon, NY, 1979.
4. Hingson R, Alpert JJ, Day N et al. Effects of maternal drinking and marijuana use on fetal growth and development. *Paediatrics.* 1982. Quas QH, Mariano E, Milman DH et al. Abnormalities in offspring associated with prenatal marijuana exposure. *Dev. Pharm. Thera.* 1985. Day NL, Richardson GA, Goldschmidt L et al. Effect of prenatal marijuana exposure on the cognitive development of offspring at age three. *Neurotox. Teratol.* 1994. Fried PA & Watkinson B. 36 and 48 month neurobehavioral follow up of children prenatally exposed to marijuana, cigarettes and alcohol. *Developmental & Behavioral Pediatrics*, 1990. Robison LL, Buchley JD, Daigle AE et al. Maternal drug use and risk of childhood non-lymphoblastic leukaemia among offspring: An epidemiological investigation implicating marijuana. *Cancer.* 1989. Ward NI et al. Elemental factors in human foetal development. *Jour. Nutrit. Med.* 1990.
5. Cabral GA. Marijuana decreases macrophage anti-viral and anti-tumour activities. *Advances in Biosciences*, 80. 1991. Cabral GA & Vasquez R. Delta-9-tetrahydrocannabinol suppresses macrophage extrinsic anti-herpes virus activity. *Proc. Exper. Biol. Med.* 1992. Cabral GA et al. *Proc. Soc. Exper. Med. Biol.* 1986. Gross G, Roussaki A, Ikenberg H & Drees N. Genital warts do not respond to systemic recombinant interferon alfa-2 treatment during cannabis consumption. *Dermatologia.* 1991. Leuchtenberger C. Effects of marijuana smoke on cellular biochemistry, utilising *in vitro* test systems. Adverse health and behavioural consequences of cannabis use. *Addiction Research Foundation Press.* Toronto, Canada. 1982. Morahan et al. Effects of cannabinoids on host resistance to *Listeria monocytogenes* and *Herpes simplex* virus. *Infect. Immunol.* 23. 1979. Munson & Fehr. Immunological effects of cannabis. Adverse health and behavioural consequences of cannabis use. *Addiction Research Foundation Press.* Toronto, Canada. 1982. Polen MR et al. Health care use by frequent marijuana smokers who do not use tobacco. *Western Jour. Med.* 158. 1993. Specter S, Lancz G, Djew J et al. *Advances in Exper. Med. Biol.* 1991. Zimmerman AM & Raj AY. Influences of cannabinoids on somatic cells *in vivo.* *Pharmacology* 21. 1980.
6. Therapeutic Uses of Cannabis, BMA, 1997. Broom JW et al. Respiratory effects of non-tobacco cigarettes. *BMJ*, 1987. Caplan GA, Brigham BA. Marijuana smoking and carcinoma of the tongue. *Cancer.* 1990. Donald PJ. Marijuana and upper respiratory tract malignancy in young patients. *Adv. Exp. Med. Biol.* 1991. Ferguson RP, Hasson J & Walker S. Metastatic lung cancer in a young marijuana smoker. *JAMA.* 1989. Marijuana and Health. *National Academy of Sciences, Institute of Medicine Report.* Washington DC. 1982. Marijuana Rescheduling Petition by NORML Denied by DEA. *Federal Register Vol. 54, No 249.* 29 Dec 1989. Polen MR et al. Health care use by frequent marijuana smokers who do not use tobacco. *Western Jour. Med.* 158. 1993. Schwartz RH. *American Journ. Dis. Child.* 143(6); p 644. 1989. Tashkin DP et al. Respiratory symptoms and lung function in habitual smokers of marijuana alone, smokers of marijuana and tobacco, smokers of tobacco alone and non-smokers. *American Review of Respiratory Diseases.* 1987. Tashkin DP et al. Longitudinal changes in respiratory systems and lung function in non-smokers, tobacco smokers and heavy habitual smokers of marijuana with or without tobacco. An International Research Report. *Proceedings of the Melbourne Symposium on Cannabis*, September 1987 (see also *Amer. Review of Respiratory Diseases*, 1987). Taylor FM. Marijuana as a potential respiratory tract carcinogen: A retrospective analysis of a community hospital population. *Southern Med. Jour.* 1988. Tennant FS, Guerry RL & Henderson RL. Histopathological & clinical



## Drug Free Australia EVIDENCE

---

- abnormalities of the respiratory system in chronic hashish smokers. *Subst. Alcohol Actions Misuse*. 1980 Wengen DF. Marijuana and malignant tumours of the upper aerodigestive tract in young patients: On the risk assessment of marijuana. *Laryngorhinotologie*. 1993.
7. Polen MR et al. Health care use by frequent marijuana smokers who do not use tobacco. *Western Jour. Med.* 158. 1993. Schwartz RH. Persistent impairment of short-term memory associated with heavy marijuana use. *Committees of Correspondence – Drug Prevention Newsletter*. June 1990. Solowij N, Michie PT & Fox AM. Differential impairments of selective attention due to frequency and duration of Cannabis use. *Biol. Psychiatry*. 1995. Solowij N. Do cognitive impairments recover following cessation of Cannabis use? *Life Sciences* Vol. 56. 1995. Varma VK, Malhotra AK, Dang R, et al. Cannabis and cognitive functions: a prospective study. *Drug Alcohol Depend.* 1988.
  8. Devane WA et al. Isolation and structure of a brain constituent that binds to the cannabinoid receptor. *Science*. 1992. Lex BW, Griffin ML, et al. Alcohol, marijuana and mood status in young women. *International Journal of the Addictions*. 1989. Mathew RJ. Middle cerebral artery velocity during upright posture after marijuana smoking. *Acta Psych. Scand.* 1992. Nahas GG. Historical outlook of the psychopathology of Cannabis. In *Cannabis: Physiopathology, Epidemiology, Detection*. CRC Press, 1993. Nahas G & Latour C. The human toxicity of marijuana. *The Medical Journal of Australia*. 1992.
  9. Information supplied by the US Drug Enforcement Agency (DEA).
  10. Therapeutic Uses of Cannabis, BMA, 1997. See also ref. 6.
  11. Leirer VO & Yesavage JA. Marijuana carry-over effects on aircraft pilot performance. *Aviation Space & Environmental Medicine*. 1991.
  12. Soderstrom CA, Triffillis AL et al. Marijuana and alcohol use among 1023 trauma patients: A prospective study. *Arch. Surg.* Vol.123, June. 1988.
  13. Information supplied on the use of MARINOL by Roxane Laboratories Inc., 1989 revision. Aceto MD et al. Cannabinoid-precipitated withdrawal by a selective antagonist SR141716A. *European Journal of Pharmacology*. 1995. Adams IB and Martin BR. Cannabis: Pharmacology and Toxicology in Animals and Humans. *Journal of Addiction*. Vol. 91. 1996. Anthony JC and Helger JE. Syndromes of drug abuse and dependence. In Roberts and Regine (Eds) *Psychiatric Disorders in America*. New York Free Press – Macmillan. 1991. Compton DR, Dewey WL & Martin BR. Cannabis dependence and tolerance production. *Advances in Alcohol & Substance Abuse*. 1990. Compton DR et al. Cannabinoid structure-activity relationships: correlation of receptor binding and *in vivo* activities. *Journal of Pharmacology and Experimental Therapeutics*. 1993 De Fonseca FR, Carrera MRA et al. Activation of corticotropin-releasing factor in the limbic system during cannabinoid withdrawal. *Science*. 1997. Devane WA et al. Determination and characterisation of a cannabinoid receptor in rat brain. *Molecular Pharmacology*. 1988 Devane WA et al. Isolation and structure of a brain constituent that binds to the cannabinoid receptor. *Science*. 1992. Gold MS. *Marijuana*. Plenum Medical Book Company, New York. 1989. Howlett AC et al. The cannabinoid receptor: biochemical, anatomical and behavioural characterisation. *Trends in Neuroscience*. 1990. Jones. Cannabis tolerance and dependence. In Fehr KO and Kalant H (Eds) *Adverse Health and Behavioural Consequences of Cannabis Use*. Addiction Research Foundation, Toronto. 1982. Kaplan HB, Martin SS et al. Escalation of marijuana use: Application of a general theory of deviant behaviour. *Jour. Health & Social Behaviour*. 1986. Kaufman E et al. Committee on Drug Abuse of the Council on Psychiatric Services. Position Statement on psychoactive substance use and dependence: update on marijuana and cocaine. *American Journal of Psychiatry*. 1987. Miller NS and Gold MS. The diagnosis of marijuana (cannabis) dependence. *Jour. Subst. Abuse Treatment*. 1989. Miller NS, Gold MS & Pottash AC. A 12-step treatment approach for marijuana (cannabis) dependence. *Jour. Substance Abuse Treatment*. 1989. National Drug & Alcohol Research Centre of Australia Report. August 1997. Poulton et al. *New Zealand Medical Journal*. Vol.110. 1997. Schuster CR. Alaskans for Drug-free Youth Newsletter. Winter, 1993/94. Schwartz RH. Marijuana: an overview. *Pediatric Clinics of North America*. 1987. Tanda G, Pontieri FE & Di Chiara G. Cannabinoid and heroin activation of mesolimbic dopamine transmission by a common  $\mu_1$  opioid receptor mechanism. *Science*. 1997. Tson et al. Physical withdrawal in rats tolerant to delta-9-THC precipitated by a cannabinoid receptor antagonist. *European Journal of Pharmacology*. 1995.
  14. Hart RH. *Bitter Grass*. Mentor Press, Kansas, USA.
  15. Mississippi University Library.
  16. Bonner R. Marijuana Rescheduling Petitions 57. Federal Register 1992, 10499-10508.

### **‘Medical Cannabis’ – only a handful of demonstrated medical uses**

Many of the claims made for cannabis regarding medical use have evaporated under the scrutiny of clinical trials.

Cannabis has some effect on:

**Nausea and vomiting** - with cancer chemotherapy can generally be controlled adequately with current methods. The drugs most commonly used and often effective are prochlorperazine and metaclopramide. Chief amongst the newer agents is the 5HT<sub>3</sub> antagonists such as ondansetron, tropisetron and dolasetron, some of which can also be given as a sub-lingual wafer or by subcutaneous, intramuscular, or intravenous injection if needed so that vomiting itself does not preclude their administration. Similarly prochlorperazine can be given by suppository. These medications can all be given by many routes of administration. Other medications can also be used including steroids where required.

**Chronic pain** - pain clinics have numerous ingenious ways to control pain. Pain can also be induced by cannabis withdrawal, and cannabis use itself has been shown to be linked with chronic back pain, so beware the pain presenting in the cannabis addicted patient / advocate. Nevertheless many patients are left in difficult situations by their chronic non-cancer pain. This is an active area of research internationally, and one to which Australian researchers, particularly at the University of Adelaide, are making major contributions. The recent demonstration that inflammatory activity in the brain and nerves is associated with pain generation and pain perceptual mechanisms has opened major investigative pathways for the development of several exciting new agents. This is a project upon which some of the top medicinal chemists in the world are actively engaged, some of whom work intramurally at the NIH and NIDA<sup>1</sup> itself.

**AIDS wasting** – as noted by Australia21 representative, Alex Wodak in a paper sent to Parliamentarians in July 2014, this indication is disappearing due to the efficacy of the newer treatments for AIDS.

**MS** - there are other treatments for MS stiffness. In particular recent advances in immunology have meant that the treatment of MS itself has dramatically improved in recent times with several newer options including teriflunomide, dimethyl fumarate, fingolimod and dalfampridine. Benzodiazepines, Lioresal, several anticonvulsants and local Botox can all find application when spasm is a problem.

### **. . . and a confounding issue - it alleviates its own withdrawal symptoms**

Cannabis has a well-recognized withdrawal syndrome associated with it, which can be experienced by up to 50% of people who are exposed to it on a daily basis, particularly when that exposure occurs in adolescence.<sup>1</sup> Oft-cited maladies treated by cannabis are pain, muscle spasm, agitation, fits, convulsions and rheumatics all of which are recognized presentations of cannabis withdrawal.<sup>2</sup>

Cannabis dependence and withdrawal is a well described medical condition acknowledged both in DSM-IV and DSM-V<sup>3</sup> of the APA<sup>4</sup>. Administration of cannabis to patients in such states will produce a short term relief of symptoms, albeit with an exacerbation of its many long term toxic effects, oncogenicity, and gateway effects in other drug use, and likely damage to adolescent brain development.<sup>1-2</sup> There is no

---

<sup>1</sup> National Institute of Drug Abuse

<sup>2</sup> See Epilepsy Action Australia - <http://www.epilepsy.org.au/living-with-epilepsy/lifestyle-issues/alcohol-and-drugs>

<sup>3</sup> Diagnostic and Statistical Manual IV and V respectively.

<sup>4</sup> American Psychiatric Association

intention in making this point to be humorous - **this is very important because it is clear that many of the patients who are brought along to parliamentary inquiries, and who offer public testimony of the wonderful effects of cannabis are actually speaking from a background of pre-existing cannabis dependency and addiction.** Legislators need to keep this key issue always in the forefront of their minds. As correctly identified by the US National Institute on Drug Abuse President Dr Volkow, who has written the leading article in the New England Journal of Medicine on June 4th 2014, cannabis can cause many illnesses, so the claim that cannabis relieves a pain in whose aetiology cannabis was implicated must be viewed with substantial circumspection by those charged with responsible decision making in our community. Legislators should note that these disorders include chronic back pain<sup>5</sup>.

### **Side-effects limit its usefulness**

Clinical reports of cannabis for medical use, as can be seen by the following tables from the IOM review, cite a very high rate of unacceptable side effects, which frequently precludes its clinical application. Such very elevated rates of discontinuation (often around 30-50%) of cannabis-based treatments are rare with other treatments in the conditions under discussion.

The risks of mental side effects from cannabis are not distant and remote as some supporters claim. Cannabis intoxication, dependence and tolerance in patients exposed to high levels of it – albeit for therapeutic purposes - are common, and entail anxiety, paranoia, forgetfulness and depression, and at times psychotic disturbances and hallucinations as being not unusual.

### **Tables of all scientific studies on ‘medical cannabis’ from the extensive IOM review**

Below are tables of every rigorous scientific study on ‘medical cannabis’ listed in the 1999 Institute of Medicine review. We note that the only studies since the Institute of Medicine review which modify their conclusions, clearly printed at the end of the table for each medical indication, are in the area of MS spasticity where cannabis has been found to have some effectiveness.

Following the establishment of the Center for Medicinal Cannabis Research (CMCR) at the University of California in 1999, the number of research projects on smoked cannabis has increased. Several clinical studies have been published on neuropathic pain and experimentally induced pain. In general the results show a modest analgesic effect of smoked cannabis over placebo, the same findings as in the 1999 IOM review.

It is important to note that most of the subjects in these studies were cannabis experienced, so the results may not be able to be extrapolated to cannabis naïve

---

<sup>5</sup> See Active Ingredients In Marijuana Found To Spread And Prolong Pain - <http://www.sciencedaily.com/releases/2009/08/090813170848.htm>

## EVIDENCE

---

patients. Moreover, because the subjects were cannabis-experienced, it is likely that blinding was compromised and hence the findings should be interpreted with this in mind.

We further note that many of these older cannabis studies were done when the THC concentration of cannabis was 3%. So the studies which found no ill effects in the 1970's - 1990's are likely out of date at this time. Dr Volkow from NIDA has noted that THC concentrations of cannabis are now reported in the USA commonly at 12%. Indeed one cannabis shop is said to be opening in Colorado reporting a choice for patrons from 17% - 20% THC in its product.

## PAIN RELIEF

### Experimentally Induced Acute Pain

Study	Cannabinoid	Trial Type	Testing modality	Delivery system	Result	Study design	Side Effects
Clark WC, Janal MN, Zeidenberg P, Nahas GG. 1981. Effects of moderate and high doses of marihuana on thermal pain: A sensory decision theory analysis. <i>Journal of Clinical Pharmacology</i> 21:299S—310S.	THC		Thermal pain		Unsuccessful - <i>increase</i> in pain sensitivity		
Hill SY, Schwin R, Goodwin DW, Powell BJ. 1974. Marihuana and pain. <i>Journal of Pharmacology and Experimental Therapeutics</i> 188:415—418.	THC		Electrical stimulation		Unsuccessful - <i>increase</i> in pain sensitivity		
Libman E, Stern MH. 1985. The effects of delta-9-tetrahydrocannabinol	THC		Tourniquet pain		Unsuccessful - <i>increase</i> in pain sensitivity		

Drug Free Australia  
**EVIDENCE**

on cutaneous sensitivity and its relation to personality. <i>Personality, Individuality and Difference</i> 6:169—174							
Raft D, Gregg J, Ghia J, Harris L. 1977. Effects of intravenous tetrahydrocannabinol on experimental and surgical pain: Psychological correlates of the analgesic response. <i>Clinical Pharmacology and Therapeutics</i> 21:26—33.	Tetrahydrocannabinol		surgical pain – tooth extraction		Unsuccessful - no analgesic effect	Poor - study suffered from several serious limitations: the tooth extraction included treatment with the local anesthetic lidocaine, the pain during the procedure was assessed 24 hours later, and there was no positive control. Levonantradol (a synthetic THC analogue) was tested in 56 patients who had moderate to severe postoperative or trauma pain. They were given intramuscular injections of levonantradol or placebo 24 hours after surgery. To control for previous drug exposure, patients with a history of drug abuse or addiction and those who received an analgesic, antiinflammatory, tranquilizer, sedative, or anesthetic agent within 24 hours of the test drug were excluded from the study. On average, pain relief was significantly greater in the levonantradol-treated patients than in the placebo-treated patients. Because the authors did not report the number or percentage of people who responded, it is not clear whether the average represents consistent pain relief in all levonantradol-treated patients	

Drug Free Australia  
**EVIDENCE**

						or whether some people experienced great relief and a few experienced none.	
<i>Animal studies - There is available data from animal studies indicate that cannabinoids could be useful analgesics. In general, cannabinoids seem to be mild to moderate analgesics. Opiates, such as morphine and codeine, are the most widely used drugs for the treatment of acute pain, but they are not consistently effective in chronic pain; they often induce nausea and sedation, and tolerance occurs in some patients. Recent research has made it clear that CB<sub>1</sub> receptor agonists act on pathways that partially overlap with those activated by opioids but through pharmacologically distinct mechanisms. Therefore, they would probably have a different side effect profile and perhaps additive or synergistic analgesic efficacy.</i>							

## Chronic Pain

Study	Cannabinoid	Trial Type	Testing modality	Delivery system	Result	Study design	Side Effects
Noyes Jr R, Brunk SF, Baram DA, Canter A. 1975a. Analgesic effect of delta-9-tetrahydrocannabinol. <i>Journal of Clinical Pharmacology</i> 15:139—143.	Oral doses of THC in pill form – 5mg, 10 mg, 15 mg, 20 mg	double-blind, placebo-controlled study of 10 subjects measuring both pain intensity and pain relief	Cancer pain	Oral pill	Successful - The 15- and 20-mg doses of THC produced significant analgesia. There were no reports of nausea or vomiting. At least half the patients reported increased appetite. Side effects should however be noted for these higher doses.	there were no positive controls--that is, other analgesics that could provide a better measure of the degree of analgesia produced by THC.	With a 20-mg dose of THC, patients were heavily sedated and exhibited "depersonalization," characterized by a state of dreamy immobility, a sense of unreality, and disconnected thoughts. Five of 36 patients exhibited adverse reactions (extreme anxiety) and were eliminated from the study. Only one patient experienced this effect at the 10-mg dose of THC.
Noyes R, Jr, Brunk SF, Avery DH, Canter A. 1975b.		single-dose study		Oral pill	Successful - the analgesic effect of 10 mg of THC was equivalent to that of 60 mg		Similar to study above, though THC was more sedating than codeine.

Drug Free Australia  
**EVIDENCE**

<p>The analgesic properties of delta-9-tetrahydrocannabinol and codeine.</p> <p><i>Clinical Pharmacology and Therapeutics</i> 18:84—89</p>					<p>of codeine; the effect of 20 mg of THC was equivalent to that of 120 mg of codeine. (Note that codeine is a relatively weak analgesic.)</p> <p>In a separate publication the same authors published data indicating that patients had improved mood, a sense of well-being, and less anxiety.</p>		
<p>Staquet M, Gantt C, Machin D. 1978. Effect of a nitrogen analog of tetrahydrocannabinol on cancer pain.</p> <p><i>Clinical Pharmacology and Therapeutics</i> 23:397—401.</p>	<p>Nitrogen analogue of THC</p>		<p>Two trials: one compared this analogue with codeine in 30 patients, and a second compared it with placebo or secobarbital, a short-acting barbiturate.</p>		<p>Successful- for mild, moderate, and severe pain, the THC analogue was equivalent to 50 mg of codeine and superior to placebo and to 50 mg of secobarbital.</p>		
<p>Holdcroft A <i>et al.</i> Pain relief with oral cannabinoids in familial Mediterranean fever. <i>Anaesthesia</i>, 1997, 52, 483</p>	<p>Cannabis oil capsules, standardised for THC content</p>	<p>placebo-controlled trial of cannabis</p>	<p>A patient with severe chronic pain of gastrointestinal origin (diagnosed as familial Mediterranean fever)</p>		<p>Provisional success due to being a single patient study - the patient's demand for morphine was substantially lower during treatment with cannabis than during a period of placebo treatment</p>	<p>Single patient study</p>	



## Migraine headaches

Study	Cannabinoid	Trial Type	Testing modality	Delivery system	Result	Study design	Side Effects
El-Mallakh RS. 1987. Marijuana and migraine. <i>Headache</i> 27:442—443.	THC			Smoked	Unsuccessful - it presents three cases of cessation of daily marijuana smoking followed by migraine attacks--not convincing evidence that marijuana relieves migraine headaches.		

## SUMMARY – PAIN RELIEF

1. There is not yet enough evidence from human studies.
2. There is solid evidence from preclinical research that cannabinoids reduce pain in animals.
3. There is no evidence that marijuana or cannabinoids relieve migraine headaches.
4. Research should be done to learn:
  - a) if cannabinoids can enhance the pain-relieving effects of opiate drugs
  - b) which cannabinoids might be useful pain medications.

## NAUSEA AND VOMITING (emesis)

Note: Many of the reported clinical experiences with cannabinoids are not based on definitive experimental methods.

Study	Cannabinoid	Trial Type	Testing modality	Delivery system	Result	Study design	Side Effects
Chang AE, Shiling DJ, Stillman RC, et al. 1979. Delta-9-tetrahydrocannabinol as an antiemetic in patients receiving high-dose methotrexate: A prospective, randomized evaluation. <i>Annals of Internal Medicine</i> 91:819—824.	THC		patients receiving methotrexate		Limited Success - THC was found to be superior to a placebo in patients receiving methotrexate, <b>an agent that is not a strong emetic.</b> However this study is moderated by the following study.	Small number of patients	
Chang AE, Shiling DJ, Stillman RC, Goldberg NH, Seipp CA, Barofsky I, Rosenberg SA. 1981. A prospective evaluation of delta-9-tetrahydrocannabinol as an antiemetic in patients receiving adriamycin and	THC		patients who were receiving a chemotherapeutic drug that is more likely to cause emesis than anthrax-cycline		Unsuccessful - the antiemetic effect was poor.	Small number of patients	

Drug Free Australia  
**EVIDENCE**

cytoxan chemotherapy. <i>Cancer</i> 47:1746—1751.							
Orr LE, McKernan JF, Bloome B. 1980. Antiemetic effect of tetrahydrocannabinol. Compared with placebo and prochlorperazine in chemotherapy-associated nausea and emesis. <i>Archives of Internal Medicine</i> 140:1431—1433.	THC		Comparison between THC and Compazine (prochlorperazine – which in the 80’s was one of the more effective anti-emetics		Very limited success - THC and prochlorperazine given orally showed similar degrees of efficacy. Even when administered in combination, THC and prochlorperazine failed to stop vomiting in two-thirds of patients.	These studies often used various chemotherapeutic agents.	
SE, Cronin CM, Zelen M, et al. 1980. Antiemetics in patients receiving chemotherapy for cancer: A randomized comparison of delta-9-tetrahydrocannabinol and prochlorperazine. <i>New England Journal of Medicine</i> 302:135—138.	THC		Comparison between THC and Compazine (prochlorperazine – which in the 80’s was one of the more effective anti-emetics		Very limited success - THC and prochlorperazine given orally showed similar degrees of efficacy. Even when administered in combination, THC and prochlorperazine failed to stop vomiting in two-thirds of patients.	These studies often used various chemotherapeutic agents.	

Drug Free Australia  
**EVIDENCE**

Gralla RJ, Tyson LB, Borden LB, et al. 1984. Antiemetic therapy: A review of recent studies and a report of a random assignment trial comparing metoclopramide with delta-9-tetrahydrocannabinol. <i>Cancer Treatment Reports</i> 68:163—172.	THC	carefully controlled double-blind study	Comparison between THC and antiemetic drug metoclopramide		Unsuccessful - complete control of emesis occurred in 47% of those treated with metoclopramide and 13% of those treated with THC. Major control (two or fewer episodes) occurred in 73% of the patients given metoclopramide compared to 27% of those given THC.	No patient had previously received chemotherapy therefore anticipatory emesis was not a factor. All patients received the same dose of cisplatin and were randomly assigned to the THC group or the metoclopramide group.	
Steele N, Gralla RJ, Braun Jr DW. 1980. Double-blind comparison of the antiemetic effects of nabilone and prochlorperazine on chemotherapy-induced emesis. <i>Cancer Treatments Report</i> 64:219—224.	Synthetic THC – nabilone and levonantradol		Comparison of the antiemetic effects of nabilone and prochlorperazine on chemotherapy-induced emesis.		Very limited success - efficacy was observed in several trials, but no advantage emerged for these agents. Nabilone and levonantradol reduced emesis but not as well as other available agents in moderately to highly emetogenic settings.		
Tyson LB, Gralla RJ, Clark RA, et al. 1985. Phase I trial of levonantradol in chemotherapy-induced emesis. <i>American Journal of</i>	Synthetic THC – levonantradol		Trial of levonantradol in chemotherapy-induced emesis.		Very limited success - efficacy was observed in several trials, but no advantage emerged for these agents. Nabilone and levonantradol reduced emesis but not as well as		

Drug Free Australia  
**EVIDENCE**

<i>Clinical Oncology</i> 8:528—532.					other available agents in moderately to highly emetogenic settings.		
--	--	--	--	--	---	--	--

## Chemotherapy-Induced Nausea

Note: Although many marijuana users have claimed that smoked marijuana is a more effective antiemetic than oral THC, no controlled studies have yet been published that analyse this in sufficient detail to estimate the extent to which this is the case.

Study	Cannabinoid	Trial Type	Testing modality	Delivery system	Result	Study design	Side Effects
Vinciguerra V, Moore T, Brennan E. 1988. Inhalation marijuana as an antiemetic for cancer chemotherapy. <i>New York State Journal of Medicine</i> 88:525—527.	Smoked marijuana	Open trial on 56 cancer patients who were unresponsive to conventional antiemetic agents	patients asked to rate the effectiveness of marijuana compared with results during prior chemotherapy cycles	Smoked	Moderately successful - 34% of patients rated marijuana as moderately or highly effective	The study's relative value was difficult to determine because no control group was used and the patients varied with respect to previous experiences, such as marijuana use and THC therapy. Did not report data on the time course of antiemetic control, possible advantages of self-titration with the smoked marijuana, or the degree to which patients were able to swallow the pills. Patients with severe vomiting would have	Inability of nearly one-fourth of the patients to tolerate the administration of marijuana by smoking

Drug Free Australia  
**EVIDENCE**

						been unlikely to be able to swallow or keep the pills down long enough for them to take effect	
Levitt M, Faiman C, Hawks R, et al. 1984. Randomized double-blind comparison of delta-9-THC and marijuana as chemotherapy antiemetics. <i>Proceedings of the American Society for Clinical Oncology</i> 3:91.	Smoked marijuana/ THC in pill form	double-blind, cross-over, placebo-controlled	study comparing smoked marijuana with THC in pill form in 20 patients who were receiving various chemotherapeutic drugs.	Smoked/THC pill	Limited success - only 25% of patients achieved complete control of emesis; 35% of the patients indicated a slight preference for the THC pills over marijuana, 20% preferred marijuana, and 45% expressed no preference	Did not report data on the time course of antiemetic control, possible advantages of self-titration with the smoked marijuana, or the degree to which patients were able to swallow the pills. Patients with severe vomiting would have been unlikely to be able to swallow or keep the pills down long enough for them to take effect	

## SUMMARY – RELIEVING NAUSEA AND VOMITING

1. Neither smoked marijuana nor cannabinoids are as effective as current medicines that stop nausea and vomiting in cancer chemotherapy patients.
2. Cannabinoids, however, might be effective in:
  - a) those few patients who respond poorly to current antiemetic (anti-nausea) drugs
  - b) or more effective in combination with current antiemetics.

