

# Marijuana and the Lungs

## Introduction

This Position Paper was developed as a component of the ALA program "Marijuana: A Second Look." It was adopted by the ATS Board of Directors at the June 1984 meeting. See page 6 for more information on "Marijuana: A Second Look."

The purpose of this position paper is to encourage physicians and health professionals to become more informed on the topic and to alert people of all ages about the potential hazards to their lungs of marijuana smoking.

Given the extensive research that now strongly indicates the harmful effects of marijuana, the major concerns of the American Thoracic Society are the effects of marijuana smoking on young, developing lungs as well as the effects of long-term marijuana smoking on lung function in adults.

Research indicates that marijuana smoke contains even more respiratory irritants than tobacco smoke.

Since 17.4 million American adults and 2.7 million teenagers smoke marijuana regularly, the implications for lung health are of concern to the American Thoracic Society, the medical section of the American Lung Association.

In recent studies comparing marijuana and tobacco, greater amounts of the irritants ammonia, hydrocyanic acid, acrolein and benzene were found in the marijuana cigarettes. Polynuclear aromatic hydrocarbons (PAH) formed during the incomplete combustion of organic matter are found in both tobacco and marijuana smoke. Compared with tobacco, marijuana produces a smoke that contains a higher concentration of PAH, including 50 percent more of the carcinogens benzpyrene and benzanthracene, which are known to produce tumors, including lung tumors, in certain animal species.

In addition to tars produced by both marijuana and tobacco smoke, the two also contain volatile N-nitrosamines which have carcinogenic potential and are present in roughly equal amounts in both types of smoke. Roughly equal amounts of carbon monoxide, carbon dioxide, acetone, and acetaldehyde are present in both marijuana and tobacco smoke.

Although marijuana does not contain nicotine, it contains chemicals not found in tobacco, including the psychoactive component delta-9-tetrahydrocannabinol (THC) as well as 60 other cannabinoid compounds, some of which are respiratory irritants. Although

THC has bronchodilating effects, these are far outweighed by the irritative effects of marijuana on the airways.

THC becomes concentrated in the body fat and also in the lungs, liver, reproductive organs, and the brain. After five to seven days, half the original dosage of the THC is still in the body. It can take weeks or as long as a month for THC to leave the body completely.

Prior to 1970, no systematic studies were conducted to examine possible effects of smoked marijuana on the lungs of either man or animals. Results of human and animal studies conducted over the last several years indicate that marijuana smoke can injure the respiratory tract. For example, in tracheostomized dogs, severe inflammation of the smaller airways and destruction of ciliated epithelial cells in the trachea with replacement by squamous epithelium occurred after 30 months of daily exposure to the smoke of four marijuana cigarettes; these changes were more marked than those noted after a similar length of exposure to the same amount of tobacco smoke. In rats, after 87 days of exposure to doses of marijuana smoke comparable to those used by man, dose-related inflammatory changes involving the alveoli (focal pneumonia) were noted, which progressed to chronic pneumonia after one year of exposure. In hamsters acutely exposed to similar doses of marijuana and tobacco, marijuana produced greater cytotoxic effects on airway cells than tobacco.

Studies on animals and healthy young adults indicate that marijuana smoke can:

- (1) produce irritating effects on the airways;
- (2) induce inflammatory changes in the lining of the respiratory tract which may be precancerous;
- (3) lead to an increase in inflammatory cells in the lung recovered by lung washings. These changes are similar to findings in cigarette smokers;
- (4) impair the host defenses of the lung in their ability to protect against infection and other noxious insults;
- (5) produce significant changes in lung function, specifically in the large airways. These changes are similar to the functional manifestations of early chronic obstructive pulmonary disease. Whether the changes lead to development of the disease is not yet known.

A problem specific to American marijuana use centers on the way in which it is smoked. Users inhale deeply and retain the smoke in their lungs for as long as possible to increase the euphoric effects. The use of paraphernalia to achieve even higher levels of smoke in the lungs compounds the potential for harm.

In those individuals who also smoke cigarettes, studies have suggested that the combined use of marijuana and tobacco may be

more harmful to the lung than the use of either substance alone.

Although few research studies to date have focused specifically on the effects of marijuana smoking on children's lungs, the potential harm inflicted by respiratory irritants and carcinogenic compounds on young, developing lungs is an especially disturbing prospect. The documented early and long-term marijuana use by young people underlines the extent of the problem.

A 1982 national survey of drug use among American high school seniors found that marijuana is by far the most widely used illicit drug: 59 percent of the seniors reported smoking it during their lives; 44 percent reported using it in the past year; and 29 percent reported smoking marijuana in the past month.

Most of the initial experiences with marijuana took place before high school, according to the national survey. A full 35 percent had tried marijuana before high school; another 24 percent began using marijuana during high school. In the class of 1982, six percent of the seniors had used marijuana daily for at least the last month.

In 1982, the U.S. Surgeon General issued this alarm: "As Surgeon General, I urge other physicians and professionals to advise parents and patients about the harmful effects of using marijuana and to urge discontinuation of its use." The problem of marijuana smoking, especially among young people, Surgeon General C. Everett Koop said, justifies national concern. "I am especially concerned about the long-term developmental effects of marijuana use on children and adolescents, who are particularly vulnerable to the drug's behavioral and physiological effects," he said.

Among the damaging effects he listed: impaired lung function; impaired short-term memory and slowed learning; interference with ovulation and prenatal development, disruption in sperm production and levels of testosterone.