

USAARL REPORT NO. 80-5



**COMMON PROBLEMS IN THE MEDICAL CARE OF PILOTS
(Reprint)**

By
Lawrence R. Whitehurst

FIELD RESEARCH AND BIOMEDICAL APPLICATIONS DIVISION

March 1980

U.S. ARMY AEROMEDICAL RESEARCH LABORATORY
FORT RUCKER, ALABAMA 36362

USAARL

NOTICE

Qualified Requesters

Qualified requesters may obtain copies from the Defense Documentation Center (DDC), Cameron Station, Alexandria, Virginia. Orders will be expedited if placed through the librarian or other person designated to request documents from DDC.

Change of Address

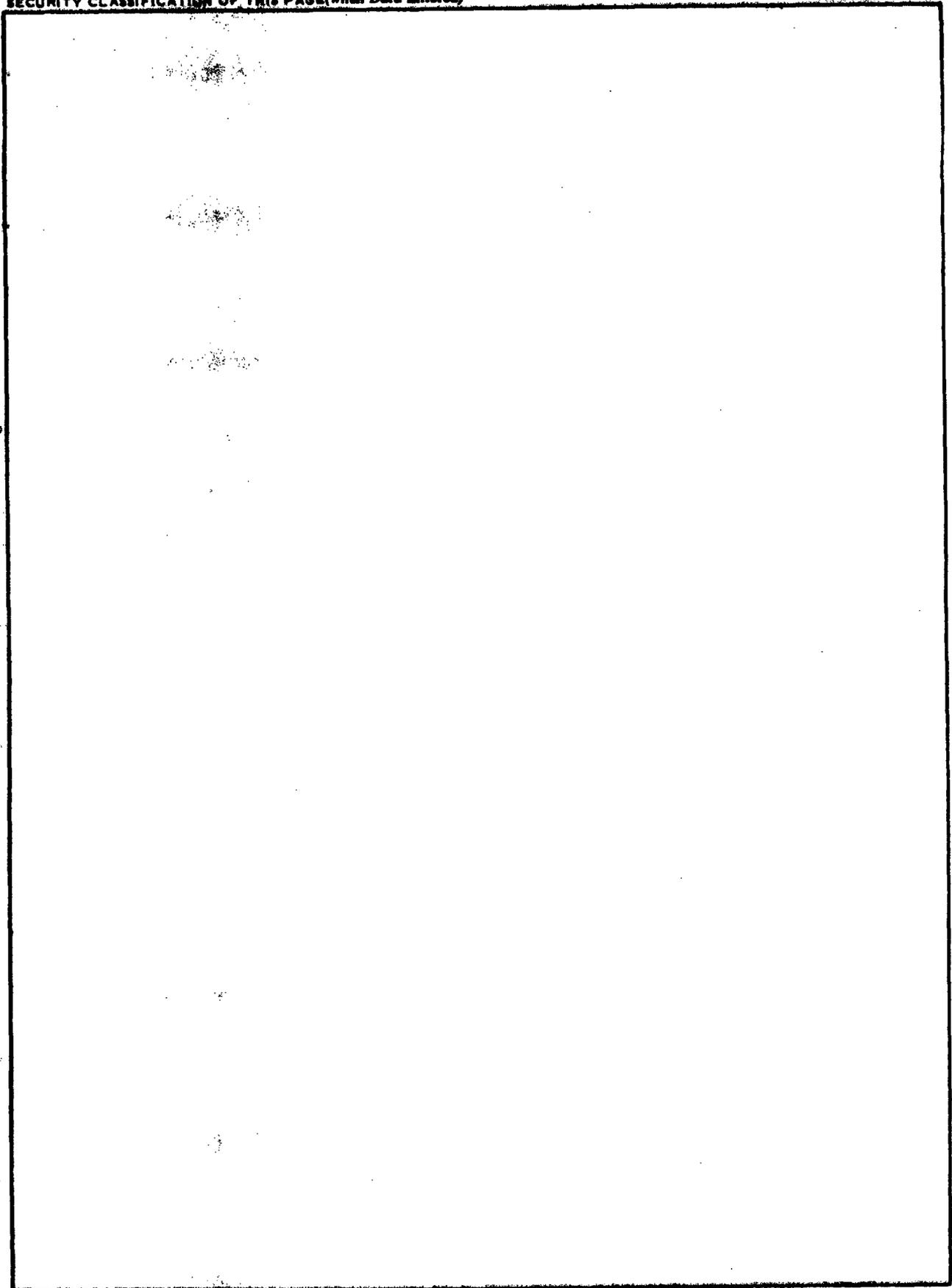
Organizations receiving reports from the US Army Aeromedical Research Laboratory on automatic mailing lists should confirm correct address when corresponding about laboratory reports.