3. Research should be pursued for patients who do not respond completely to current antiemetics.
4. A safe (non-smoking) delivery system for cannabinoids should be developed.
5. Until then, the harmful effects of smoking marijuana for a limited period of time may be outweighed by marijuana 's antiemetic benefits for those few cancer patients for whom current antiemetics do not work.
6. Doctors should evaluate such patients on a case by case basis and provide marijuana to them under close medical supervision for a limited period.

## WASTING SYNDROME & APPETITE STIMULATION

### Malnutrition

Note: A major concern with marijuana smoking in HIV-infected patients is that they might be more vulnerable than other marijuana users to immunosuppressive effects of marijuana or to the exposure of infectious organisms associated marijuana plant material.

Study	Cannabinoid	Trial Type	Testing modality	Delivery system	Result	Study design	Side Effects
<p>Beal JE, Olson RLL, Morales JO, Bellman P, Yangco B, Lefkowitz L, Plasse TF, Shepard KV. 1995. Dronabinol as a treatment for anorexia associated with weight loss in patients with AIDS. <i>Journal of Pain and Symptom Management</i> 10:89—97.</p> <p>Beal JE, Olson R, Lefkowitz L, Laubenstein L, Bellman P, Yangco B, Morales JO, Murphy R, Powderly W, Plasse</p>	Synthetic THC - Dronabinol (Marinol)	Short-term (six-week) and long-term (one-year) therapy		pill	Moderate success - associated with an increase in appetite and stable weight, and in a previous short-term (five-week) clinical trial in five patients, dronabinol was shown to increase body fat by 1%. However, megestrol acetate (Megace) is a synthetic derivative of progesterone that can stimulate appetite and cause substantial weight gain when given in high doses (320—640 mg/day) to AIDS patients. Megestrol acetate is more effective than dronabinol in stimulating weight gain, and dronabinol has no additive effect when used in combination with megestrol acetate		<p>HIV/AIDS patients are the largest group of patients who use dronabinol. However, some reject it because of the intensity of neuropsychological effects, an inability to titrate the oral dose easily, and the delayed onset and prolonged duration of its action.</p> <p>Dizziness and lethargy reported</p>



Drug Free Australia  
**EVIDENCE**

TF, Mosdell KW, Shepard KV. 1997. Long-term efficacy and safety of dronabinol for acquired immunodeficiency syndrome-associated anorexia. <i>Journal of Pain and Symptom Management</i> 14:7—14.							
Struwe M, Kaempfer SH, Geiger CJ, Pavia AT, Plasse TF, Shepard KV, Ries K, Evans TG. 1993. Effect of dronabinol on nutritional status in HIV infection. <i>Annals of Pharmacotherapy</i> 27:827—831.							

## Malnutrition – Cancer Patients

Study	Cannabinoid	Trial Type	Testing modality	Delivery system	Result	Study design	Side Effects
Gorter R. 1991. Management of anorexia-cachexia associated with	Synthetic THC – Dronabinol (Marinol)			pill	Successful - has been shown to improve appetite and promote weight gain		Cannabinoids have also been shown to negatively affect the immune system and

Drug Free Australia  
**EVIDENCE**

cancer and HIV infection. <i>Oncology (Supplement)</i> 5:13—17.							this could be contraindicated in some cancer patients (both the chemotherapy and the cancer can be immunosuppressive). Dizziness and lethargy also reported
---	--	--	--	--	--	--	---

## Anorexia Nervosa

Study	Cannabinoid	Trial Type	Testing modality	Delivery system	Result	Study design	Side Effects
Gross H, Egbert MH, Faden VB, Godberg SC, Kaye WH, Caine ED, Hawks R, Zinberg NE. 1983. A double-blind trial of delta-9-THC in primary anorexia nervosa. <i>Journal of Clinical Psychopharmacology</i> 3:165—171.	THC				Unsuccessful		Caused severe dysphoric reactions in three of 11 patients. Furthermore, such patients might have underlying psychiatric disorders, such as schizophrenia and depression, in which cannabinoids might be hazardous

## SUMMARY – MALNUTRITION AND WASTING SYNDROME

1. No published research shows marijuana or cannabinoids are effective in treating malnutrition or wasting in AIDS patients.
2. A standard drug is more effective than THC in stimulating appetite in AIDS patients.

3. Cannabinoids modulate the immune system, which could be a problem in patients whose immune system is already compromised.
4. A major concern is that HIV-infected patients who smoke marijuana may be more vulnerable to the immunosuppressive effects of marijuana or to infectious organisms found in the plant material.
5. Cannabinoids, in combination with other drugs, might help increase appetite, help reduce nausea and vomiting caused by protease inhibitors, and help reduce the pain and anxiety associated with AIDS and cancer in late stages of these diseases.
6. There are medications that are more effective than marijuana for treating the nausea, appetite loss, pain, and anxiety associated with wasting, but these drugs are not equally effective for all patients.
7. A rapid onset form of THC should be developed and tested for these patients.
8. Smoking marijuana is not recommended. The long-term harms from smoking make it a poor delivery system for patients with chronic diseases.
9. For terminally ill patients who get relief from no other drugs, the medical benefits of smoking marijuana may outweigh the harms.
10. THC is ineffective in treating anorexia.

## NEUROLOGICAL DISORDERS

### Muscle Spasticity – Multiple Sclerosis

Study	Cannabinoid	Trial Type	Testing modality	Delivery system	Result	Study design	Side Effects
Greenberg HS, Werness SA, Pugh JE, Andrus RO, Anderson DJ, Domino EF. 1994. Short-term effects of smoking marijuana on balance in patients with multiple sclerosis and normal volunteers. <i>Clinical Pharmacology and Therapeutics</i> 55:324—328.	Smoked marijuana	double-blind placebo-controlled	study of postural responses in 10 MS patients and 10 healthy volunteers	Smoked	Unsuccessful - marijuana smoking impaired posture and balance in both MS patients and the volunteers.	Survey data do not measure the degree of placebo effect, estimated to be as great as 30 percent in pain treatments. Furthermore, surveys do not separate the effects of marijuana or cannabinoids on mood and anxiety from the effects on spasticity.	The 10 MS patients felt that they were clinically improved. The subjective improvement, while intriguing, does not constitute unequivocal evidence that marijuana relieves spasticity
Clifford DB. 1983. Tetrahydrocannabinol for tremor in multiple sclerosis. <i>Annals of Neurology</i> 13:669—671.  Petro D, Ellenberger Jr C. 1981. Treatment of human spasticity with delta 9-	THC	3 open clinical trials testing a total of 30 patients			Successful - spasticity was less severe after the THC treatment	Based on patient report or clinical exam by the investigator	THC was not effective in all patients and frequently caused unpleasant side effects

Drug Free Australia  
**EVIDENCE**

<p>tetrahydrocannabinol 1. <i>Journal of Clinical Pharmacology</i> 21:413S—416S.</p> <p>Ungerleider JT, Andrysiak TA, Fairbanks L, Ellison GW, Myers LW. 1987. Delta-9-THC in the treatment of spasticity associated with multiple sclerosis. <i>Advances in Alcohol and Substance Abuse</i> 7:39—50.</p>							
<p>CN, Illis LS, Thom J. 1995. Nabilone in the treatment of multiple sclerosis [Letter]. <i>Lancet</i> 345:579.</p>	Nabilone				Successful - spasticity was also reported to be less severe		
<p><i>Animal studies - There are no supporting animal data to encourage clinical research in this area, but there also are no good animal models of the spasticity of MS. However, in an MS like disease in mice (experimental autoimmune encephalomyelitis), low doses of cannabinoids alleviate the muscle tremor seen in such animals. Cannabinoids also suppress spinal cord reflexes in animals. Basic animal studies have shown that cannabinoid receptors are particularly abundant in areas of the brain that control movement and that cannabinoids affect movement and posture in animals as well as humans. The observations are consistent with the possibility that cannabinoids have antispastic effects, but they do not offer any direct evidence that cannabinoids affect spasticity, even in animals.</i></p>							

## SUMMARY – MUSCLE SPASTICITY

1. There is little research evidence to support claims that marijuana reduces muscle spasticity in Multiple Sclerosis.
2. Research should be conducted to determine whether cannabinoids might relieve symptoms associated with MS.

3. Marijuana should not be smoked by patients with MS, a chronic disease.

## SPINAL CORD INJURY

Study	Cannabinoid	Trial Type	Testing modality	Delivery system	Result	Study design	Side Effects
<p>Hanigan WC, Destree R, Truong XT. 1986. The effect of delta-9-THC on human spasticity. <i>Clinical Pharmacology and Therapeutics</i> 39:198.</p> <p>Maurer M, Henn V, Dittrich A, Hoffman A. 1990. Delta-9-tetrahydrocannabinol shows antispastic and analgesic effects in a single case double-blind trial. <i>European Archives of Psychiatry and Clinical Neuroscience</i> 240:1—4.</p>	Oral THC	double-blind study	study of a paraplegic patient with painful spasms in both legs		Successful - suggested that oral THC was superior to codeine in reducing muscle spasms	Limitations of one patient	

## **SUMMARY – SPINAL CORD INJURY**

1. Animals research indicates that areas of the brain that control movement contain abundant cannabinoid receptors.
2. Clinical trials testing the effects of cannabinoids on muscle spasticity in spinal cord injury should be considered.
3. If THC is proven to relieve spasticity, then a pill might be the preferred delivery route for nighttime use.
4. An inhaled form of THC, if found to be effective, might be appropriate to relief acute episodes of spasticity.

## MOVEMENT DISORDERS

### Dystonia

Study	Cannabinoid	Trial Type	Testing modality	Delivery system	Result	Study design	Side Effects
Consroe P, Sandyk R, Snider SR. 1986. Open label evaluation of cannabidiol in dystonic movement disorders. <i>International Journal of Neuroscience</i> 30:277—282.	Cannabidiol (CBD)	preliminary open trial			Moderate success - suggested modest dose-related improvements in the five dystonic patients studied		

### Huntington's Disease

Study	Cannabinoid	Trial Type	Testing modality	Delivery system	Result	Study design	Side Effects
P, Laguna J, Allender J, Snider S, Stern L, Sandyk R, Kennedy K, Schram K. 1991. Controlled clinical trial of cannabidiol in Huntington's disease. <i>Pharmacology,</i>	Cannabidiol (CBD)	double-blind crossover study (CBD and placebo) of 15 Huntington's disease patients			Unsuccessful - symptoms neither improved nor worsened with CBD treatment		



Drug Free Australia  
**EVIDENCE**

<i>Biochemistry and Behavior (New York)</i> 40:701—708.  Sandyk R, Consroe P, Stern P, Biklen D. 1988. Preliminary trial of cannabidiol in Huntington's disease. Chesher G, Consroe P, Musty R., Editors, <i>Marijuana: An International Research Report</i> . Canberra: Australian Government Publishing Service.		who were not taking any antipsychotic drugs					
<i>Animal studies suggest that cannabinoids have antichoreic activity, presumably because of stimulation of CB<sub>1</sub> receptors in the basal ganglia.</i>							

## Parkinson's Disease

Study	Cannabinoid	Trial Type	Testing modality	Delivery system	Result	Study design	Side Effects
Frankel JP, Hughes A, Lees AJ, Stern GM. 1990. Marijuana for Parkinsonian tremor. <i>Journal of Neurology, Neurosurgery and Psychiatry</i> 53:436.	Smoked marijuana			Smoked	Unsuccessful - no improvement in tremor after the five patients smoked marijuana--whereas all subjects benefited from the administration of standard medications for Parkinson's disease (levodopa and apomorphine)		
<i>Animal studies - Hyperactivity of the subthalamic neurons, observed in both Parkinson's patients and animal models of Parkinson's disease, is hypothesized to be a major factor in the debilitating</i>							

Drug Free Australia  
**EVIDENCE**

*bradykinesia associated with the disease. Furthermore, although cannabinoids oppose the actions of dopamine in intact rats, they augment dopamine activation of movement in an animal model of Parkinson's disease. This suggests the potential for adjunctive therapy with cannabinoid agonists.*

## Tourette's Syndrome

Study	Cannabinoid	Trial Type	Testing modality	Delivery system	Result	Study design	Side Effects
<p>Hemming M, Yellowlees PM. 1993. Effective treatment of Tourette's syndrome with marijuana. <i>Journal of Psychopharmacology</i> 7:389—391.</p> <p>Sandyk R, Awerbuch G. 1988. Marijuana and Tourette's syndrome. <i>Journal of Clinical Psychopharmacology</i> 8:444—445.</p>	marijuana	four case histories			Questionable Success - indicating that marijuana use can reduce tics in Tourette's patients. In three of the four cases the investigators suggest that beneficial effects of marijuana might have been due to anxiety-reducing properties of marijuana rather than to a specific antitictic effect.		

## SUMMARY – MOVEMENT DISORDERS

1. There is no research evidence that marijuana or cannabinoids are helpful in reducing symptoms that occur in movement disorders.

2. The anxiety-reducing aspects of marijuana and cannabinoids might be beneficial to some patients with movement disorders.
3. However, chronic marijuana smoking is a health risk for chronic conditions such as movement disorders.
4. Animal studies should be undertaken to determine if cannabinoids might play a role in movement disorders.
5. Clinical trials of isolated cannabinoids should be undertaken.

## **EPILEPSY**

<b>Study</b>	<b>Cannabinoid</b>	<b>Trial Type</b>	<b>Testing modality</b>	<b>Delivery system</b>	<b>Result</b>	<b>Study design</b>	<b>Side Effects</b>
Ng SKC, Brust JCM, Hauser WA, Susser M. 1990. Illicit drug use and the risk of new-onset seizures. <i>American Journal of Epidemiology</i> 132:47—57.	marijuana	case-controlled study			Inconclusive – see Study Design. Ng and co-workers concluded that marijuana is a protective factor for first-time seizures in men but not women	This was a weak study. It did not include measures of health status prior to hospital admissions for the patients' serious conditions, and differences in their health status might have influenced their drug use rather than--as suggested by the authors--that differences in their drug use influenced their health.	

## SUMMARY - EPILEPSY

1. Neither marijuana nor cannabinoids are effective in treating epilepsy.

## ALZHEIMER'S DISEASE

Study	Cannabinoid	Trial Type	Testing modality	Delivery system	Result	Study design	Side Effects
Volicer L, Stelly M, Morris J, McLaughlin J, Volicer BJ. 1997. Effects of dronabinol on anorexia and disturbed behavior in patients with Alzheimer's disease. <i>International Journal of Geriatric Psychiatry</i> 12:913—919.	Dronabinol (Marinol)	Eleven Alzheimer's patients were treated for 12 weeks on an alternating schedule of dronabinol and placebo (six weeks of each treatment).		pill	Successful - treatment resulted in substantial weight gains and declines in disturbed behavior		No serious side effects were observed

## SUMMARY – ALZHEIMER'S DISEASE

1. Further clinical research should be conducted to determine if cannabinoids have a role in stimulating appetite in Alzheimer's patients with severe dementia.
2. Because short-term memory loss is a common side-effect of THC, the effect of cannabinoids on memory in Alzheimer's patients who are less severely disturbed must be contemplated.

## GLAUCOMA

Study	Cannabinoid	Trial Type	Testing modality	Delivery system	Result	Study design	Side Effects
<p>Hepler RS, Frank IM, Petrus R. 1976. Ocular effects of marijuana smoking. In: Braude MC, Szara S, Editors, <i>The Pharmacology of Marijuana</i>. New York: Raven Press. Pp. 815—824.</p> <p>Jones RT, Benowitz NL, Herning RI. 1981. Clinical relevance of cannabis tolerance and dependence. <i>Journal of Clinical Pharmacology</i></p>	Marijuana			Eaten or in pill form	Successful - IOP was reduced by an average of 25%		

Drug Free Australia  
**EVIDENCE**

21:143S—152S.							
<p>Alm A, Camras CB, Watson PG. 1997. Phase III latanoprost studies in Scandanavia, the United Kingdom and the United States. <i>Survey of Ophthalmology</i> 41:S105—S110.</p> <p>CB, Alm A, Watson P, Stjernschantz J. 1996. Latanoprost, a prostaglandin analog, for glaucoma therapy: Efficacy and safety after 1 year of treatment in 198 patients. Latanoprost Study Groups. <i>Ophthalmology</i> 103:1916—1924.</p> <p>Crawford WJ, Merritt JC. 1979. Effects of tetrahydrocannabinol on arterial and-intraocular hypertension. <i>International Journal of Clinical</i></p>	Smoked Marijuana with 2% THC			Smoked	<p>Limited success as below - IOP was reduced by an average of 25% after smoking a marijuana cigarette that contained approximately 2% THC--a reduction as good as that observed with most other medications available today.</p> <p>But the effect lasts only about three to four hours. Elevated IOP is a chronic condition and must be controlled continuously.</p>		

Drug Free Australia  
EVIDENCE

<p><i>Pharmacology and Biopharmacy</i> 17:191—196.</p> <p>Hepler RS, Frank IM, Petrus R. 1976. Ocular effects of marijuana smoking. In: Braude MC, Szara S, Editors, <i>The Pharmacology of Marijuana</i>. New York: Raven Press. Pp. 815—824.</p> <p>Hepler RS, Frank IR. 1971. Marihuana smoking and intraocular pressure. <i>Journal of the American Medical Association</i> 217(10):1392.</p> <p>Merritt JC, Crawford WJ, Alexander PC, Anduze AL, Gelbart SS. 1980. Effect of marihuana on intraocular and blood pressure in glaucoma. <i>Ophthalmology</i></p>							
--	--	--	--	--	--	--	--

Drug Free Australia  
**EVIDENCE**

---

87:222—228.  Walters TR. 1996. Development and use of brimonidine in treating acute and chronic elevations of intraocular pressure: A review of safety, efficacy, dose response, and dosing studies. <i>Survey of Ophthalmology</i> 41(Suppl. 1):S19— S26.							
---	--	--	--	--	--	--	--

## SUMMARY - GLAUCOMA

1. Both cannabinoids and marijuana lower intraocular pressure (IOP).
2. However, both also lower blood pressure, which might reduce the flow of blood through the optic nerve and actually increase the progression of glaucoma.
3. Many effective medications are available to treat glaucoma at a cost of about US\$60 per month.



## Cost of pharmaceutical cannabinoids may need PBS subsidy

The cost of cultivated **crude** cannabis in the United States is, like many medical treatments, expensive, as is reflected by NORML in the US in its 2009 Recommendations to the Obama Administration on marijuana dispensaries:

There is little doubt as to why cannabis dispensaries are multiplying at such a rate. The price of cannabis in dispensaries ranges from \$12.50 to \$25 per gram (28 grams per ounce). The average "medical" user with a chronic medical condition may consume from 1.5 to 3.0 grams per day.<sup>31</sup> Therefore, the monthly cost to patients **ranges from \$562 (1.5 grams/day at \$12.50/gm) to \$2,250 (3 grams/day at \$25/gm)**. Since the herbal cannabis, which is of varying strains and quality, has not received FDA approval, none of this expense is covered by a patient's health insurance, and there is no assurance of quality control or accurate dosage information.

[http://norml.org/pdf\\_files/Marijuana\\_Dispensaries\\_Recommendations.pdf](http://norml.org/pdf_files/Marijuana_Dispensaries_Recommendations.pdf)

By comparison, the generic version of Marinol, the THC capsule, **costs US\$402 per 100 capsules for 2.5 mg, US\$927 for 100 5mg capsules, or US\$1,696 for 100 10mg capsules** online, taking one website as an example <http://www.drugs.com/price-guide/dronabinol#oral-capsule-2-5-mg>. Brand-name Marinol is more than twice the cost of the generic brand. Marinol, whether brand or generic, is longer acting than smoked cannabis.

Where pharmaceutical cannabinoids are genuinely effective for patients within Australia, and where it can be demonstrated that there is a critical mass of prescribed medical need, PBS subsidies might well be sort to cheapen the cost to patients.

## 95% of 'medical cannabis' users are recreational users

The following text is from the 1999 US Institute of Medicine review on 'medical cannabis', finding that 95% of medical users were previously recreational users of the substance:

There have been no comprehensive surveys of the demographics and medical conditions of 'medical marijuana' users, but a few reports provide some indication. In each case, survey results should be understood to reflect the situation in which they were conducted and are not necessarily characteristic of 'medical marijuana' users as a whole. Respondents to surveys reported to the IOM study team were all members of "buyers' clubs," organizations that provide their members with marijuana, although not necessarily through direct cash transactions. The atmosphere of the marijuana buyers' clubs ranges from that of the comparatively formal and closely regulated Oakland Cannabis Buyers' Cooperative to that of a "country club for the indigent," as Denis Peron described the San Francisco Cannabis Cultivators Club (SFCCC), which he directed.

John Mendelson, an internist and pharmacologist at the University of California, San Francisco (UCSF) Pain Management Center, surveyed 100 members of the SFCCC who were using marijuana at least weekly. Most of the respondents were unemployed men in their forties. Subjects were paid \$50 to participate in the survey; this might have encouraged a greater representation of unemployed subjects. All subjects were tested for drug use. About half tested positive for marijuana only; the other half tested positive for drugs in addition to marijuana (23% for cocaine and 13% for amphetamines). The predominant disorder was

AIDS, followed by roughly equal numbers of members who reported chronic pain, mood disorders, and musculoskeletal disorders ([Table 1.1](#)).

The membership profile of the San Francisco club was similar to that of the Los Angeles Cannabis Resource Center (LACRC), where 83% of the 739 patients were men, 45% were 36—45 years old, and 71% were HIV positive. [Table 1.2](#) shows a distribution of conditions somewhat different from that in SFCCC respondents, probably because of a different membership profile. For example, cancer is generally a disease that occurs late in life; 34 (4.7%) of LACRC members were over 55 years old; only 2% of survey respondents in the SFCCC study were over 55 years old.

Jeffrey Jones, executive director of the Oakland Cannabis Buyers' Cooperative, reported that its largest group of patients is HIV-positive men in their forties. The second-largest group is patients with chronic pain.

Among the 42 people who spoke at the public workshops or wrote to the study team, only six identified themselves as members of marijuana buyers' clubs. Nonetheless, they presented a similar profile: HIV/AIDS was the predominant disorder, followed by chronic pain ([Tables 1.3](#) and [1.4](#)). All HIV/AIDS patients reported that marijuana relieved nausea and vomiting and improved their appetite. About half the patients who reported using marijuana for chronic pain also reported that it reduced nausea and vomiting.

Note that the medical conditions referred to are only those reported to the study team or to interviewers; they cannot be assumed to represent complete or accurate diagnoses. Michael Rowbotham, a neurologist at the UCSF Pain Management Center, noted that many pain patients referred to that center arrive with incorrect diagnoses or with pain of unknown origin. At that center the patients who report medical benefit from marijuana say that it does not reduce their pain but enables them to cope with it.

**Most--not all--people who use marijuana to relieve medical conditions have previously used it recreationally.** An estimated 95% of the LACRC members had used marijuana before joining the club. It is important to emphasize the absence of comprehensive information on marijuana use before its use for medical conditions. Frequency of prior use almost certainly depends on many factors, including membership in a buyers' club, membership in a population sector that uses marijuana more often than others (for example, men 20—30 years old), and the medical condition being treated with marijuana (for example, there are probably relatively fewer recreational marijuana users among cancer patients than among AIDS patients).

Patients who reported their experience with marijuana at the public workshops said that marijuana provided them with great relief from symptoms associated with disparate diseases and ailments, including AIDS wasting, spasticity from multiple sclerosis, depression, chronic pain, and nausea associated with chemotherapy. Their circumstances and symptoms were varied, and the IOM study team was not in a position to make medical evaluations or confirm diagnoses. Three representative cases presented to the IOM study team are presented in [Box 1.1](#); the stories have been edited for brevity, but each case is presented in the patient's words and with the patient's permission.

## EVIDENCE

The variety of stories presented left the study team with a clear view of people's beliefs about how marijuana had helped them. But this collection of anecdotal data, although useful, is limited. We heard many positive stories but no stories from people who had tried marijuana but found it ineffective. This is a fraction with an unknown denominator. For the numerator we have a sample of positive responses; for the denominator we have no idea of the total number of people who have tried marijuana for medical purposes. Hence, it is impossible to estimate the clinical value of marijuana or cannabinoids in the general population based on anecdotal reports. Marijuana clearly seems to relieve some symptoms for some people--even if only as a placebo effect. But what is the balance of harmful and beneficial effects? That is the essential medical question that can be answered only by careful analysis of data collected under controlled conditions.

**TABLE 1.1** Self-Reported Disorders Treated with Marijuana by Members of San Francisco Cannabis Cultivators Club

HIV	60
Musculoskeletal disorders and arthritis	39
Psychiatric disorders (primarily depression)	27
Neurological disorders and nonmusculoskeletal pain syndromes	9
Gastrointestinal disorders (most often nausea)	7
Other disorders : Glaucoma, allergies, nephrolithiasis, and the skin manifestations of Reiter syndrome	7
Total disorders	149
Total number of respondents	100

**TABLE 1.2** Self-Reported Disorders Treated with Marijuana by Members of Los Angeles Cannabis Resource Center (LACRC), According to Center Staff<sup>a</sup>

HIV <sup>b</sup>	528	71
Cancer	40	5.4
Terminal cancer	10	1.4
Mood disorders (depression)	4	0.5
Musculoskeletal (multiple sclerosis, arthritis)	30	4.1
Chronic pain and back pain	33	4.5
Gastrointestinal	7	2.3
Neurological disorders (epilepsy, Tourette syndrome, brain trauma)	7	0.9
Seizures or migraines <sup>c</sup>	13	1.8
Glaucoma	15	2.0
Miscellaneous	42	5.7
Total number	739	100

**TABLE 1.3** Summary of Reports to IOM Study Team by 43 Individuals

# Drug Free Australia

## EVIDENCE

Symptoms	Dominant Disease	Symptoms	Dominant Disease
Anorexia, nausea, vomiting	AIDS	Pain	Migraine
	AIDS		Injury
	AIDS		Injury
	AIDS		Epilepsy and postpolio syndrome
	AIDS		Trauma and epilepsy
	AIDS		Degenerative disk disease
	AIDS		Rheumatoid arthritis
	AIDS and cancer		Nail-patella syndrome
	Cancer		Reflex sympathetic dystrophy
	Testicular cancer		Gulf War chemical exposure
	Cancer and multiple sclerosis		Multiple congenital cartilaginous exostosis
	Thyroid condition <sup>a</sup>		Histiocytosis X
	Migraine	Muscle spasticity	Spasticity <sup>a</sup>
	Wilson's disease		Multiple sclerosis
Mood disorders	Depression		Multiple sclerosis
	Depression		Multiple sclerosis
	Depression and anxiety		Paralysis
	Depression and anxiety		Spinal-cord injury
	Manic depression		Spasmodic torticollis
	Manic depression	Intraocular pressure	Glaucoma
	Posttraumatic stress		
	Premenstrual syndrome	Diarrhea	Crohn's disease

<sup>a</sup>Not specified.

