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FLYING HIGH: THE AEROMEDICAL ASPECTS OF MARIHUANA

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16. Abstract

A summary of the discussions from the CAMI Symposium on Aeromedical Aspects of Marihuana is presented. The invited panel discussed the legal aspects of marihuana use and aviation, the experiences of military aviation, and the acute and chronic effects of the drug. For civil aviation, the panel proposed: (1) a 12-16 hour period between marihuana use and work in aviation, (2) no radical changes in FAA policy towards marihuana use, and (3) additional research on aeromedical aspects of marihuana.

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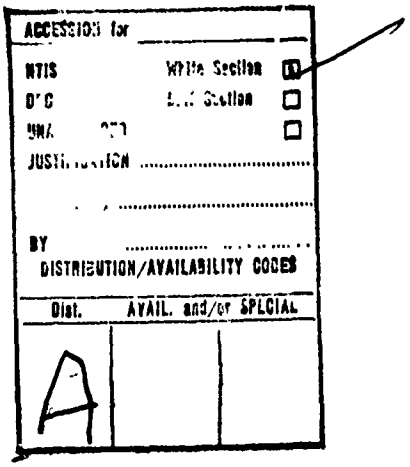

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FLYING HIGH:
THE AEROMEDICAL ASPECTS OF MARIHUANA

I. Introduction.

In June 1972, the Office of Aviation Medicine, FAA, sponsored a Symposium on Aeromedical Aspects of Marihuana at the Civil Aeromedical Institute in Oklahoma City, Oklahoma. Most of the formal papers presented at that symposium are available elsewhere.[1] This paper summarizes material relevant to aviation medicine presented in the formal papers or in the informal panel discussions. Much of the latter developed from questions submitted to the panel from representatives of the aviation community.

II. Legal Aspects.

Use of marihuana by an individual does not in itself constitute grounds for denying an FAA medical certificate. Under the FAA medical regulations (Part 67), drug dependence (i.e., an established diagnosis of drug dependence) is disqualifying for all classes of certification. A history of occasional, experimental use of marihuana is not, of itself, disqualifying unless there has been a personality disorder that is severe enough to have repeatedly manifested itself by overt acts. Additionally, a certificate may be denied by the Federal Air Surgeon if he determines that a personality disorder makes the applicant unable to perform safely the duties of an airman, or if the Federal Air Surgeon finds that the disorder may reasonably be expected to make the applicant unable to perform those duties within two years after the finding.

FAA regulations (Parts 61.15, 63.12, and 65.12) state that no person who is convicted of violating any Federal or State statute relating to the growing, processing, manufacture, sale, disposition, possession, transportation, or importation of narcotic drugs, marihuana, and depressant or stimulant drugs or substances is eligible for any certificate or rating . . . for a period of one year after the date of conviction. Additionally, FAA regulations (Part 91.12) hold that no person may operate a civil aircraft within the United States with knowledge that narcotic drugs, marihuana, and depressant or stimulant drugs or substances as defined in Federal or State statutes are carried in the aircraft, unless that carriage is authorized by or under any Federal or State statute or by any Federal or State agency.

The Aeromedical Certification Branch of CAMI currently processes about 500,000 applications for medical certificates annually. The accompanying histories contain questions about the use of drugs. During the last three years, a small but significant number of applications (approximately 500 out of a total of about 1,000,000 in a two-year period) has been processed in which the applicant has admitted to previous use of marihuana. Such individuals have admitted to a crime, an admission that is carried in FAA records and that may prove potentially dangerous to those individuals in the future unless the confidentiality of individual records is protected. At the time of the symposium this issue had not been resolved.

One question frequently raised at the FAA's AME seminars is "Do you think in another five years or so we'll have an eight-hour rule for marihuana as we have for alcohol presently?" A similar question was posed to the panel: specifically, in the event that the private use of marihuana is decriminalized, as suggested by the National Commission on Marihuana and Drug Abuse, what is the minimum interval which must elapse before the user may be permitted to engage in aviation-related activities? This question provoked considerable discussion about the difficulty in defining what for each individual may be different. Obviously, a safe limit would be one week, since all of the drug is metabolized and disposed of by the body in this time interval. Although periods of 8 to 12 hours were suggested the panel was unable to agree upon a reasonable minimum period based on current data. Taken orally, the drug is still active up to 12 hours. If

a distinction is made based upon route of administration, the panel seemed to agree that safe minimum intervals would be: 8–12 hours, if inhaled; 12–20 hours, if ingested. The panel agreed that specification of a reasonable minimum period would be controversial at this time.

