

Cannabis and the lung

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Cannabis use in New Zealand

Most widely used illegal drug

- 50% adults have ever used**
- 25% adults used last year**
- 3% heavy users (>10 joints last month)**

Cannabis vs tobacco

Similar constituents:

- **Cannabis - THC**
- **Tobacco - nicotine**

THC

- **Major active pharmacological constituent**
- **Highly lipid soluble**
- **Bioavailability - 20% smoking**
- 5% orally

Characteristics of smoking

	Tobacco	Cannabis
Puff volume (ml)	49	88
Puff duration (sec)	2.4	3.8
Inhaled volume (L)	1.3	1.8
Retention time (sec)	3.5	13.8

Cannabis vs tobacco

5 x greater increase in carboxyhaemoglobin

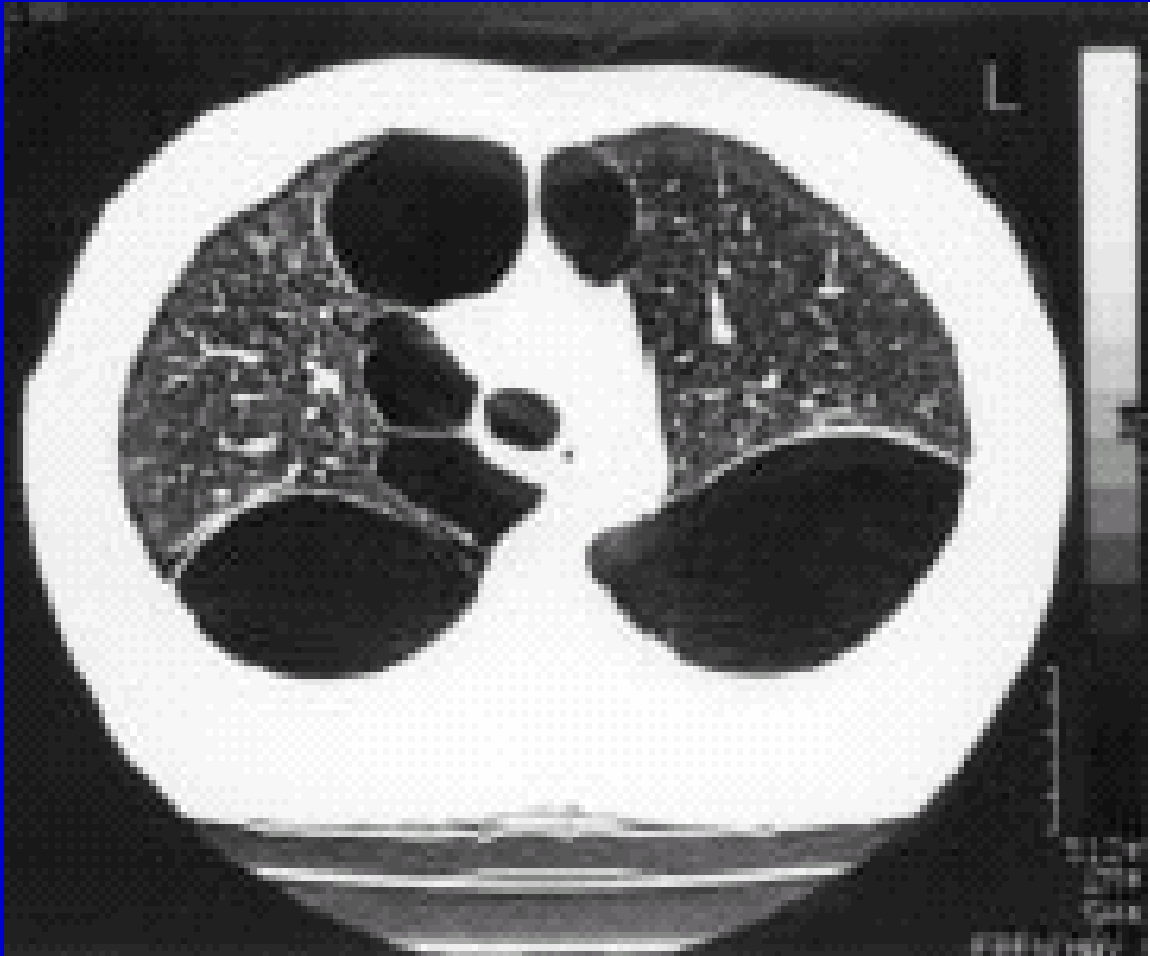
3 x greater increase in tar

Cannabis – acute respiratory effects

- **Acute bronchodilation**
- **Attenuates provoked bronchoconstriction**
- **Tachyphylaxis**
- **Not mediated by β_2 or muscarinic receptors**
- **Occasional bronchospasm**