NOTE: This table lists the people who reported to the IOM study team during the public workshops, or through letters, that they use marijuana as medicine; it should not be interpreted as a representative sample of the full spectrum of people who use marijuana as medicine. Each dominant disease represents an individual report.

**TABLE 1.4** Primary Symptoms of 43 Individuals Who Reported to IOM Study Team

Primary Symptom	Symptom Frequency		Multiple Symptoms	
	No. of Reports <sup>a</sup>	% of Total Symptoms Reported	No. Who Reported (primary) Additional Symptoms	% of Those Who Reported Primary Symptoms
Anorexia, nausea, vomiting	21	31	13	62
Diarrhea	4	6	3	75
Intraocular	2	3	1	50

Drug Free Australia  
**EVIDENCE**

pressure				
Mood disorders	12	18	7	58
Muscle spasticity	12	18	7	58
Pain	16	24	13	81
Total	67		44	66

<sup>a</sup>Forty-three persons reporting; 20 reported relief from more than one symptom.

### **Most uses of ‘medical cannabis’ are objectively unverifiable**

In the US State of Nevada, the majority of marijuana is used for **generalised** conditions; for example, 53% for severe pain, 29% for muscle spasms, and 11% for severe nausea.<sup>6</sup> There is no straightforward way to assess each of these conditions objectively. The remaining 7% are for glaucoma, HIV+/AIDS, cancer and cachexia (wasting). The demographic data and usage data reveal that most registrants have come from a background of recreational use and are smoking marijuana for conditions which cannot be easily objectively verified. This is not to necessarily argue that registrants do not have medical conditions which they believe may be treated by marijuana, but simply to note that this mode of drug delivery and means of treatment are not subject to the usual controls put in place for ensuring the good of the patient. There is also no straightforward way to assess whether someone might simply be seeking marijuana for ‘recreational’ use under the guise of medical treatment, and thereby exposing themselves to a litany of avoidable harms.

<sup>6</sup> Raybuck T, Medical Marijuana, Nevada’s Big Gamble. *The Journal of Global Drug Policy and Practice* 5(2), 2011

---

## CENTRAL ISSUES FOR AUSTRALIAN LEGISLATORS - 3

### Crude 'Medical Cannabis' a Trojan Horse to Legalise Recreational Use

Those working to legalise the recreational use of cannabis worldwide by seeking to destroy the United Nations' International Drug Conventions use 'medical marijuana' as a Trojan horse to introduce the full legalisation of cannabis for recreational use. In one US State with 'medical marijuana' laws, almost 50% of young people entering treatment for cannabis addiction sourced their cannabis from people with 'medical marijuana' prescriptions, demonstrating that diversion to recreational users will always be a problem under such provisions

#### Drug legalisation strategies

"The consensus here is that medical marijuana is our strongest suit. It is our point of leverage which will move us toward the legalization of marijuana for personal use, and in that process we will break down the power of the narcocracy to wage a war of terror over things."

*Richard Cowan – Director of NORML at the 50th anniversary of the discovery of LSD in San Francisco 1993*

"I would establish a strictly controlled distribution network through which I would make most drugs, excluding the most dangerous ones like crack, legally available. Initially, I would keep prices low enough to destroy the drug trade. Once that objective was attained I would keep raising the prices, very much like the excise duty on cigarettes, but I would make an exception for registered addicts in order to discourage crime. I would use a portion of the income for prevention and treatment. And I would foster social opprobrium of drug use." *Soros on Soros: Staying Ahead of the Curve. New York: John Wiley & Sons, 1995 p 200 - George Soros is named in Time magazine as the most influential financial supporter of the drug legalization movement, providing \$50,000,000 thus far for legalization efforts globally*

"Come up with an approach that emphasizes 'treatment and humanitarian endeavors,' he said, hire someone with the political savvy to sit down and negotiate with government officials, and target a few winnable issues, like medical marijuana and the repeal of mandatory minimums." *George Soros, quoted by Cynthia Cotts, "Smart Money," Rolling Stone, May 5, 1994.*

"(I am sure you have read the recent reports linking cannabis to schizophrenia). As we have managed to reduce the prevalence of smoking (from 70% to 20%

in males) and incidence of tobacco related health problems, and also reduced alcohol consumption by about 25% in the last 20 years as well as the number of alcohol related deaths by 20% in the last decade, why do we not tax and regulate cannabis as these controls have been so successful for the legal drugs.”

*Dr Alex Wodak, President of the Australian Drug Law Reform Foundation and Australia's highest profile advocate of drug legalization - on Drugtalk, 23 November 2002, 9.55 pm*

### **Massive, trafficable quantities recommended for medical use**

In August 2000 a NSW Working Party on the Use of Cannabis for Medicinal Purposes recommended that 5 marijuana plants be legalised for medical use per individual. Two of these plants could be greater than 25 cm in height.

This well illustrates the mischief-making of such proposals, which aim to give 'medical cannabis' users massive but also saleable yields which can easily be diverted into the recreational cannabis market. Drug Free Australia questions how the police could possibly regulate the non-distribution of such plant material when they already struggle to prohibit the recreational use of marijuana.

The Victorian Police Association disclosed one cannabis plant yields five crops a year of 500 grams per crop totalling 2500 grams. — *Letter, The Police Association to DJ Perrin, 26 April 1996 p 3*

The Woodward Royal Commission disclosed that a three month old cannabis plant will produce at least 500 grams of harvestable leaf or a crop of 2000 grams a year.

Just 25 grams of marijuana produces 86 joints with 3% of THC, so one plant can produce up to 8600 marijuana joints every year. (*Marijuana An Australian Crisis*).

### **And a green light for public mischief**

The assertion that all medical marijuana is headed for seriously ill patients is misleading. Statistics from the California Branch of the National Organization for the Reform of Marijuana Laws (NORML) shows that a survey of Californians reports the top three reported uses of medicinal marijuana:

**40% Chronic Pain**  
**22% AIDS-Related**  
**15% Mood Disorders**  
(23% All other categories)

Local and state law enforcement counterparts cannot distinguish between illegal marijuana grows and grows that qualify as medical exemptions. Many self-designated 'medical marijuana' growers are, in fact, growing marijuana for illegal, "recreational" use.

Elected law enforcement officials, i.e. Sheriffs and District Attorneys in California have been targeted by the "marijuana lobby." Political action by groups such as NORML have

endorsed and supported candidates favorable to medical marijuana. NORML tracks local elections and takes credit for the defeats of anti-marijuana candidates. Last year the DEA arrested a major marijuana trafficker in Humboldt County who was an undeclared candidate for sheriff.

The DEA and its local and state counterparts routinely report that large-scale drug traffickers hide behind and invoke Proposition 215, even when there is no evidence of any medical claim. In fact, many large-scale marijuana cultivators and traffickers escape state prosecution because of bogus medical marijuana claims. Prosecutors are reluctant to charge these individuals because of the state of confusion that exists in California.

**Therefore, high-level traffickers posing as "care givers" are able to sell illegal drugs with impunity.**

The California NORML website lists federal defendants for the largest indoor marijuana cultivation operation in the U.S., which occurred in Northern California, as "green prisoners." While unscrupulously claiming to be "medical marijuana" defendants, in fact these two individuals were dangerous, armed fugitives believed to be responsible for drug-related murders and other violence.

DEA's San Francisco Field Division coordinates the statewide Domestic Cannabis Eradication/Suppression Program (DCE/SP). The number of plants eradicated and assets seized represent the largest totals in California history.

*Source - DEA Information Sheet*

## **Diversion to Minors for recreational use documented**

In Colorado, 48.8 percent of adolescents admitted to substance abuse treatment obtained their marijuana from someone registered to use medically.<sup>7</sup> The authors conclude:

Diversion of 'medical marijuana' is common among adolescents in substance treatment. These data support a relationship between 'medical marijuana' exposure and marijuana availability, social norms, frequency of use, substance-related problems and general problems among teens in substance treatment.

In a recent study by Cerda and co-workers, it was found that states with 'medical marijuana' laws had higher rates of use, abuse and dependence.<sup>8</sup> The authors are careful not to assume a causal link, and acknowledge that there are several possible mechanisms by which 'medical marijuana' laws could lead to increased abuse.

---

<sup>7</sup> Thurstone C, Lieberman SA & Schmiede SJ, Medical marijuana diversion and associated problems in adolescent substance treatment. *Drug Alcohol Dependence* 118(2-3):489-492, 2011

<sup>8</sup> Cerda M *et al.*, Medical marijuana laws in 50 states: investigating the relationship between state legalization of medical marijuana and marijuana use, abuse and dependence, *Drug Alcohol Depend.* 120(1-3): 22-27, 2012



### **‘Medical cannabis’ facilitating the avoidance of taxation in Colorado**

It was estimated recently by official sources that Colorado will consume 130 tonnes of cannabis annually.<sup>9</sup> Selling at \$220 per ounce<sup>10</sup> and with 35,274 ounces per tonne, this translates to \$7,760,280 / tonne or \$1,008,836,400 for the whole crop in that state alone. Unfortunately, whilst tax revenues were cited as a major reason for legalization in Colorado, the simple expedient of not buying it from one of the state’s three registered recreational cannabis dispensaries which were more expensive than the medical pot shops, allowed taxation to be circumvented.<sup>11</sup> It is important to note that 67% of all the cannabis sold was used by the 22% of heaviest users, further confirming the addictive nature of the legally available weed.<sup>12</sup>

### **Damning evidence against the drug legalisation lobby**

*Testimony of Barry R. McCaffrey Director, Office of National Drug Control Policy (ONDCP) before the House Government Reform and Oversight Committee subcommittee on criminal justice, drug policy, and human resources - the drug legalization movement in America - June 16, 1999*

Our nation's democratic system of government is founded upon free and open debate. Our nation holds no beliefs or icons above challenge and examination. We all must be willing to lay the facts and our analysis on the table of public scrutiny, and make the case for what we believe.

However, in the marketplace of ideas, just as in other marketplaces, there are people willing to use deceptive claims, half-truths and flawed logic to hawk ill-considered beliefs. Nowhere is this problem more clear than with respect to the drug legalization movement.

Proponents of legalization know that the policy choices they advocate are unacceptable to the American public. Because of this, many advocates of this approach have resorted to concealing their real intentions and seeking to sell the American public legalization by normalizing drugs through a process designed to erode societal disapproval.

---

<sup>9</sup> Silva R “Colorado marijuana market consumes estimated 130 tonnes of the drug annually.” HNGN 12th July 2014. <http://www.hngn.com/articles/35958/20140711/colorado-marijuana-market-consumes-estimated-130-tonnes-of-the-drug-annually.htm> Viewed 13th July 2014.

<sup>10</sup> Wyatt C., “Colorado Completed First Legal Pot Study.” Associated Press. [http://hosted.ap.org/dynamic/stories/U/US\\_RETHINKING\\_POT\\_DEMAND?SITE=AP&SECTION=HOME&TEMPLATE=DEFAULT](http://hosted.ap.org/dynamic/stories/U/US_RETHINKING_POT_DEMAND?SITE=AP&SECTION=HOME&TEMPLATE=DEFAULT) Viewed 13th July 2014.

<sup>11</sup> Wyatt C., “Colorado Completed First Legal Pot Study.” Associated Press. [http://hosted.ap.org/dynamic/stories/U/US\\_RETHINKING\\_POT\\_DEMAND?SITE=AP&SECTION=HOME&TEMPLATE=DEFAULT](http://hosted.ap.org/dynamic/stories/U/US_RETHINKING_POT_DEMAND?SITE=AP&SECTION=HOME&TEMPLATE=DEFAULT) Viewed 13th July 2014.

<sup>12</sup> Light M.L., Orens A., Lewandowski B., Pickton T. “Market size and demand for marijuana in Colorado.” Prepared for Colorado Dept of Revenue. <http://www.colorado.gov/cs/Satellite?blobcol=urldata&blobheadname1=Content-Disposition&blobheadname2=Content-Type&blobheadvalue1=inline;+filename%3D%22Market+Size+and+Demand+Study,+July+9,+2014.pdf%22&blobheadvalue2=application/pdf&blobkey=id&blobtable=MungoBlobs&blobwhere=1252008574534&ssbinary=true> Viewed 13th July 2014.

## EVIDENCE

---

For example, ONDCP has expressed reservations about the legalization of hemp as an agricultural product because of the potential for increasing marijuana growth and use. While legitimate hardworking farmers may want to grow the crop to support their families, many of the other proponents of hemp legalization have not been as honest about their goals. A leading hemp activist, is quoted in the San Francisco Examiner and on the Media Awareness Project's homepage (a group advocating drug policy reforms) as saying *he "can't support a movement or law that would lift restrictions from industrial hemp and keep them for marijuana."* Katherine Seligman, Legalization Sought for Cousin of Pot, San Francisco Examiner, May 9, 1999, C1 (quoting hemp activist Jack Herer). If legalizing hemp is solely about developing a new crop and not about eroding marijuana restrictions, why does this individual only support hemp deregulation if it is linked to the legalization of marijuana?

Similarly, when Ethan Nadelmann Director of the Lindesmith Center (a drug research institute), speaks to the mainstream media, he talks mainly about issues of compassion, like medical marijuana and the need to help patients dying of cancer. However, Mr. Nadelmann's own words in other fora reveal his underlying agenda: legalizing drugs. Here is what he advocates:

"Personally, when I talk about legalization, I mean three things: the first is to make drugs such as marijuana, cocaine, and heroin legal..."

(Ethan Nadelmann, Should Some Drugs Be Legalized?, 6 Issues in Science and Technology 43-46 (1990).

"I propose a mail order distribution system based on a right of access . . ."

(Ethan Nadelmann, Thinking Seriously About Alternatives to Drug Prohibition, 121 Daedalus 87-132 (1992).

"Any good non-prohibitionist drug policy has to contain three central ingredients. First, possession of small amounts of any drug for personal use has to be legal. Second, there have to be legal means by which adults can obtain drugs of certified quality, purity and quantity. These can vary from state to state and town to town, with the Food and Drug Administration playing a supervisory role in controlling quality, providing information and assuring truth in advertising. And third, citizens have to be empowered in their decisions about drugs. Doctors have a role in all this, but let's not give them all the power".(Ethan Nadelmann and Jan Wenner, Toward a Sane National Drug Policy, Rolling Stone May 5, 1994, 24-26.)

"We can begin by testing low potency cocaine products -- coca-based chewing gum or lozenges, for example, or products like Mariani's wine and the Coca-Cola of the late 19th century -- which by all accounts were as safe as beer and probably not much worse than coffee. If some people want to distill those products into something more potent, let them".(Id.)

"But if there is a lot of PCP use in Washington, then the government comes in and regulates the sale". (Ethan Nadelmann, How to Legalize, interview with Emily Yoffe, Mother Jones, Feb./Mar. 1990, 18-19.)

Mr. Nadelmann's view that drugs, including heroin and other highly addictive and dangerous drugs, should be legalized are widely shared by this core group of like-minded individuals. For example, Mr. Arnold Trebach states:

*"Under the legalization plan I propose here, addicts . . . would be able to purchase the heroin and needles they need at reasonable prices from a non-medical drugstore". (Arnold Trebach & James Inciardi, Legalize It? Debating American Drug Policy, 109-110 (1993).*

International financier George Soros, who funds the Lindesmith Center, has advocated: *"If it were up to me, I would establish a strictly controlled distributor network through which I would make most drugs, excluding the most dangerous ones like crack, legally available."* (George Soros, 'Soros on Soros', p. 200 (1995).

William F. Buckley, Jr. has also called for the *"legalization of the sale of most drugs, except to minors"*. (William F. Buckley, The War on Drugs is Lost, National Review, Feb. 12, 1996, 35-48.)

Similarly, when the legalization community explains their theory of harm reduction -- the belief that illegal drug use cannot be controlled and, instead, that government should focus on reducing drug-related harms, such as overdoses -- the underlying goal of legalization is still present. For example, in a 1998 article in Foreign Affairs, Mr. Nadelmann expressed that the following were legitimate 'harm reduction' policies: allowing doctors to prescribe heroin for addicts; employing drug analysis units at large dance parties, known as raves, to test the quality of drugs; and decriminalizing possession and retail sale of cannabis and, in some cases, possession of 'hard drugs'. (See Ethan Nadelmann, Commonsense Drug Policy, 77 Foreign Affairs 111-126 (1998).

Legalization, whether it goes by the name harm reduction or some other trumped up moniker, is still legalization. For those who at heart believe in legalization, harm reduction. It should, however, be emphasized that not all advocates of harm reduction support drug legalization. Nor, does harm reduction, by itself, requires legalization. In fact, aspects of the National Drug Control Strategy, such as methadone treatment, properly adopt harm reduction programs as part of a comprehensive, balanced approach to reducing drug use. Nevertheless, the fact remains that many who advocate harm reduction use it as a subterfuge for legalization. Is too often a linguistic ploy to confuse the public, cover their intentions and thereby quell legitimate public inquiry and debate. Changing the name of the plan doesn't constitute a new solution or alter the nature of the problem.

In many instances, these groups not only advocate public policies that promote drug use, they also provide people with information designed to encourage, aid and abet drug use. For example, from the Media Awareness Project (a not-for-profit organization whose self-declared mission is to encourage a re-evaluation of our drug policies) website a child can link to a site that states:

Overthrow the Government! Grow your own stone! It's easy! It's fun! Everybody's doing it! Growing marijuana: a fun hobby the whole family can enjoy! See [www.cannabisculture.com/grow](http://www.cannabisculture.com/grow)

The linked website goes on to provide the reader with all the information needed to grow marijuana, including a company located in Vancouver, Canada that will ship seeds or plants.

## EVIDENCE

---

The Media Awareness Project website also includes links to instructions about how drug users can defeat drug tests. See [www.mapinc.org](http://www.mapinc.org) ('drug links' 7 and 8 link to the following two websites: [www.hightimes.com/ht/tow/tes/index.html](http://www.hightimes.com/ht/tow/tes/index.html) and [www.cannabisculture.com/usage/dtfaq.shtml](http://www.cannabisculture.com/usage/dtfaq.shtml)). Similarly, the websites of both the Drug Policy Foundation, a self proclaimed drug policy reform group, and the Media Awareness Project, both provide links to a site that gives instructions for how to manufacture the drug 'ecstasy'. See [www.mapinc.org](http://www.mapinc.org) which includes as part of its site [www.mapsorg/news.html](http://www.mapsorg/news.html) [www.ecstasy.org/links/index.html/](http://www.ecstasy.org/links/index.html/) which then includes [www.hyperreal.org/~lamont/pharm/faq/faq-mdma-synth.html](http://www.hyperreal.org/~lamont/pharm/faq/faq-mdma-synth.html)

This same information is also found on [www.lyceum.org/drugs/synth](http://www.lyceum.org/drugs/synth) .  
./mdma/synthesis/mdma.mda.synthesis

Careful examination of the words -- speeches, webpostings, and writings -- and actions of many who advocate policies to 'reduce the harm' associated with illegal drugs reveals a more radical intent. In reality, their drug policy reform proposals are far too often a thin veneer for drug legalization. See Richard Cowan, Building a New NORML, High Times, Jan. 1993, p. 67. Mr. Cowan has made clear how harm reduction policies fit into the legalization agenda as follows:

*Based on our objective of 'Legalization by 97' we must begin by demanding: 1 - immediate access to marijuana for the sick. 2 -- The immediate cessation of all attacks on users, growers and sellers of marijuana. 3 -- An immediate end to lying about marijuana and its users. 4 -- Recognition of the economic and environmental importance of hemp, and studies on how it can be best exploited by American agriculture and industry. (Id.)*

What do drug 'legalizers' truly seek? They want drugs made legal -- even though this would dramatically increase drug use rates. They want drugs made widely available, in chewing gums and sodas, over the Internet and at the corner store - even though this would be tantamount to putting drugs in the hands of children. They want our society to no longer frown on drug use -- even though each year drug use contributes to 50,000 deaths CSR Inc., unpublished research prepared for ONDCP, 1999. and costs our society \$110 billion in social costs. NIDA and NIAAA, The Economic Costs of Alcohol and Drug Abuse in the United States, 1992, NIDA/NIH pub. no. 98-4327, Sept. 1998. And, they want the government to play the role of facilitator, handing out drugs like heroin and LSD.

Let me emphasize, there is nothing wrong with advocating for change in public policy. From civil rights to universal suffrage, much of what makes our nation great has been the result of courageous reform efforts. Our nation benefits from the airing of dissent. However, we all have a responsibility to be honest in debate about our motives. We all have an obligation to be open with the American people about the risks inherent in what we advocate. To date, advocates of legalization have not been so forthcoming.

**Road deaths - increased consequence of adding another legal drug**

Cannabis is the drug most frequently implicated in car crashes after alcohol, and the most frequently implicated of all the illicit drugs in motor vehicle crashes. Legalising it and increasing its use would obviously exacerbate this by an amount at least proportional to the amount of its increased use. Because alcohol is already legal, legalising cannabis effectively legalises the highly dangerous cannabis–alcohol cocktail. This has been shown to be very dangerous in many studies.

## **CENTRAL ISSUES FOR AUSTRALIAN LEGISLATORS - 4**

### **Substantial Harms Must Keep Cannabis Use from Proliferating**

**The harms of recreational cannabis use are so substantial and substantiated that giving any leeway to Trojan horse strategies of the drug legalisation lobby should never be contemplated. Such strategies give a green light to public mischief-making as is evidenced in those US States where crude cannabis has been approved for medical use, particularly where trafficable quantities of 'medical cannabis' are made available to sufferers**

#### **Summary of harms**

Printed below is the Drug Free Australia publication enumerating the many harms of cannabis, demonstrating that adding another destructive drug to the current legal drugs, alcohol and tobacco, is societally irresponsible.

The harms listed below have been researched via literally thousands of studies on cannabis. These harms, in short, are as follows – for more detail read from the pages following this summary.

#### **Harms**

- 1500 toxic chemicals when burned
- ONDCP and NIDA note THC content is 2.5 times higher between 1983 & 2008, with UK Home Office finding a 15% average
- Gateway to other dangerous drugs, adding another gateway drug to two existing legal drugs.
- Cannabis users 50% more likely to develop alcohol use disorder
- Psychosis - 2.6 times higher chance
- Depression - 4 times higher chance
- Amotivational syndrome
- Suicide – 3 fold risk of ideation
- Immune system adversely affected
- VIOLENCE AND AGGRESSION as part of withdrawal
- Brain Function
  - Verbal learning adversely affected
  - Organisational skills adversely affected
  - Loss of Coordination
  - Memory loss which can become permanent
  - Attention problems
- Driving – 16 times more likely to hit obstacles
- Miscarriage elevated
- Fertility adversely affected
- Newborns adversely affected with appearance, weight, size, hormonal function, cognition and motor function adversely affected to adulthood
- COPD & bronchitis

## EVIDENCE

---

- Cancers – respiratory tract, lung, breast
- Cardio-vascular – stroke, heart attack, myocardial infarction 5 times higher after one joint

# ***Cannabis – suicide, schizophrenia and other ill- effects***

***A research paper on the consequences of acute and  
chronic cannabis use***



---

**A review prepared for Drug Free Australia**  
*First Edition, March 2009*

---



© Drug Free Australia Ltd 2009

This work is copyright. Apart from any use as permitted under the Copyright Act 1968, no part may be reproduced by any process without the written permission of the publisher.

**Published by Drug Free Australia Ltd**

**PO Box 497, Elizabeth, SA 5112**

**Telephone: + 61 8 8244 1185**

**email: [admin@drugfree.org.au](mailto:admin@drugfree.org.au)**

**website: [www.drugfree.org.au](http://www.drugfree.org.au)**

This work has been supported by funding from the Australian Government Department of Health and Ageing

Opinions expressed in this publication are those of the authors and not necessarily those of Drug Free Australia Ltd or the Australian Government.

## **CONTENTS**

---

<b>ACKNOWLEDGEMENTS</b>	<b>67</b>
<b>FOREWORD</b>	<b>68</b>
<b>EXECUTIVE SUMMARY</b>	<b>69</b>
<b>SECTION ONE: CANNABIS USE</b>	<b>70</b>
Description of the Drug	70
Increased Potency	74
Gateway Drug	76
Dependence	77
<b>SECTION TWO: CANNABIS HARMS</b>	<b>80</b>
Adverse Health Consequences	80
Mental Health	80
Brain Function	83
Physical Harms	85
<b>SECTION THREE: QUITTING CANNABIS</b>	<b>89</b>
<b>SECTION FOUR: RECOMMENDATIONS</b>	<b>91</b>
<b>REFERENCES &amp; SUGGESTED ADDITIONAL READING</b>	<b>93</b>
<b>APPENDIX A: UNITED KINGDOM</b>	<b>110</b>
<b>APPENDIX B: AUSTRALIA</b>	<b>112</b>

## **ACKNOWLEDGEMENTS**

---

This review of cannabis in Australia was written to provide up-to-date evidence to key researchers including those at the National Drug and Alcohol Research Centre (NDARC) and others involved in compiling the National Cannabis Strategy 2006-2009. It is intended that this research paper will provide useful information for future updates of the National Cannabis Strategy in Australia.

Drug Free Australia would like to acknowledge the following people for their assistance with the content of this review.

**Heather Ashton DM, FRCP** is Emeritus Professor of Clinical Psychopharmacology at the University of Newcastle upon Tyne, UK. Prof Ashton has done laboratory research on the effects of smoking THC on the brain and performance, and has carried out surveys on the extent of cannabis use in UK university students, including separate surveys on medical students, dentists and junior doctors. She has written extensively in professional journals on the adverse effects of cannabis use.

**Gary Christian** – Secretary, Drug Free Australia. Mr Christian was co-author of the research publication 'The Kings Cross Injecting Room – The Case for Closure' and co-writer of the 'Quit Now Stop Smoking Program, 1986-87'. In 1999 he was co-founder of the Cabramatta ADRACare Centre for drug dependent and homeless people of the area and from 2000-2003, he was President of Hassela Australia's Teen Drug Rehabilitation program.

**Herschel Mills Baker** – President of Australian Parents for Drug Free Youth. Mr Baker was author of 'Suicide/Schizophrenia - Consequences of Acute and Chronic Cannabis Use' (1988 and 1996). He was responsible for updating the 'Drug Awareness' booklet for Lions International District 201.Q5 Zone 2 of Queensland, Australia. He also developed a drug prevention resource for parents entitled 'Drug Free Kids: A Parent's Guide' and developed a series of 'Parent Drug Education Courses' successfully used by Queensland TAFE and many organisations in Wide Bay Queensland such as the Lions Clubs, Quota Club and churches.

**Craig Thompson**, former Magistrate, NSW and Chair of Drug Free Australia. Mr Thompson was co-author of 'Drug Precipice', Board Member of the Ted Noffs Foundation for 7 years and Council Member of the Australian National Council on Drugs (ANCD).

**Mary Brett BSc (Hons)**, Board Member of EURAD. Appreciation is expressed for her extensive international research in the areas of the impact of cannabis use and its damaging effects. Her contribution to this publication consists of substantial quotations especially in the sections on 'Pregnancy and Newborns', 'Cardiovascular Effects', 'Dependence and Cancer'. These excerpts were previously published by EURAD (Europe Against Drugs) in 'Cannabis - A General Survey of its Harmful Effects Submission to The Social Justice Policy Group' (2008), available at <http://www.eurad.net/pdf/Cannabis%20combined%20document%20new.pdf>

**Dr Ivan Van Damme MD** (Belgium), Member International Task Force on Strategic Drug Policy. Appreciation is expressed for peer-review of this publication, including substantial quotations in the sections describing Cannabis, the history of Cannabis prohibition, the effects of Cannabis on Australian Indigenous communities, Chronic Obstructive Pulmonary Disease, Cannabis and the Cardiovascular System and Cannabis – Effects on the Brain.