Disposition

Destroy this report when it is no longer needed. Do not return it to the originator.

Disclaimer

The views, opinions, and/or findings contained in this report are those of the authors and should not be construed as an official Department of the Army position, policy, or decision, unless so designated by other official documentation. Citation of trade names in this report does not constitute an official Department of the Army endorsement or approval of the use of such commercial items.



Common Problems in the Medical Care of Pilots

LAWRENCE R. WHITEHURST, MAJ., MC, USA
U.S. Army Aeromedical Research Laboratory, Fort Rucker, Alabama

Family physicians need to have an increased awareness of the medical needs of pilots. A close, trusting relationship is essential. Special consideration must be given when prescribing medications. Hypoxia is a special problem for pilots with cardiovascular and/or respiratory diseases. Several medical problems may occur because of rapid changes in barometric pressure, including barotitis media, which is best treated in flight. Minor ailments, use of alcohol and smoking may become serious problems for aviators; therefore, patient education is important.

Flying is becoming an increasingly popular hobby and occupation. As of December 31, 1977, the Federal Aviation Administration (FAA) reported 783,932 registered pilots. Of these, approximately 204,000 were student pilots; 327,000 held private pilot licenses; 189,000 had commercial ratings, and 50,000 held airline transport ratings. These statistics make it apparent that many family physicians are providing medical care for people who fly. The family physician must, therefore, be aware of some of the problems that are peculiar to pilots.

General Characteristics of Pilots

Aviators, as a group, tend to be healthy. The nature of flying is such that most people who engage in it lead vigorous, active lives. However, two problems occur more frequently in pilots than in the general population. These problems are hypertension and associated cardiovascular diseases. There also seems to be an increased prevalence of smoking in pilots, but this impression has not been substantiated or documented.

Aviators tend to show feelings of ambivalence toward physicians. The average pilot is quite conscious of his health and takes measures to preserve it. However,

the physician represents a very real threat, because he may discover a condition or prescribe a medication which could terminate the pilot's flying status. This is of special concern to the professional pilot, whose livelihood depends on his staying in the cockpit. Thus, denial becomes a major factor in the pilot's approach to illness. Symptoms will often be ignored, attributed to minor illness or understated until the pilot's fear of the disease overcomes his fear of not being able to fly. The importance of taking a careful, complete history and developing a close, trusting relationship with the pilot-patient cannot be overstressed. The pilot must feel that the physician is his advocate who will manage his medical problems and keep him flying, or return him to flying, whenever possible.

Legal Requirements

Part 67 of the Federal Air Regulations establishes strict medical fitness standards for anyone who flies or controls aircraft in flight (i.e., pilots, air traffic controllers and flight service station personnel). Pilots and air traffic controllers are required to have periodic physical examinations at varying intervals, depending on the class of their certificate and the privileges

exercised (*Table 1*). These examinations are performed by FAA-designated Aviation Medical Examiners (AMEs) or, in some cases, by military flight surgeons; examination results are then reviewed by the FAA's Aeromedical Certification Branch in Oklahoma City.

The regional FAA flight surgeon or the Aeromedical Certification Branch of the FAA may grant waivers of medical fitness standards for certain static conditions. Appropriate medical work-up is required to fully define the condition and to establish that it is truly static. Occasionally a flight test will be required to produce a statement of demonstrated ability.

Drugs

A physician should prescribe drugs for an active pilot with the same caution with which he would prescribe for a pregnant woman. All drugs should be looked upon with suspicion. As with pregnancy, there is more than one life to consider, and the passengers in the airplane may have no

more control over the situation than does the developing fetus.

Any drug which may potentially affect the pilot's judgment, vision or fine motor coordination, or which may reduce his tolerance to hypoxia or make him subject to syncope or motion sickness, should not be used. Among these drugs are antihistamines, narcotics, hypnotics, sedatives (including alcohol), tranquilizers, amphetamines, caffeine, anticholinergics and most antihypertensive and cardiac agents. Even aspirin in high doses may cause problems through the production of methemoglobin, which reduces the pilot's tolerance to hypoxia. Other drugs, such as the warfarin derivatives, make the pilot more susceptible to contusion and hemorrhage in the event of a crash.

