Cannabis: The Facts

British Toxicology Society - sponsored
1 day Symposium

11 October 2002
Cannabis: The Facts

INTRODUCTION AND BACKGROUND
Professor Gabrielle Hawksworth (University of Aberdeen)

RECENT ADVANCES IN THE PHARMACOLOGY OF CANNABINOIDS
Dr David Baker (University College, London)

THERAPEUTIC USES OF CANNABINOIDS
Professor Tony Moffatt (Royal Pharmaceutical Society of Great Britain)

WANTED AND UNWANTED EFFECTS OF CANNABIS IN MAN
Professor Heather Ashton (University of Newcastle)

MARIJUANA AND MADNESS
Professor Robin Murray (Institute of Psychiatry)

CLINICAL EFFECTS OF CANNABIS – PRESENT AND FUTURE
Professor John Henry (Imperial College School of Medicine, London)

TEACHING YOUNG PEOPLE ABOUT HARM AND RISK FROM CANNABIS
Mrs Mary Brett (Challoner School, Bucks)

CANNABIS – THE WAY FORWARD
Dr Ian Oliver (University of Teesside)
Wanted and unwanted effects of cannabis in man

Prof Heather Ashton
(University of Newcastle)
<table>
<thead>
<tr>
<th>Group</th>
<th>Prevalence</th>
<th>Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>School children</td>
<td>8-16 yrs 30-40% (1% smoke daily) 18 yrs – 59%</td>
<td>Survey of several 1000s of 8-18 yr olds</td>
</tr>
<tr>
<td>University Students</td>
<td>60% (20% weekly or more often)</td>
<td>Survey of 3699 students from 10 UK universities</td>
</tr>
<tr>
<td>Medical Students</td>
<td>46% (10% weekly or more often)</td>
<td>Survey of 785 medical students from 7 UK medical schools</td>
</tr>
<tr>
<td>Junior Doctors</td>
<td>30% (11% weekly or more often)</td>
<td>90 junior doctors in NE England</td>
</tr>
</tbody>
</table>
Addictive effects with anagesics, phenothiazones and other drugs used in palliative care

<table>
<thead>
<tr>
<th>Therapeutic Potential of Cannabinoids</th>
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<tbody>
<tr>
<td>Antiemetic</td>
</tr>
<tr>
<td>Appetite stimulant</td>
</tr>
<tr>
<td>Analgesic</td>
</tr>
<tr>
<td>Anxiolytic</td>
</tr>
<tr>
<td>Muscle relaxant</td>
</tr>
<tr>
<td>Hypnotic</td>
</tr>
<tr>
<td>Anticonvulsant</td>
</tr>
<tr>
<td>Antidepressant</td>
</tr>
<tr>
<td>Antipyretic</td>
</tr>
<tr>
<td>Bronchodilator</td>
</tr>
</tbody>
</table>

Addictive effects with anagesics, phenothiazones and other drugs used in palliative care
Figure 4: The distribution of THC after a single administration in plasma and body tissues. Note the "biphase" disappearance curve in plasma. The rapid phase (in minutes) indicates a rapid uptake of the drug by fat containing tissues. The slow phase (in days) shows the release of THC by these tissues. From D.S. Kreuz, J. Axelrod: D9-THC - Localisation in body fat. Science. 179:391 (1973).
Distribution of THC in Brain

Cerebral cortex - logical thought, reasoning, judgement

Hippocampus - memory functions, time appreciation

Limbic system nuclei - pleasure/reward centres

Sensory areas - perception of sound, colour etc

Motor areas - muscle co-ordination, psychomotor performance
### Signs and symptoms of abstinence after abrupt cessation of oral cannabis (210mg/day for 11-21 days)

