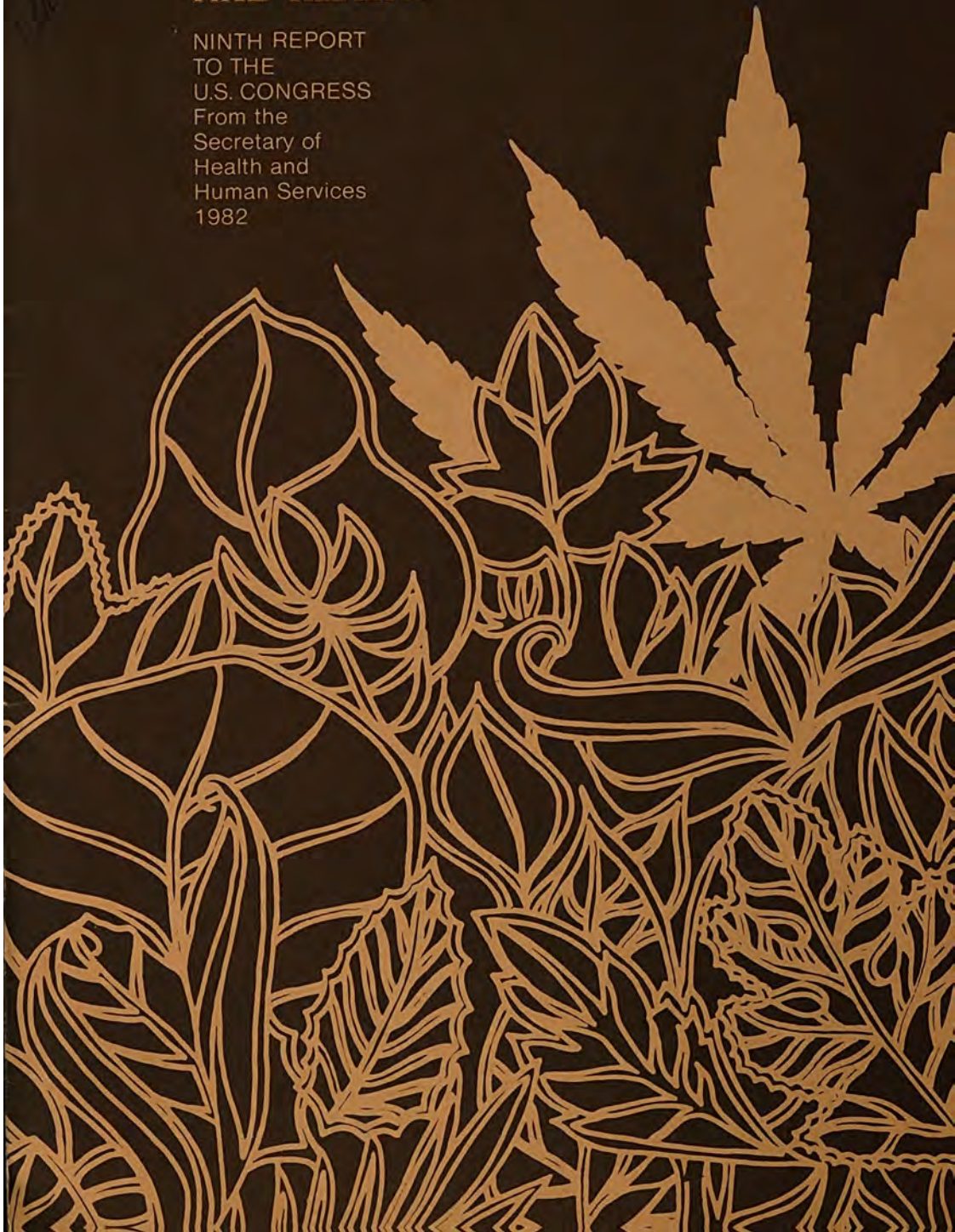


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MARIJUANA AND HEALTH

NINTH REPORT
TO THE
U.S. CONGRESS
From the
Secretary of
Health and
Human Services
1982



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MARIJUANA AND HEALTH

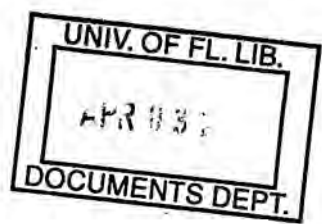
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Ninth Report 982
to the U.S. Congress
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1982

National Institute on Drug Abuse
5600 Fishers Lane
Rockville, Maryland 20857



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DHHS Publication No.(ADM)82-1216
Printed 1982

Statement by
C. Everett Koop, M.D.
Surgeon General of the U.S. Public Health Service

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 health consequences of marijuana use have been the subject of scientific and public debate for almost 20 years. Based on scientific evidence published to date, the Public Health Service has concluded that marijuana has a broad range of psychological and biological effects, many of which are dangerous and harmful to health.

