RESPONSE TO ASSOCIATION BETWEEN MARIJUANA EXPOSURE AND PULMONARY FUNCTION OVER 20 YEARS STUDY

1. Research validity

The study appears well designed and there is no reason to think it was not done according to description. But they only look at limited lung function parameters which measures how much and how quickly a subject moves air in and out of the lungs (FeV1 and FVC). No microscopic analysis of tissue was done, no analyses of pulmonary diffusion, and other measures of potential damage were not addressed.

Increased lung capacity was found with under 10 joint-years - that could be 1 joint per day for 10 years or 2 joints per week for 30 years.

Clearly there was a reduction in lung function between 7-10 joint-years, but significant reductions at more than 20 joints per month.

The investigators also admit that there were limitations in the study. A significant problem is that cannabis use is often difficult to quantify precisely due to smokers sharing joints, different inhalation techniques and different ways of smoking cannabis including joints, pipes and bongs. By comparison, the average amount of tobacco in a commercial cigarette of standard length is 1 gram. Therefore, the comparison between nicotine smokers and marijuana smokers is moot because the amount of smoke exposure in the two groups was vastly different and a comparable marijuana cohort was not recruited.

Numerous other studies have demonstrated damage- I am including some that are attached.

What is telling is that they did not have heavy users but still found evidence to suggest that heavy use causes lung damage. There is no accounting for changing patterns of use over the life time and lung recovery potential, which is great.

A key sentence is *occasional and low cumulative marijuana* use is not associated with adverse effects on pulmonary function. Occasional and low tobacco use is also not associated with adverse consequences. They did not have enough heavy marijuana users to draw conclusions of detrimental effects on pulmonary function. If nicotine smokers are using about 8-9 cigarettes/day and marijuana users 2-3 episodes in past 30 days, this is not really a valid comparison.

The authors note that “some investigators have proposed that the deep inspiratory maneuvers practiced by marijuana smokers could stretch the lungs resulting in larger lung volumes.” It is true that cannabis smokers inhale more deeply, hold their breath for longer, and perform Valsalva manoeuvre at maximal breath hold which could result in a stretching of the lungs. However, it is important to note that cannabis is usually smoked without a filter and to a shorter butt length, and the smoke is a higher temperature than tobacco, thus exposing the cannabis smoker to greater levels of carboxyhaemoglobin and tar inhaled when compared with a tobacco cigarette of the same size. (Tashkin)

Another speculative possibility they note is “strengthening of chest wall musculature or another ‘training’ effect that allows marijuana users to inspire more fully (closer to total lung capacity) on spirometry testing.” The functional effects of this association on lung health or respiratory function in daily life are unclear. "Hypothetically speaking, a positive effect from marijuana in the short term (the stretch/training effect) and a negative effect in the long term (damage from smoke exposure) should result in a nonlinear association as observed. According to this explanation, the predominant effect for FEV1 at very high exposure (more than 40 joint-years) reflects cumulative damage.

Their findings suggest an accelerated decline in pulmonary function with heavy use and a resulting need for caution and moderation when marijuana use is considered.

Additionally, marijuana potency has increased dramatically in recent years and this study was initiated 20 years ago. The authors conclude that they did not find an association with calendar time, but this assumption is questionable because the people were recruited a long time ago and their smoking habits (dose/unit) may or may not remain stable.

2. What this study lacked

This study did not compare light cigarette smokers (2-3 cigarettes in past 30 days) with light marijuana smokers (2-3 episodes in past 30 days) (or heavy with heavy). They provide no comforting conclusions. Lung capacity (how much air you can force your lungs to exhale) was the only measure presented. Deep inhalation may have increased the ability of lungs to store more air and enable exhalation. But studies have shown that marijuana smoking is associated with large airway inflammation, symptoms of bronchitis, increased airway resistance and lung hyperinflation. They should have availed themselves of more lung tests than simply "blowing out air."

There are many other studies that have demonstrated health concerns about smoking marijuana. (Below are summaries of some studies. A fuller report of these and other studies are available upon request.)

S Aldington, et al. 2007. Effects of cannabis on pulmonary structure, function and symptoms. Thorax Online First.

METHODS: 339 adults from the Greater Wellington region. Their respiratory status was assessed using high-resolution CT (HRCT) scanning, pulmonary function tests and a respiratory and smoking questionnaire. Associations between respiratory status and cannabis use were examined by analysis of covariance and logistic regression.

RESULTS: A dose-response relationship was found between cannabis smoking and reduced force expiratory volume in 1 s to forced vital capacity ratio and specific airways conductance, and increased total lung capacity. Cannabis smoking was associated with decreased lung density on HRCT scans.

CONSLUSIONS: Smoking cannabis was associated with a dose-related impairment of large airways function resulting in airflow obstruction and hyperinflation. In contrast, cannabis smoking was seldom associated with macroscopic emphysema. The most important finding was that one joint of cannabis was similar to 2.5-5 tobacco cigarettes in terms of causing airflow obstruction. This dose equivalence is consistent with the reported 3-5 fold greater levels of carboxyhaemoglobin and tar inhaled when smoking a cannabis joint compared with a tobacco cigarette of the same size. The findings suggest that the predominant effects of cannabis on pulmonary structure, function and symptoms are in causing the symptoms of wheezing, cough, chest tightness and sputum production, large airways obstruction and hyperinflation, but not emphysema.

S Aldington, et al. 2008. Cannabis use and risk of lung cancer: a case-control study. European Respiratory Journal.

METHODS: A case-control study of lung cancer in adults greater than ≤yers of age was conducted in eight district health boards in New Zealand. In total, 79 cases of lung cancer and 324 controls were included in the study. The aim of the study was to determine the risk of lung cancer associated with cannabis smoking.