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Symptom</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mood changes</td>
<td>Hyperactivity</td>
</tr>
<tr>
<td>Disturbed sleep</td>
<td>Hiccups (rare)</td>
</tr>
<tr>
<td>Decreased appetite</td>
<td>Nasal congestion (rare)</td>
</tr>
<tr>
<td>Restlessness</td>
<td>Weight loss</td>
</tr>
<tr>
<td>Irritability</td>
<td>Hemoconcentration</td>
</tr>
<tr>
<td>Perspiration</td>
<td>Salivation</td>
</tr>
<tr>
<td>Chills</td>
<td>Tremor</td>
</tr>
<tr>
<td>Feverish feeling</td>
<td>Loose bowel movements</td>
</tr>
<tr>
<td>Nausea</td>
<td>Body temperature increase</td>
</tr>
<tr>
<td>Abdominal distress</td>
<td>Sleep EEG eye movement rebound</td>
</tr>
<tr>
<td>Tremulousness</td>
<td>Waking EEG changes</td>
</tr>
<tr>
<td></td>
<td>Intraocular pressure increase</td>
</tr>
</tbody>
</table>

Source: Jones et al (1976)
Comparison of Wechsler Memory Prose Passages score soon after admission and 6 weeks later.
# Cannabis Effects on Driving and Piloting Skills

<table>
<thead>
<tr>
<th>Effect</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slowed reaction times</td>
<td>Poor detection of peripheral lights</td>
</tr>
<tr>
<td>Impaired co-ordination</td>
<td>Poor tracking ability</td>
</tr>
<tr>
<td>Impaired attention and memory</td>
<td>Deficits in complex task performance</td>
</tr>
<tr>
<td>Size and time distortion</td>
<td>Additive effects with alcohol</td>
</tr>
</tbody>
</table>
Pilot Performance Decrement Scores

Squares & Dashes = 20 mg Dose, Circles & Solid Line = Placebo

Decrement Scores vs. Hours After Smoking

Before 0 → Hours After Smoking
Some Psychiatric Effects of Cannabis

Anxiety, panic reactions

Flashbacks

Paranoid psychosis

Aggravation of schizophrenia    Risk of aggression

Interaction with alcohol    and violence
## Costs of Cannabis Use 1

<table>
<thead>
<tr>
<th>Personal</th>
<th>Community</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Short Term</strong></td>
<td></td>
</tr>
<tr>
<td>Psychomotor impairment</td>
<td>- Traffic accidents (road, rail, air)</td>
</tr>
<tr>
<td></td>
<td>- Accidents at work and home</td>
</tr>
<tr>
<td>Cognitive impairment</td>
<td>- Educational underattainment (School, university, work training)</td>
</tr>
<tr>
<td></td>
<td>- Impaired work performance</td>
</tr>
<tr>
<td>Psychiatric disorders</td>
<td>- Acute psychosis, aggravation of schizophrenia, violence, crime</td>
</tr>
<tr>
<td></td>
<td>- NHS and prison costs</td>
</tr>
</tbody>
</table>
## Costs of Cannabis Use 2

<table>
<thead>
<tr>
<th>Personal</th>
<th>Community</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Long Term</strong></td>
<td>- NHS and voluntary service costs</td>
</tr>
<tr>
<td>Dependence</td>
<td></td>
</tr>
<tr>
<td>Respiratory and cardiovascular disease</td>
<td>- NHS costs</td>
</tr>
<tr>
<td>? Long term cognitive impairment</td>
<td>- Impaired work performance</td>
</tr>
<tr>
<td>? Polydrug use</td>
<td>- NHS and social cost</td>
</tr>
</tbody>
</table>
Marijuana and Madness

Professor Robin Murray
(Institute of Psychiatry)
A brief history of cannabis and psychosis

- First cases reported 150 years ago
- Numerous anecdotal reports of individual cases of cannabis psychosis from many countries
- Reports of cannabis-induced psychosis from Frank Knight in Jamaica in the 1960s
- Series of reports from University Clinic in Amsterdam in the early 1990s
Substance abuse in Psychotic Patients

- 119 patients with recent onset psychosis and 96 normal controls were interviewed about their use of alcohol and drugs

