why **marijuana** smoke harm reduction?

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THE WATERPIPE STUDY WAS UNDERTAKEN AS A FIRST STEP toward marijuana harm reduction. It was motivated by concerns that, like tobacco, marijuana smoking poses hazards to respiratory health, such as increased risks of bronchitis, lung infection, and throat and neck cancers. These hazards are not caused by the psychoactive ingredients in marijuana, but by noxious vapors and solid particles, or tars, in the smoke produced by leaf combustion. In practice, these hazards can be eliminated by oral ingestion. However, smoking remains the most popular mode of consumption on account of its faster action, greater convenience, and easier adjustability of dosage. Surveys indicate that some two or three million Americans are daily marijuana smokers. Thousands of other Americans are currently smoking marijuana for medical purposes in the treatment of cancer, AIDS, glaucoma, and chronic pain and spasticity. To the extent that their health is already compromised, such patients may be especially vulnerable to respiratory infections caused by marijuana smoking.

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There accordingly appears to be a need for technology to reduce the respiratory hazards of marijuana. The most obvious fix is some form of smoke filtration device to reduce, suppress, or otherwise separate noxious by-products from the cannabinoids in the smokestream. Among the vast variety of pipes, bongs, chillums, hookahs and other marijuana smoking devices available, three basic technologies are in use: water filtration, cigarette filters and vaporizers. The first two of these have been shown to be of some value for tobacco. However, there has been virtually no published research on any devices when used with marijuana. We accordingly undertook the present study to find out which if any currently available technologies were effective, and which offered most promise for further development.

Our research was guided by the philosophy of harm reduction, a concept popularized by advocates of needle exchange, methadone maintenance, and similar drug treatment measures. Harm reductionists hold that drug use is to some degree inevitable, so it is better to mitigate the harmfulness of drugs than to aggravate it through harsh and futile law enforcement efforts. So far, harm reductionists have focused on hard drugs, the major source of drug abuse problems. However, there is no reason harm reduction efforts should not also be applied to marijuana.

Guiding Philosophy

Unfortunately, research in marijuana harm reduction has been stifled by prohibitionist policymakers, who mistrust efforts to mitigate the adverse effects of drugs on the grounds they make illicit drug use acceptable. Not surprisingly, it proved impossible for us to interest the National Institute on Drug Abuse in supporting our project. They reminded us that the tobacco industry had spent billions developing a smokeless cigarette, only to withdraw it in the face of consumer distaste and active hostility from the anti-tobacco lobby. Sadly, the reduction of smoking-related harm is viewed as a threat by many anti-drug zealots, insofar as it undermines their rationale for prohibiting drugs in the first place. Thus the anti-drug lobby has actively impeded the development of marijuana harm reduction technology by lobbying for anti-paraphernalia laws, which outlaw the

manufacture of devices for smoking controlled substances.

Adverse Effects

Harm reduction has equally little appeal to those marijuana enthusiasts who naively believe that marijuana, alone of all drugs, is a perfectly harmless herb. This delusion is quickly refuted by a review of the medical literature, which reveals extensive evidence of possible adverse effects of marijuana. From a physiological standpoint, these effects are mostly mild or of marginal significance, such as temporarily elevated heartbeat, slight and subtle impacts on immune cells, alleged changes in endocrine functioning, disputed and marginal influences on newborns, and so forth. Of considerably more consequence are the alleged psychological effects, including increased risk of accidents, impaired school and job performance, amotivation, heightened risk of drug abuse and sundry other social pathologies.

Nevertheless, from the standpoint of physical health, the single best established hazard of marijuana use appears to be an increased risk of lung disease from smoking. According to Dr. Lester Grinspoon, "After carefully monitoring the literature for more than two decades, we have concluded that the only well-confirmed deleterious physical effect of marijuana is harm to the pulmonary system."[1]

THIS SHOULD COME as no surprise to any naive non-smoker who has exploded in a paroxysm of coughing after inhaling his or her first toke of marijuana. Chemically, marijuana and tobacco smoke are quite similar, aside from their psychoactive ingredients: both arise from the combustion of leafy material, which produces a host of noxious gases and solid particulates, or tars, that are known to be hazardous to respiratory health.[2] Dating back to the British Indian Hemp Drugs Commission a century ago, observers have noted a high rate of bronchitis and other respiratory diseases among chronic ganja smokers in India, Jamaica and elsewhere;[3] however, interpretation of the data has been clouded by the subjects' high rate of tobacco use, making it impossible to determine whether cannabis itself was responsible. This issue has been resolved thanks to modern clinical research by Dr. Donald Tashkin at UCLA, who has followed separate cohorts of marijuana-only, tobacco-only, marijuana-and-tobacco, and non-smoking subjects. Dr. Tashkin's work indicates that heavy daily marijuana smokers are more susceptible than non-marijuana smokers to respiratory disorders such as coughing, bronchitis, impaired lung immune function, and potentially precancerous cell changes.[4]

Epidemiological Research

In the last couple of years, there has also emerged epidemiological evidence of marijuana's respiratory hazards. A prospective study of 902 subjects by the Kaiser Permanente Center found that daily marijuana-only smokers had a 19% higher rate of respiratory complaints than non-smokers.5 They also found a 30% higher rate of injuries, perhaps reflecting an increased risk of accidents. Surprisingly, those subjects who had used marijuana for the longest time (>15 years) showed no increase in respiratory illness but a higher risk of injuries, while those who had used marijuana for less than 15 years suffered more respiratory complaints, but not injuries! The Kaiser study was not large enough to detect changes in mortality, but a larger study is in progress.