RESULTS: The risk of lung cancer increased 8% for each joint-year of cannabis smoking, after adjustment for confounding variables included cigarette smoking, and 7% for each pack-year of cigarette smoking, after adjustment for confounding variables including cannabis smoking. The highest tertile of cannabis use was associated with an increased risk of lung cancer, after adjustment for confounding variables including cigarette smoking.

CONCLUSION: The result indicated that long-term cannabis use increases the risk of lung cancer in young adults. The results also provided a quantification of the effect of cannabis smoking: the increased risk for each joint-year of cannabis smoking was similar to that for each pack-year of cigarettes. In other words, the risk of lung cancer increased by 8% for each joint-year of cannabis exposure after adjustment for confounding variables, including tobacco smoking.

D Moir, et al. 2008. A Comparison of Mainstream and Sidestream Marijuana and Tobacco Cigarette Smoke Produced under Two Machine Smoking Conditions. American Chemical Society.

METHODS: In this study a systematic comparison of the smoke composition of both mainstream and sidestream smoke from marijuana and tobacco cigarettes prepared in the same way and consumed under two sets of smoking conditions was undertaken. The study examined the suite of chemicals routinely analyzed in tobacco smoke.

RESULTS: As expected, the results showed qualitative similarities with some quantitative differences. Ammonia was found in mainstream marijuana smoke at levels up to 20-fold greater than that found in tobacco. Hydrogen cyanide, and some aromatic amines were found in marijuana smoke at concentrations 3-5 times those found in tobacco smoke. Mainstream marijuana smoke contained selected poly7chclic aromatic hydrocarbons (PAHs) at concentrations lower than those found in mainstream tobacco smoke, while the reverse was the case for sidestream smoke, with PAHs present at higher concentrations in marijuana.

CONCLUSION: The presence, in both mainstream and sidestream smoke of marijuana cigarettes, of known carcinogens and other chemicals implicated in respiratory diseases was confirmed.

B Moore. 2004. Respiratory Effects of Marijuana and Tobacco Use in a U.S. Sample. JGIM.

METHODS: This study examined respiratory effects of marijuana and tobacco use in a nationally representative sample while controlling for age, gender, and current asthma. The Design was analysis of the nationally representative third National Health and Nutrition Examination Survey (NHANES III) and the Setting was U.S. households. Participants were a total of 6,728 adults age 20-59 who completed the drug, tobacco, and health sections of the NHANES III questionnaire in 1988 and 1994. Current marijuana use was defined as self-reported 100+ lifetime use and at least 1 day of use in the past month.

RESULTS: Self-reported respiratory symptoms included chronic bronchitis, frequent phlegm, shortness of breath, frequent wheezing, chest sounds without a cold, and pneumonia. A medical exam also provided an overall chest finding and measure of reduced pulmonary functioning. Marijuana use was associated with respiratory symptoms of chronic bronchitis, coughing on most days, phlegm production, wheezing, and chest sounds without a cold.

CONCLUSION: The impact of marijuana smoking on respiratory health has some significant similarities to that of tobacco smoking.

S W Hii, et al. 2007. Bullous lung disease due to marijuana. Asian Pacific Society of Respirology.

METHODS: A report on a series of 10 patients (mean age 41 ± 9 years, eight male, two female), who presented over a period of 12 months with new respiratory symptoms and who admitted to regular chronic marijuana smoking (≥ 1 year continuously). Symptoms on presentation were dyspnoea, pneumothorax, and chest infection.

RESULTS: High-resolution CT revealed symmetrical, variably sized, emphysematous bullae in the upper and mid zones. However, the CXR was normal in four patients and lung function was normal in five.

CONCLUSION: Marijuana smoking leads to asymmetrical bullous disease, often in the setting of normal CXR and lung function. In subjects who smoke marijuana, these pathological changes occur at a younger age (approximately 20 years earlier) than in tobacco smokers.

Another example: Ann Epidemiol. 2010 Apr;20(4):289-97. Associations between duration of illicit drug use and health conditions: results from the 2005-2007 national surveys on drug use and health. Han B, Gfroerer JC, Colliver JD.

METHODS: Data from respondents aged 35 to 49 (N = 29,195) from the 2005-2007 National Surveys on Drug Use and Health (NSDUH) were analyzed.

RESULTS: The prevalence rates of a broad range of health conditions by duration of use of specific illicit drug among persons 35 to 49 years of age in the United States were estimated and compared: Positive associations between duration of marijuana use and anxiety, depression, sexually transmitted disease (STD), bronchitis, and lung cancer were found.

3. Impact on the debate over medical marijuana

The use of marijuana daily for "chronic medical conditions" or for psychoactive purposes is not captured by this study and therefore cannot inform the public about the ongoing "medical marijuana" effects and effects of heavy marijuana use.

Marijuana is being used by many individuals on a daily (and several times a day) as a so-called medicine for prolonged and indefinite periods of time. The authors' own conclusions were that they did not have enough people who were heavy users (e.g. daily) to draw any conclusions and the trend towards accelerated decline in lung capacity was seen in heavy users (but not statistically because not enough users). Sadly, because it is a longitudinal study they did not start with current trends of high dose marijuana and increased number of heavy users, especially those using for purported medical purposes.

Until such time that specific substances have proven effects there is no place for marijuana in modern medicine. Medications have side effects that have to be managed and risks weighed against benefit; but, for most of evidence-based medical practitioners, there is no place for a smoked medicine without proven efficacy.

4. Additional thoughts

This will fuel the debate among those already committed to marijuana but it will not advance public health.

It is important to not forget the NUMEROUS other serious consequences of marijuana use: cognitive, learning, psychosis, addiction, criminal behavior, impaired drivers on the highway and in workplaces, etc. – none of which were considered in this study.

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