# Abuse of Alcohol or Drugs

<table>
<thead>
<tr>
<th></th>
<th>Psychotic Patients</th>
<th>Controls</th>
<th>Odds Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alcohol</td>
<td>21</td>
<td>26</td>
<td>0.76</td>
</tr>
<tr>
<td>Cannabis</td>
<td>39</td>
<td>22</td>
<td>2.25**</td>
</tr>
<tr>
<td>Other drugs*</td>
<td>11</td>
<td>9</td>
<td>1.18</td>
</tr>
</tbody>
</table>

**P=.01

Grech et al, 2002
Cannabis consumption at age 18 and later risk of schizophrenia

Andreasson et al., 1987
Psychotic patients may use cannabis to:-

- counteract the unpleasant effects of their symptoms - eg anxiety or negative symptoms

- counteract the unpleasant effects of their treatment - eg excessive dopamine blockade

- if cannabis use is therefore beneficial, its use might confer a better outcome
# Effect of Cannabis Intake on Outcome of Psychosis at Four Years

<table>
<thead>
<tr>
<th></th>
<th>Positive Symptoms</th>
<th>Negative Symptoms</th>
<th>Continuous Course</th>
</tr>
</thead>
<tbody>
<tr>
<td>No cannabis</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Initially only</td>
<td>1.6</td>
<td>0.6</td>
<td>1.7</td>
</tr>
<tr>
<td>Both</td>
<td></td>
<td>1.1</td>
<td></td>
</tr>
</tbody>
</table>

Grech et Al, 2002
The situation in UK Psychiatric Units

- Cannabis consumption by psychotic patients is now widely accepted as exacerbating the illness.
- It is a major problem for English psychiatric units with cannabis frequently being traded on in-patient wards.
- The Department of Health is advocating the establishment of so-called dual-diagnosis treatment teams.
Swedish population-based cohort study

49,968 males were inducted into the army at age 18 in 1969–70, and then followed-up till 1983. 195 were admitted to hospital with an ICD-8 diagnosis of schizophrenia.
Cannabis use at baseline and psychosis 2 years later

<table>
<thead>
<tr>
<th>Use Level</th>
<th>OR</th>
<th>95%CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>No use</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Low use</td>
<td>1.23</td>
<td>0.4-4.2</td>
</tr>
<tr>
<td>Middle use</td>
<td>4.90</td>
<td>10.4-23.1</td>
</tr>
<tr>
<td>High use</td>
<td>6.81</td>
<td>1.8-25.9</td>
</tr>
</tbody>
</table>

Experimental Studies

- Cyril D’Souza and colleagues have been giving intravenous THC to normal and psychotic subjects

- Normal individuals experience brief psychotic symptoms

- Individuals who have been psychotic suffer a greater increase in psychotic symptoms
Clinical effects of cannabis – present and future

Professor John Henry
(Imperial College School of Medicine, London)
Use (%) of cannabis in the last 12 months by age and gender

Data for England and Wales 2000 (British Crime Survey)
Compared with tobacco smoking, marijuana smoking is associated with:

- two-thirds larger puff volume
- one-third larger inhaled volume
- four-fold longer breath hold time
- five-fold increase in blood carboxyhaemoglobin

Wu TC et al. Influence of marijuana potency and amount of cigarette consumed on marijuana smoking pattern. J Psychoactive Drugs 1988;20:43-6
CANNABIS INTOXICATION (DSM 4)

A) recent use of cannabis

B) behavioural or psychological changes during or shortly after use, e.g.