Cannabis – chronic respiratory effects

- **Habitual heavy smoking causes chronic bronchitis**
- **Impaired small and large airway function**
- **Bullous emphysema – case reports**



Cannabis – chronic respiratory effects

**Estimated 3 to 4 cannabis joints per day
equivalent to 20 tobacco cigarettes per day
in causing symptoms of chronic bronchitis.**

Cannabis – chronic respiratory effects

**Bronchitis symptoms and airways obstruction
in cannabis-dependent individuals at age of 21
years.**

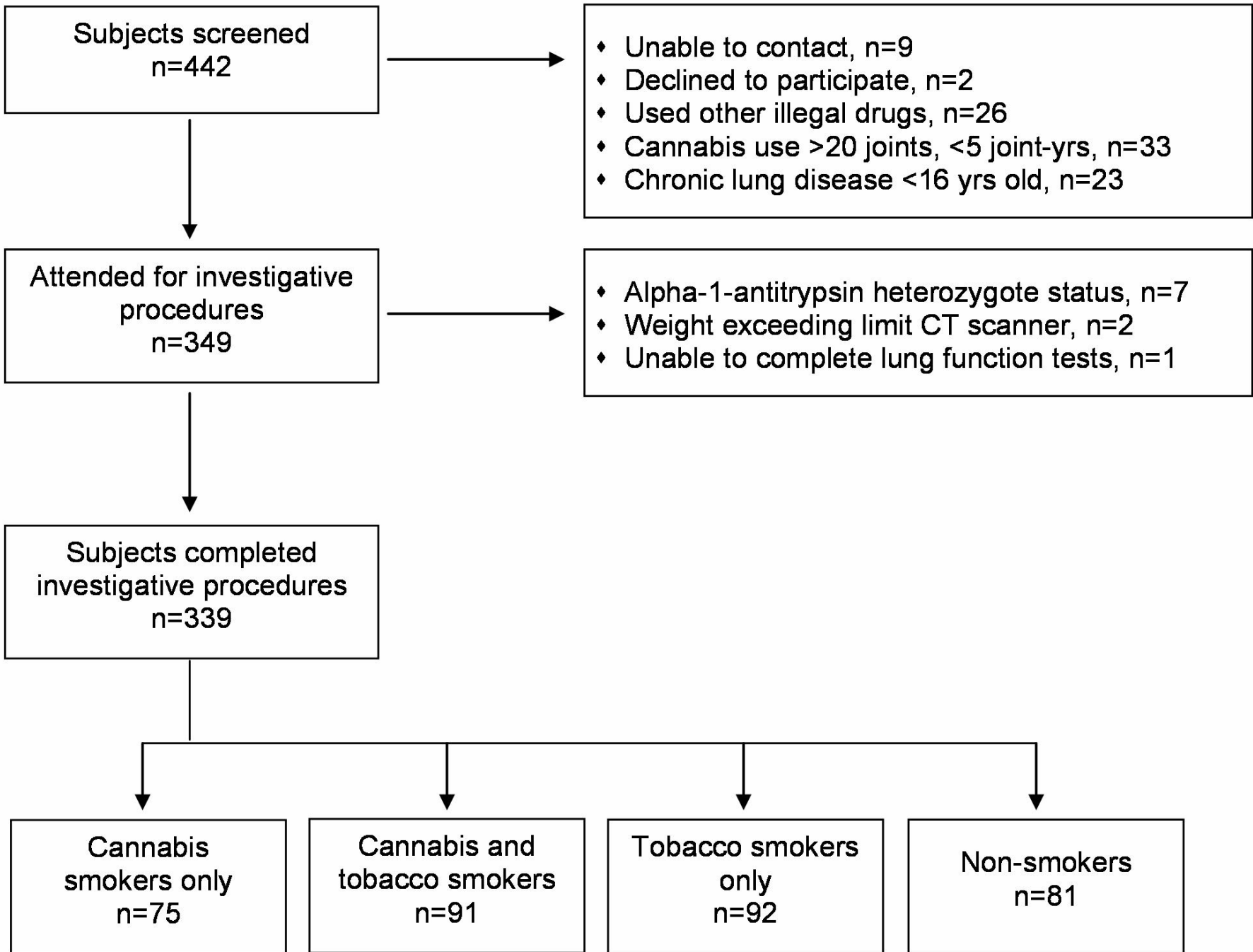
**Dunedin Multidisciplinary Health
Development Survey**