On March 24, Secretary Schweiker transmitted a report, Marijuana and Health - 1982, the ninth in a series, to the U.S. Congress reviewing the health consequences of marijuana use.

Among the known or suspected chronic effects of marijuana use are:

- impaired short-term memory and slowed learning;
- impaired lung function similar to that found in cigarette smokers (indications are that more serious effects may ensue following extended use);
- decreased sperm count and sperm motility;
- interference with ovulation and prenatal development;
- impaired immune response;
- possible adverse effects on heart function; and
- by-products of marijuana remaining in body fat for several weeks with unknown consequences. The

storage of these by-products increases the possibilities for chronic effects as well as residual effects on performance even after the acute reaction to the drug has worn off.

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. The "amotivational syndrome" has been attributed by some to prolonged use of marijuana by youth. The syndrome is characterized by a pattern of loss of energy, diminished school performance, harmed parental relationships, and other behavioral disruptions. Though more research is required to clarify the course and extent, in recent national surveys up to 40 percent of heavy users report that they observe some or all of these symptoms in themselves.

The Public Health Service review of the health consequences of marijuana supports this major conclusion of the National Academy of Sciences' Institute of Medicine:

What little we know for certain about the effects of marijuana on human health--and all that we have reason to suspect--justifies serious national concern.

MARIJUANA AND HEALTH--1982

Executive Summary

This year's report on Marijuana and Health, the ninth in a series, is based primarily on two major 1981 scientific reviews of this issue: the first undertaken by the Institute of Medicine (IOM) of the National Academy of Sciences; and the second carried out by the Canadian Addiction Research Foundation for the World Health Organization (WHO). Summaries of both of these reviews are appended to this report.

The Department continues to believe that marijuana use is a major public health problem in the United States. Nearly one-quarter of the total American population has used the drug, representing a 30-fold increase in use over the past 20 years. Approximately half of those who try the drug once go on to use it again; and the age of onset of use has been steadily going down over the past decade. At its peak, daily or nearly daily use of marijuana involved more than one in ten high school seniors, with daily use of marijuana now substantially more common than daily use of alcohol among this age group.

A great deal has been learned about both the acute and chronic effects of marijuana use. Acute intoxication with marijuana interferes with many aspects of mental health functioning and poses a major impediment to classroom performance. The drug also has serious acute effects on perception and skilled performance, both of which are involved in driving and a number of other tasks. Among the known or suspected chronic effects are: impaired lung functioning; decreased sperm counts and sperm motility; interference with ovulation and prenatal development; impaired immune response; and possible adverse effects on heart function. There is also increasing concern 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.

The ninth report also notes that the marijuana in use today is considerably more potent than that previously available. In fact, there has been a five-fold increase in potency during the past 5 years. This change may have a substantial impact on the effects felt by current users of the drug.

The report recommends increased Federal research on marijuana. There are specific needs in this area which seem most pressing: (1) research on the effects of marijuana on children and adolescents; (2) research on other groups which may be at a higher than average risk for adverse effects of marijuana use, e.g., women of childbearing age or offspring of women who used marijuana during pregnancy; (3) large-scale epidemiological research, including both cross-sectional and longitudinal studies.

There have been some hopeful findings this past year, most notably the decrease in marijuana use noted for the third consecutive year in the National High School Senior Survey. Nevertheless, the Department feels it must maintain a high level of concern about this drug and plans to continue its research and national prevention efforts. Those efforts are beginning to bear fruit, but much work remains to be done.

MARIJUANA AND HEALTH--1982

This is the ninth in the series of reports to the Congress on Marijuana and Health from the Secretary of Health and Human Services, required by the Marijuana Reporting Act (Title V, P.L. 91-296). As with earlier versions, the continuing aim is to answer the question: "What are the health implications of marijuana use for Americans?"