**Josephine Baxter** Executive Officer, Drug Free Australia. Ms Baxter was formerly Community Relations Manager at Odyssey House Victoria, National Director – Programs and Training at Life Education Australia NSW, Project Manager for Offshore Licensing (India & Bangladesh), Centre for International Education and Training. She is currently a Member of the Australian National Council on Drugs (ANCD).

Thanks and grateful appreciation also to the following people who provided useful and specific advice on issues covered in this paper, related to their jurisdictions:

Dr Craig Raeside, Forensic Psychiatrist, SA, Hon. Chris Foley, MP, Member for Maryborough, Queensland and Member Travel Safe Committee, Mrs. Nan Ott, Mrs. Debbie Mason and Ms Sharon Baker.

## **FOREWORD**

---

This research paper gives a concise, clear, accurate and logical account of the main mental and physical risks of cannabis consumption, particularly for young users. The aim is to provide information and advice to politicians, decision-makers and researchers in order to ensure that the level of cannabis use in Australia is markedly reduced. The report provides practical recommendations towards this end and makes a valuable contribution to public knowledge and to the framing of government policies.

It is right that the emphasis is on young people since the age of first cannabis use is declining, and children and adolescents are the most vulnerable to the adverse effects. These include severe psychiatric disorders, cognitive impairment, and progression to other illegal drugs. It may be noted that the age of continuing cannabis use is also increasing and contributing to public risks, such as traffic and other accidents. These issues underline the importance of the addictive nature of cannabis, particularly in its increasingly more potent forms – unfortunately nurtured by burgeoning trafficking in hydroponically grown cannabis.

The widespread use of this pervasive and addictive drug demands urgent attention to the problem of quitting in people already cannabis dependent. None of the present methods, which rely mainly on psychological approaches, is highly effective. Further research, perhaps including the judicious use of cannabinoid antagonists combined with psychological therapies, needs to be explored, instigated and financed.

The report is written in a style easily accessible to the layman but is firmly based on hard scientific evidence, carefully selected from the vast amount of literature on cannabis that has accrued over the years. Policy makers would do well to heed its messages and recommendations.

**Heather Ashton DM, FRCP**

## **EXECUTIVE SUMMARY**

---

Cannabis is the most commonly used illicit drug in Australia, with one in three aged 14 years and older using the drug in their lifetime<sup>13</sup>. With the age of first use declining and the potency and popularity of the drug increasing there is clear incentive to ensure we understand the ramifications of its use on our health and communities.

This paper seeks to provide an introduction to the available literature on cannabis and the issues arising from cannabis use today, including: a description of the drug and its use; the increased potency of cannabis in the market; cannabis as a “gateway” to harder drug use; the issues of dependence and withdrawal; the significant cannabis harms on mental health, brain function and development, and physical conditions such as cancer; and, the problems encountered when trying to quit cannabis and the generally poor outcomes today.

The paper also provides recommendations on how we can effectively answer the questions surrounding cannabis use in Australia.

Throughout, we return to the issue of age of first use. Overwhelming evidence exists to support the fact that the age of first cannabis use is an important predictor of progression to heavier drug use and need for treatment (for example, see Pope et al, 2003; Anthony et al, 1994; Warner et al, 1995; Kandel et al, 1997). Clearly, there is a significant problem when boys aged 9 and 10 are discovered with cannabis in Brisbane schools<sup>14</sup>.

---

<sup>13</sup> 2004 National Drug Strategy Household Survey

<sup>14</sup> “Children caught with pot”, Sunday Mail, October 26, 2003

## **SECTION ONE: CANNABIS USE**

### **A DESCRIPTION OF THE DRUG**

---

Cannabis is the term most frequently used to refer to the drug deriving from the plant *Cannabis sativa*, the most commonly used illicit drug in Australia.

Cannabis is generally found in three forms, all of which contain delta-9 tetrahydrocannabinol (“THC”) as the main psychoactive ingredient. The most common and least potent of these forms is marijuana, a mix of the plant’s dried leaves and flowers. Cannabis in the form of hashish, or dried cannabis resin, produces stronger effects through its higher concentration of THC. Hashish oil, a thick oily liquid, is the third and most powerful form of cannabis.

Of the active constituents of cannabis there have been over 60 cannabinoids identified; however, only a few, and primarily THC, have been studied intensely. The primary metabolite, 11-hydroxy-THC, is also psychoactive and even more potent and, as with all cannabinoids, acts on the endogenous receptors in the brain and body.

Cannabis is well absorbed through inhaling its smoke or its inclusion in cakes or cookies and is very slowly metabolised by the body as it becomes deeply absorbed and entrenched in the body’s fatty tissues, with the brain a primary target. The complete elimination of a single dose from a user’s system may take up to thirty days (Cabral, 1989) and its acute effects can last several hours. In the case of chronic and frequent use, cannabis concentrations accumulate and can cause a chronic intoxication and dependency.

Further, the endocannabinoid system moderates many of the body’s vital functions, including motor control, cognition and memory, cardiovascular and endocrine activity, appetite, mood and immune responses. The endocannabinoid system’s regulation of these functions is fundamental to the brain’s normal performance and as such is central to understanding the pervasive effects of cannabis. THC overwhelms this system with long-lasting and extensive effects on both cannabinoid receptor type 1 (CB<sub>1</sub>), in the brain, spinal cord and peripheral nerves; and cannabinoid receptor 2 (CB<sub>2</sub>), in the body’s immune tissues. Physically, this means a decrease in the release of neurotransmitters, decreased neural firing and transmission of nerve impulses. Of note is the fact that the body’s natural substances which interact with CB<sub>1</sub> and CB<sub>2</sub> receptors are called anandamides, with these modulators being released locally in discrete brain areas, and in contrast to THC, are rapidly deactivated in minutes.

It has also been argued that 27% of the population carry a high risk genetic variant which produces a weaker Catechol-O-Methyl Transferase (COMT) enzyme which is responsible for the break down of dopamine in the brain. Henquet (2005) argues that the excessive amounts of dopamine released by cannabis use places those with the weaker COMT enzyme at 10 times greater risk of developing psychosis and, later in life, of developing schizophrenia (see Section 4: Cannabis Harms, Mental Health).

Over 1,500 toxic chemicals have been identified in the smoke of cannabis, including carbon monoxide, carcinogens and irritants. These all greatly affect the body's respiratory and cardiovascular systems, and in a similar manner to the known effects of smoking tobacco. Moir et al's 2007 study of marijuana smoke found ammonia at levels up to 20-fold greater than that found in tobacco, hydrogen cyanide at concentrations 3-5 times those in tobacco smoke, and confirmed the presence of known carcinogens and other chemicals implicated in respiratory diseases.

The Institute of Medicine of Washington DC<sup>15</sup> produced the table opposite, which shows a comprehensive comparison of the chemicals in cannabis and tobacco:

---

<sup>15</sup> Sources cited by the Institute of Medicine, Marijuana and Health, Washington DC: Hoffmann, D et al, 1975; Hoffman, D et al, 1976; Brunnemann, KD et al, 1976; Brunnemann KD et al, 1977.



Drug Free Australia  
**EVIDENCE**

**Table 1 – Comparison of Chemicals – Cannabis and Tobacco**

<b>A. Cigarettes</b>			
	<b>Units</b>	<b>Marijuana</b>	<b>Tobacco</b>
		(85mm)	(85mm)
Average Weight	(mg)	1115	1110
Moisture	(%)	10.3	11.1
Pressure Drop	cm	14.7	7.2
Static Burning rate	mg/s	0.88	0.80
Puff Number		10.7	11.1
<b>B. Mainstream Smoke</b>			
<b>I. Gas Phase</b>	<b>Units</b>	<b>Marijuana</b>	<b>Tobacco</b>
Carbon Monoxide	%	3.99	4.58
	mg	17.6	20.2
Carbon Dioxide	%	8.27	9.38
	mg	57.3	65.0
Ammonia	mcg	228	199
HCN	mcg	532	498
Cyanogen (CN) <sub>2</sub>	mcg	19	20
Isoprene	mcg	83	310
Acetaldehyde	mcg	1200	980
Acetone	mcg	443	578
Acrolein	mcg	92	85
Acetonitrilebenzene	mcg	132	123
Benzene	mcg	76	67
Toluene	mcg	112	108
Vinyl chloride	ng	5.4	12.4
Dimethylnitrosamine	ng	75	84
Methylethylnitrosamine	ng	27	30
pH, third puff		6.56	6.14
fifth puff		6.57	6.15
seventh puff		6.58	6.14
ninth puff		6.56	6.10
tenth puff		6.58	6.02
<b>II. Particulate phase</b>			
	<b>Units</b>	<b>Marijuana</b>	<b>Tobacco</b>
TI particulate - dry	mg	22.7	39.0
Phenol	mcg	76.8	138.5
o-Cresol	mcg	17.9	24
m- and p-Cresol	mcg	54.4	65
Dimethylphenol	mcg	6.8	14.4
Catechol	mcg	188	328
Cannbidol	mcg	190	
D9 THC	mcg	820	
Cannabinol	mcg	400	
Nicotine	mcg		2850
N-Nitrosanomicotine	ng		390
Naphthalene	mcg	3.0	1.2
1-Methylnaphthalene	mcg	6.1	3.65
2-Methylnaphthalese	mcg	3.6	1.4
Benz(a)anthracene	ng	75	43

Drug Free Australia  
**EVIDENCE**

---

Benzo(a)pyrene	ng	31	21.1
----------------	----	----	------

## **INCREASED POTENCY**

---

Of particular concern in recent years is the cultivation of high potency cannabis, often referred to as “skunk” or “super skunk”<sup>16</sup>. This increase in potency, which in real terms refers to increased THC concentrations, is in addition to the existing hybrid varieties of cannabis which are continuing to gain popularity in Australia. High potency cannabis, or cannabis containing high THC concentrations, is currently cultivated in all states of Australia, largely through the use of hydroponics cultivation, and is also brought into Australia from countries such as Papua New Guinea, India, Lebanon, Morocco, Holland and Canada.

The effects of THC in the cannabis user, including those which are negative, are dose-related – the higher the dose of THC, the greater the effects – hence, the significance of increased cannabis potency (Raemaekers, 2006).

It is important to note that some publications dated as recently as 2006, be treated with caution on this matter, as the evidence base has now substantially changed. For example, the Australian National Council on Drugs (ANCD's) position, outlines in the papers “*Cannabis: answers to your questions*” (2006) and “*Evidence-based answers to cannabis questions: a review of the literature*” (2006), is that in the past few decades Australia has only seen small increases in THC levels.

Of interest is the fact that, more than a decade ago, the Australian Bureau of Criminal Intelligence (1993) reported a THC content in cannabis plants of up to 30%, a substantial increase from the early 60's when the typical cannabis joint contained as little as 0.5%. One example of our concerns regarding the increase of potency of cannabis in Australia is that of ‘Drug Kingpin’, Alexander Malcolm Lane, who used drug mules, paying up to \$30,000 a trip to travel to Amsterdam and bring back thousands of high-potency cannabis seeds.

The Courier-Mail August 17 2007. <http://www.news.com.au/story/0.23599.22257426-2.00.html>

In both the United States (US) and United Kingdom (UK) public offices have acknowledged THC potency increases. A joint report of the US's Office of National Drug Control Policy (NDCP) and the National Institute on Drug Abuse recently found that levels of THC in cannabis have reached the highest-ever levels since analysis of the drug began in the late 1970's. They found the average to have increased from just below 4% in 1983 to a new high of 9.6% in 2008, a doubling of potency. John Walters, Director of NDCP, states “Baby boomer parents who still think marijuana is a harmless substance need to look at the facts. Marijuana

---

<sup>16</sup> See Appendix A and Appendix B for media reports

potency has grown steeply over the past decade, with serious implications in particular for young people”.

The UK’s Home Office “Cannabis Potency Study 2008”, while finding a lesser increase over time (from 13.98% to 15.0%), nevertheless presents a startling average percentage of THC content at 15% potency. These figures, while not based on Australian data, cannot be ignored. It would be imprudent to assume the increases in potency seen in overseas cannabis markets are not mirrored within Australia.

When it is considered that there is a well-demonstrated dose-response relationship between cannabis and its related drug-induced psychosis, where the greater the amount of cannabis consumed correlates to a higher degree of risk of psychosis, any three to fourfold increase in potency is of absolutely critical importance to any assessment of cannabis harms.

When it is further considered that changed usage patterns, whereby young users smoke only the multiple potent heads of the cannabis plant and also use a more concentrated mode of drug delivery via the use of bongs, the ANCD papers’ dismissive approach to potency is of great concern. By over-emphasising their assessment of a narrow understanding of the thirty-fold claim, which makes three to fourfold increases pale into insignificance, the very significant conjuncture of these real and significant three to fourfold increases in cannabis potency, along with new usage patterns which deal significantly higher doses of cannabinoids, is downplayed for the Australian reader at the very time that the scientific community has expressed alarm at this very same conjuncture and its relationship to psychosis. Concluding their discussion in ANCD Research Paper (2006, p.11), the authors cite US figures which do in fact show increases in potency which have more than tripled:

*“Between 1980 and 1997 THC content increased from 1.2 per cent to 4.2 per cent. Cannabis samples (excluding hash and hash oil) analysed between May and August 2003 had average THC levels of 6.37 per cent (see 1.2 for details on potency for different forms of cannabis). This finding suggests definite rises in cannabis THC content. However, over the last two decades, such increases are not consistent with claims of a thirty-fold increase. While Australia has not collected such comprehensive data, moderate changes as seen in the United States and New Zealand data are likely to be replicated in Australian trends given that, with isolated exceptions, the majority of THC levels in studies of cannabis seizures have remained under 5 per cent.”*

## **GATEWAY DRUG**

---

The term “gateway drug” is used to illustrate the tendency of cannabis to introduce the user to other illicit drugs, and arguments for and against the hypothesis have a long history.

There are multiple studies that have reached a conclusion in support of the gateway hypothesis (see Kandel, 1992 and 1996; Clayton, 1992; Bailey, 1992; Poikolainen et al, 2001). Specifically, the Centre on Addiction and Substance Abuse (CASA) at Columbia University found that children who use drugs, including cannabis, are up to 266 times more likely to use cocaine than those who do not use any of the gateway drugs identified (cannabis, tobacco and alcohol).

There are critics of the gateway theory who argue that a clear link between cannabis use and other illicit drugs does not reflect a causal sequence, relying upon the presence of confounding factors such as a user’s socio-economic status and family history (see Johnson, 1973; Hays et al, 1987).

In contrast, the US Office of National Drug Control Policy’s “2008 Marijuana Sourcebook” clearly states that recent research supports the gateway hypothesis, specifically that “its use creates greater risk of abuse or dependency on other drugs, such as heroin and cocaine”.

Further, a study on 311 sets of same-sex twins, in which only one twin smoked cannabis before age 17, found that early cannabis smokers were up to five times more likely than their twin to move on to harder drugs (Lynskey, 2003). Also, Hurd (2006) concluded that findings supported the gateway hypothesis when she conducted a study on rats. Hurd found that rats trained to self-administer heroin would administer greater doses if they had previously been exposed to THC. A further study of 75,000 adolescents and young adults found teenage cannabis smokers had a 50% higher risk of developing an alcohol-use disorder and specifically stated “Addictive drugs all act on a part of the brain that is described as the central reward circuitry. Once this system is exposed to one drug, the brain may become more sensitive to the effects of other drugs, as demonstrated by a number of rodent studies” (Gruzca, 2006).

In summary, as Kandel states (1992), very few try illicit drugs other than cannabis without prior use of cannabis.

## **DEPENDENCE**

---

There is general consensus that cannabis is addictive and the addiction carries with it all the adverse affects of dependence, including symptoms of withdrawal (see Ramstrom, 2003, in *A Survey of Scientific Studies*).

In fact, in 1992 the World Health Organisation (WHO) identified cannabinoid dependence syndrome and described that dependence as existing where three or more of the following diagnostic guidelines were experienced or exhibited during a year:

- a) a strong desire or sense of compulsion to take cannabinoid;
- b) difficulties in controlling cannabinoid-taking behaviour in terms of its onset, termination or levels of use;
- c) a physiological withdrawal state when cannabinoid use has ceased or been reduced, as evidenced by: the characteristic withdrawal syndrome for cannabinoid; or use of the same (or a closely related) substance with the intention of relieving or avoiding withdrawal symptoms;
- d) evidence of tolerance, such that increased doses of cannabinoid are required in order to achieve effects originally produced by lower doses;
- e) progressive neglect of alternative pleasures or interests because of cannabinoid use, increased amount of time necessary to obtain or take the substance or to recover from its effects;
- f) persisting with cannabinoid use despite clear evidence of overtly harmful consequences, such as depressive mood states consequent to periods of heavy substance abuse, or drug-related impairment of cognitive functioning; and
- g) efforts should be made to determine that the user was actually, or could be expected to be, aware of the nature and extent of the harm.

Haney et al (1999) demonstrated withdrawal symptoms from pure THC delivered under laboratory conditions in humans and those symptoms such as anxiety and insomnia lead to difficulty in stopping cannabis use.

Budney et al (2004) reviewed the validity of cannabis withdrawal syndrome and concluded that the evidence of laboratory and clinical studies indicates that withdrawal syndrome reliably follows discontinuation of chronic cannabis use and further noted that the severity of withdrawal symptoms appeared substantial.

Later, in 2006, Budney & Hughes found evidence of a withdrawal syndrome in cannabis use and noted “demand for treatment of cannabis dependence has grown dramatically (and) the majority of people who enter treatment have difficulty in achieving and maintaining abstinence from cannabis”. They found laboratory studies had established the reliability, validity and time course of a cannabis withdrawal syndrome and pointed to the discovery of an endogenous cannabinoid system, the identification of cannabinoid receptors and demonstrations of precipitated withdrawal with cannabinoid receptor antagonists as the neurological basis for cannabis withdrawal.

In a wide ranging appraisal of the literature, Gardner reviewed 224 scientific papers in 2003 and concluded “cannabinoids act on the brain reward processes and reward-related behaviours in strikingly similar fashion to other addictive drugs”.

Budney (2006) also asked if specific dependence criteria were necessary for different substances in a report for *Addiction* and found that “cannabis dependence is much more similar to, than different from, other types of substance dependence, even with regard to withdrawal”.

Vandrey (2008) more recently suggested withdrawal from cannabis use is similar to that experienced when quitting smoking tobacco, in a controlled comparison based on the self-reporting of twelve heavy users of both cannabis and tobacco. The participants’ abstinence was confirmed objectively, procedures were identical during each abstinence period and abstinence periods occurred in a random order. The strength of this study is in the same participants reporting on withdrawal symptoms for tobacco and marijuana, eliminating the likelihood that results reflect physiological differences between subjects.

Vandrey found that “since tobacco withdrawal symptoms are well documented and included in the DSM-IV<sup>17</sup> and the ICD-10<sup>18</sup>, we can infer from the results of this comparison that marijuana withdrawal is also clinically significant and should be included in these reference materials”.

Also, Cambridge University Press recently published “Cannabis Dependence: Its Nature, Consequences and Treatment” (2006), a report on over 2,500 adult daily cannabis users where 1, 111 adults met the DSM-IV criteria for dependence and reported significant associated problems, such as depression and lower levels of motivation and satisfaction with life.

Coffey et al (2003) related dependence to a user’s starting age and reported that weekly use of cannabis marks the threshold for an increased risk of later cannabis dependency, specifically amongst

---

<sup>17</sup> Diagnostic and Statistical Manual of Mental Disorders, 4<sup>th</sup> Edition

<sup>18</sup> International Classification of Diseases, 10<sup>th</sup> Edition

young users. Coffey et al reported “30% of teenagers smoking more than once a week became addicted by their early twenties, those between 14 and 17 were twenty times more likely”.

Interestingly, dependent cannabis users reported compulsive and out-of-control use more frequently than dependent alcohol users, withdrawal to a similar extent and tolerance considerably less often.

Chambers’ study (2003) supported the increased vulnerability of adolescent brains to addiction compared to adults. He suggested that drug addiction should be thought of as a development disorder in the brains of teenagers, in that the adolescents’ changing brain circuitry leaves them especially vulnerable to the effects of addictive drugs.

Finally, *Science Threads of Addiction, Substance Use and Health* (STASH January 2007) looked at the transition from drug use to dependence in over 8,000 participants. They found the probability of drug initiation and developing dependence both peaked at 18. Interestingly, male users were found to be approximately twice as likely to develop dependence in the first two to five years as female users.



## **SECTION TWO: CANNABIS HARMS**

### **INTRODUCTION TO THE ADVERSE HEALTH CONSEQUENCES OF CANNABIS**

---

Sweden was the first country in the world to extensively research the evidence on the adverse health consequences of cannabis use and has since adopted a strategy of community wide information sharing regarding the health hazards posed by the drug. Renowned psychiatrist Jan Ramstrom has compiled extensive reviews for the Swedish National Board of Health Welfare (in 1998) and National Institute of Public Health (in 2003) on the health implications of cannabis use. A result of Ramstrom's reviews was the report "*Adverse Health Consequences of Cannabis Use*", which provides outlines of mental disorders, physical injury, psychological and psychosocial injury. More recently in the United Kingdom, Brett (2008) produced "*Cannabis – A General Survey of its Harmful Effects*" in a review of the ever-widening range of negative effects upon health caused by the substance, including childhood development, mental illness and cognitive functioning.

In this section we shall discuss only a limited portion of the available literature on adverse health consequences in three primary areas including mental health, brain function and physicality.

### **MENTAL HEALTH**

---

The harms of cannabis use on the user's mental health have been well documented and include specific research into the onset of schizophrenia (see Boydell, 2006; Solowij, 2007; Fergusson, 2005; Ferdinand, 2005, Veling 2008) and other mood disorders including depression, bi-polar disorder and amotivational syndrome (see Bovasso, 2001; Hayatbakhsh, 2007; Corcoran 2008). Research has also explored the links to suicide, especially in young people (Dervaux, 2003; Greenblatt, 1998; Beautrais, 1999).

Firstly, severe mental disturbances, such as momentary short-term psychosis or the long-term illness of schizophrenia, have been linked to cannabis use and especially so when cannabis use begins in adolescence. As a stimulant of the dopamine system, cannabis offers the user a pleasurable 'high'; however, this 'high' can become dangerous when dopamine levels become excessive. Murray (2005) discusses the impact of early cannabis use on the developing adolescent brain and specifically dopamine receptors, indicating early cannabis use may damage these receptors permanently, leaving a young cannabis user at a much higher risk of developing schizophrenia or experiencing psychosis.

A significant study in Sweden (Andreasson, 1987) examined, over fifteen years, the link between heavy cannabis use and schizophrenia in 50,087 members of the Swedish Army and conclusively found schizophrenia occurred more frequently in heavy consumers of cannabis.

The results were re-analysed and replicated in additional studies (Zammit, 2002; Fergusson, 2003) with the British Medical Journal (BMJ) reporting in 2002 heavy consumers of cannabis at age 18 were over 600% more likely to be diagnosed with schizophrenia over the next fifteen years than those who did not use cannabis. The BMJ report also clarified that it was cannabis use and not other drugs that was associated with schizophrenia.

Moore et al concluded in 2007, that “there is now sufficient evidence to warn young people that using cannabis could increase their risk of developing a psychotic illness later in life”. In fact, Moore et al found, in a review of 35 longitudinal studies that cannabis use increased the risk of developing a psychotic illness, such as schizophrenia, by 40%. This figure was doubled for frequent or heavy users. Reports by Hollis et al (2008); Henquet (2005) and Konings (2008) have found a significant positive association between cannabis use and mental health disturbance in young people who are genetically predisposed to mental health problems, such as schizophrenia.

Interestingly, Ramstrom (2003) demonstrated the association between adolescent cannabis use and adult psychosis persists even after controlling for many potential confounding variables, such as low IQ and education levels, unemployment, social integration, gender, age, ethnic group, tobacco smoking and previous psychotic symptoms. This finding was supported by recent studies of Finnish adolescents (Jouku et al, 2008) which showed an association between cannabis use and psychosis symptoms not caused by other drug use, family background or behavioural problems.

Further, researchers in Spain recently found a strong and independent link between cannabis use and the onset of psychosis at a young age, reporting that compared with nonusers, the age of psychotic onset was lowered by 7, 8.5 and 12 years among users, abusers and dependents respectively. These results are supported by multiple studies (Fergusson, 2005; Ferdinand, 2005; Solowij, 2007) and all highlight the notion of the younger the user, the worse the effects.

A second mental health issue frequently associated with cannabis use is depression and numerous studies support the connection.

For example, an Australian study of 3,239 young adults, from their birth to the age of 21, found a relationship between early initiation to and frequent use of cannabis and depression (Hayatbakhsh, 2007); a 16-year study of individuals not initially suffering from depression, but who then frequently used

cannabis, were found to be four times more likely to develop depression at follow up (Bovasso, 2001); and, Fergusson (2002) studied 1,265 children over a 21-year period and concluded that cannabis use, particularly heavy or regular use, was associated with a later increase in depression and suicide. Recent articles in *The Age* newspaper (September 29, 2008) discuss Australian statistics showing that cannabis' toll on mental health, expressly causing depression, is more prevalent than that caused by the well known impact of amphetamines.

Thirdly, cannabis use can induce amotivational syndrome, a mental state characterised by apathy, an inability to carry out plans, deal with frustration or concentrate for any length of time (Cohen, 1982). While equivocal, amotivational syndrome strikes a chord in that it aptly describes the 'personality' of a chronic cannabis smoker and is supported by numerous studies (Newcomb & Bentler, 1988; Tunving, 1987; Cohen, 1982). Musty & Kaback (1995) maintain that amotivational syndrome exists and is a manifestation of depression.

Finally, multiple studies have linked cannabis use with suicide<sup>19</sup>. A study by Beautrais et al (1999) examined and found a relationship between cannabis abuse and suicide. Greenblatt (1998) found that young people, aged 12 to 17, who smoke cannabis weekly are three times more likely than non-users to have thoughts about committing suicide, and this ratio was confirmed by Lynskey et al (2004). Dervaux (2003) examined the link between cannabis abuse and the suicide attempts of schizophrenics, finding a close correlation.

---

<sup>19</sup> See Appendix B for media articles on this issue

## **BRAIN FUNCTION**

---

It is undeniable that cannabis affects the brain, and affects the brain's functioning adversely. Conclusive evidence shows that heavy marijuana use for five years or more may impair memory and slow cognitive function (Lambros, 2006; Ashtari, 2005; Robbe, 2006; Karila, 2005; Lundqvist, 2005; Fisk 2008; Solowij, 2008), with specific research completed on impaired driving ability (Kurathaler, 1999; Menetry, 2005; Drummer, 1994, 1998, with Gerostamoulos, 1999).

The short-term effects of cannabis use on brain function can include things such as problems with memory and learning, difficulty in thinking and problem solving, loss of coordination. Long-term effects include permanent memory impairment and overall slower cognitive function.

Importantly, Chambers (2003) and Pistis (2004) found the adolescent brain, while still under development, was particularly vulnerable to the ill effects of substance abuse, including cannabis. Researchers have concluded that repeated exposure to cannabis as an adolescent was related to abnormalities in the development of the specific fibres associated with higher aspects of language auditory functions (Ashtari, 2005). Giedd et al (1999) also discusses the development of the adolescent brain which does not reach physical maturity until the mid-twenties, and warned drug abuse could alter the normal course of brain growth. He later specifically looked at regions of the brain that control impulse and risky behaviours, reconfirming his previous findings that cannabis use on a developing adolescent brain can negatively affect overall and specific brain functions. In a study of brain abnormalities in schizophrenics as compared to the brain abnormalities presenting in adolescents frequently using cannabis, Kumra (2007) concluded the deficiencies were the same and in that part of the brain which develops during adolescence – emotional associations and other higher cognitive functions such as language, perception, creativity and problem solving.