Pilots should be cautioned about the dangers of self-medication with over-the-counter preparations and should be encouraged to consult their physician or local AME about the use of any drug while flying. A good guideline is to restrict a pilot from flying for the entire period he is taking any of the previously mentioned drugs and for 24 hours after the last dose or after all side effects have subsided, whichever is longer.

A few medications are generally considered safe to take while flying, provided the condition for which they are being prescribed is not itself a contraindication to flying. Most antibiotics, except those which are potentially ototoxic or toxic to the vestibular system, are considered safe. The U.S. Army currently waives thiazide diuretics for the treatment of essential hypertension, as well as isoniazid, folate and pyridoxine for asymptomatic tuberculin test converters. Topical epinephrine ophthalmic preparations are allowed for



The Author

LAWRENCE R. WHITEHURST, MAJ., MC, USA is a flight surgeon and family physician for the U.S. Army Aeromedical Research Laboratory, Fort Rucker, Ala. Major Whitehurst received his medical degree from the Medical College of Virginia Commonwealth University, Richmond, and served his residency in family practice at Womack Army Hospital, Fort Bragg, N.C. In 1978 he was chosen as the Distinguished Graduate of the Army Aviation Medicine Basic Course. Major Whitehurst is currently involved in a research effort to measure physiologic stress in Army pilots during high workload operations. He is a diplomate of the American Board of Family Practice.

the treatment of uncomplicated open-angle glaucoma when there is no evidence of visual field defects. Probenecid and, occasionally, allopurinol are approved for use in asymptomatic hyperuricemia. Pure decongestants, such as pseudoephedrine HCl, are sometimes allowed for short-term use. Thyroid replacement is waiverable.

The FAA reviews each request for a medical certificate for a pilot on chronic medication. When a certificate is issued, it will usually be a special issuance certificate stating certain restrictions on the individual's flying and requiring periodic follow-up reports.

Hypoxia

It should be remembered that increasing altitude causes decreasing partial pressures of oxygen. At 10,000 ft. above mean sea level (MSL), the alveolar oxygen tension has already dropped from 100 to 60. Above 10,000 ft. it decreases more rapidly. The time of useful consciousness at 22,000 ft. MSL is approximately 10 minutes, without supplementary oxygen. Federal

air regulations require the use of oxygen for the crew at altitudes above 12,500 ft. Military regulations are even stricter. Decrements in night vision have been shown at altitudes as low as 5,000 ft. MSL, and even lower in heavy smokers. Any pilot who has a long history of heavy smoking or has signs of early obstructive lung disease should undergo complete pulmonary function tests and may need to use oxygen at altitudes lower than those specified in the regulations. If severe ventilation-perfusion defects are present, flying is probably contraindicated.

Cardiovascular Problems

Cardiovascular disease is generally made worse by hypoxia, and cases of in-flight myocardial infarction have been documented. Any pilot who has a history of chest pain on exertion or at altitude, or who has other symptoms suggestive of angina pectoris, should undergo a treadmill exercise tolerance test as part of a complete cardiovascular work-up. A positive treadmill test should be followed by immediate medical restriction from flying and, in most cases, coronary angiography. Each case must then be considered by a special FAA medical review panel in Washington, D.C. Three "clean" coronary arteries or a surgically corrected lesion followed by a negative treadmill test are the usual criteria for eventual return to flying status. In the case of a surgically corrected lesion, the pilot will probably be restricted from performing duties of pilot-in-command.

Paroxysmal atrial tachycardia, other tachyarrhythmias and valvular heart disease are contraindications to flying. Other cardiovascular conditions, including hypertension when not controllable by diuretics

TABLE 1. Classes of FAA Medical Certificates

Class	Privileges	Expiration	Standards
I	Airline transport	Six months from last day of month in which previous examination was done	Stringent
II	Commercial and air traffic control	One year from last day of month in which previous examination was done	Less stringent
III	Private and student	Two years from last day of month in which previous examination was done	Similar to Class II, except that vision standards are more lenient

**Common Problems
in the Medical Care of Pilots**

alone, would be worked up on a case-by-case basis. The final decision about flying status usually rests with the Aeromedical Certification Branch after consultation with appropriate specialists.

Changes in Barometric Pressure

Table 2 shows the major medical problems associated with changes in barometric

pressure. The most common of these by far is barotitis media. In this condition, the eustachian tube fails to allow sufficient air to enter the middle ear cavity to equalize the pressure across the tympanic membrane during descent from altitude. The resulting vacuum in the middle ear causes retraction of the tympanic membrane (Figure 1) and, if not relieved in a

TABLE 2.