This year's report is based primarily on two major scientific reviews conducted in 1981. One was undertaken by the Institute of Medicine (IOM) of the National Academy of Sciences at the request of former Secretary of Health, Education, and Welfare, Joseph Califano, and was conducted under the supervision of the National Institutes of Health. The other was carried out simultaneously by the Canadian Addiction Research Foundation (ARF) for the World Health Organization (WHO). Department scientists were invited observers at both reviews, but the reports were done independently. The summaries of both reviews are appended.

These two comprehensive reviews of available scientific knowledge provide strong evidence that the use of marijuana is a serious public health concern. This is based on the following conclusions:

- ° Nearly a quarter of the total American population have used the drug--a 30-fold increase in use over the past 20 years (IOM Report, Chapter 2; Director, NIDA, Testimony of 10/21/81). This is an unprecedented level of illegal drug use in this country.
- ° Of those who try the drug once, about one-half continue its use. Most users are adolescents and young adults who are most vulnerable to its effects (Main Findings of the National Survey 1979, p. 48).
- ° The age of first use has declined progressively over the last decade (IOM Report, Chapter 2).

- The drug is readily available and much more potent marijuana than before--potency has increased five-fold in the past 5 years (Marijuana Research Findings: 1980, p. 12).
- Acute intoxication with marijuana interferes with mental functioning; learning and thinking are impaired. It is a marked impediment to classroom performance (IOM Report, Chapter 6; ARF/WHO Report, p. 23).
- Marijuana produces serious acute effects on perception and skilled performance, which impairs such everyday tasks as driving and other complex tasks involving judgment or fine motor skills (IOM Report, Chapter 6; ARF/WHO Report, pp. 24-25).
- Daily or near daily use--20 times/month or more--involved more than one in 10 high school seniors at its peak in 1978. There is good evidence that even 4 years after graduation nearly 9 out of 10 daily users continue use, half of them on a daily basis. Daily use among high school seniors is more common than daily alcohol use and is much more readily concealed (IOM Report, Chapter 2).
- A significant number of serious or potentially serious chronic effects are known or suspected. Known effects include impaired lung function similar to that found in cigarette smokers. Indications are that more serious effects such as cancer and other lung disease may ensue following extended use (IOM Report, Chapter 3; ARF/WHO Report, pp. 11-12).
- Reproductive effects may prove to be serious. Preliminary findings include decreases in sperm count and sperm motility in humans (which may affect male fertility), and interference with ovulation in female monkeys (a possible basis for concern in girls and young women). The active ingredients in marijuana readily cross the placenta--the connection between the developing fetus and the mother--and preliminary

evidence suggests possible effects on prenatal development (IOM Report, Chapter 5; ARF/WHO Report, p. 22).

- Long-term or irreversible effects on adult intellectual and social functioning are still uncertain. However, there is increasing concern about the long-term developmental effects of marijuana use on children and adolescents, who are particularly at risk from the drug's disruptive behavioral and physiological effects (IOM Report; ARF/WHO Report, p. 48).
- Like cigarette smoking, marijuana use may have deleterious effects on heart functioning, and these effects may manifest themselves as the user group ages (IOM Report, Chapter 3; ARF/WHO Report, p. 8).
- If marijuana-induced decreases in the body's immune response, which have been found in animals, occur in humans (present evidence is inconclusive), even a modest decrease could have widespread public health implications (IOM Report, Chapter 5; ARF/WHO Report, p. 12).
- Marijuana's by-products persist in body fat for several weeks following use. This may mean a continued interference with bodily functioning, though definitive evidence for prolonged effects is still lacking (IOM Report, Chapter 1; ARF/WHO Report, p. 38).

Because of the brevity of the American experience with marijuana and the limited amount of research that has been done, particularly on the long-term effects of use, there remain many unanswered or only partially answered questions about marijuana which are noted by both scientific reviews. There are other countries where certain groups have used marijuana over long periods of time. However, their mode of use is often different from present American patterns of use; and the American pattern--widespread use by large numbers of children, adolescents, and females in a highly demanding

industrialized society--is unprecedented. There are disturbing clinical reports* of behavioral disruption and loss of conventional motivation related to marijuana use. In addition, significant percentages of daily users in nationwide surveys report the presence of components of the amotivational syndrome. Although such reports are not easily confirmed by traditional scientific research methods, the Department tends to place more reliance on these clinical reports as confirmed by users' self-perceptions reported in national surveys than does the WHO or IOM report. Individuals who are experiencing difficulties while growing up may be attracted to marijuana or other drug use as a means of "escape" from their developmental difficulties. Also their drug use may in time contribute to further developmental difficulties, including alienation and lack of self-esteem. Membership in a drug-using subgroup may further serve to consolidate such patterns. The consistency of the clinical observations and the self-perception gives considerable credence to the occurrence of an "amotivational" syndrome among heavy marijuana users even though rigorous scientific demonstration of the specific role of marijuana in causing the syndrome has not yet been elicited.