Most recently, Medini et al (2008) confirmed the adverse brain impact of adolescent cannabis use in a study presented to the American Academy of Pediatrics. The research team found that the chronic use of cannabis during adolescence – a critical period of ongoing brain development – slowed psychomotor speed, led to poorer complex attention, verbal memory and also planning ability. Perhaps, most startlingly, these impacts continued after one month's abstinence from cannabis use.

Recent evidence on cannabis and cognitive functioning also comes from Greece (Messinis et al, 2006) where they found that those who smoked at least four joints per week for several years performed significantly worse than non-users in several areas, particularly verbal learning (the ability to remember previously learned words) and executive functioning (organising and coordinating simple tasks). Further,

Ranganathan (2006) reviewed the literature on the acute effects of cannabis on memory, concluding that cannabinoids impair all stages of memory (including encoding, consolidation and retrieval).

Solowij et al (2002) examined the effects of the duration of cannabis use on specific areas of cognitive functioning among users seeking treatment for cannabis dependence. Their results also confirmed that long-term heavy cannabis users show impairments in memory and attention, and in fact that endure beyond the period of intoxication and with increasing years of regular cannabis use. Bolla (2002) found a dose-response relationship in that the more cannabis used, the worse they performed in cognitive testing, especially memory. It is very clear that regular cannabis use is associated with impaired functioning – both by objective measures and by the admission of users themselves (Pope Jr, 2004).

Alternate studies (Niveau & Dang, 2003; Howard & Menkes, 2007) also looked at the effects of cannabis use upon neural mechanisms controlling impulse and found a connection with acts of violence and aggression. Additionally, the latest evidence of brain abnormalities in long-term, chronic cannabis users further confirms that heavy daily use exerts harmful effects on brain tissue (Yucel, 2008) and in similar ways to those seen after long-term abuse of other major drugs (de Fonseca, 1997).

Specific research on the impacts of cannabis on driving ability has increased of late. Drummer (1994; 1998; with Gerostamoulos, 1999) has done significant research on the issue and found road fatalities related to cannabis intoxication have steadily increased over the last ten years. Consistent with Drummer's findings, past research examining the effects of THC on driving ability indicate it impairs both car control (Moskowitz, 1985) and the driver's awareness of the vehicle's position in traffic (Ramaekers et al, 2000). Hansteen et al (1976) also found THC intoxication is more likely to result in collisions with obstacles on a driving course than when not intoxicated. Studies by Papfotiou (2001, 2005) found that driver errors occurred more frequently when the driver was under the influence of both cannabis and alcohol. Since the two are frequently taken together it is concerning to note that a 2005 study (Laumon et al) found the risk of accident when cannabis was combined with alcohol was 16 times higher than when using either drug alone.

These findings indicate that cannabis impairs driving ability and given the prevalence of cannabis use (upward of 300,000 Australians smoke it daily; 750,000 smoking it weekly<sup>20</sup>) this poses a significant risk on our roads.

---

<sup>20</sup> Australian Institute of Health and Welfare 2005. Statistics on drug use in Australia 2004. AIHW Cat. No. PHE 62. Canberra: AIHW (Drug Statistics Series No. 15). p 22

## **PHYSICAL HARMS**

---

Cannabis smoke contains many of the same known carcinogens as tobacco smoke. In fact, studies have found the tar from cannabis contains 50% more of some of the carcinogens found in tobacco, notably benzopyrene, a potent carcinogen and key factor in the development of lung cancer (Hoffman et al, 1997; Tashkin et al, 1997; Novotny et al, 1976; Leuchtenberger et al, 1983), and so it should not be surprising to see cannabis use as a factor in a wide range of adverse physical conditions, including lung cancer, chronic obstructive pulmonary disease, increased risk of heart or stroke due to adverse impacts on the cardiovascular system, weakened immune system and birth defects. Cannabis cigarettes also have a higher combustion temperature than tobacco cigarettes.

There is research to support the connection between cannabis use and cancer of the digestive and respiratory tracts (Hall, 2002), lung cancer (Berthiller 2008), lung (Sridar, 1994) and breast (McKallip, 2005). Aldington (2007; et al, 2008) found that long term cannabis use specifically increased the risk of lung cancer in young adults, particularly in those who started smoking cannabis at a young age. Tashkin (2006) explains that cannabis smokers typically hold their breath four times longer than tobacco smokers, allowing more time for particles to be deposited in the lungs. In addition, cannabis is usually smoked without an adequate filter.

Researchers have interviewed lung cancer patients in seeking to identify the main risk for the disease, such as smoking habits, family history and occupation (Tetrault et al, 2007). The patients were questioned about cannabis consumption and results showed lung cancer risk rose by 5.7 times for patients who had smoked a joint a day for 10 years, or two joints a day for five years, and after adjusting for cigarette smoking.

A study in 2006 (Terris et al) reported that, of 52 men with transitional cell bladder cancer, 88.5% had a history of smoking cannabis and almost 31% were still using the drug. Terris et al found that cannabis metabolites have a half-life in urine about 5 times greater than tobacco metabolites, and warned smoking cannabis may be a more potent stimulant than tobacco smoking of malignant cell transformation, a hallmark of cancer.

In relation to chronic obstructive pulmonary disease (COPD), the period of cannabis use seems to play an important role, particularly in regard to lung emphysema and various other respiratory complications such as asthma, dyspnea, pharyngitis and chronic cough (Tetrault et al, 2007). Beshay (2007) researched emphysema in young adults and agreed the period of cannabis use was influential. A further study Tan (2007) on people aged 40 and over found that smokers were two and a half times as likely as

non-smokers to develop COPD and that adding cannabis to tobacco increased the risk again by one-third.

With regard to the body's cardiovascular system, the harms of cannabis use are again significant. At first, the intoxication produced by cannabis causes an increase in heart rate of between 20% and 50% (Huber et al, 1988; Jones, 1984) as THC increases the production of chemicals which stimulate the heart.

The increase in heart rate caused by cannabis is additive with the increased heart rate caused by nicotine in tobacco. THC is also found to have analgesic properties, lessening chest pain which Jones (1982, 1984) argues may delay the seeking of treatment, decrease the supply of oxygen to the heart and place it under greater strain. Maykut (1984) also found a rise in blood pressure if the person is sitting or lying, but upon standing drops drastically, in some cases causing the person to faint.

It must be added that tolerance can develop quickly to the acute cardiovascular effects of cannabis, with people receiving daily doses by mouth developing tolerance within 7 to 10 days, in a possible explanation of why effects can sometimes be missed (Benowitz & Jones, 1975; Nowlen & Cohen, 1977; Jones, 1984).

Supporting research as to the cardiovascular harms of cannabis use are found in Herning et al (2001), who used sound waves to measure cerebral artery blood flow resistance and found that prolonged cannabis use in 18 to 30 year olds increased the resistance in arteries and restricted blood flow to the brain; in Geller et al (2004) who detail an incident in which three teenagers, aged 15 to 17, "binge smoked" cannabis and suffered strokes from which two later died; and, in Mittleman (2001) who interviewed 3,882 patients of heart attacks and found the risk of myocardial infarction rose almost 5 times in the hour following the smoking of a joint.

We still do not know the long term effects of exposure to cannabis smoke on the cardiovascular system over extended periods, but experience with the problems of tobacco smoke should urge caution. Jones (1984) suggests "after years of repeated exposure, there may be lasting, perhaps even permanent alterations of the cardiovascular system function. There are enough similarities between THC and nicotine's cardiovascular effects to make the possibility plausible" and this is supported by a multitude of research (Mukamal et al, 2008; Lindsay, 2005; Fisher et al, 2005; Korantzopoulos, 2008).

There is also significant supporting research on the effects of cannabis use during pregnancy on newborns, with THC readily crossing the placenta (Bada, 2006; Cornelius, 1995; Bailey, 1987) – Bluhm (2006) discusses an increased risk of neuroblastoma; Robinson et al (1989) identified an eleven-fold

increase in leukaemia; and, there are multiple abnormalities in physical appearance, size, weight and hormonal functions discussed by Fried, 1980 and 1984; Zimmerman, 1991; Zuckerman, 1989; Barnett, 1983; El Marroun 2008; Mendelson, 1985 and 1986).

A paper by Klonoff-Cohen et al (2006) studied the effects of cannabis use on the outcomes of IVF and GIFT fertility treatments and concluded cannabis use lowered the prospects of successful treatments. They found females produced fewer eggs and the child once successfully conceived had a significantly lower birth weight.

The risk of miscarriage of ectopic pregnancy of women smoking cannabis in the early stages of pregnancy was highlighted in recent research by Day (2006). THC was found to mimic anandamide and its control over embryo development, disrupting the process and creating cell abnormalities in mice. Day also concluded that, "Prenatal exposure to marijuana, in addition to other factors, is a significant predictor of marijuana use at age 14".

A review by Huizink & Mulder (2006) came to the conclusion that pre-natal exposure to cannabis use is related to some common neuro-behavioural and cognitive outcomes, including symptoms of ADHD such as inattention and impulsivity, decreased general cognitive functioning and deficits in learning and memory tasks.

Barros and colleagues, writing in *The Journal of Paediatrics* in January 2007, found that marijuana-exposed infants born to adolescent mothers scored differently on measures of arousal, regulation and excitability compared to non-exposed infants, where they displayed subtle behaviour changes in the first few days of life, i.e. they cried more, startled more easily and were more jittery. The authors said this may also interfere with mother-child bonding.

Harkany et al. (2007) found that endocannabinoid signalling modulates central nervous system patterning, so that "pharmacological interference with endocannabinoid signals during foetal development leads to long-lasting modifications of synaptic structure and functioning. Marijuana abuse during pregnancy can impair social behaviours, cognition and motor functions in the offspring with the impact lasting into adulthood".

Another paper in May 2007 had similar findings. Endocannabinoids in the human body play a vital role in the development of a baby's brain in that they are responsible for controlling how the complex system of nerves develop in the embryonic brain. Dr Ann Rajnicek states "Smoking cannabis could interfere with the signals that are being used in the brain to wire it up correctly in the first place. As the brain develops further, there will be functional problems – potential brain damage" (Berghuis et al. 2007).



The reason for the late appearance of this damage is assumed to be that the functions involved are “executive” cognitive functions that are not taken into use until the child is four to six years old. Another long-term study shows similar associations between exposure during the foetal stage and relatively late (at age 6 and 10 respectively) behavioural disturbances (Ramstrom, 2003).

### **SECTION THREE: QUITTING CANNABIS**

It is not only important to have strategies to help people quit cannabis but prevention must be the aim of the policy makers. Student drug testing is intended as prevention and as a deterrent. It offers young people a tool to refuse drugs among their peers. Student drug testing, which include anonymity, privacy, non-coercion, also encourages families to seek help for their children in need. (McKinney 2005, DuPont 2002, Ticker 1997, Goldberg 2007).

While it is acknowledged that it is far easier and less expensive to adopt preventative measures than invest in treatment, for those who are addicted to cannabis, it is important to provide the means to be able to stop – just as we have seen implemented with other common drugs such as tobacco and alcohol. This section discusses symptoms, the need for treatment, effective treatment techniques and the high incidence of relapse.

Contributors to *“Cannabis Dependence, Its Nature, Consequences and Treatment”* state the symptoms of cannabis withdrawal are “irritability, anger, nervousness, sleep difficulty, change in appetite, physical discomfort” (2006) and Kouri (1999) found previous reports of an abstinence syndrome associated with chronic marijuana use were confirmed and also suggested aggressive behaviour as a component. There is also research to suggest staying clean for cannabis addicts is as hard as for heroin addicts (Roffman, Stephens, Marlatt; 2006).

Extensive research has found a connection between early cannabis use and the likelihood of need for treatment (Kandel & Yamaguchi, 1985; Robins & Przybeck, 1985; Adams & Gfroerer, 1988; Glantz & Pickens, 1992; Anthony & Petronis, 1995).

There is a need for effective treatment of cannabis misuse. Psychological therapies have been developed based on principles of motivational interviewing, cognitive-behavioural therapy and relapse prevention. The evidence base for these therapies is explored in a review by Maddock & Babbs (2006), and studies targeting both adult users and young people are considered. They also discuss new pharmacological treatments.

Increased recognition that marijuana can cause addiction and significant negative consequences in a subset of users has prompted the development of marijuana-specific interventions and treatment materials paralleling those for other substance use disorders. These advances have increased users' and caregivers' perceptions that it is acceptable to seek and provide treatment for cannabis use and

have contributed to an increase in the number of individuals requesting help (Budney, 2007). In light of the recognition that people smoke cannabis mainly for pleasure (euphoria/"high") it is noted that none of the available treatments are highly effective.

The Substance Abuse and Mental Health Services Administration (SAMHSA) released a treatment manual titled "Brief Counselling for Marijuana Dependence – a Manual for Treating Adults" and outlined procedures for individuals who use cannabis as their primary drug. The manual suggested chronic cannabis users tended not to seek treatment in traditional drug treatment settings, but that when given the opportunity would respond positively. Increasing evidence suggests that counselling for cannabis dependence is effective (Steinberg et al, 2002; SAMHSA, 2005).

Clients in treatment require a sense of hope and positive expectations are especially critical when facing a protracted period of withdrawal (Zweben & O'Connell, 1992). Programs designed to aid cessation should focus on the negative effects of marijuana and should offer alternative ways to relieve negative physical and psychological conditions such as stress (Weiner, 1999).

Professionals working with cannabis dependent people often see them relapse repeatedly. Relapse may involve the length of detoxification; ease of access to the substance; social pressures in schools, work, entertainment, social and family settings; persistent denial; or the high level of functioning many addicts have when they enter recovery. Marijuana addicts who have not previously shown extensive drinking histories often believe they can consume alcohol and this can lead to a cannabis relapse (Chacin, 1996). Budney et al (2002) found clinical trials evaluating treatment for cannabis dependence suggest that the withdrawal syndrome, like other substance dependence disorders, is responsive to intervention but the majority have difficulty achieving and maintaining abstinence.

In recent years, multiple sources have released suggested treatment programs, ranging from counselling treatments for adults (SAMHSA, 2005), intervention programs (Maddock & Babbs, 2006) and specific treatment programs developed for women (Chacin, 2006). The work of Roffman & Stephens (2006) and Budney et al (2007) also discuss treatment options and are recommended reading on the topic.

## **SECTION FOUR: RECOMMENDATIONS**

The evidence is clear that the younger the age of initiation to cannabis use, the greater the risk of harmful effects to the individual. The following recommendations aim to provide advice and strategies to politicians, decision-makers and researchers to ensure that the level of cannabis use in Australia is markedly reduced, within the next few years.

Drug Free Australia's research recommends:

1. That all Australian Governments urgently implement effective preventative drug education in all States and Territories, focusing on education, in both primary and secondary schools that includes the latest scientific research into the harmful effects of cannabis on the developing brain, together with information on issues related to the risk of suicide, drug-induced psychosis, schizophrenia and depression.
2. That the Federal Government urgently implements a national media campaign, similar to the "Bloody Idiot" alcohol campaign, in order to inform the community of the harmful effects of cannabis use on all community members. This would be an appropriate response to the concerns of the Australian community, as measured in the Pfizer/NDARC report of 2007, in which 77% of Australians expected the government to run a public health campaign alerting the public to the harms of cannabis.
3. That clear cannabis prevention policies be issued by the Commonwealth Department of Health and Ageing, to be implemented in all schools and further, that these be regularly updated and reinforced.
4. That Federal, State and Territory police are resourced to implement NOAH (Narcotics, Opiates, Amphetamines, Hashish 1992) blitzes every three months for a two year period. This should target users and potential users; it should deal with plantation and hydroponically grown cannabis, trafficking, financing, and/or selling drugs to children. Further, that the Proceeds of Crime funds be used to continue a NOAH cannabis campaign after the two-year period.
5. That all professionals working in drug and alcohol fields be required to strongly discourage any cannabis use by those whom they counsel or to whom they provide treatment for drug related problems.

6. That the Federal and all States and Territory Governments resource and conduct a long-term cannabis QUIT campaign, to be organised and implemented along lines similar to the successful “QUIT Tobacco” campaign. Further, that the Cancer Council of Australia be encouraged to promote the message that cannabis has carcinogenic properties that cause the same adverse health consequences as tobacco.
7. That greater penalties be introduced to prosecute suppliers and traffickers of drugs to children while young offenders be directed toward compulsory treatment rather than jail.
8. That clear messages about the harmful effects of cannabis on the young body should be issued by the Commonwealth Department of Health and Ageing with the cooperation of the State and Territory Governments be used in all schools and be constantly reinforced.
9. That recommendation Number 70 of the report to the *Ampe Akelyernemane Meke Mekarle* “Little Children are Sacred” Inquiry be fully implemented. This recommends that government develop and implement a multi-faceted approach to address the abuse of illicit substances in Aboriginal communities, in particular cannabis. This approach to include strategies for prevention, intervention and enforcement strategies which:
  - a) Recognise the geographic context of substance abuse, which occurs in both urban and remote locations, and its implications; and
  - b) Are population-based, youth-focused and integrate substance abuse, mental health and other health and welfare concerns into youth programs.
10. That drug testing in schools be encouraged, giving a clear message that drug use including cannabis, is not permitted. Many youngsters do not see cannabis as a drug or that it will harm them.
11. That roadside testing be implemented to identify drug-driving and related safety issues, in all States and Territories.

## REFERENCES AND SUGGESTED ADDITIONAL READING

- Adams IB, Martin BR: "*Cannabis: pharmacology and toxicology in animals and humans*". *Addiction* **91** (11):1585-1614, 1996.
- Agrawal, A., Lynskey, M.T., Pergadia, M.L., Bucholz, K.K., Heath, A.C., Martin, N.G., & Madden, P.A. (2008). "*Early cannabis use and DSM-IV nicotine dependence: A twin study*". *Addiction* **103**, 1896-1904.
- Agrawal A, Madden PA, Bucholz KK, Heath AC, Lynskey MT "*Transitions to regular smoking and to nicotine dependence in women using cannabis*" *Drug Alcohol Depend* 2008 **1**;95(1-2):107-14
- Alan H. Jobe. MD. PhD "*Marijuana effects on neurobehavior of newborns*" *The Journal of Pediatrics* **149**: **6**: 781-787, 2006.
- Aldington, S. 2007. "*Cannabis linked to lung cancer risk*" Thoracic Society conference Auckland Medical Research Institute in Wellington.
- Aldington, S., Harwood M., Cox B., Weatherall M., Beckert L., Robinson G., Beasley R. "*Cannabis use and risk of lung cancer: A case-control study*" *European Respiratory Journal* issue:**31**(2) 280-86 2008.
- ALDINGTON S, WILLIAMS M, NOWITZ M, WEATHERALL M, PRITCHARD A, MC NAUGHTON A, ROBINSON G, BEASLEY R,**
- "THE EFFECTS OF CANNABIS ON PULMONARY STRUCTURE, FUNCTION AND SYMPTOMS." THORAX 62: 1058-1063, 2007.**
- Alex Perkonig, Roselind Lied, Michael Hofler, Peter Schuster, Holger Sonntag & Hans-Ulrich Wittchen "*Patterns of cannabis use, abuse and dependence over time: incidence, progression and stability in a sample of 1228 adolescents*" *Addiction* (1999) **94**(11), 1663-1678.
- ANCD Hamilton M "*Cape York Indigenous Issues*" Australian National Council on Drugs 2002.
- ANCD Copeland J "*Cannabis answers to your questions*" Australian National Council on Drugs 2006.  
[http://www.ncnd.org.au/publications/pdf/cannabis\\_qa.pdf](http://www.ncnd.org.au/publications/pdf/cannabis_qa.pdf)
- ANCD Copeland J "*evidence-based answers to Cannabis Questions a review of the literature*" Australian National Council on Drugs 2006. [http://www.ncnd.org.au/publications/pdf/rp11\\_cannabis\\_questions.pdf](http://www.ncnd.org.au/publications/pdf/rp11_cannabis_questions.pdf)
- Andréasson, S., Allebeck, P., Engstrom, A., Rydberg, U., "*Cannabis and Schizophrenia: a longitudinal study of Swedish conscripts*", *The Lancet*, December 26, 1987, **2**(8574): 1483-1486.
- Andréasson, S., Allebeck, P., Rydberg, U., "*Schizophrenia in users and nonusers of cannabis*", *Acta Psychiatrica Scandinavica*, **79**, 1989, pp. 505-510.
- Anthony, J.C. Petronis, K.R., 1995. "*Early-onset drug use and risk of later drug problems*". *Drug Alcohol Depend.* **40**, 9-15.
- Anthony, J.C. Warner, L.A. & Kessler, R.C. (1994) "*Comparative epidemiology of dependence on tobacco, alcohol, controlled substances, and inhalants:*" basic findings from the National Comorbidity Survey, *Experimental and Clinical Psychopharmacology*, **2**, 244-268.
- Andrew J. "*Psychiatric effects of cannabis*". *British Journal of Psychiatry* **178**, 116-122 2001.
- Arendt M, Rosenberg R, Foldager L, Perto G, Munk-Jorgensen P,. "*Cannabis-induced psychosis and subsequent schizophrenia-spectrum disorders: follow-up study of 535 incident cases*. *Br J Psychiatry* 2005; **187**: 510-5.
- Arseneault L Cannon M, Poulton R, Murray R, Caspi A, Moffitt TE. "*Cannabis use in adolescence and risk for adult psychosis: Longitudinal prospective study*" *BMJ*: **325**:1212-3 2002.
- Arseneault, L., Cannon, M., Witton, J Murray Robin M., et al "*Causal association between cannabis and psychosis: examination of the evidence*" *British Journal of Psychiatry.* **184**, 110-117 2004.
- Ashtari M, Kumra S "*Brain Imaging-Cannabis and Schizophrenia look similar*" presentation to the 91<sup>st</sup> scientific assembly radiological society of North America (RSNA) 2005.  
<http://www.schizophrenia.com/sznews/archives/002708.html>

## Drug Free Australia

# EVIDENCE

---

Ashton, C.H. (7) "Adverse effects of cannabis and cannabinoids", British Journal of Anaesthesia **83** (4) 1999. pp 637-649. 1999.

Australian Bureau of Criminal Intelligence, 1993 Australian Drug Intelligence Assessment, "Suicide/Schizophrenia Consequences of acute and chronic cannabis use" 1996 p. 22.

Australian Crime Commission (Illicit Drug Data Report 2005/6 Cannabis  
[http://www.crimecommission.gov.au/content/publications/iddr\\_2005\\_06/Cannabis.pdf](http://www.crimecommission.gov.au/content/publications/iddr_2005_06/Cannabis.pdf)

Australian Federal Police: [http://www.afp.gov.au/site\\_search?](http://www.afp.gov.au/site_search?) Cannabis.

Bada HS, Reynolds EW, Hansen WF. "Marijuana use, adolescent pregnancy, and alteration in newborn behavior: how complex can it get?" J Pediatr 2006 Dec;**149**(6):742-5.

Bailey S L, Flewelling R L, and Rachal J V. "Predicting continued use of marijuana among adolescents: the relative influence of drug-specific and social context factors." Journal of Health and Social Behavior. 1992; **33**:51-66.

Bailey EL, Swallow BL. "The relationship between cannabis use and schizotypal symptoms" Eur Psychiatry. (2):113-4 2004.

Bangalore S.S, Prasad K M.R., Montrose D.M, Goradia D.D, Diwadkar V.A, Keshavan M.S "Cannabis use and brain structural alterations in first episode schizophrenia-A region of interest, voxel based morphometric study" chizophrenia Research 99 1-6 2008.

BBC News: "Under 10s treated for drug abuse". Mike Linnell Oldham Lifeline Project and Jamelia Rashid Alcohol Substance Intervention Service (Oasis) 31<sup>st</sup> July 2007. <http://news.bbc.co.uk/1/hi/england/manchester/6924860.stm>

Beautrais A.L., Joyce P. R. and Mulder R. T. "Cannabis abuse and serious suicide attempts" Addiction **94**(8), 1155-1164 (10) 1999.

Benson MK, Bentley AM "Lung disease induced by drug addiction" Thorax **50**(11):1125-1127 1995.

Berghuis P, Rajnec AM, Morozov YM, Ross R, Mulder J, Urban GM et al Hardwiring the Brain: Endocannabinoids Shape Neuronal Connectivity. Science 2007 May 25; **316**(5828):1212-6.

Berthiller, J., Straif, K., Boniol, M., Voirin, N., Benhaïm-Luzon, V., Ayoub, W.B., Dari, I., Laouamri, S., Hamdi-Cherif, M., Bartal, M., Ayed, F.B., & Sasco, A.J. (2008). "Cannabis smoking and risk of lung cancer in men: A pooled analysis of three studies in Maghreb". Journal of Thoracic Oncology 3, 1398-1403.

Beshay M., Kaiser H., Niedhart D., Reymond M., Schmid R., "Emphysema and secondary pneumothorax in young adults smoking cannabis" European Journal of Cardio-thoracic Surgery 2007 Dec;**32**(6):834-8. Epub 2007 Oct 10..

Bluhm EC; Daniels J; Pollock BH; Olshan AF; "Maternal use of recreational drugs and neuroblastoma in offspring: a report from the Children's Oncology Group (United States). Cancer Causes Control. 2006; **17**(5):663-9 (ISSN: 0957-5243).

Bolla, K.I., et al. "Dose-related neurocognitive effects of marijuana use" Neurology 59 (9) 1337-1343 2002.

Bovasso, GB. "Cannabis abuse as a risk factor for depressive symptoms". The American Journal of Psychiatry, **158**:2033-2037, 2001.

Boydell J, Van Os J, Caspi A, Kennendy N, Giouroukou E, Fearon P, Farrell M, Murray RM "Trends in cannabis use prior to first presentation with schizophrenia, in South-East London between 1965 and 1999" Psychol Med. **36**(10):1441-6. 2006. Epub 2006 Jul 20.

Brambilla C. Colonna M. "Cannabis: the next villain on the lung cancer battlefield?" European Respiratory Journal Editorial **31**: 227-228 2008.

Brett M. "CANNABIS" A general survey of its Harmful Effects Submission to The Social Justice Policy Group 2008.  
<http://www.eurad.net/pdf/Cannabis%20combined%20document%20new.pdf>

Bridget F. Grant, Roger Pickering "The relationship between cannabis use and DSM-IV cannabis abuse and dependence: Results from the National Longitudinal Alcohol Epidemiologic Survey" Journal of Substance Abuse, **10** Issue 3: 255-264 1999.

British Lung Foundation "A Smoking Gun?" 2002.

Brook, DW et al. "Drug use and the risk of major depressive disorder, alcohol dependence, and substance use disorders". Archives of General Psychiatry, **59**(11):1039-1044, 2002.

## Drug Free Australia EVIDENCE

---

Brook JS, Balka EB, BA, Whiteman B "The Risks for Late Adolescence of Early Adolescent Marijuana Use" American Journal of Public Health 1999; **89**(10):1549-1554.

Budney AJ "Are specific dependence criteria necessary for different substances: how can research on cannabis inform this issue?" Addiction 101 (suppl. 1): 125-133 2006.

Budney AJ, Brent A, Moore. "Development and Consequences of Cannabis Dependence" J. Clin Pharmacol **42**:28S-33S 2002.

Budney AJ, Hughes JR, Moore BA, Vandrey R Review of the validity and significance of cannabis withdrawal syndrome American J of Psychiatry Nov. 2004; **161**(11):1967-77.

Budney AJ, Hughes JR "The Cannabis Withdrawal Syndrome" Curr. Opin. Psychiatry **19**: 233-238 2006.

Budney A.J., Rooffman R., Stephens R.S., Walker D "Marijuana Dependence and its Treatment" Addiction Science & Clinical Practice December 2007 pp 4-16. e-mail: [ajbudney@uams.edu](mailto:ajbudney@uams.edu)

Budney, A., & Stanger, C. (2007). Contingency management for Marijuana (Cannabis) Abuse and Dependence. In S. Higgins, K. Silverman, & S. Heil (Eds). *Contingency Management in the treatment of Substance Use Disorders: A science-based treatment innovation*. New York: Guilford. Chapter 4 Marijuana pp 61-79.