III. Military Experience.

Two papers discussed the impact of marihuana use on military aviation. Lt. Col. William H. Hark (U.S. Army) reported that a 1969 field survey of flight surgeons suggested that the use of marihuana occurred primarily among rear support units and rarely involved actual flying personnel. No evidence of maintenance impairment attributable to marihuana was found and no aircraft accidents were attributed to marihuana use among Army personnel.

Capt. Victor M. Holm (MC, USN) reported a paucity of data relating marihuana use to Naval aviation. Only a few cases were isolated and it was felt that the rigors of training and of operational tours act to deselect chronic marihuana users. While stressing the need for careful appraisal of individual cases, Capt. Holm concluded that there was no evidence to indicate that previous experimentation with marihuana should be grounds for disqualification.

IV. Acute Effects.

Generally, the acute effects of marihuana included disruption of both simple and complex performance tasks. One researcher[2] reported a biphasic phenomenon: at low doses, marihuana appeared to have excitatory effects, while at high doses the drug was a depressant. Both Ferraro[3] and Dornbush[4] reported studies in which marihuana (or the principal active ingredient, Δ^9-THC*) produced decrements in short-term memory. Dornbush ascribed these memory decrements to disruptions produced by the drug during the encoding phase.

Moskowitz[5] reported that marihuana produced deficits in peripheral signal detection, as well as very large effects on autokinesis. He obtained no effects on visual acuity, dark adaptation, or vertical phoria, but found a pronounced influence on lateral phoria, a result that may be related to the autokinetic effects of the drug.

Hall[6] described research that strongly suggests that the effects of marihuana may be augmented by conditions of hypoxia.

V. Chronic Effects.

A large part of the research reported at the symposium was concerned with the development of tolerance to marihuana. Tolerance may be defined as a return of a dependent variable to baseline levels upon repeated administrations of a constant drug dose following an initial change in the baseline when the drug is first administered, or as the maintenance of a recovered baseline (following initial disruption when the drug is first given) with increments in chronic drug dose.

There was general agreement that the effects of marihuana on simple behaviors demonstrate a rapid development of tolerance. McMillan demonstrated that tolerance can develop to such an extent that changes in the lethality of the drug are observed.[3] Nevertheless, some behaviors are remarkably resistant to tolerance. Thus, Ferraro found that short-term memory remained disrupted during chronic administration of Δ^9-THC.

Benjamin surveyed research concerning marihuana users and driving; although the evidence did not indicate that marihuana use increased accident rates, there was evidence that driving ability may be impaired by use of marihuana.

VI. Some Myths.

The panel was most emphatic in debunking many of the myths that have been propagated about marihuana use. Thus, while there was no disagreement about "flashback" experiences occurring with other drugs (i.e., with some drugs, such as LSD, the users report experiences of drug-like effects that occur some time well after the initial drug-produced experiences have disappeared and, importantly, in the absence of additional drug taking), the panel agreed that the "flashback" phenomenon was very unlikely for marihuana. Indeed, it was suggested that reports of a "flashback" phenomenon by marihuana users were probably due to the adulteration of the "marihuana" purchased on the street. Reports were cited of marihuana being adulterated with LSD, mescaline, peyote, and various other

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* Although it is the principal active ingredient, Δ^9-THC is only one active ingredient found in the marihuana plant. Δ^8-THC, for example, is also psychoactive, but not to the same extent as Δ^9.

substances. Dornbush related that in a study in Greece of very heavy hashish users the "flashback" phenomenon was never reported. Reports of flashback may be due partly to learning. Pharmacologically, the flashback phenomenon doesn't exist for marihuana.

Among the other myths refuted was the claim that marihuana users tend to avoid alcohol. It was pointed out that although early reports based on surveys of older users suggested that the users did not drink while smoking marihuana, more recent data indicate that there is a rising interest in the combined use of alcohol and marihuana. The effects of such combined use have not been definitively elucidated.

Another question concerned marihuana's reputation for being an aphrodisiac. Ferraro cited reports from surveys of marihuana smokers in which it was reported that they were less likely to initiate sexual activity while using marihuana, but once sexual activity was initiated, enjoyment was augmented. Ferraro attributed this latter effect to the overestimation of temporal intervals that the drug produces; the man feels he's wonderful during intercourse, because ten minutes seem more like an hour.