* impaired motor coordination
* euphoria
* anxiety
* sensation of slowed time
* impaired judgement
* social withdrawal
CANNABIS INTOXICATION (DSM 4)

C) 2 or more of the following within 2 hours of cannabis use:
   - conjunctival injection
   - increased appetite
   - dry mouth
   - tachycardia

D) Not due to a general medical condition
   Not due to another mental disorder
Classification of Cannabis
[under Schedule 2 of Misuse of Drugs Act 1971]

- Less harmful than other Class B substances (amphetamines, barbiturates, codeine-like compounds)
- However, this suggests that their harmful effects are equivalent
- Users may think that if they have had no harmful effects from cannabis then other Class B substances will be equally safe
- Council therefore recommends reclassification of all cannabis preparations to Class C

ACMD 2002
Lung Damage

- Bullous lung disease occurs after a shorter time than cigarette smoking, and has a different pattern
- Incidence unknown
- $\text{Alpha}_1$-antitrypsin deficiency excluded

Large lung bullae in marijuana smokers
Heart and Lung Disease

“Increased incidence of bronchitis, asthma and lung cancer as well as disorders of the heart and circulation”

ACMD 2002
Heart and Lung Damage
Longer Term

“Since cannabis use has only become commonplace in the past 30 years there may be worse news to come”

ACMD2002
Cannabis – The Way Forward

Ian Oliver (University of Teesside)
Cannabis

There are 3 drugs derived from the plant:

- **Marijuana** - refers to leaves & flowers - smoked as reefers, joints, roach, etc.
- **Hashish** - potent resinous substance from dried plant usually smoked in pipes;
- **Hash oil** - very potent, viscous liquid extract usually dropped onto normal cigarettes.
Cannabis

Plant contains 400 chemicals and over 60 cannabinoids. The smoke contains more than 2000 chemicals.

**Delta 9 THC** is the chemical responsible for producing the psychoactive effect.

Others such as cannabidiol and cannabinol may modify the effects of THC.

Cannabis is classified as a Dangerous Drug and is proven to be **addictive**.
Cannabis

Cannabis is known to affect adversely these systems:-

* central nervous
* cardiovascular
* respiratory
* immune
* reproductive
* neuro-psychological
Cannabis and Mental Health.

Cannabis is one of the most psychopathogenic of all narcotic preparations. In addition to the feelings of relaxation it is associated with: delirium, psychosis, schizophrenia, anxiety disorders, depersonalisation syndrome, depression & suicide, amotivational syndrome and impulsively violent behaviour. 1 in 10 of all users are thought to experience cannabis psychosis.
Cannabis & Mental Health.

2002 - University of Maastricht = smoking cannabis triples the risk of a psychiatric disorder - hallucinations, paranoia, manic depression and schizophrenia American Journal of Epidemiology.

Similar results found in NZ, Sweden & Israel.

Okayama University Japan found evidence that marijuana can cause genetic abnormalities linked with mental illness.
Cannabis & pregnancy.

Using cannabis during pregnancy/breast feeding is unsafe:~

★ birth weight/size lower;
★ increased risk of birth defects;
★ appears to enhance the risk of S.I.D.S;
★ affects neuropsychological performance in some which may persist into later life;
★ possible foetal-cannabis syndrome;
★ associated with childhood cancers.
Cannabis

Known toxins and carcinogens are stored in the fatty tissues of the body and are released over a period of days. Tests have shown traces up to 4 months after last ingestion.

A regular user is never free of THC. Modern cannabis may be up to 40 times stronger than that used in the 1960s.
Cannabis use by Teenagers

Anything in excess of casual use poses a threat to the development of young people. Owing to immaturity and inner mental imbalance teenagers are more likely to react with psychiatric symptoms than adults. It is reasonable to assume that young people are more susceptible to the known adverse effects of cannabis than adults.
Cannabis as a medicine?

Some of the compounds found in cannabis do have a potential as a medicine but there are established and tested alternatives which are usually more effective. **No prescribed medication is smoked** because of uncertainty of dosage and purity/strength of the substance.
Cannabis is a harmful drug that impairs performance and presents a real health risk; occasional use is dangerous for some; regular use can result in dependence; it can lead to the use of Class A drugs; more research is necessary combined with a public health education programme. There may be worse news to come!