Budney AJ, Vandrey RG, Hughes JR, Moore BA, Bahrenburg B "Oral delta-9-tetrahydrocannabinol suppresses cannabis withdrawal symptoms" Drug and Alcohol Dependence; 2007 Jan 5;**86** (1):22-9

Busch FW Seid DA Wei EJ "Mutagenic activity of marijuana smoke condensates Cancer" lett. **6**(6): 319-324 1979.

Cabral G.A. Dove Pettit DA "Drugs and immunity: cannabinoids and their role in decreased resistance to infectious disease." J Neuroimmunol **83**(1-2): 116-23 1998.

Cambridge University Press: *Cannabis Dependence: Its Nature Consequences and Treatment* Eds. Roger Roffman and Robert Stephens Addiction 101(11):1589-1597 2006. <http://www.nida.nih.gov/pdf/ascpl/vol4no1/marijuana.pdf>

Cantwell R, Brwein J, Glazebrook C, et al. "Prevalence of substance misuse in first-episode psychosis". British Journal of Psychiatry.;**174**:150-153 1999.

Carriot F; Sasco AJ "Cannabis and Cancer" Rev Epidemiol Sante Publique 2000; **48**(5):473-83 ISSN: 0398-7620.

Caspi A, Moffitt TE, Cannon M, McClay J, Murray R, Harrington H, and others. "Moderation of the effect of adolescent-onset cannabis use on adult psychosis by a functional polymorphism in the catechol-O-methyltransferase gene: Longitudinal evidence of a gene x environment interaction". Biol Psychiatry 2005 **57**(10):1117-27.

Cassidy F, Ahearn EP, Carroll BJ. "Substance abuse in bipolar disorder" Bipolar Disord **3**(4): 181-8 2001.

Centre on Addiction and Substance Abuse at Columbia University (CASA) "Addiction / Gateway / Drug" Oct. 27, 1994. <http://www.samia.com/GROUPS/ANTIDRUG/mjcnct/addctn.htm>

Chacin S., "Women's Marijuana Problems: An Overview with Implications for Outreach, Intervention, Treatment, and Research" Journal of Chemical Dependency Treatment Vol. **6**, No. ½, pp, 129-167 1996.

Chacko JA, Heiner JG, Siu W, Macy M, Terris MK "Association between marijuana use and transitional cell carcinoma." Urology **67**:100-104 2006.

Chambers RA, Taylor JR, Potenza MN *Developmental Neurocircuitry of Motivation in Adolescence: A Critical Period of Addiction Vulnerability* Am. J. Psychiatry 2003; **160**:1041-1052.

Chang L., C. Clock, Yakupov R., Ernst T. "Combined and Independent Effects of Chronic Marijuana Use and HIV on Brain Metabolites" Neuroimmune Pharmacol **1**: 65-76 2006.

Charbonney E., Sztajzel J., Polletti P., Rutschmann O. "Paroxysmal atrial fibrillation after recreational marijuana smoking: another "holiday heart?" Swiss Med Wkly **135**: 412-414 2005.

Christine N Vidal, PhD; Judith L. Rapoport, MD; Kiralee M. Hayashi, BS; Jennifer A. Geaga, BS; Yihong Sui, BS; Lauren E. Mclemore, BS; and others: "Dynamically Spreading Frontal and Cingulate Deficits Mapped in Adolescents with Schizophrenia" Arch Gen Psychiatry. 2006; **63**: 25-34.



## Drug Free Australia EVIDENCE

---

Clough AR, Burns CB, Guyula T, Yunupingu M. "Diversity of substance use in eastern Arnhem Land (Australia): patterns and recent changes." *Drug Alcohol Rev* 2002; **21**(4):349-56.

Clough AR, Cairney S, Maruff P, Parker R. "Rising cannabis use in remote Indigenous communities." *Med J Aust* 2002;**177**(7):395-6.

Clough AR, D'Abbs P, Cairney S, Gray D, Maruff P, Parker R, O'Reilly B "Emerging patterns of cannabis and other substance use in Aboriginal communities in Arnhem Land, Northern territory: a study of two communities" *Drug Alcohol Rev* 23(4):381-90 2004.

Clough AR, Kylie Lee KS, Jaragba MKJ, Conigrave KM, Patton GC "Heavy cannabis use and depressive symptoms in three Aboriginal communities in Arnhem Land, Northern Territory" *MJA* Volume **188** Number 10 605-607 2008.

Coffey C, Lynskey M, Wolfe R, Patton GC "Initiation and Progression of cannabis use in a population-based Australian adolescent longitudinal study" *Addiction* 2000; **95** No 11:1679-1690.

(A large cohort study of 2032 students from 44 secondary schools following the outcome and predictors of escalation to harmful daily cannabis use).

Coffey C, Carlin J, Lynskey M, Ning Li, Patton GC "Adolescent Precursors of Cannabis Dependence: Findings from the Victorian Adolescent Health Cohort Stud" *Br. J. Psychiatry* 2003; **182**: 330-336.

Coffman K. "The debate about marijuana usage in transplant candidates: recent medical evidence on marijuana health effects" *Organ Transplantation* **13**(2):189-195 2008.

Cohen S. "Cannabis: Effects upon Adolescent Motivation. In: *Marijuana and Youth: Clinical Observations on Motivation and Learning*." Report. Rockville, MD: National Institute of Drug Abuse; 1982.

Cornelius MD, Taylor PM, Geva D, Day NL. "Prenatal tobacco and marijuana use among adolescents: effects on offspring gestational age, growth, and morphology". *Pediatrics* 1995; **95**: 738-43.

Copeland J Swift W, Hall W "Characteristics of Long-Term Cannabis Users in Sydney, Australia" *Eur Addict Res* 1998;**4**:190-197 (DOI: 10.1159/000018952).

[http://www.nationaldrugstrategy.gov.au/internet/drugstrategy/publishing.nsf/Content/4FDE76ABD582C84ECA257314000BB6EB/\\$File/mono-57.pdf](http://www.nationaldrugstrategy.gov.au/internet/drugstrategy/publishing.nsf/Content/4FDE76ABD582C84ECA257314000BB6EB/$File/mono-57.pdf)

Copeland, Underwood and Van Wyck "The health and psychological consequences of cannabis use – chapter.6.5" <http://www.healthconnect.gov.au/internet/wcms/publishing.nsf/Content/health-pubs-drug-cannab2-ch65.htm> (1980).

Corcoran, C.M., Kimhy, D., Stanford, A., Khan, S., Walsh, J., Thompson, J., Schobel, S., Harkavy-Friedman, J., Goetz, R., Colibazzi, T., Cressman, V., & Malaspina, D. (2008). "Temporal association of cannabis use with symptoms in individuals at clinical high risk for psychosis" *Schizophrenia Research* **106**, 286-293.

Daaka Y, Zhu W, Friedman H, Klein T W. "Induction of Interleukin-2 alpha gene by delta-9-THC is mediated by nuclear factor kB and CBa cannabinoid receptor." *DNA and Cell Biology* 1997;**16**:301-309 (THC might augment AIDS development because of an increase in NK-kB which is known to activate the HIV genome and increase retro viral replication.).

Day NL et al "Effect of Prenatal Marijuana Exposure on the Cognitive Development of Offspring at Age Three" *Neurotoxicology and Teratology* 1994; **16**(2): 169-75.

Day NL, Goldschmidt, Lidush, Thomas, Carrie "Prenatal marijuana exposure contributes to the prediction of marijuana use at age 14." *Addiction* Sept 2006; **101**(9): 1313-22.

Dean, B et al. "Studies on [3H]CP-55940 binding in the human central nervous system: regional specific changes in density of cannabinoid-1 receptors associated with schizophrenia and cannabis use". *Neuroscience*, **103**:9-15, 2001.

Degenhardt L, Coffey C, Moran P, Carlin JB, Patton GC (2007) "The predictors and consequences of adolescent amphetamine use: findings from the Victoria Adolescent Health Cohort Study" Volume 102 Issue 7 Page 1076-1084.

Degenhardt, L and Hall W *Is cannabis use a contributory cause of psychosis?* *Canadian Journal of Psychiatry-revue Canadienne De Psychiatrie*, **51** 9: 556-565 2006.

Degenhardt L, Hall W, Lynskey M. "The relationship between cannabis use, depression and anxiety among Australian adults": findings from the National Survey of Mental Health and Wellbeing. *Soc Psychiatry Psychiatr Epidemiol* 2001; **36** (5): 219-227.

Degenhardt LD, Hall W M. Teesson "Does cannabis use lead to mental-health problems? Parliamentary Library

## Drug Free Australia

# EVIDENCE

---

No. 21 Research Note 2007. <http://www.aph.gov.au/library/pubs/rn/2006-07/07rn21.pdf>

Delahunty B, Putt J. "The policing implications of cannabis, amphetamine and other illicit drug use in Aboriginal and Torres Strait Islander communities" Australian Institute of Criminology 2006.  
<http://www.aic.gov.au/publications/tandi2/tandi322t.html>

Department of Parliamentary Services Research Note. 'Does cannabis use lead to mental-health problems?: findings from the research'. June 2007, no. 21 <http://www.aph.gov.au/library/pubs/rn/Index.htm>

Dervaux A, Laqueille X, Bourdel MC, Leborgne MH, Olie JP, Loo H, Krebs MO. "Cannabis and schizophrenia: demographic and clinical correlates" *Encephale* 2003 **29**(1):11-7.

Diana M, Melis M, Muntoni AL et al. "Mesolimbic dopaminergic decline after cannabinoid withdrawal". *Proc Natl Acad Sci* **95**(17):10269-10273, 1998.

Di Forti M, Murray RM. Cannabis consumption and risk of developing schizophrenia: myth or reality? *Epidemiol Psychiatr Soc.* 2005;**14** (4):184-187.

Drewe J "Desired effects and adverse effects of cannabis use" *Ther Umsch.* 2003; **60**(6):313-6.

Drummer, O.H. "Drugs in drivers killed in Victorian road traffic accidents". Melbourne: Victorian Institute of Forensic Medicine; May 1998. Report No. 0298.

Drummer, O.H. & Gerostamoulos, J. "The involvement of drugs in car drivers killed in Victorian road traffic accidents." Melbourne: Victorian Institute of Forensic Medicine and Monash University Department of Forensic Medicine; July 1999. Report No. 0499.

Drummer, O.H., Gerostamoulos, J., Batziris, H., Chu, M., Caplehorn, J., Robertson, M.D. & Swann, P. (2004), "The involvement of drugs in drivers of motor vehicles killed in Australian road traffic crashes" *Accident Analysis and Prevention*, vol. 36, pp. 239-248.

Drummer OH., Gerostamoulos et al *Incidence of drugs in drivers killed in Australian Road Traffic Accidents Forensic Sci. Inst.* 2003 July 8 **134**(2-3 154-162.

D'Souza DC, Abi-Saab W, Madonick S, Forselius-Bielen K, Doersch A, Braley G, Gueorguieva R, Cooper T, Krystal J "Delta-9-tetrahydrocannabinol effects in schizophrenia: implications for cognition, psychosis, and addiction" *Biol Psychiatry* **15**;57(6):594-608 2005.

Duffy A, Milin R (1996). "Case study: withdrawal syndrome in adolescent chronic cannabis users", *Journal of the American Academy of Child and Adolescent Psychiatry*, **35** (12) 1618-1621.

DuPont R.L., Campbell T.G. and Mazza J.J. "Elements of a Successful School-Based Student Drug Testing Program" 2002.  
[http://www.randomstudentdrugtesting.org/pdf/elements\\_sdt\\_program.pdf](http://www.randomstudentdrugtesting.org/pdf/elements_sdt_program.pdf)

Eisenstein K Toby, Joseph J Meissler, Qiana Wilson, John P Gaughan, Martin W. Adler "Anandamide and Delta9-tetrahydrocannabinol directly inhibit cells of the immune system via CB2 receptors" *Journal of Neuroimmunology* Vol. 189 Issue 1-2 pp 17-22 2007.

Eldreth DA, Matochink JA, Cadet JL, Bolla KI. "Abnormal brain activity in prefrontal brain regions in abstinent marijuana users". *Neuroimage* 2004;**23**(3):914-20.

Ellgren M, (Karolinska Institutet) "Neurobiological effects of early life cannabis exposure in relation to the gateway hypothesis" <http://diss.kib.ki.se/2007/978-91-7357-064-0/> 2007.

El Marroun, H., Tiemeier, H., Jaddoe, V.W., Hofman, A., Mackenbach, J.P., Steegers, E.A., Verhulst, F.C., van den Brink, W., & Huizink, A.C. (2008). "Demographic, emotional and social determinants of cannabis use in early pregnancy: The Generation R study". *Drug and Alcohol Dependence* **98**, 218-226.

Ernst T, Chang L, Arnold S (2003) "Increased glial markers predict increased working memory network activation in HIV patients". *Neuroimage* **19** Issue 4: 1686-1693.

Ferdinand. RF et al. "Cannabis—psychosis pathway independent of other types of psychopathology". *Schizophrenia Research*, **79**(2-3):289-95, 2005.

## Drug Free Australia EVIDENCE

---

- Fergusson, DM et al. "Cannabis use and psychosocial adjustment in adolescence and young adulthood". *Addiction* **97**:1123-1135, 2002.
- Fergusson, DM et al. "Cannabis dependence and psychotic symptoms in young people". *Psychological Medicine*, **33**:15-21, 2003.
- Fergusson DM, Boden JM "Cannabis use and adult ADHD symptoms" *Drug Alcohol Depend* **1;95**(1-2):90-6 2008.
- Fergusson DM, Boden JM (2008) "Cannabis use and later life outcomes" *Addiction* Volume 103 Issue 6 Page 969-976.
- Fergusson DM, Boden JM, Horwood LJ *Cannabis use and other illicit drug use: testing the cannabis gateway hypothesis* *Addiction* **101**(4):556-69 2006.
- Fergusson DM, Boden JM, Horwood LJ "The developmental antecedents of illicit drug use: Evidence from a 25-year longitudinal study" *Drug and Alcohol Dependence* 2008 Jul **1;96**(1-2):165-77. Epub 2008 Apr 21.
- Ferguson, D., Horwood, L. J. "Early onset cannabis use and psychosocial adjustment in young adults." *Addiction* **92**; 279-296. 1997.
- Ferguson, D., Horwood, L.J, Ridder EM. "Test of causal linkages between cannabis use and psychotic symptoms" *Addiction* **100**; 354-66. 2005.
- Fergusson DM Horwood LJ "Does cannabis use encourage other forms of illicit drug use?" *Addiction* **95**(4), 505-520 2000.
- Fergusson DM, Horwood LJ "Cannabis use and dependence in a New Zealand birth cohort". *New Zealand Medical Journal*; **113**:56-58. 2000.
- Fergusson DM, Horwood LJ, Swian-Campbell NR. "Cannabis dependence and psychotic symptoms in young people" *Psychol Med* ;**33**:5-21 2003.
- Fergusson D.H., Horwood L.J., Swain-Campbell N. "Cannabis use and psychosocial adjustment in adolescence and young adulthood". *Addiction* **97**; 1123-35 2002. <http://www.jiacam.org/0202/CANNABIS.pdf>
- Fergusson D.M., Richie Poulton., Paul F Smith., Joseph M Boden. "Cannabis and Psychosis" *BMJ* Volume **332**(7534)172-175 2006.
- Fisher et al "Dangers of Cannabis" *Emergency Medicine Journal* **22**:612a 2005.  
<http://emj.bmj.com/cgi/content/full/22/9/612a>
- Fisk, J. & Montgomery, C. (2008). Real-world memory and executive processes in cannabis users and non-users. *Journal of Psychopharmacology* **22**, 727-736.
- Fried P A., " Adolescents Prenatally Exposed to Marijuana: Examination of Facts of Complex Behaviors and Comparisons with the Influence of In Utero Cigarettes" *J Clin Pharmacol* **42**:97S-102S 2002.
- Fried P A., "Marijuana use by pregnant women: Neurobehavioral effects in neonates" *Drug and Alcohol Dependence*. 1980 **6**:415-424.
- Fried P A., Watkinson B, and Willan. "Marijuana use during pregnancy and decreased length of Gestation." *American Journal of Obstet. Gynecol.* 1984;**150**(1):23-27.
- Friedman H, Newton C, Klein TW. "Microbial infections, immunomodulation, and drugs of abuse". *Clin Microbiol Rev* **16**(2):209-219, 2003.
- Garavan H, Nestor L, Roberts G, Hester R "Deficits in learning and memory: Parahippocampal hyperactivity and frontocortical hypoactivity in cannabis users" *Neuroimage* 2008 Jan **12**: 18296071 (P,S,E,B,D). <http://lib.bioinfo.pl/pmid:18296071>
- Gardner EL, *Addictive Potential of Cannabinoids: The underlying neurobiology*  
CPL Chemistry and Physics of Lipids 2002 **121**; 267-297.
- Gaziano J "Marijuana use among those at risk for cardiovascular events" *American Heart Journal* 2008; **155**:395-6.
- Geller T, Loftis L, Brink D, 2004 "Cerebellar Infarction in Adolescent Males Associated with Acute Marijuana Use" *Pediatrics*; Vol. **113** No 4: 365-70.
- Gfroerer J, Epstein J "Marijuana initiates and their impact on future drug treatment need" *Drug and Alcohol Dependence* **54** 1999 229-237.

## Drug Free Australia EVIDENCE

Ghosh S, Preet A, Groopman J, Ganju R "Cannabinoid receptor CB2 modulates the CXCL12/CXCR4-mediated chemotaxis of T lymphocytes" Volume 43, Issue 14 July 2006, Pages 2169-2179

Giedd Jay "The Structural Development of the Human Brain as measured Longitudinally with measured resonance Imaging" Chapter 3 pp50-73

[http://books.google.com.au/books?hl=en&lr=&id=2xpvp4ie\\_8MC&oi=fnd&pg=PA50&dq=Giedd+Jay++Current+Direction+in+Psychological+Science+2007.+&ots=Vd2ZrIbRbE&sig=WZi3OkOj4LcnM54JXJNDznOnXVs#PPA50.M1](http://books.google.com.au/books?hl=en&lr=&id=2xpvp4ie_8MC&oi=fnd&pg=PA50&dq=Giedd+Jay++Current+Direction+in+Psychological+Science+2007.+&ots=Vd2ZrIbRbE&sig=WZi3OkOj4LcnM54JXJNDznOnXVs#PPA50.M1)

Goldberg L, Elliot DL, MacKinnon DP, Moe EL, Kuehl KS, Yoon M, Taylor A, Williams J

"Outcomes of a prospective trial of student-athlete drug testing: the Student Athlete Testing Using Random Notification" (SATURN) study." *J Adolesc Health*. 2007 Nov;41(5):421-9

[http://www.ncbi.nlm.nih.gov/pubmed/17950161?ordinalpos=1&itool=EntrezSystem2.PEntrez.Pubmed.Pubmed\\_ResultsPanel.Pubmed\\_DefaultReportPanel.Pubmed\\_RVDocSum](http://www.ncbi.nlm.nih.gov/pubmed/17950161?ordinalpos=1&itool=EntrezSystem2.PEntrez.Pubmed.Pubmed_ResultsPanel.Pubmed_DefaultReportPanel.Pubmed_RVDocSum)

Golub A, Johnson BD, "The Shifting Importance of Alcohol and Marijuana as Gateway Substances among Serious Drug Abusers" *J. Stud Alcohol* 1994;55:607-614.

Goncharov I, Weiner L, Vogel Z (2005) "Delta 9-tetrahydrocannabinol increases C6 glioma cell death produced by oxidative stress". *Neuroscience* 134: Issue 2: 567-574.

Gray D, Morfitt B, Williams S, Ryan K, Coyne L. "Drug Use and Related Issues among young aboriginal people in Albany" National Centre for Research into the Prevention of Drug Abuse Curtin University of Technology 1996.

Greenblatt, J. "Adolescent self-reported behaviours and their association with marijuana use". Based on data from the National Household Survey on Drug Abuse, 1994-1996, SAMSHA, 1998.

[http://eric.ed.gov/ERICWebPortal/custom/portlets/recordDetails/detailmini.jsp?\\_nfpb=true&\\_ERICExtSearch\\_SearchValue\\_0=ED424526&ERICExtSearch\\_SearchType\\_0=no&accno=ED424526](http://eric.ed.gov/ERICWebPortal/custom/portlets/recordDetails/detailmini.jsp?_nfpb=true&_ERICExtSearch_SearchValue_0=ED424526&ERICExtSearch_SearchType_0=no&accno=ED424526)

Griggs W, Caldicott, Pfeiffer J, Edwards N, Pearce A, Davey M "The impact of drugs on road crashes, assaults and other trauma-a prospective trauma toxicology study" National Drug Law Enforcement Research Fund 65pp an initiative of the National Drug Strategy Trauma Service, Royal Adelaide Hospital and Emergency Department, Royal Adelaide Hospital 2007. [http://casr.adelaide.edu.au/library/newadditions/WhatsNew\\_May2007\\_CV.pdf](http://casr.adelaide.edu.au/library/newadditions/WhatsNew_May2007_CV.pdf)

Groopman Jerome E. M.D. "Marijuana component opens the door for virus that causes kaposi's sarcoma" American Association for Cancer Research 2007.

<http://www.sciencedaily.com/releases/2007/08/070801112156.htm>

Gruza RA, Bierut LJ "Cigarette Smoking and the Risk for Alcohol Use Disorders Among Adolescent Drinkers" *Alcohol Clin Exp Res*. 2006 Dec;30(12):2046-54.

Hall W. 'Cannabis policy challenges' in "Matters of Substance" Nov/Dec 2007 produced by the New Zealand Drug Foundation. [www.drugfoundation.org.nz](http://www.drugfoundation.org.nz).

Hall, W., Degenhardt L. "Cannabis use and psychosis" *Curr Psychiatry Rep*. 2002 Jun;4(3):191-6.

Hall, W., Degenhardt L. "What are the policy Implications of the evidence on cannabis and Psychosis? *Can J Psychiatry*, Vol 51, No 9, 566-74 2006.

Hall W., Macphree D. "Cannabis use and cancer" *Addiction* 97,243-247 2002.

Haney, M; Ward, A.S.; Comer, S.D.; Foltin, R.W.; and Fischman, M.W.; "Abstinence symptoms following smoked marijuana in humans" *Psychopharmacology*, 141:395-404, 1999.

Harkany T, Guzman M, Galve-Roperh I, Berghuis P, Devi LA, Mackie K "The emerging functions of endocannabinoid signaling during CNS development" *Trends Pharmacol Sci* 2007; 28(2): 88-92.

Harrison G. Pope Jr., M.D. "Cognitive Effects of Long-Term Cannabis Use: The Devil is in the confounding variables" McaLean Hospital/Harvard Medical School 2004.

<http://www.nida.nih.gov/whatsnew/meetings/apa/ppt/pope.ppt>

Hashibe M; Straif K; Tashkin DP; Morgenstern H; Greenland S; Zhang ZF "Epidemiologic review of marijuana and cancer risk" *Alcohol* 35(3):265-75 2005.

Hayatbakhsh, MR et al. "Cannabis and anxiety and depression in young adults: a large prospective study.". *Journal of the American Academy of Child and Adolescent Psychiatry*, 46(3):408-17, 2007.

Hayatbakhsh, M.R., Mamun, A.A., Najman, J.M., O'Callaghan, M.J., Bor, W., & Alati, R. (2008).

## Drug Free Australia EVIDENCE

---

"Early childhood predictors of early substance use and substance use disorders: Prospective study." *Australian and New Zealand Journal of Psychiatry* 42, 720-731.

Hayatbakhsh, M.R., O'Callaghan, M.J., Jamrozik, K., Najman, J.M., Mamun, A.A., Alati, R., & Bor, W. (2008). "The association between school performance at 14 years and young adults' use of cannabis: An Australian birth cohort study". *Journal of Drug Issues* 38, 401-418.

Henquet C. COMT "Val158Met moderation of cannabis-induced effects on psychosis and cognition." Presented at the 13th Association of European Psychiatrists (AEP) Symposium by the Section on Epidemiology and Social Psychiatry; June 15-17, 2006; Bordeaux, France.

Henquet C. 'The Effects of COMT VAL<sup>158</sup>Met Egenotype and Cannabis Use on Psychosis and Cognition'. Presented at the 13th Association of European Psychiatrists (AEP) Symposium by the Section on Epidemiology and Social Psychiatry held June 14-17, 2006.

Henquet C, Corcoran C. "Cannabis and psychosis: from genetics and biology to functional outcome and treatment:" Program of the 5th International Conference on Early Psychosis; October 4-6, 2006; Birmingham, United Kingdom. Symposium 12. [http://www.medscape.com/viewarticle/556097\\_6](http://www.medscape.com/viewarticle/556097_6)

Henquet, C., Di Forti, M., Morrison, P., Kuepper, R., & Murray, R.M. (2008). "Gene-environment interplay between cannabis and psychosis." *Schizophrenia Bulletin* 34, 1111-1121.

Henquet C, Krabbendam L, Spauwen J, et al. "Prospective cohort study of cannabis use, predisposition for psychosis, and psychotic symptoms in young people." *BMJ*. 2005;330:11-15.

Henquet C, Murray R, Linszen D, van Os J. "The environment and schizophrenia: the role of cannabis use". *Schizophr Bull*. 2005;31(3): 608-612 2005.

Henquet C, Rosa A, van Os J, Myin-Germeys I. COMT VAL<sup>158</sup>MET moderation of cannabis induced psychosis: an experience sampling study (ESM). Program and abstracts of the 5th International Conference on Early Psychosis; Psychol Med. 2007 20:1-6. <http://lib.bioinfo.pl/auth:Henquet.C>

Hill S.W., Tam JDC, Thompson B.R. Naughton M.T. "Bullous lung disease due to marijuana" *Respirology* 13 issue 1: 122-127 2008.

Hiller C.F., Wilson F.J., Mazumder M.K., Wilson J.D., Bone R.C. *Concentration and Particle Size Distribution in smoke from Marijuana Cigarettes with Different Delta9-Tetrahydrocannabinol Content* Oxford University Press Vol 4 Number 3 page 451-454 1984.

Hillman SD, Silburn SR, Green A, Zubrick R. "Youth suicide in Western Australia involving cannabis and other drugs: a literature review and research report. Perth": TVW Telethon Institute for Child Health Research, WA Youth Suicide Advisory Committee (WA Strategy Against Drug Abuse); 2000. Occasional Paper Number 2. <http://www.dao.health.wa.gov.au/>

Hoffmann D Brunnemann KD Gori GB Wynder EL "On the carcinogenicity of marijuana smoke." *Recent Advances Phytochem*. 9:63-81 1975.

Howard, C. (2008). Application of new DNA markers for forensic examination of cannabis sativa seizures: Developmental validation of protocols and a genetic database. NDLERF Monograph Series No. 29. Hobart: National Drug Law Enforcement Research Fund.

Howard Richard C, Menkes David B, "Changes in brain function during acute cannabis intoxication: preliminary findings suggest a mechanism for cannabis-induced violence" *Criminal Behaviour and Mental Health* 17 Issue 2: 113-117 2007.

Huas, C., Hassler, C. & Choquet, M. (2008). "Has occasional cannabis use among adolescents also to be considered as a risk marker?" *European Journal of Public Health* 18, 626-629.

Huizink AC, Mulder EJ "Maternal smoking, drinking or cannabis use during pregnancy and neurobehavioural and cognitive functioning in human offspring" *Neurosci Biobehav Rev* 2006 30(1) 24-41.

Hurd Y "Ongoing research into neurotransmitter levels in animals to mimic adolescent drug exposure, especially cannabis, seen in humans" *Neurotoxicology and Teratology* Vol. 28 Issue 3 pp 386-402 2006. e-mail [yasmin.hurd@mssm.edu](mailto:yasmin.hurd@mssm.edu).