As a final myth, some mention must be made of the marihuana "high." Barratt was convinced that 50% of the people who say that they get high on marihuana never get physiologically high. They get a social high. Lewis[5] has asserted that in the absence of evidence that marihuana use is self-sustaining, we must conclude that marihuana use is sustained principally by the social reinforcement provided by the milieu of the "pot party" and that this social reinforcement may be sufficiently powerful to transform what may be an unpleasant or neutral drug effect into an apparently pleasant stimulus condition; i.e., rather than being a primary reinforcer, marihuana is a conditioned reinforcer that derives its power from the potent reinforcements provided by social interactions. Thus, the "social high" is an individual's production of the external signs of marihuana use to obtain social reinforcement in the absence of reinforcement provided by the drug. Lewis[5] explains the lassitude and apathy of the heavy marihuana user as being, in part, due to the acquired reinforcing power of the drug, a power that is socially maintained despite wide fluctuations in the potency of the available drug supply.

VII. Marihuana and Civil Aviation.

The primary question asked of the panel concerned the need to develop rational aeromedical policies, in the event that the recommendations of the National Commission on Marihuana and Drug Abuse to decriminalize the private use of marihuana may be made into law. For example, how much marihuana use is unsafe? The panel agreed that there was no rational method for defining safe use. For one thing, the casual marihuana user who makes purchases in the street cannot tell in advance what the THC content of the marihuana he buys will be and, in fact, a lot of it has been dipped in opium. One member of the panel suggested that use be defined in terms of the number of times an individual gets high, since most marihuana users titrate themselves in terms of smoking; i.e., they smoke until they are high and then stop. However, when pressed to define a high, this researcher could define the term only as the point at which the user stopped smoking, a definition that was, admittedly inadequate.

Earlier, we mentioned the lack of agreement about the minimum time that should elapse between marihuana use and work in aviation-related activities. While the panel was unable to suggest a definite number of hours, many members felt that something of the order of 12 to 16 hours would be appropriate.

Another question concerned the effects of marihuana on performance under emergency conditions. Citing studies of shock avoidance in animals, one researcher stated that since these behaviors seem to be fairly resistant to the effects of Δ^9-THC, very high doses had to be taken before performance deficits would occur. Other members of the panel felt that the behavior in question had to be more clearly defined before any generalizations could be made.

The panel was asked if pilots who volunteered to participate in controlled studies of the use of marihuana on flying proficiency, either in-flight or in simulated flight, should be grounded for the duration of the study and/or for any period thereafter. The panel generally agreed that there would be good reason for grounding participating pilots during the study. Since restrictions would have to be placed on these subjects, such as restricting their alcohol intake, grounding them would be advisable; and by observing them during the study and by making post-drug tests,

the researcher could determine when it became safe for the pilot to be returned to flight status.

Finally, the panel was asked if the FAA should conduct research on the aeromedical aspects of marihuana. Here, there was complete agreement. All panel members felt that the academic community was not equipped to extend itself into this area of interest. Therefore, the FAA should perform the research required.

VIII. Recommendations of the Panel.

1. The panel would not recommend any radical changes in FAA policy with respect to marihuana use, at the current time.

2. The panel suggested that a 12- to 16-hour period between marihuana use and work in aviation activities would not be unreasonable.

3. The panel recommended that the FAA engage in research on aeromedical aspects of marihuana.

Appendix I
Members of the Symposium Panel

E. Barratt, Behavioral Science Laboratory, Department of Neurology and Psychiatry, The University of Texas, Galveston, Texas.

Fred B. Benjamin, Research Institute, NHTSA, Department of Transportation, Washington, D.C.

Rhea L. Dornbush, New York Medical College, Flower and Fifth Avenue Hospital, New York, N.Y.

Douglas P. Ferraro, Department of Psychology, University of New Mexico, Albuquerque, New Mexico.

Stanley D. Glick, Herbert M. Singer Laboratory of Neurosciences and Addictive Diseases, Beth Israel Medical Center, and Department of Pharmacology, Mt. Sinai School of Medicine, New York, N.Y.

Peter Hall, Department of Physiology and Biophysics, Colorado State University, Greeley, Colorado.

William H. Hark, Office of the Surgeon General, U.S. Army, Washington, D.C.

Victor M. Holm, Bureau of Medicine and Surgery, Department of the Navy, Washington, D.C.

D. E. McMillan, Department of Pharmacology, School of Medicine, University of North Carolina, Chapel Hill, North Carolina.

Herbert Moskowitz, Departments of Engineering and Psychology, University of California, Los Angeles, and Department of Psychology, California State University, Los Angeles, California.

Frank J. Sodetz, Department of Experimental Psychology, Walter Reed Army Institute of Research, Washington, D.C.

Appendix II
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