In the meantime, an important, unsettled concern is that of lung cancer. Despite the fact that epidemiosmoking increases the risk of cancer, especially in the throat and upper respiratory tract.[6] To begin with, the tars from marijuana contain most of the same carcinogens as tobacco, to a greater or lesser extent.[7] It has been argued that marijuana is even more carcinogenic than tobacco because it contains some 50% more of the highly potent carcinogens known as polycyclic aromatic hydrocarbons, by-products of incomplete combustion which are thought to be a prime culprit in lung cancer. In reply, hempsters contend that tobacco is more dangerous because it contains far more radioactive carcinogens, particularly polonium-210.[8] However, this point seems moot in the light of experiments by the Leuchtenbergers and others, showing that marijuana tars, like those of tobacco, produce carcinogenic changes when applied to both animal and human lung tissue cultures.[9]

The most compelling evidence of marijuana's potential carcinogenicity comes from recent clinical reports of throat and neck cancer in young marijuana-using males. This was first discovered by oncologist Dr. Paul Donald at the University of California at Davis, who in examining six patients who had contracted throat and neck cancer at the unusually early age of under 40, found that every one had a history of marijuana use.[10] Although most of the patients also had other risk factors such as tobacco smoking or heavy drinking, marijuana use was the only one common to them all. Subsequent investigations by Dr. Donald and other oncologists have continued to find suspiciously high rates of marijuana use among younger throat, neck and tongue cancer patients, suggesting the possibility

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of a significant upsurge in upper respiratory tract cancers in coming years as the sixties generation ages.[11]

The link between marijuana and throat cancer seems especially compelling in light of Dr. Tashkin's work, which indicates that cannabis smoke tends to concentrate in the larger, upper passages of the respiratory tract.[12] In contrast, cigarette smoke is more likely to penetrate to the smaller, lower air passageways, where most tobacco-related lung cancers originate. It is still unclear whether marijuana plays a significant role in cancer of the lower lungs. However, Dr. Tashkin warns that the total tissue area in the upper respiratory passages is much smaller than that in the lower passages, so that marijuana smokers may well be exposing their throats to a proportionately much greater concentration of carcinogens. It is therefore possible that marijuana is a greater risk to the throat than cigarettes to the lungs. On the other hand, marijuana appears to be a much lesser factor in emphysema, which originates in the lower lungs.

Given the evident need to reduce the health risks of marijuana smoking, vaporization merits further research and development.

Marijuana Smoke vs. Tobacco Smoke

It is tempting to try to compare marijuana and cigarette smoking. An exact comparison is hard to make, given that marijuana and tobacco affect different parts of the respiratory system differently. Anti-marijuana propagandists like to say that one joint per day is equivalent to one pack a day of cigarettes. This myth misrepresents a study by Dr. Tashkin, which found that one-joint-per-day marijuana smokers experienced a "mild but significant" increase in airflow resistance in the large airways greater than that seen in persons smoking 16 cigarettes per day. However, the same study found that marijuana smokers did much better in other measures of respiratory health. A more accurate comparison based on studies by Dr. Tashkin's group is that marijuana smokers absorb four times as much tar in their lungs than cigarette smokers per weight smoked.[13] Given that a typical joint weighs about .4 - .5 grams, one-half as much as a tobacco cigarette, a rough equivalence is 2 cigarettes = 1 joint.

WITH THIS INFORMATION in mind, we undertook to explore various ways of filtering marijuana smoke. Waterpipes were the most obvious candidate, being widely available in head shops and popular with many users on account of the apparent mildness of their smoke. We were especially encouraged by research showing that waterpipes could be highly effective in filtering tobacco;[14] unfortunately, we were to discover that these results did not hold up for marijuana. A second candidate technology that would likewise prove disappointing was cigarette filters, which are widely available and can be easily adapted to marijuana by means of a simple homemade filter holder. We did not consider the more advanced "smokeless cigarette" developed by RJ Reynolds, due to the fact that it is not actually a smoke filtration device, but rather an inhaler for artificially flavored nicotine, which is of no use for marijuana. Instead, we turned our attention to vaporizers, which have been touted as a possible ideal solution to the cannabis smoking problem. Unfortunately, because vaporizers can't be used with tobacco, they are prohibited under US paraphernalia laws, and users must accordingly resort to homemade designs. We obtained one such device from the San Francisco Cannabis Buyers Club. Another was obtained from a Canadian supplier, who is selling them on that country's newly emerged, illegal but tolerated "gray market" in Vancouver. Although neither device performed close to the smokeless ideal, our study left reasonable hope that substantial improvement is possible. Given the evident need to reduce the health risks of marijuana smoking, vaporization merits further research and development.•

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