Hurd Y, Professor of Psychiatry, Pharmacology and Biological Chemistry Ongoing research into neurotransmitter levels in animals to mimic adolescent drug exposure, especially cannabis, seen in humans. Paper now available:



## Drug Free Australia EVIDENCE

Neuropsychopharmacology advance online publication 5<sup>th</sup> July 2006 doi:10.1038/sj.nnp.1301127 **32**: 607-615 2006  
Correspondence to [yasmin.hurd@mssm.edu](mailto:yasmin.hurd@mssm.edu).

Ilse Kurtzthaler, Martina Hummer, Carl Miller, Barbara Sperner-Unterweger, Verena Gunther, Heinrich Wechdom, M.S.; Hans-Jurgen Battista, Wolfgang Fleischhacker, "Effects of Cannabis Use on Cognitive Functions and Driving Ability" J Clin Psychiatry 1999;**60**:395-399.

Ishida J, Peters M, Jin C, Louie K, Tan V, Bacchetti P and Terrault N "Influence of Cannabis Use on Severity of Hepatitis C Disease" Clinical Gastroenterology and Hepatology" **6** 69-75 2008  
. [http://www.janis7hepc.com/drugs\\_that\\_cause\\_liver\\_damage.htm#da](http://www.janis7hepc.com/drugs_that_cause_liver_damage.htm#da)

Jan Ramstrom "Adverse Health Consequences of Cannabis Use" ISBN 91-7201-289-7 National Institute of Public Health Sweden 1998.

Järbe, T. U. C., Hiltunen, A. J., Mechoulam, R. "Stereospecificity of the discriminate stimulus functions of the dimethylheptyl homologs of 11-hydroxy- $\Delta^8$ -tetrahydrocannabinol in rats and pigeons". Journal of Pharmacol. Exp. Ther., **250**, 1989, pp. 1000-1005.

Jay N. Giedd "Adolescent Brain Development: Vulnerabilities and Opportunities" Ann. N.Y. Acad Sci **1021**: 61-63 2004.

Jay N Giedd (2004) "Structural Magnetic Resonance Imaging of the Adolescent Brain" Annals of the New York Academy of Science Vol 1021 (1), 77-85.

Jay N. Giedd, MD, Liv S Clasen, PhD, Gregory L. Wallace, MA, Rhoshel K. Lenroot, MD, Jason P. Lerch, PhD, Elizabeth Molloy Wells, MD, Joathan D. Blumenthal, MA, Jean E. Nelson, MHS, Julia W. Tossell MD, Catherine Stayer, MD, PhD, Alan C. Evans PhD and Carole A. Samango-Sprouse, EdD. "XXY (Klinefelter Syndrome: A Pediatric Quantitative Brain Magnetic Resonance Imaging Case-Control Study" Pediatrics Vol **119** No. 1 January, pp. e232-e240 2007.

Jayanthi S, Buie S, Moore S, Herning RI, Better W, Wilson NM, Contoreggi C, Cadet JL "Heavy marijuana users show increased serum apolipoprotein C3 levels: evidence from proteomic analyses" Molecular Psychiatry 2008; DOI: 10.1038/mp.2008.50 <http://www.nature.com/mp>.

Jones RT, Cardiovascular System Effects of Marijuana Journal of Clinical Pharmacology 2002 **42** (11 Suppl):58S-63S.

Kandel DB, Yamaguchi K, Chen K "Stages of Progression in Drug Involvement from Adolescence to Adulthood: Further Evidence for the Gateway Theory" J Study Alcohol **53**(5):447-457 1992.

Kraft, B.; Frickey, N.; Kaufmann, R.; Reif, M.; Frey, R.; Gustorff, B; Kress, H. "Lack of Analgesia by oral Standardized Cannabis Extract on Acute Inflammatory Pain and Hyperalgesia in Volunteers" Anesthesiology. 109(1):101-110, July 2008. doi: 10.1097/ALN.0b013e31817881e1

Kari Poikolainen, Annamari Tuulio-Henriksson, Terhi Aalto-Setälä, Mauri Marttunen, Tuula Anttila, Jouko Lonnqvist "Correlates of initiation to cannabis use: a 5-year follow-up of 15-19 year-old adolescents" Drug and Alcohol Dependence **62** (2001) 175-180.

Karila L, Vignau J, Alter C, Reynaud M. "Acute and chronic cognitive disorders caused by cannabis use" Rev Prat 15;**55**(1):23-26 discussion 27-29 2005.

Kelley R. Mark Ph.D., Denny George, Ph.D., Young Michael, Ph.D. "Modified stages of acquisition of gateway drug use: A primary prevention application of the stages of change model" J. Drug Education, **29**(3) 189-203, 1999.

Kelly E, Darke S, Ross J "A review of drug use and driving: epidemiology, impairment, risk factors and risk perceptions" Drug and Alcohol Review 23, 319-344 2004.

Klonoff-Cohen HS, Natarajan L, Chen RV "A prospective study of the effects of female and male marijuana use on in vitro fertilization (IVF) and gamete intrafallopian transfer (GIFT) outcomes" Amer J Obst Gynecol 2006; **194**(2):369-76.

Kokkevi A, Gabhainn S.N, Spyropoulou M, and the Risk Behaviour Focus Group of the HBSC "Early Initiation of Cannabis Use: A Cross-national European Perspective" Journal of Adolescent Health 712-719 2006.

Konings, M., Henquet, C., Maharajh, H.D., Hutchinson, G., & Van Os, J. (2008). "Early exposure to cannabis and risk for psychosis in young adolescents in Trinidad." Acta Psychiatrica Scandinavica 118, 209-213

Korantzopoulos P, Liu T, Papaioannides D, Li G, Goudevenos J. A "Atrial fibrillation and Marijuana Smoking" Int J Clin Pract. **62** (2):308-313 2008.

## Drug Free Australia EVIDENCE

---

Kouri E.M, Pope Jr H.G, Lukas S.E. "Changes in aggressive behavior during withdrawal for long-term marijuana use" *Psychopharmacology* **143**:302-308 1999.

Kumra, S. "Schizophrenia and cannabis use". *Minnesota Medicine*, **90**(1):36-8, 2007.

Lambros Messinis, Ph. D., "Neuropsychological deficits in long-term frequent cannabis users" *Neurology* **66**:737-739 2006.

Lancet "Cannabis smokers risk psychosis" paper published in *The Lancet* written by seven British psychiatrists, psychologists July 27 2007. [http://www.timesonline.co.uk/tol/life\\_and\\_style/health/article2148315.ece](http://www.timesonline.co.uk/tol/life_and_style/health/article2148315.ece)

Lane Malcolm Alexander "Australia's cannabis king put away for 13 years" *The Courier-Mail* August 17 2007. <http://www.news.com.au/story/0,23599,22257426-2,00.html>

Laumon B, Gadegebeku B, Martin, J, Biecheler M. "Cannabis intoxication and fatal road crashes in France: population based case-control study" *BMJ* ;**331**:1371 2005.

Lehrmann E. "Chronic Abuse of Different Drugs Causes Similar Brain Changes" <http://www.nida.nih.gov/pdf/newsscan/newsscan51.pdf>

Lindsay A.C., Foale R.A., Warren O., Henry J.A. "Cannabis as a precipitant of cardiovascular emergencies" *Emergency Medicine Journal* **22**: 679-680 2005. *Int J Cardiol.* 2005 **104**(2):230-2.

L. Lu, C. Leonard, P. Thompson, E Kan, J Jolley, S. Welcome, A. Toga, and E. Sowell. "Normal Developmental Changes in Inferior Frontal Gray Matter Are Associated with Improvement in Phonological Processing: A Longitudinal MRI Analysis." *Cereb Cortex*, May 1, 2007; **17** (5): 1092-1099.

Looby A, Earleywine M "Negative consequences associated with dependence in daily cannabis users" *Substance Abuse Treatment, Prevention and Policy* January 2007; **2**:3

Note: M Earleywine is on the board of the MPP (Marijuana Policy Project). Among their aims are the legalisation of medical marijuana and the reform of marijuana policy.

Lundqvist T. "Cognitive consequences of cannabis use: Comparison with abuse of stimulants and heroin with regards to attention, memory and executive functions." *Pharmacology, Biochemistry and Behavior* **81**(2) (2005) 319-330.

Lundqvist T. "Recent scientific data on the consequences of cannabis use" Drug Addiction Treatment Centre, Lund University Hospital, Kioskgatan 17, S-221 85 Lund Sweden. Email [thomas.lundqvist@med.lu.se](mailto:thomas.lundqvist@med.lu.se) (2003) [http://www.droginform.com/pdf/publicerade\\_artiklar/Recent\\_scientific\\_data.pdf](http://www.droginform.com/pdf/publicerade_artiklar/Recent_scientific_data.pdf).

Lynskey M., "Escalation of Drug Use in Early-Onset Cannabis Users vs. Co-Twin Controls" *JAMA* **289** No.4 427-433 2003.

Lynskey M.T. Editorial "Life-time cannabis use and late onset mood and anxiety disorders" *Addiction*. **102**(8):1181-1182 2007.

Lynskey, M et al. "Major depressive disorder, suicidal ideation, and suicide attempt in twins discordant for cannabis dependence and early-onset cannabis use". *Archives of General Psychiatry*, **61**:1026-1032, 2004.

Lynskey M., Hall W. "The effects of adolescent cannabis use on educational attainment." *Addiction* 2000; **95**(11): 1621-30.

Mach F, Steffens S et al 2005 Low dose oral cannabinoid therapy reduces progression of atherosclerosis in mice. *Nature* **434**:782-6. <http://www.nature.com/nature/journal/v434/n7034/full/nature03389.html>

Macleod, J., Oakes, R., Copello, A., et al "Psychological and social sequelae of cannabis and other illicit drug use by young people: a systematic review of longitudinal, general population studies" *Lancet* **363**(9421):1579-1588 2004.

Maddock Clementine & Babbs Michelle "Intervention for cannabis misuse" *Advances in Psychiatric Vol.* **12**, 432-439 2006.

Maharajh, HD et al. "Cannabis and suicidal behaviour among adolescents: a pilot study from Trinidad". *The Scientific World Journal Vol.5*:576-85, 2005.

Marina Carvalho de Moraes Barros, MD, PhD, Ruth Guinsburg, MD, PhD, Clovis de Araujo Peres, PhD, Sandro Mitsuhiro, MD, Elisa Chalem, Ronaldo Ramos Laranjeira, MD, PhD. "Exposure to marijuana during pregnancy alters neurobehavior in the early neonatal period" *The Journal of Pediatrics Vol.* **149**: Issue **6**, 781-787 2006.

Marios Marselos & Petros Karamanakos "Mutagenicity, developmental toxicity and carcinogenicity of cannabis." *Addiction Biology* (1999) **4** (1) 5-12.

## Drug Free Australia EVIDENCE

---

Massi P; Vaccani A; Parolaro D "Cannabinoids, immune system and cytokine network" Curr Pharm Des. 2006; Vol. 12 Number 24:3135-46(12).

McGhee R, Williams S, Poulton R, Moffitt T "A longitudinal study of cannabis use and mental health from adolescence to early adulthood" Addiction **95**(4), 491-503 2000.

McHale S; Hunt N "Executive function deficits in short-term abstinent cannabis users" Human Psychopharmacology: Clinical and Experimental Volume 23 Issue 5, page 409-415 2008.

McKallip RJ; Nagarkatti PS, "Delta-9-tetrahydrocannabinol enhances breast cancer growth and metastasis by suppression of the antitumor response" J Immunol, 2005; **174**(6):3281-9.

McKay DR, Tennant CC "Is the grass greener? The link between cannabis and psychosis" Med J Aust **172**:284-286 2000.

McKinney J.R. "The effectiveness and legality of random student drug testing programs revisited" 2005  
[http://www.randomstudentdrugtesting.org/pdf/el\\_random\\_student\\_drug\\_testing.pdf](http://www.randomstudentdrugtesting.org/pdf/el_random_student_drug_testing.pdf)

McLaren J. & Mattick R.P. "Cannabis in Australia Use, supply, harms, and responses" NDARC Monograph No. 57 National Drug and Alcohol Research Centre 2007.

McLean J. & Swift J "Cannabis potency and contamination: a review of the literature" Addiction, Volume 103, Number 7, pp. 1100-1109(10) 2008.

Medina, Hanson, Schweinsburg, Cohen-Zion, Nagel, Tapert "Neuropsychological functioning in adolescent marijuana users: Subtle deficits detectable after a month of abstinence" [Journal of the International Neuropsychological Society](http://journals.cambridge.org/action/displayAbstract?fromPage=online&aid=1296240) (2007), **13**: 807-820.  
<http://journals.cambridge.org/action/displayAbstract?fromPage=online&aid=1296240>

Medina K L et al presented at the 2008 meeting of the American Academy of Pediatrics in Boston. (ANI) "Neuroimaging Marijuana Use and its Effects on Cognitive Functions" University of Cincinnati.

Mehra R, Moore BA, Crothers K, Tetrault J, Fiellin DA (2006). "The association between marijuana smoking and lung cancer. A systematic review". Arch Inter Med **166**(13): 1359-1367.

Mendelson J H, et al. "Marijuana smoking suppresses leuteinizing hormone in women." Journal of Pharm. Exp. Therapeutics. 1986;**237**:862-866.

Mendelson J H, Mello N K, and Ellingvøe J. "Acute effects of marijuana smoking on prolactin levels in human females." The Journal of Pharm. and Exp. Therap. 1985;**232**::220-222.

Menetrey A, Augsburger M, Favrat B, Pin MA, Rothuizen LE, Appenzeller M, Buclin T, Mangin P, Giroud C. "Assessment of Driving Capability through the use of Clinical and Psychomotor Tests in Relation to Blood Cannabinoids Level Following Oral Administration of 20 mg Dronabinol or of a cannabis Decoction Made with 20 or 60 mg Delta9-THC". JAnal Toxicol. 2005 Vol **29** Number(5):327-38(12).

Mental Health Council of Australia, "Where there's smoke..." Cannabis and Mental Health. MHCA, 2006.  
<http://www.mhca.org.au/documents/MHCACannabisfinalLR.pdf>

Messinis L et al Neuropsychological deficits in long-term frequent cannabis users Neurology 2006; **66**: 737-9.

Mikkel Arendt, Raben Rosenberg, Leslie Foldager, Gurli Perto and Povl Munk-Jorgensen. "Cannabis-induced psychosis and subsequent schizophrenia-spectrum disorders: follow-up study of 535 incident cases." British Journal of Psychiatry **187**, 510-515 2005.

Mirken B, Earleywine M. "The cannabis and psychosis connection questioned: a comment on Fergusson et al". Addiction 2005 Vol. Issue 5 **100**:715-6.

Moiche BP, Atxa de la Presa MA, Guesta A (2001). " Transitional cell carcinoma in a young heavy marijuana smoker." Arch Esp Urol **54**:165-167.

Moir, David et al. "A Comparison of Mainstream and Sidestream Marijuana and Tobacco Cigarette Smoke Produced under Two Machine Smoking Conditions" Toxicol.; 2007; **21**(2); 494-502.

Moore BA, Augustson EM, Moser RP, Budney AJ Respiratory Effects of Marijuana and Tobacco Use in a US Sample J Gen Intern Med 2005; **20**: 33-37.



## Drug Free Australia EVIDENCE

---

- Moore BA, Budney AJ "Relapse in outpatient treatment for marijuana dependence" *Journal of Substance Abuse Treatment*. 2003 **25**(2):85-89.
- Moore, T et al. "Cannabis use and risk of psychotic or affective mental health outcomes: a systemic review". *The Lancet*, Vol. **370**(9584): 319-328, 2007.
- Morgenstern J, Langenbucher J, Labouvie EW *The generalizability of the dependence syndrome across substances: an examination of some properties of the proposed DSM-IV dependence criteria* *Addiction* 1994; **89** (9):1105-1113.
- Moussouttas M, "Cannabis Use and Cerebrovascular Disease" *Neurologist* 2004 **10**(1): 47-53.
- Mukamal K J, Maclure M, Muller J E, Mittleman M A. *An exploratory prospective study of marijuana use and mortality following acute myocardial infarction* *American Heart Journal* **155**: (3) 465-70 2008.
- Musty RE, Kaback L. Relationships between Motivation and Depression in Chronic Marijuana Users. *Life Sciences* 1995; **56**, issue 23-24, 2151-8.
- National Campaign Against Drug Abuse "Department of Health, Housing and Community Services. *National Campaign Against Drug Abuse Social Issues Survey, 1991 (Computer file)*. Canberra: Social Science Data Archives, The Australian National University, 1997.
- National Drug & Alcohol Research Centre Ross J. "Illicit drug use in Australia: Epidemiology, use patterns and associated harm. 2007. <http://www.springerlink.com/content/xq64343767454374/>
- National Drug Intelligence Centre Marijuana October 2006.  
<http://www.aic.gov.au/publications/tandi2/tandi308.pdf>
- Narang S, Gibson D, Wasan A D, Ross E L, Michna E, Nedeljkovic S S, Jamison R N "Efficacy of Dronabinol as an Adjuvant Treatment for Chronic Pain Patient on Opioid Therapy" *The Journal of Pain*, Vol 9, 254-264 2008.
- Negrete, Juan C., "Editorial: "cannabis and schizophrenia", *British Journal of Addiction* Vol. **84** Issue 4 1989, pp. 349-351
- Negrete, J. C., et. al., "Cannabis effects the severity of schizophrenic symptoms: results of a clinical survey", *Psych. Med.*, **16**, 1986, pp. 515-520
- Nieder AM, Lipke MC, Madjar S (2006). "Transitional cell carcinoma associated with marijuana: Case report and review of literature." *Urology* Vol. **67**, Issue 1, 200.e5-200.e6.
- Niveau G, Dang C (2003). "Cannabis and violent crime" *Medicine, Science and the Law* **43**(2):115-121.
- Northern Territory Police, Fire and Emergency Services. 2007 annual report. Darwin: NTPFES, 2007.  
[http://www.nt.gov.au/pfes/documents/File/police/publications/annrep/Annual\\_Report\\_2007\\_FINAL.pdf](http://www.nt.gov.au/pfes/documents/File/police/publications/annrep/Annual_Report_2007_FINAL.pdf) (accessed Apr 2008).
- Pacifici R., Roset P.N., Segura J., Segura J. "Modulation of the Immune System in Cannabis Users" *JAMA* Vol **289**, No. 15 1929-1931 2003.
- Pacula R, Ringel J, Dobkin C, Truong K "The incremental inpatient costs associated with marijuana comorbidity" *Drug and Alcohol Dependence* **92** 248-257 2008.
- Papafotiou Katherine "An evaluation of the efficiency of sobriety testing to detect blood levels of cannabis and impaired driving ability" Swinburne University of Technology 2001.  
<http://adt.lib.swin.edu.au/uploads/approved/adt-VSWT20050323.083420/public/02whole.pdf>
- Papathanasopoulos P, Messinis L, Lyros E, Kastellakis A, Panagis G "Multiple sclerosis, cannabinoids, and cognition" *J Neuropsychiatry Clin Neurosci*. 2008 Winter;**20**(1):36-51.
- Patton G "Cannabis Linked to use of amphetamines" *Addiction* **8**, 2007
- Patton GC, Coffey C, Carlin JB, Degenhardt L, Lynskey M, Hall W. "Cannabis use and mental health in young people:" cohort study. *BMJ*.**325** (7374):1195-1198 2002.
- Patton GC, Coffey C, Lynskey MT, Reid S, Hemphill S, Carlin JB and Hall W *Trajectories of adolescent alcohol and cannabis use into young adulthood* *Addiction* **102**:607-615 2007.
- Pedersen CB, Mortensen PB. Are the cause(s) responsible for urban-rural difference in schizophrenia risk rooted in families or in individuals? *Am J Epidemiol*. 2006;**163**: (11): 971-978.

## Drug Free Australia

# EVIDENCE

---

Pistis M, Perra S, Pillolla G, Melis M, Muntoni AL, Gessa GL, "Adolescent exposure to cannabinoids induces long-lasting changes in the response to drugs of abuse of rat midbrain dopamine neurons" *Biol Psychiatry* **56**:86-94 2004.

Pope Jr HG, Gruber AJ, Hudson JI, Huestis MA, Yurgelun-Todd D "Neuropsychological performance in long-term cannabis users." *Arch Gen Psychiatry* 2001;**58**(10):909-15.

Pope HG, Gruber AJ, Yurgelun-Todd D. "The residual neuropsychological effects of cannabis: the current status of research". *Drug and Alcohol Dependence*. **38**, Number 1 pp. 25-34 (10) 1995.

Poulton RG, Brooks M, Moffitt TE, et al "Prevalence and correlates of cannabis use and dependence in young New Zealanders" *New Zealand Medical Journal* **110**;(1039):68-70 1997.

Putt J, Delahunty B "Illicit drug use in rural and remote Indigenous communities" No. 322 *Trends & Issues in crime and criminal justice* Australian Institute of Criminology 2006.

Rais M, Cahn W, Van Haren N, Schnack H, Caspers E, M.S., Pol HH, Kahn R. "Excessive Brain Volume Loss Over Time in Cannabis-Using First-Episode Schizophrenia Patients" *Am J Psychiatry* 2008; **165**:490-496.

Ranga K., Krishnan R "Psychiatric and Medical Comorbidities of Bipolar Disorder" *Psychosomatic Medicine* **67**:1-8 2005.

Ranganathan, Mohini D'Souza, Deepak Cyril. "The acute effects of cannabinoids on memory in humans: a review" *Psychopharmacology* **188** (4) 2006 pp. 425-444 (20) 2006.

Ramaekers JG, Kauert G, Van Ruitenbeek P, Theunissen EL, Schneider E, Moeller MR. "High-potency marijuana impairs executive function and inhibitory motor control" *Neuropsychopharmacology* **31**: 2296-2303 2006.

Ramaekers, J.G, Lamers, C.T. J., Robbe, H. W. J. & O'Hanlon, J. F. "Low doses of marijuana and alcohol severely impair driving when taken together." In *Alcohol, drugs and Traffic Safety* Stockholm, Sweden, Eds. Hans Laurell and Frans Schlyter. May 21-26, 2000.

Ramstrom, J. "Adverse Health Consequences of Cannabis Use: a survey of scientific studies published up to and including the autumn of 2003". National Institute of Public Health, Sweden, 2004.

Raphael, B et al. "Comorbidity: cannabis and complexity. *Journal of Psychiatric Practice*". **11**(3):161-76, 2005.

Rey, J. "Does marijuana contribute to psychotic illness?" *Current Psychiatry*, Vol. **6**, No. 2, 2007.

Rey J, Sawyer MG, Raphael B, Patton GC, Lynskey MT, "The mental health of teenagers who use marijuana" *Br J Psychiatry* **180**:222-6 2002.

Rey J, Tennant C "Cannabis and Mental health" *BMJ* **325** 1183-1184 2002

Robbe D. "Marijuana wreaks havoc on brain's memory cells" 2006; *nature Neuroscience* (DOI: 10.1038/nn1801).

Robison, L.L., Buckley J.D., Daigle A.E. (1989) "Maternal drug use and risk of childhood nonlymphoblastic leukemia among offspring. An epidemiologic investigation implicating marijuana (a report from the Children's Cancer Study Group)". *Cancer*, **63**, 1904-1911.

<http://mutage.oxfordjournals.org/cgi/reprint/13/6/557>

Rodriguez de Fonseca F, et al "Activation of corticotropin-releasing factor in the limbic system during cannabinoid withdrawal" *Science* **276** (5321): 2050-2054, 1997.

Roffman R, Stephens R, Marlatt A "Cannabis Dependence Its Nature, Consequences and Treatment" Cambridge, UK: Cambridge University Press ISBN#0-521-81447-2.

[http://assets.cambridge.org/9780521814478/frontmatter/9780521814478\\_frontmatter.pdf](http://assets.cambridge.org/9780521814478/frontmatter/9780521814478_frontmatter.pdf)

Rosenblatt KA, Daling JR, Chen C, Sherman KJ, Schwartz SM (2004). "Marijuana Use and Risk of Oral Squamous Cell Carcinoma." *Cancer Research* **64**(11):4049-4054.

Roth MD, Kleerup EC, Arora A, Barsky S, Taskin DP "Airway inflammation in young marijuana and tobacco smokers" *Am. Rev. Respir. Crit. Care. Med* **157**: (3) 928-937 1998.

Roth MD, Zhu L, Sharma S, Stolina M, Chen K, Park A, Tashkin DP, Dubinett SM "D-9-tetrahydrocannabinol inhibits antigen presentation in vitro and anti-tumor immunity in vivo" Symposium International Cannabinoid Research Society Stone Mountain GA June 1997.

<http://www.eurad.net/may/References%20for%20Cannabis%20and%20Cancer%20sorted.pdf>

## Drug Free Australia

# EVIDENCE

---

- Sahaa S, Chant D, Welham J, McGrath J. "A systematic review of the prevalence of schizophrenia". PloS Med 2005;2(5):e141.
- SAMHSA's "Brief Counselling for Marijuana Dependence A Manual for Treating Adults" 166 pages Substance Abuse and Mental Health Services Administration 2005. [www.ncadi.samhsa.gov](http://www.ncadi.samhsa.gov)
- Sarafian T, Habib N, Mao JT, Tsu IH, Yamamoto ML, Hsu E, Tashkin DP, Roth MD "Gene expression changes in human small airway epithelial cells exposed to Delta-9-tetrahydrocannabinol." Toxicol Lett. August 14<sup>th</sup> 2005; **158**(2): 95-107.
- Schiffman J, Nakamura B, Earleywine M, LaBrie J. "Symptoms of schizotypy precede cannabis use" Psychiatry Res. **30**; 134(1):37-42 2005.
- Schneider M., Koch M." Chronic pubertal, but not adult chronic cannabinoid treatment impairs sensorimotor gating, recognition memory, and the performance in progressive ratio task in adult rats" Neuropsychopharmacology 2003; **28**:(10) 1760-9.
- Schramm-Sapota N.L., Cha Y M., Chaudhry S., Wilson W. A., Awartzwelder H.S. Kuhn C. M. "Differential anxiogenic, aversive, and locomotor effects of THC in adolescent and adult rats" Psychopharmacology (Berl) 2007; **191**: (4) 867-77.
- Schwartz R. "Marijuana: A decade and a half later, still a crude drug with Underappreciated Toxicity" Pediatrics Vol. 109 pp. 284- 289 2002.
- Semple D, McIntosh A, Lawrie S. "Cannabis as a risk factor for psychosis: systematic review" J Psychopharmacol 19(2):187-194 2005.
- Selten JP, Zeyl C, Dwarkasing R, Lumsden V, Kahn RS, Van Harten PN. "First-contact incidence of schizophrenia in Surinam." Br J Psychiatry. 2005;186:74-75.
- Shen D, Liu D, Liu H, Clasen L, Giedd J, Davatzikos C. "Automated morphometric study of brain variation in XXY males." Neuroimage. 2004; **23** : 648-653
- Sidney S, 2002 "Cardiovascular Consequences of Marijuana Use" Journal of Clinical Pharmacology **42**: 64-70.
- Sixty-minutes "Out of Control" Reporter Liz Hayes 20.9.2007. <http://sixtyminutes.ninemsn.com.au/article.aspx?id=297623>
- Smesny S, Rosburg T, Baur K, Rudolph N, Sauer H, Cannabinoids influence Lipid-Arachidonic Acid Pathways in Schizophrenia Neuropsychopharmacology 2007; **32**: 2067-2073.
- Smit F, Boiler L, Cuijpers P. Cannabis use and the risk of later schizophrenia: a review. Addiction. 2004;**99**:425-430.
- Soderstorm CA, Dischinger PC, Kerns TJ, et al. "Marijuana and other drug use among automobile and motorcycle drivers treated at a trauma centre". Accid Anal Prev 1995;**27**:131-135
- Solowij, N et al. "Cannabis and cognitive dysfunction: parallels with endophenotypes of schizophrenia?" Journal of Psychiatry & Neuroscience, **32**(1):30-52, 2007.
- Solowij N, 1,2,3 and Battisti R. 1 "The Chronic Effects of Cannabis on Memory in Humans: A Review Current Drug Abuse Reviews, 2008", 1, 81-98811874-4737/08
- Solowij N., Grenyer B.F. "Are the adverse consequences of cannabis use age-dependent?" Addiction **97**(9): 1083-6 2002.
- Solowij N, Stephens R et al, Cognitive functioning of long-term heavy cannabis users seeking treatment J Am Med Assoc; **287**(9): 1123-1131.2002.
- Solowij N. Stephens RS, Roffiman RA, Babor T, Kadden R, Miller M, et al. "Marijuana Treatment Project Research Group Cognitive functioning of long-term heavy cannabis users seeking treatment". JAMA ;**287**(1):54-61. 2002.
- South Australian Department of State Aboriginal Affairs "Aboriginal People and Drug Use" South Australian Drug Summit June 24-28 2002.
- Sporn AL, Greenstein DK, Gogtay N, Jeffries NO, Lenane M, Gochman P, Clasen LS, Blumenthal J, Giedd JN, Rapoport JL. "Progressive brain volume loss during adolescence in childhood-onset schizophrenia". Am J Psychiatry. 2003; **160**:2181-2189.
- Stacy AW, Newcomb MD, Bentler PM. "Cognitive motivation and drug use: a 9 year longitudinal study." J Abnorm Psychol. 1991; **100** (4):502-515.
- STASH (Science Threads on Addiction, Substance Use and Health) "The transition from drug use to drug dependence: The bridge to more troubled waters." STASH 2007; Vol. **3**(1). <http://www.basisonline.org/2007/01/index.html>

## Drug Free Australia EVIDENCE

---

Stefanis NC, Delespaul P, Henquet C, Bakoula C, Stefanis CN, Van Os J. "Early adolescent cannabis exposure and positive and negative dimensions of psychosis" *Addiction* Vol. **99**:1333-1341 2004.