Medical Conditions Associated with Changes in Barometric Pressure

<i>Condition</i>	<i>Signs and symptoms</i>	<i>Pathophysiology</i>	<i>Treatment</i>	<i>Prevention</i>
Trapped gas	Bloating; abdominal pain; pain in teeth, sinuses or ears	Expansion of trapped gas in viscera or other body cavities with ascent to altitude	Belching or flatulence; descent to lower altitude	No spicy or gas-producing foods; no flying with sinus or nasal congestion
"Bends"	Pain in joints, muscles or bones; mild pain progressing to severe	Evolution of gas bubbles previously dissolved in tissues and body fluids (usually nitrogen)	Descent to lower altitude	Pressurized aircraft; prebreathing oxygen (100 percent) before ascent to high altitudes (30 minutes or more)
Paresthesia	Tingling, itching, cold and warm sensations of skin; rash	Evolved gas in skin and nerves innervating skin	Generally no treatment is required	Pressurized aircraft; prebreathing oxygen
"Chokes"	Chest pain, usually substernal and pleuritic; dyspnea; dry, nonproductive cough	Pulmonary vessels blocked by evolved gas bubbles	Immediate descent; 100 percent oxygen, IV fluids, head down, hyperbaric chamber	Pressurized aircraft; prebreathing oxygen; otherwise, no altitude above 25,000 ft.
Central nervous system disorders	Headache; scotomas; scintillations; partial paralysis	Evolved gas in the brain and central nervous system pathways	Same as for the chokes; delayed collapse may occur during the first 24 hours	Same as for the chokes
Barotitis media	Fullness and pain in ear; partial hearing loss	Failure of eustachian tube to equalize pressure across tympanic membrane during descent	Valsalva maneuver, phenylephrine nasal spray, Politzer bag	No rapid descents; is worsened by prebreathing oxygen

few hours, causes transudation of serous fluid into the cavity. This produces an acute serous otitis media.

Early symptoms of barotitis media include a feeling of fullness in the ear, slight hearing loss and occasional tinnitus. These may progress rapidly to mild discomfort and then to severe ear pain. As the descent continues, the last 3,000 ft. are often the most painful because the greatest changes in pressure occur closer to the ground. The pilot should immediately perform a Valsalva maneuver or swallow while pinching his nose. If this is not instantly successful, the pilot may have to temporarily terminate his descent or even climb a few hundred feet to clear his ears before starting back down.

Once on the ground, barotitis media may be treated by gently forcing air into the nose and eustachian tube with a Politzer bag (Figure 2) while the patient repeatedly says the letter "K." Phenylephrine nasal spray occasionally improves the success of this procedure. Once fluid has collected in the middle ear, the condition should be treated as a standard case of serous otitis media.

Colds and Allergic Rhinitis

For the average person, colds and hay fever are nuisances; for the pilot, they are potentially fatal conditions. Besides predisposing him to barotitis media, these conditions may cause painful sinus blocks, spatial disorientation or vertigo as a result of congestion in the ears and sinuses. The antihistamines he may take while suffering from a cold or hay fever may slow his thinking, impair his judgment, increase his reaction time, distort his visual perception or induce vertigo. Thus, the pilot must understand that flying with either

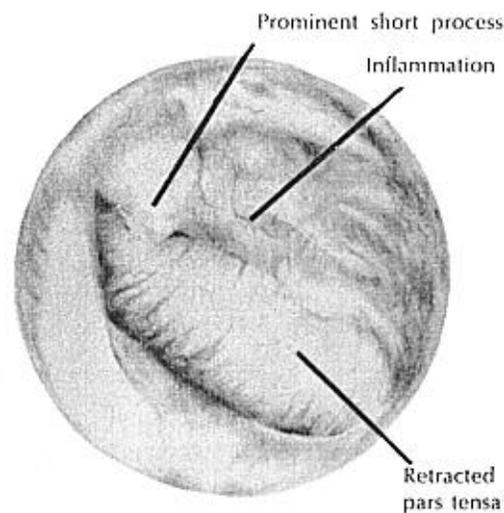


FIGURE 1. Appearance of the tympanic membrane in barotitis media.