The IOM report summarizes evidence concerning possible therapeutic effects of marijuana or its constituents in treating several medical disorders, including most notably glaucoma and the nausea induced by cancer chemotherapy. In each instance, the findings are described as preliminary. It is reported that marijuana and delta-9-THC often produce troublesome psychotropic or cardiovascular side effects that limit their therapeutic usefulness, particularly in older patients. It is concluded that the greatest therapeutic potential

*National Institute on Drug Abuse. Marijuana and Youth: Clinical Observations on Motivation and Learning. DHHS Pub. No. (ADM)82-1186. Washington, D.C.: Supt. of Docs., U.S. Govt. Print. Off., 1982.

probably lies in the use of synthetic analogues of marijuana derivatives with higher ratios of therapeutic to undesirable effects. It should be emphasized that possible therapeutic benefits in no way modify the significance of the negative health effects of marijuana.

Future Directions

Both the IOM and the ARF/WHO reports advocate increased research and make several recommendations. The recommendation for an increasing Federal marijuana research effort is in line with the increase in the departmental cannabinoid research dollars during each of the past 3 years. Both reports underscore:

1. The critical need for research on the effects of marijuana on children and adolescents who are undergoing rapid development and may be particularly vulnerable to the disruptive behavioral and physiological effects of marijuana use.
2. The need to expand present research efforts to include other groups which may be at a higher than average risk, such as women in the childbearing years. Such research should include the study of the offspring of women who have used marijuana during pregnancy. Other groups include those with pre-existing medical or psychological conditions that may be worsened by marijuana use (e.g., cardiovascular disorders and mental disorders).
3. The emerging need for large-scale epidemiological research to better monitor drug use and its effects in both general and special populations such as prepubertal children and adolescents. These should be both cross-sectional (i.e., studies of groups at a particular point in time) and longitudinal. The latter provide base rate comparisons against which to assess possible deleterious effects of marijuana use. Such studies may yield important clues as to why some users become intensely involved with marijuana and other drugs while others discontinue

use, and to possible methods for preventing involvement. Costs of such studies may be reduced by employing already existing samples that have been studied longitudinally or by collaborative efforts with other groups and agencies.

In view of the high cost of large-scale prospective user studies, especially at a time when patterns of use are rapidly changing, the Department hopes to emphasize well designed retrospective studies using previously studied groups as the data base. It is anticipated that studies of marijuana use with particular emphasis on those areas outlined by the two review groups will become a larger part of the total departmental research effort.

It will undoubtedly require many years of research in the laboratory, in the clinic, and through modern epidemiological methods involving large populations to define adequately the parameters of risk associated with marijuana use. But if the history of abused drugs demonstrates anything, it is that the initial optimism that so often accompanies the discovery (or rediscovery) of the "pleasure potential" of a drug is soon followed by the more gradual recognition that the transient "pleasure" is bought at enduringly high individual and societal cost. While our understanding of marijuana is still far from complete, the reviews abstracted here make clear that marijuana is unlikely to be an exception.

In recent years, the Department has emphasized its concern about the increasing use trends and the evidence of possible long-term health consequences of marijuana use in this country. It is gratifying to be able to report that 1981 was the third consecutive year in which the National High School Senior Survey showed a decrease in marijuana use by this key age group, and that the drop in daily use was greater this year than in both previous years. Nevertheless, we must maintain a high level of concern, despite this encouraging reversal of trend. It is believed that overall drug use levels by American teenagers continue to be close to or above the highest use levels in any other Western developed

country. The Department will therefore continue that combination of research and national prevention efforts which, on the basis of recent decreases in incidence and prevalence, is believed to be effective.

SUMMARY

Report of an Addiction Research Foundation/World Health
Organization Scientific Meeting on Adverse Health and
Behavioral Consequences of Cannabis Use

Toronto, Ontario
March 30 - April 3, 1981

The acute use of moderate doses of cannabis produces a state of intoxication. This is associated with a dose-related impairment of the ability to drive a car or operate complex machinery. In some situations, the user may not feel the desired euphoric state but rather may experience a short-lived dysphoric reaction which can range in intensity and character from mild anxiety to an acute psychosis. Other acute physiological effects are also transient and do not appear to be of major significance in individuals with no pre-existing disease.

