**Title and Subtitle**

**FLYING HIGH: THE AEROMEDICAL ASPECTS OF MARIJUANA**

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This research was conducted under Task No. AM-B-73-PSY-25.

**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.

**Keywords**

Marihuana
Aviation Medicine
Performance

**Distribution Statement**

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<table>
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<th>Distribution Code</th>
<th>Security Classification</th>
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<td>DOT F 1700.7 (69)</td>
<td>Unclassified</td>
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**Page Count**

5 pages

**Price**

$3.00
ACKNOWLEDGMENT

We gratefully acknowledge the assistance of Mrs. Dorothy Gay who transcribed all of the Symposium discussion periods from tape recordings to typed copy for use in compiling this report.
FLYING HIGH:
THE AEROMEDICAL ASPECTS OF MARIHUANA

Introduction.
In June 1972, the Office of Aviation Medicine, AA, 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. This paper summarizes material relevant to aviation medicine presented at the formal papers or in the informal panel discussions. Much of the latter developed from statements submitted to the panel from representatives of the aviation community.

Legal Aspects.
Use of marihuana by an individual does not 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, 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 67.12) state that no person who is convicted of violating any Federal or State statute relating to the growing, processing, manufacture, sale, 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 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 such 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 rigor 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 reported a biphasic phenomenon: at low doses, marihuana appeared to have excitatory effects, while at high doses the drug was a depressant. Both Ferraro and Dornbush reported studies in which marihuana (or the principal active ingredient, Δ⁹-THC*) produced decrements in short-term memory. Dornbush ascribed these memory decrements to disruptions produced by the drug during the encoding phase.

Moskowitz 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 described research that strongly suggested 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 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 recover 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. McMillen demonstrated that tolerance can develop to such an extent that changes in the lethality of the drug are observed. Nevertheless, some behaviors are remarkably resistant to tolerance. Th Ferraro found that short-term memory remains disrupted during chronic administration of Δ⁹-THC.

Benjamin surveyed research concerning marihuana users and driving; although the evidence did not indicate that marihuana use increases 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 disagreement about "flashback" experiences occurring with other drugs (i.e., with some drugs such as LSD, the users report experiences 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 "flashback" phenomenon was very unlikely with 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 streets. Reports were cited of marihuana being adulterated with LSD, mescaline, peyote, and various of

* Although it is the principal active ingredient, Δ⁹-THC is only one active ingredient found in the marihuana plant. Δ⁹-THC, for example, is also psychotomimetic, but not to the same extent as Δ⁹.
stances. Dornbush related that in a study in ece of very heavy hashish users the “flash-
king” phenomenon was never reported. Reports flashback may be due partly to learning. urmoeologically, the flashback phenomenon sn’t exist for marihuana.

Among the other myths refuted was the claim marrihuana users tend to avoid alcohol. It pointed out that although early reports based surveys of older users suggested that the s did not drink while smoking marihuana, re recent data indicate that there is a rising rest in the combined use of alcohol and mari-

Another question concerned marihuana’s repu-

eration for being an aphrodisiac. Ferraro cited artc from surveys of marihuana smokers in it was reported that they were less likely nitate sexual activity while using marihuana, once sexual activity was initiated, enjoyment augmented. Ferraro attributed this latter xt to the overestimation of temporal intervals the drug produces; the man feels he’s won-

a final myth, some mention must be made he marihuana “high.” Barratt was convinced 50% of the people who say that they get n marihuana never get physiologically a. They get a social high. Lewis has asked that in the absence of evidence that mari-

Another question concerned the effects of mar-

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 rad changes in FAA policy with respect to marihuana use, at the current time.

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

3. The panel recommended that the FAA gage 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.
Ithiel Dorfman, New York Medical College, Flower and Fifth Avenue Hospital, New York, N.Y.
Douglas F. 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, 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 North Carolina.
Herbert Moskowitz, Departments of Engineering Psychology, University of California, Los Angeles, Department of Psychology, California State Unive. Los Angeles, California.
Frank J. Sodetz, Department of Experimental Psychology, Walter Reed Army Institute of Research, Washington, D.C.

Appendix II

 Relevant Bibliography

REFERENCES