SMOKING

Effects of cannabis on pulmonary structure, function and symptoms

Sarah Aldington, Mathew Williams, Mike Nowitz, Mark Weatherall, Alison Pritchard, Amanda McNaughton, Geoffrey Robinson, Richard Beasley

Thorax 2007 ;0:1-7. doi: 10.1136/thx.2006.077081



Characteristics of subjects

	C	C & T	T	NS
Age (yrs)	43	41	46	44
Joint years	54	46	-	-
Pack years	-	16	24	-

Emphysema

	C	C & T	T	NS
CT (%)	1	17	19	0
Physiology (KCO/VA)	1.6	1.4	1.4	1.6

Lung function

	C	C & T	T	NS
FEV ₁	4.2	3.9	3.7	4.2
sGaw	1.2	1.2	1.3	1.5
MMEF	213	203	181	238

Symptoms (%)

	C	C & T	T	NS
Wheeze	27	34	30	11
Chronic bronchitis	19	31	13	3

Dose equivalence

- One joint equivalent to 2.5 to 5.0 tobacco cigarettes for effect on FEV_1/FVC , FRC, sGaw.
- Findings consistent with 3 to 5-fold greater levels of carboxyhaemoglobin and tar inhaled, cannabis joint vs tobacco cigarette.

Cannabis smoked

- **No filter**
- **Shorter butt length**
- **Higher temp**
- **Inhale deeper**
- **Breath hold**
- **Similar products combustion**

Cannabis – potential carcinogenic effects

- **Qualitatively similar to tobacco smoke**
- **Impairs cellular immune response to tumour antigens**
- **Tumours in mice**
- **Squamous metaplasia in trachea in dogs**
- **DNA damage in human alveolar macrophages**
- **Histological and molecular characteristics in human airways**

Cannabis – head and neck cancer

**Increased risk of head and neck cancer
in young adults – preliminary evidence**

Cannabis – lung cancer

Potential causative role in young adults

Four case-control studies

- 3 positive association**
- 1 no positive association**

Cannabis use and risk of lung cancer: a case-control study

The Cannabis and Respiratory Disease Research Group

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Cannabis use and risk of lung cancer: a case-control study

Funding

The Hawkes Bay Medical Research Foundation

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GlaxoSmithKline

Wellcome Trust

Sites: Christchurch, Wellington, Hutt Valley,
Palmerston North, Hawkes Bay,
Gisborne, Hamilton, Tauranga

Population: 1.7M

Period: 2001-2005

Age group: 18-55 years

Cases: 79

Controls: 324

Tobacco use and risk of lung cancer

Characteristic	RR	CI
<i>Cigarette Smoking</i>		
Never	1.00	
Ever	1.99	(0.78-5.04)
<i>Pack-years</i>		
None	1.00	
1 st quintile	2.62	(0.90-7.66)
2 nd quintile	2.46	(0.77-7.87)
3 rd quintile	6.06	(2.24-16.38)
4 th quintile	12.33	(4.66-32.66)
5 th quintile	23.91	(8.73-65.52)

Cannabis use and risk of lung cancer

Characteristic	RR	CI
<i>Cannabis use</i>		
Never	1.00	
Ever	1.18	(0.54-2.56)
<i>Joint-years</i>		
None	1.00	
1 st tertile	0.34	(0.07-1.71)
2 nd tertile	0.54	(0.14-2.01)
3 rd tertile	5.65	(1.48-21.61)

Cannabis use, tobacco use and age of onset of cannabis use as continuous variables

Characteristic	RR	95% CI
Pack-year cigarette smoking	1.07	(1.05-1.09)
Joint-year cannabis smoking	1.08	(1.02-1.15)
Joint-years to 5 yrs prior to diagnosis	1.10	(1.02-1.18)

Cannabis and lung cancer

- Onset cannabis use, <16 yrs >21 yrs
- Relative risk lung cancer 10.3 (0.8 – 132)

Public health issues

- **Cannabis – widely used worldwide**
- **Lung cancer**
 - **over 1 million deaths per year**
 - **prevalence and mortality increasing**
 - **no major treatment advances**

“The findings of this study suggest that public health programmes (to reduce tobacco smoking) may need to include greater initiatives to reduce cannabis smoking and should be directed particularly at young people.”

[Aldington et al al, Eur Respir J 2007]