Intermittent use of low-potency cannabis is not generally associated with obvious symptoms of toxicity. Daily or more frequent use, especially of the highly potent preparations, can produce a chronic intoxication which may take several weeks to clear after drug use is discontinued. The seeming inconsistency of this observation throughout the world may reflect differing exposures to THC because of the large variation of potencies and smoking techniques, as well as different cultural preferences for the route of administration.

Respiratory toxicity is observed in heavy users and is probably related to smoke components other than THC. Therefore its severity may depend more on the smoking techniques employed by the user and the combustion properties of the material, than on the THC content.

Cannabis effects on the hormonal, reproductive, and immunological status of these users is, as yet, unclear.

Chronic administration of cannabis results in the development of tolerance to a wide variety of the acute drug effects in both humans and experimental animals. Though scientific opinion is more divided on the question of dependence on cannabis, there is now substantial evidence that at least mild degrees of dependence, both psychological and physical, can occur.

Some individuals may be particularly susceptible to the effects of cannabis for a variety of reasons. Adolescents who are undergoing rapid developmental change and elderly populations with decreased rates of drug metabolism, increased prevalence of disease and a more conservative and less flexible mental set may be more sensitive to the effects of cannabis and other drugs. The symptoms of patients with a variety of diseases including various forms of mental illness, diabetes, cardiovascular disease or epilepsy may be exacerbated by cannabis use. Interactions with a variety of substances including tobacco and alcohol may also potentiate the observed effects.

The epidemiological studies necessary to assess the frequency of adverse effects and to relate their occurrence to factors such as potency and amount of cannabis used, length of exposure, set and setting have not, as yet, been conducted. The low prevalence of adverse effects observed in field studies of small numbers of heavy users suggests that the adverse effects described in many of the clinical reports occur relatively infrequently in these carefully selected populations. Given that millions of individuals are now using the drug, even relatively infrequent but serious adverse consequences could be of public health significance.

The results of experimental studies in animals have consistently demonstrated toxicity at doses comparable to those consumed by the human who smokes cannabis

several times per day. Respiratory toxicity, CNS dysfunction, endocrinological disturbances, reproductive deficits, and immunosuppression have all been observed after treatment with THC or cannabinoids in experimental animals. Most, but not all, of these effects disappear when treatment is discontinued.

In vitro studies have also been used to demonstrate cannabis-induced cytotoxicity. The results of these experiments are, for the most part, qualitatively consistent with the in vivo observations, and may provide valuable information about the mechanisms of action of cannabinoids and other plant components or products of pyrolysis.

SUMMARY

Report of a Study by a Committee of the Institute of
Medicine, Division of Health Sciences Policy,
on Marijuana and Health

Washington, D.C.
December 1981

The Institute of Medicine (IOM) of the National Academy of Sciences has conducted a 15-month study of the health-related effects of marijuana, at the request of the Secretary of Health and Human Services and the Director of the National Institutes of Health. The IOM appointed a 22-member committee to:

- analyze existing scientific evidence bearing on the possible hazards to the health and safety of users of marijuana;
- analyze data concerning the possible therapeutic value and health benefits of marijuana;
- assess Federal research programs in marijuana;
- identify promising new research directions, and make suggestions to improve the quality and usefulness of future research; and
- draw conclusions from this review that would accurately assess the limits of present knowledge and thereby provide a factual, scientific basis for the development of future government policy.

This assessment of knowledge of the health-related effects of marijuana is important and timely because marijuana is now the most widely used of all the illicit

drugs available in the United States. In 1979, more than 50 million persons had tried it at least once. There has been a steep rise in its use during the past decade, particularly among adolescents and young adults, although there has been a leveling off in its overall use among high school seniors in the past 2 or 3 years and a small decline in the percentage of seniors who use it frequently. Although substantially more high school students have used alcohol than have ever used marijuana, more high school seniors use marijuana on a daily or near-daily basis (9 percent) than use alcohol that often (6 percent). Much of the heavy use of marijuana, unlike alcohol, takes place in school, where effects on behavior, cognition, and psychomotor performance can be particularly disturbing. Unlike alcohol, which is rapidly metabolized and eliminated from the body, the psychoactive components of marijuana persist in the body for a long time. Similar to alcohol, continued use of marijuana may cause tolerance and dependence. For all these reasons, it is imperative that we have reliable and detailed information about the effects of marijuana use on health, both in the long and short term.