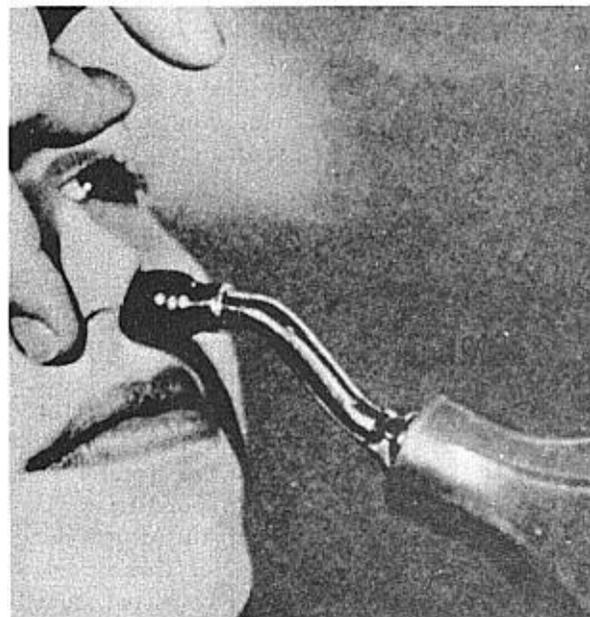


FIGURE 2. Insufflation of the eustachian tube using a Politzer bag.

of these conditions, especially after self-medication, is foolish and dangerous.

A pilot who has more than occasional attacks of allergic rhinitis or who requires continuous medication for its control should be grounded. A thorough allergy work-up is indicated, with an attempt at desensitization. If this is successful, the pilot may eventually be returned to flying status.

Miscellaneous Problems

Even small amounts of alcohol have been shown to have devastating effects on pilot performance. Pilots should be strongly discouraged from consuming any alcohol for periods of up to 24 hours before flying. Habitual drinkers should *not* be pilots. Performance decrements have also been shown to result from chronic fatigue and sleep deprivation. The effects are probably worse during flights late at night. Pilots should be encouraged to get adequate rest and to avoid flying during late night hours until sleep cycles have been adequately adjusted.

Current Army policy restricts pilots from flying for 72 hours after donating blood. Frequent blood donation is discouraged. Pilots are also grounded for 12 hours after receiving immunizations—longer if they experience a reaction or side effects.

Because of its effects on visual perception, time perception and judgment, marijuana is absolutely contraindicated in the flying population. Until more is known about the drug's long-term effects, frequent or chronic users should be indefinitely restricted from flying.

Persons with even mild anemia probably should not fly until the condition has been corrected and the cause definitely estab-

lished. Anemia lowers tolerance to hypoxia and the effects can be dramatic at higher altitudes. Sick cell trait may be another contraindication to flying. Though asymptomatic on the ground, persons who have this genetic defect are possibly subject to sickling crises at altitude. Current literature on this subject is somewhat controversial. ■

NOTE: Specific questions on medical problems affecting aviators should be referred to local AMEs, regional FAA flight surgeons, military flight surgeons or the Chief, Aeromedical Certification Branch, FAA, P.O. Box 25082, Oklahoma City, Okla. 73125.

The views, opinions and/or findings contained in this article are those of the author and should not be construed as official Department of the Army position or policy.

SUGGESTED READING

- Randall, Hugh W. (ed.): *Aerospace Medicine*, Baltimore: Williams & Wilkins, 1971.
- United States Army Aviation School, *Army Flight Surgeon's Manual* (Special Text ST 1-105-8), Fort Rucker, Ala.: U.S. Army Aeromedical Center, August 1976.
- Naval Aerospace Medical Institute and Biotechnology, Inc., *U.S. Naval Flight Surgeon's Manual*, Washington, D.C.: Bureau of Medicine and Surgery, Department of the Navy, September 1978.
- Cutting, W.C.: *Guide to Drug Hazards in Aviation Medicine*, Federal Aviation Administration, Aviation Medical Service, Washington, D.C.: U.S. Government Printing Office, 1962.
- Department of the Army, AR 40-501, chapter 4, *Medical Fitness Standards for Flying* (Army Regulation), Washington, D.C.: Headquarters, Department of the Army, May 27, 1976.
- Department of the Army, AR 40-8, *Temporary Flying Restrictions Due to Exogenous Factors* (Army Regulation), Washington, D.C.: Headquarters, Department of the Army, Oct. 1, 1976.
- Federal Aviation Administration, FAR Part 67, *Medical Standards and Certification* (Federal Aviation Regulation), Washington, D.C.: Department of Transportation, Oct. 1, 1976.