Steinberg, K.L.; Roffman, R.A.; Carroll, K.M.; Kabela, E.; Kadden, R.; Miller, M.; Duresky, D.; and The Marijuana Treatment Project Research Group. "Tailoring cannabis dependence treatment for a diverse population". *Addiction* Vol. **97**(Suppl. 1):135-142, 2002.

Stirling, J., Barkus, E.J., Nabosi, L., Irshad, S., Roemer, G., Schreudergoidheijt, B., & Lewis, S. (2008). "Cannabis-induced psychotic-like experiences are predicted by high schizotypy. Confirmation of preliminary results in a large cohort." *Psychopathology* **41**, 371-378.

Stirling J, Lewis S, Hopkins R, White C. "Cannabis use prior to first onset psychosis predicts spared neurocognition at 10-year follow-up" *Schizophr Res* Vol. **75**(1):135-137 2005.

Takei N, Sham P, O'Callaghan E, Murray GK, Glover G, Murray RM. "Prenatal exposure to influenza and the development of schizophrenia: is the effect confined to females?" *Am J Psychiatry*. 1994;**151**:117-119.

Tamminga CA, Holcomb HH. "Phenotype of schizophrenia: a review and formulation". *Mod Psychiatry* 2005;**10**:27-39.

Tan W.. "The Impact of Cigarette and Marijuana Smoking in Chronic Obstructive Lung Disease Study in Vancouver, Canada" The American Thoracic Society International Conference on Disease Study in Vancouver Canada 2007. <http://www.medicalnewstoday.com/articles/72372.php>

Tarter, Ralph E. PhD. "Predictors of Marijuana Use in Adolescents Before and After Licit Drug Use: Examination of Gateway Hypothesis" *The Am J Psychiatry* **163**:2134-2140 2006.

Tashkin DP "Effects of marijuana smoking profile on respiratory deposition of tar and absorption of CO and D-9 tetrahydrocannabinol Pulmonary pathophysiology and immune consequences of smoked substance abuse" FESEB Summer Research Conference July 18-23 Copper Mountain CO 1999. <http://www.nida.nih.gov/PDF/MeetSum/faseb99/FASEB.pdf>.

Tashkin DP "Is frequent marijuana smoking harmful to health"? *Western J Medicine* 158:635-637 1993.

Tashkin DP "Smoked marijuana as a cause of lung injury" *Monaldi Arch Chest Dis* **63**(2):93-100 2005.

Tashkin DP "Study Finds Link No between Marijuana Use and Lung Cancer" *American Thoracic Society* 2006. <http://www.thoracic.org/sections/publications/press-releases/conference/articles/study-finds-no-link-between-marijuana-use-and-lung-cancer.html>

Tashkin, D.P., Coulson, A.H., Clark, V.A., Simmons, M., Bourque, L.B., Duann, S., Spivey, G.H. & Gong, H. "Respiratory symptoms and lung function in habitual heavy smokers of marijuana alone, smokers of marijuana and tobacco, smokers of tobacco alone, and nonsmokers." *American Review of Respiratory Diseases*, **135**, 209-216 1987.

Tashkin DP, Simmons MS, Sherrill DL, Coulson AH. "Heavy habitual marijuana smoking does not cause an accelerated decline in FEV1 with age." *American Journal of Respiratory and Critical Care Medicine* Vol **155**:141-148 1997.

Terris M et al "Marijuana use linked to early bladder cancer" *Urology* January 2006. <http://www.eurad.net/pdf/Report.pdf>.

Tetrault JM, Crothers K, Moore BA et al, *Effects of marijuana smoking on pulmonary function and respiratory complications: a systematic review*. *Arch Intern Med* 2007; **167**(3): 221-8.

Thomson W.M., Moffit, Poulton R., Welch D., Hancox R., "Heavy marijuana use has been found to contribute to gum disease, apart from the known effects that tobacco smoke was already known to have" *JAMA* vol. 299 **5**: 525-531 2008.

Ticker R, Connolly D "Drugs and the college athlete: an analysis of the attitudes of student athletes at risk" *J Drug Educ*.1997;27 (2):105-19 [http://www.ncbi.nlm.nih.gov/pubmed/9270209?ordinalpos=5&itool=EntrezSystem2.PEntrez.Pubmed.Pubmed\\_Results\\_Panel.Pubmed\\_DefaultReportPanel.Pubmed\\_RVDocSum](http://www.ncbi.nlm.nih.gov/pubmed/9270209?ordinalpos=5&itool=EntrezSystem2.PEntrez.Pubmed.Pubmed_Results_Panel.Pubmed_DefaultReportPanel.Pubmed_RVDocSum)

Ujike H, Morita Y. "New perspectives in the studies on endocannabinoid and cannabis: cannabinoid receptors and schizophrenia". *J Pharmacol Sci* 2004;**96**:376-81.

Vandrey R.G., Budney A.J., Hughes J.R., Liguori A. "A within-subject comparison of withdrawal symptoms during abstinence from cannabis, tobacco, and both substances" *Drug and Alcohol Dependence* 2008 **92** (1-3)48-54.

## Drug Free Australia EVIDENCE

---

Vandrey R., Budney A., Ligouri A. "Marijuana withdrawal as bad as withdrawal from cigarettes" Drug and Alcohol Dependence January 2007 5; 86 (1) 22-9.

Vandrey R G, Budney A J, Moore B A, Hughes J R. "A cross-study Comparison of Cannabis and Tobacco withdrawal" The American Journal on Addiction. 14:54-63, 2005.

Van Os, J et al. "Prospective cohort study of cannabis use, predisposition for psychosis, and psychotic symptoms in young people" British Medical Journal, 330:11-,2005.

Van Os J, Bak M, Hansen M, Bijl RV, de Graaf R, Verdoux H. "Cannabis use and psychosis; a longitudinal population based study". Am J Epidemiol 2002;156(4)319-27.

Van Os J, Hanssen M, Bak M, Bijl RV, Vollebergh W. "Do urbanicity and familial liability coparticipate in causing psychosis?" Am J Psychiatry. 2003;160:425-429.

Veen ND, Selten JP, van der Tweel I, Feller WG, Hoek HW, Kahn RS. "Cannabis use and age at onset of Schizophrenia" Am J Psychiatry 2004 Mar;161(3):501-506.

**Velting, W., Mackenbach, J.P., van Os, J., & Hoek, H.W.** (2008). Cannabis use and genetic predisposition for schizophrenia: A case-control study. *Psychological Medicine* 38, 1251-1256.

Verdoux H, Gindre C, Sorbara F, Tournier M, Swendsen JD. "Effects of cannabis and psychosis vulnerability in daily life: an experience sampling test study". Psychol Med 2002; 33:23-32 2003.

Victoria Police "Impaired Driver Enforcement Training Version 1.0 Testing for Drug Impaired Driving- An Instructional CD-Rom. Copyright Vic Roads 1999.

Victoria Police "Random roadside drug testing program expanded" 28 February 2006.

Watanabe K, Motoya E, Matsuzawa N, Funahashi T, Kimura T, Matsunaga T, Arizono K, Yamamoto I (2005). "Marijuana extracts possess the effects like the endocrine disrupting chemicals." *Toxicol* 206:471-478.

Watson C, Fleming J, Alexander K. "A survey of drug use patterns in Northern Territory Aboriginal communities: 1986-1987. Darwin: Northern Territory Department of Health and Community Services, Drug and Alcohol Bureau; 1988".

Weinberg NZ, Glantz M "Child psychopathology risk factors for drug abuse: overview" J Clin Child Psychol. 1999 Sep;28(3):290-7

Weiner Michelle D., Sussman Steve, McCuller William J., Lichtman Kara "Factors in Marijuana Cessation among High-Risk Youth" J Drug Education Vol 29(4) 337-357, 1999.

Werch CE, Anzalone D. "Stage Theory and Research on Tobacco, Alcohol, and Other Drug Use", Journal of Drug Education 25:2, pp. 81-98, 1995.

WHO/ARF (Addiction Research Foundation) Report: "Adverse Health and Behavioural Consequences of Cannabis Use" Addiction Research Foundation <http://www.eurad.net/pdf/Report.pdf> 2006.

Wilson W., Mathew R., Turkington T., Hawk T., Coleman E., Provenzale J., "Brain Morphological Changes and Early Marijuana Use: A Magnetic Resonance and Position Emission Tomography Study" Journal of Addictive Diseases Volume 19 Number 1 2000.

Wu TC Tashkin DP Djahed B Rose JE "Pulmonary hazards of smoking marijuana as compared with Tobacco" New England Journal of Medicine 318:347-351 1988.

Yücel M, Lubman D I, Harrison BJ, Fornito A, Allen NB et al, "A combined spectroscopy and functional MRI investigation of the dorsal anterior cingulate region in opiate addiction." Molecular psychiatry 2007; 12: 691-702.

Yücel, M., Lubman, DI., Harrison, BJ., Fornito, A., Wellard, RM., Roffel, K., Allen, NB., Clarke, K., Wood, SJ., Forman, SD. & Pantelis, C. (2007). "Neuronal, physiological and brain-behavioural abnormalities in opiate-addicted individuals" Molecular Psychiatry. 12, 611.

Yücel, M. Lubman, DI., Velakoulis, D., Wong, MTH., Wood, SJ., Condello, A., Brewer, WJ. & Pantelis, C (2006). "Structural brain correlates of alcohol and cannabis use in recreational users". *Acta Neuropsychiatrica*. 18(5), 226-229.

## Drug Free Australia

# EVIDENCE

---

- Yücel, M., Solowij, N., Respondek, C., Whittle, S., Fornito, A., Pantelis, C., Lubman, D.I. (In Press; Accepted January 2008). "Regional brain abnormalities associated with heavy long-term cannabis use." *Arch Gen Psychiatry*. 2008;65(6):694-701.
- Yurgelun-Todd DA, Gruber SA, Hanson RA, Baird AA, Renshaw P, Pope HC. "Residual effects of marijuana use: a fMRI study. *Proceedings of the 60<sup>th</sup> annual scientific meeting of the college on problems of drug dependence*". MDIDA Research Monograph, vol **179**;1999. P.78.
- Zammit, S et al. "Self-reported cannabis use as a risk factor for schizophrenia in Swedish conscripts of 1969: historical cohort study". *British Medical Journal*, **325**:1199-1201, 2002.
- Zammit S, Allebeck P, Andreasson S, Lundberg I, Lewis G. "Self reported cannabis use as a risk factor for schizophrenia in Swedish conscripts of 1969; historical cohort study." *BMJ* 2002;**325**:1199-1201.
- Zammit S., Bisaga A., M. D. "Pot and Psychosis: Possible Link?" *The Lancet* 370, 319-328 (2007).
- Zammit, S., Moore, T.H., Lingford-Hughes, A., Barnes, T.R., Jones, P.B., Burke, M., & Lewis, G. (2008). Effects of cannabis use on outcomes of psychotic disorders: Systematic review. *The British Journal of Psychiatry* 193, 357-363.
- Zhang X., Wang J.F., Kunos G., Groopman J.E. *Cannabinoid Modulation of Kaposi's Sarcoma-Associated Herpesvirus Infection and Transformation*". *Cancer Res* **67**: (15) 7230-7237, 2007.
- Zhang, ZF, Morgenstern, H, Spitz, MR, Tashkin, DP, Marshall, JR, Hsu, TC and Schantz, SP, "Marijuana use and increased risk of squamous cell carcinoma of the head and neck" *Cancer Epidemiol. Biomarkers Prev.* **8**(12) 1071-8, 1999.
- Zhu LX, Sharma M, Stolina S, et al. "Delta-9-tetrahydrocannabinol inhibits antitumor immunity by a CB2 receptor-mediated, cytokine-dependent pathway". *J Immunology* **165**(1):373-380, 2000.
- Zimmer L., "Chapter One: The History of Cannabis Prohibition" "The Ascendancy and Decline of Worldwide Cannabis Prohibition" 1996. <http://www.hereinstead.com/Lynn-Zimmer-On-World-Wide-Cannabis-Prohibition.pdf>
- Zimmerman S, Zimmerman A M. "Genetic effects of marijuana". *The International Journal of Addictions*. 1990-1991;**25**:19-23.
- Zuckerman B et al. "Effects of maternal marijuana and cocaine use on fetal growth". *NEJM*. 1989;**320**:762-768.
- Zweben Joan Ellen Ph.D., O'Connell Kathleen "Strategies for Breaking Marijuana Dependence" *Journal of Psychoactive Drugs* Vol **24**(2) pp 165-171 1992. <http://members.optushome.com.au/~apdfdy/Strategy.html>



## **APPENDIX A: UNITED KINGDOM**

An article by David Wilkes in the Daily Mail dated 5 September 2007 see link:

[http://www.dailymail.co.uk/pages/live/articles/news/news.html?in\\_article\\_id=480162&in\\_page\\_id=1770](http://www.dailymail.co.uk/pages/live/articles/news/news.html?in_article_id=480162&in_page_id=1770)

**“Mother blames cannabis for suicide of promising violinist daughter”**

Talented, bubbly and pretty, Laura Bower-McKnight had it all to live for. A gifted musician, the 22-year-old studied at the prestigious Royal Welsh College of Music and seemed destined for a career in the performing arts. But her life once so full of promise was prematurely ended when she killed herself after cannabis turned her into a shambling wreck and left her an depressed recluse terrified of going outdoors. She was found dead at her family's home last week after hanging herself from the end of her bed. Her heartbroken mother told how smoking a single joint of the potent "skunk" variety of the drug triggered a psychotic episode in her violinist daughter and set her on the road to her death.

Mrs. McKnight said: "People think nothing of cannabis nowadays. They just don't realise this drug can tip you over the edge. "A lot of people try it". With the government downgrading it, I think young people assume it is completely harmless." But it can destroy your mind."

Having returned to the family home in North Hykeham, troubled Laura, who had previously smoked normal cannabis with friends, tried a joint of skunk - and the experience proved devastating. Mrs. McKnight said: "It wasn't the real Laura, the always-on-the-go, lovely young woman, the musician, the passionate writer, the artist." It tipped her into psychosis. We lost our wonderful girl for a while. Her behaviour became completely erratic. She was doing very odd things. Mrs. McKnight said she and her husband Malcolm, Laura's stepfather, now only hoped their daughter's death would serve as a warning to others.

She said: "Laura would have wanted us to highlight these issues. We were so close. It's just a massive, irreplaceable loss from our lives. "There are a lot of young, vulnerable people. Expectations of them are so high. Drug use, depression and suicide among them is a growing problem." Mr. McKnight, 44, an engineer, added: "Different people have different limits with drugs. For some even the tiniest amount can be too much."

An article by Paul Britton in the Manchester Evening News on 17 April 2006 see link:

[http://www.manchestereveningnews.co.uk/news/s/210/210885\\_parents\\_blame\\_cannabis\\_for\\_sons\\_suicide.html](http://www.manchestereveningnews.co.uk/news/s/210/210885_parents_blame_cannabis_for_sons_suicide.html)

**‘Parents blame cannabis for son's suicide’**

A grieving family blames cannabis for causing the mental illness that drove their son to suicide. Lee Michael Wellock, 24, was found hanging from a tree with a note in his pocket indicating that he intended to kill himself. Lee had smoked the drug since he left Elton High school in Bury to work at a computer company. His parents, Michael and Denise, of Newington Drive in Bury, said it "took over and controlled" their son's life and ultimately led to his death. Lee, who did not drink alcohol, smoke cigarettes or take any other drugs, developed mental health problems at the age of 18 and was diagnosed with schizophrenia at 22, an inquest in Bury was told.

An article by Richards Edwards in the Telegraph Newspaper on the 25 September 2007 see link:

<http://www.telegraph.co.uk/news/main.jhtml?xml=/news/2007/09/25/nsuicide125.xml>

**“Suicide girl jumped to death at hospital”**

The daughter of an aristocratic couple jumped to her death following an eight-year descent into mental illness triggered by cannabis, it has emerged. Genevieve Butler, 28, the daughter of Lord and Lady

## EVIDENCE

---

Dunboyne, the Anglo-Irish family, threw herself from a balcony at a London hospital after breaking free from a nurse who was taking her for a cigarette break.

Her parents told of how their "clever, bright and quick-witted" daughter had been lost to them eight years ago when she was diagnosed with drug-induced -paranoia after using cannabis. *"Potent marijuana blamed for remote youth suicides"* reported in 'The Australian' on Wednesday 21 November 2007 highly potent marijuana is being blamed for youth suicides and psychotic episodes in a remote central Australian community, which is struggling to cope with increasing levels of drug use over the past 12 months. Susie Low the head of the Internationally-recognised substance abuse program at Mt Theo outstation said "In two out of the last three (suicides), the young men were under the influence of alcohol and marijuana". Ms Low's anecdotal concerns support the findings of two reports on marijuana use in the Territory, the most recent of which said 60 per cent of people in some Arnhem Land communities were cannabis users.



## APPENDIX B: AUSTRALIA

Spencer Gear in a Letters to the Editor, Fraser Coast Chronicle Maryborough Queensland on the 15 March 2007 wrote. Sadly, I have conducted the funeral of a 27-year old who committed suicide. Her family told me that the doctor said that her psychosis was probably marijuana induced. Herschel Baker (FCC 31-3-07) is right in challenging Dr. Kees Nydam's incorrect statement that "finding a clear-cut association between marijuana and mental health was not easy." It is clear in the research literature.

***"Potent marijuana blamed for remote youth suicides"*** reported in The Australian on Wednesday 21 November 2007 highly potent marijuana is being blamed for youth suicides and psychotic episodes in a remote central Australian community, which is struggling to cope with increasing levels of drug use over the past 12 months. Susie Low the head of the Internationally-recognised substance abuse program at Mt Theo outstation said "In two out of the last three (suicides), the young men were under the influence of alcohol and marijuana". Ms Low's anecdotal concerns support the findings of two reports on marijuana use in the Territory, the most recent of which said 60 per cent of people in some Arnhem land communities were cannabis users.

### **Cannabis may trigger psychosis: experts**

The Sydney Morning Herald March 7, 2005 - 1:24AM [www.SMH.com.au](http://www.smh.com.au/news/Health/Cannabis-may-trigger-psychosis-experts/2005/03/07/1110044267823.html).  
<http://www.smh.com.au/news/Health/Cannabis-may-trigger-psychosis-experts/2005/03/07/1110044267823.html>

Cannabis is not the harmless drug many people believe it to be, with new evidence showing today's genetically engineered crops are more potent and may trigger psychotic illnesses, Australian scientists say. One in five Australian teenagers smoke cannabis every week, some as young as 10, and 10 per cent of those become addicted. Psychologists, bioscientists and counsellors are seeing more young Australians developing psychoses, depression and anxiety disorders through cannabis use, the ABC's *Four Corners* program has been told. Professor Vaughan Carr, Scientific Director of the Neuroscience Institute, said he believed there were similarities between the effects of cannabis on the brain, and schizophrenia. "I think that the odds are better than 50-50 that cannabis use in sufficient quantities beginning early enough in life may produce some cases of schizophrenia in people who otherwise would not have developed it," he told *Four Corners*, which airs tonight. "But that's my gut feeling. Roughly one in five adolescents overall are cannabis users in reasonable quantities. "I would have to say that all of them are at risk, but the earlier the onset of cannabis use and the greater the frequency of use, the higher the risk."

Sydney psychologist Andrew Campbell said there was much debate about whether cannabis uncovered an existing psychosis, or caused it. "My view is that it is bringing on new cases of psychosis," he told the program. "I see a lot of people with long-standing psychosis and if I see one in 10 people in a day, seven of them will have used cannabis on a daily basis at the first time of onset of psychosis."

The experts also say new hydroponically grown crops have been engineered into a much more toxic drug than 30 years ago. Dr Campbell said the new variety grew only about a metre high with little leaf and a lot of heads. As a result, the main chemical, tetrahydrocannabinol, or THC, is much more concentrated. "So when you buy \$25 worth of cannabis these days you're mainly getting heads. You don't get the leaf which is much lower in concentration of cannabis," Dr Campbell told the program. The experts also say that because new research has shown the brain is not fully wired until a person is in their early to mid-20s, teenage users are most at risk of developing mental illness.

Melbourne's Early Psychosis Prevention and Intervention Centre (EPPIC) director, Pat McGorry, said at least 70 per cent of young people who attended the centre had used cannabis. "The proportion of patients using it that we see has gone up. I would say it's doubled since the early '80s when we started to look at this group of patients," Professor McGorry said.

**Convicted of manslaughter after relying on cannabis psychosis re diminished responsibility.**

Daily Telegraph by Michele Tydd 3<sup>rd</sup> September 1991

In the Supreme Court at Wollongong on the 3<sup>rd</sup> September, 1991, a Bega man pleaded guilty to slashing his neighbour's throat and stabbing him in the stomach and anus, on the spur of the moment, in the victim's caravan at Burragate on 3<sup>rd</sup> September, 1991. He was a long term user of marijuana and a friend of the deceased. He raised diminished responsibility and was found to be suffering from a marijuana-induced psychosis. He was freed by the Judge after being held in custody for some two years.

**"Skunk Sparks a stink"** by Christopher Taylor The Sunday Mail 9 April 1994.

Drug Counsellors are concerned that skunk weed is 10 to 15 times more potent than normal cannabis strains and that is a conservative estimate. Experts say the strain has an almost hallucinogenic effect. Where marijuana gives the user a sense of euphoria, skunk can leave the user in a state that could easily be mistaken for mental in balance.

The user can become intensely paranoid even exhibiting extreme schizophrenic traits. Experts said the strain can create "users with retarded motivation and responses."

**"Video dream made me stab brother"** Daily Telegraph 9 November 1988.

A 19 year old who cut his brother's throat while he was asleep. He had seen the film Platoon and he believed he was an American soldier and his brother a member of the Vietcong. He had used 4 cones of marijuana and was said to be hallucinating, a psychiatrist gave evidence that he was suffering from a cannabis induced toxic psychosis. He was convicted of murder. The trial Justice, Justice Yeldham remarked "So much for those who would legalise marijuana".

**"Debbie's alleged killer sobbed, say police"** The Sydney Morning Herald September 15, 1987  
[www.SMH.com.au](http://www.SMH.com.au).

A 21-year-old man who is a heavy user of cannabis and lived with his family and nine-year old sister at Maitland in NSW, he was directed by voices (auditory hallucinations) to kill a member of his family and hence sexually assaulted and bashed his sister to death in their flat they both occupied. His plea of diminished responsibility as a result of cannabis induced psychosis was accepted. He was sentenced to three years imprisonment with a parole period of two years.

**Innisfail Advocate of Saturday July 18, 1992.**

"In the Townsville Bulletin newspaper on Thursday was the shocking story of two teenagers facing committal proceedings for murder, who, after smoking 20 cones of marijuana, allegedly battered a man to death with a shifting spanner and a large lump of wood. Police asked the youth (about the marijuana): "How effective was it?" to which the youth answered: "Well, I can't remember much after it happened". The youth also allegedly told police: "I wish I'd never had that first cone of marijuana".

This horrifying, yet pathetic, story involving marijuana usage is not an isolated case of marijuana smoking leading to a shocking allegedly criminal act.

## CENTRAL ISSUES FOR AUSTRALIAN LEGISLATORS - 5

### 92% of Australians do not Approve of Cannabis Use

According to the 2010 National Drug Strategy Household Survey, a survey of more than 24,000 Australians, 92% of Australians do not approve the recreational use of cannabis, which is precisely what Australia21's lobbyists are seeking to legalise. While 69% of Australians support 'medical marijuana' in the same study, Drug Free Australia believes very few of these Australians would be able to specify the handful of medical indications attributed to cannabis

### Cannabis use not acceptable to most Australians

Australians do not approve of cannabis use as per the National Drug Strategy Household Survey table reproduced below. It logically follows that if legislating the use of smoked marijuana for medical purposes leads to diversion of cannabis for recreational use, then Australians would not approve of such legislation.

Drug	Approval of regular drug use by adults			Most serious concern for community			Drug thought to cause most deaths		
	2007	2010		2007	2010		2007	2010	
Tobacco	14.3	15.3	↑	17.2	15.4	↓	40.6	36.5	↓
Alcohol <sup>(a)</sup>	45.2	45.1		32.3	42.1	↑	29.4	29.4	
Cannabis	6.6	8.1	↑	5.7	4.5	↓	1.3	1.0	↓
Ecstasy	2.0	2.3		6.0	5.5		5.2	3.9	↓
Meth/amphetamines <sup>(b)</sup>	1.2	1.2		16.4	9.4	↓	5.3	4.6	↓
Cocaine/crack	1.4	1.7		8.3	6.1	↓	6.8	5.0	↓
Hallucinogens	1.7	2.4	↑	0.5	0.9	↑	0.6	0.4	
Inhalants	0.8	1.0		1.4	1.3		n.a.	0.7	
Heroin	1.0	1.2		10.5	11.4	↑	9.8 <sup>(c)</sup>	15.9 <sup>(c)</sup>	↑
Pharmaceuticals <sup>(d)</sup>	13.4	22.4	n.a.	1.4	2.2	n.a.	1.1	1.5	n.a.
None of these	n.a.	n.a.		0.3	0.4		n.a.	n.a.	
Other	n.a.	n.a.		n.a.	n.a.		n.a.	0.3	

(a) Question asked as 'excessive drinking of alcohol' for 'most serious concern for community'.

(b) For non-medical purposes.

(c) Other opiates are included with heroin for 'drug thought to cause most deaths'.

(d) Additional pharmaceuticals were included in the 2010 survey, so 2007 and 2010 data are not directly comparable. For this reason, significance testing was not done for these variables.

**DFA Conjecture – most Australians ignorant of ‘medical cannabis’ background**

It may be conjecture on our part, but we firmly believe that few Australians know enough about ‘medical marijuana’ to form any opinions on its legality. 69% of those surveyed supported ‘medical cannabis’. Informed?