What, then, did we learn from our review of the published scientific literature? Numerous acute effects have been described in animals, in isolated cells and tissues, and in studies of human volunteers; clinical and epidemiological observations also have been reported. This information is briefly summarized in the following paragraphs.

Effects on the Nervous System and on Behavior

We can say with confidence that marijuana produces acute effects on the brain, including chemical and electrophysiological changes. Its most clearly established acute effects are on mental functions and behavior. With a severity directly related to dose, marijuana impairs motor coordination and affects tracking ability and sensory and perceptual functions important for safe driving and the operation of other machines; it also impairs short-term memory and slows learning. Other

acute effects include feelings of euphoria and other mood changes, but there also are disturbing mental phenomena, such as brief periods of anxiety, confusion, or psychosis.

There is not yet any conclusive evidence as to whether prolonged use of marijuana causes permanent changes in the nervous system or sustained impairment of brain function and behavior in human beings. In a few unconfirmed studies in experimental animals, impairment of learning and changes in electrical brain-wave recordings have been observed several months after the cessation of chronic administration of marijuana. Widely cited studies purporting to demonstrate that marijuana affects the gross and microscopic structure of the human or monkey brain are not convincing, in the judgment of the committee; much more work is needed to settle this important point.

Chronic relatively heavy use of marijuana is associated with behavioral dysfunction and mental disorders in human beings, but available evidence does not establish if marijuana use under these circumstances is a cause or a result of the mental condition. There are similar problems in interpreting the evidence linking the use of marijuana to subsequent use of other illicit drugs, such as heroin or cocaine. Association does not prove a causal relation, and the use of marijuana may merely be symptomatic of an underlying disposition to use psychoactive drugs rather than a "stepping stone" to involvement with more dangerous substances. It is also difficult to sort out the relationship between use of marijuana and the complex symptoms known as the amotivational syndrome. Self-selection and effects of the drug are probably both contributing to the motivational problems seen in some chronic users of marijuana.

Thus, the long-term effects of marijuana on the human brain and on human behavior remain to be defined. Although we have no convincing evidence thus far of any effects persisting in human beings after cessation of

drug use, there may well be subtle but important physical and psychological consequences that have not been recognized.

Effects on the Cardiovascular and Respiratory Systems

There is good evidence that the smoking of marijuana usually causes acute changes in the heart and circulation that are characteristic of stress, but there is no evidence to indicate that a permanently deleterious effect on the normal cardiovascular system occurs. There is good evidence to show that marijuana increases the work of the heart, usually by raising heart rate and, in some persons, by raising blood pressure. This rise in workload poses a threat to patients with hypertension, cerebrovascular disease, and coronary atherosclerosis.

Acute exposure to marijuana smoke generally elicits bronchodilation; chronic heavy smoking of marijuana causes inflammation and pre-neoplastic changes in the airways, similar to those produced by smoking of tobacco. Marijuana smoke is a complex mixture that not only has many chemical components (including carbon monoxide and tar) and biological effects similar to those of tobacco smoke, but also some unique ingredients of its own. This suggests the strong possibility that prolonged heavy smoking of marijuana, like tobacco, will lead to cancer of the respiratory tract and to serious impairment of lung function. Although there is evidence of impaired lung function in chronic smokers, no direct confirmation of the likelihood of cancer has yet been provided, possibly because marijuana has been widely smoked in this country for only about 20 years, and data have not been collected systematically in other countries with a much longer history of heavy marijuana use.

Effects on the Reproductive System and on Chromosomes

Although studies in animals have shown that delta-9-THC (the major psychoactive constituent of marijuana) lowers

the concentration in blood serum of pituitary hormones (gonadotropins) that control reproductive functions, it is not known if there is a direct effect on reproductive tissues. Delta-9-THC appears to have a modest reversible suppressive effect on sperm production in men, but there is no proof that it has a deleterious effect on male fertility. Effects on human female hormonal function have been reported, but the evidence is not convincing. However, there is convincing evidence that marijuana interferes with ovulation in female monkeys. No satisfactory studies of the relation between use of marijuana and female fertility and child-bearing have been carried out. Although delta-9-THC is known to cross the placenta readily and to cause birth defects when administered in large doses to experimental animals, no adequate clinical studies have been carried out to determine if marijuana use can harm the human fetus. There is no conclusive evidence of teratogenicity in human offspring, but a slowly developing or low-level effect might be undetected by the studies done so far. The effects of marijuana on reproductive function and on the fetus are unclear; they may prove to be negligible, but further research to establish or rule out such effects would be of great importance.

Extracts from marijuana smoke particulates ("tar") have been found to produce dose-related mutations in bacteria; however, delta-9-THC, by itself, is not mutagenic. Marijuana and delta-9-THC do not appear to break chromosomes, but marijuana may affect chromosome segregation during cell division, resulting in an abnormal number of chromosomes in daughter cells. Although these results are of concern, their clinical significance is unknown.

The Immune System

Similar limitations exist in our understanding of the effects of marijuana on other body systems. For example, some studies of the immune system demonstrate a mild, immunosuppressant effect on human beings, but other studies show no effect.

Therapeutic Potential

The committee also has examined the evidence on the therapeutic effects of marijuana in a variety of medical disorders. Preliminary studies suggest that marijuana and its derivatives or analogues might be useful in the treatment of the raised intraocular pressure of glaucoma, in the control of the severe nausea and vomiting caused by cancer chemotherapy, and in the treatment of asthma. There also is some preliminary evidence that a marijuana constituent (cannabidiol) might be helpful in the treatment of certain types of epileptic seizures, as well as for spastic disorders and other nervous system diseases. But in these and all other conditions, much more work is needed. Because marijuana and delta-9-THC often produce troublesome psychotropic or cardiovascular side-effects that limit their therapeutic usefulness, particularly in older patients, the greatest therapeutic potential probably lies in the use of synthetic analogues of marijuana derivatives with higher ratios of therapeutic to undesirable effects.

The Need for more Research on Marijuana

The explanation for all of these unanswered questions is insufficient research. We need to know much more about the metabolism of the various marijuana chemical compounds and their biologic effects. This will require many more studies in animals, with particular emphasis on sub-human primates. Basic pharmacologic information obtained in animal experiments will ultimately have to be tested in clinical studies on human beings.

Until 10 or 15 years ago, there was virtually no systematic, rigorously controlled research on the human health-related effects of marijuana and its major constituents. Even now, when standardized marijuana and pure synthetic cannabinoids are available for experimental studies, and good qualitative methods exist for the measurement of delta-9-THC and its metabolites in body fluids, well-designed studies on human beings are relatively few. There are difficulties in studying the

clinical effects of marijuana in human beings, particularly the effects of long-term use. And yet, without such studies the debate about the safety or hazard of marijuana will remain unresolved. Prospective cohort studies, as well as retrospective case-control studies, would be useful in identifying long-term behavioral and biological consequences of marijuana use.

The Federal investment in research on the health-related effects of marijuana has been small, both in relation to the expenditure on other illicit drugs and in absolute terms. The committee considers the research particularly inadequate when viewed in light of the extent of marijuana use in this country, especially by young people. We believe there should be a greater investment in research on marijuana, and that investigator-initiated research grants should be the primary vehicle of support.

The committee considers all of the areas of research on marijuana that are supported by the National Institute on Drug Abuse to be important, but we did not judge the appropriateness of the allocation of resources among those areas, other than to conclude that there should be increased emphasis on studies in human beings and other primates. Recommendations for future research are presented at the end of Chapters 1-7 of this report.

Conclusions

The scientific evidence published to date indicates that marijuana has a broad range of psychological and biological effects, some of which, at least under certain conditions, are harmful to human health. Unfortunately, the available information does not tell us how serious this risk may be.

Our major conclusion is that what little we know for certain about the effects of marijuana on human health--and all that we have reason to suspect--justifies serious national concern. Of no less concern is the extent of our ignorance about many of the most basic and important questions about the drug. Our

major recommendation is that there be a greatly intensified and more comprehensive program of research into the effects of marijuana on the health of the American people.

For information on obtaining copies of the full reports on which Marijuana and Health--1982 is based, contact the Addiction Research Foundation, Toronto, ON, Canada for the Report on Cannabis Use, and the National Academy Press, 2101 Constitution Avenue, N.W., Washington, D.C. 20418 for the Institute of Medicine's Marijuana and Health.

UNIVERSITY OF FLORIDA



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