

A 10-Year Retrospective Review of Airline Transport Pilots Aged 60 to 63 in Japan

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Background: On May 14, 1991, the Japanese Ministry of Transport issued an official notice allowing medically certified airline transport pilots aged 60 to 63 yr old (aged pilot) to work on non-scheduled flights. Since September 24, 1996, the official notice was revised to allow them to work on scheduled flights. The regulation requires pilots to pass both routine and additional aviation medical examinations. **Method:** Ten years have passed since the first regulation, so the medical records and the present status of aged pilots were reviewed and summarized. **Results:** By the end of October 2000, 159 pilots had undergone their first additional examination. Two pilots failed due to coronary ischemia, two due to brain infarction, and one due to complete right bundle branch block (CRBBB) on ECG. One pilot failed the examination at the age of 62 due to coronary ischemia and another at the age of 62.5 due to atrial fibrillation. Thirteen pilots retired prior to the age of 63 for unknown reasons. At the time of review, 44 pilots had reached the age of 63 and retired. Subsequent flight time as aged pilot was 83,872 h in total (617 ± 483 h; mean $\pm$ SD) with monthly flight time of 41 ± 27 h. Japan Aircraft Accident Investigation Commission reported 323 accidents, including 27 airtransport accidents in the past 10 yr. There were no accidents involving any of the aged pilots. **Conclusion:** The review suggests that the aged pilots who are deemed medically qualified by the official notice criteria are flying safely without mishap incidence.

Keywords: aviation medicine, medical fitness, aeromedical certification, aging, elderly aircrew, aged pilot.

AS THE LIFE EXPECTANCY of Japanese people has significantly increased in recent years, so has the number of healthy elderly people, including aircrew. The health care of aircrew and the thorough understanding of their medical conditions are considered to be two of the most important matters for flight safety and for securing manpower for air transportation.

With increasing age the physiological functions of aircrew members deteriorate and the prevalence of diseases increases, but there are many healthy elderly aircrew members who can pass the aeromedical examination. For the continued development of air traffic in Japan it is desirable that these healthy elderly aircrew members be employed appropriately.

The Japan Aeromedical Research Center conducted a "study group on the aging and medical fitness of flight crew" during 1988 to 1989. After considering the results of the study group, the Japanese Ministry of Transport issued the official notice on May 14, 1991. The notice medically allowed airline transport pilots aged 60 to 63 (aged pilot) to be medically certified to work on non-revenue flights (ferry or charter flights). The regulation

requires the pilot to pass both a routine and an additional aviation medical examination (Table I). On September 24, 1996, the official notice was revised to allow aged pilots to work on scheduled flights. It has been 10 yr since the first regulation and the present status of these Japanese aged pilots was reviewed and summarized retrospectively.

METHODS

By the end of October 2000, 159 airline transport pilots had undergone the first additional medical examination at the age of 60. Their physical findings and laboratory findings are examined retrospectively. For statistical analysis the paired *t*-test was used to test the difference among data obtained. A *p*-value of less than 0.05 was considered significant.

RESULTS

Fig. 1 shows the number of pilots who underwent the first examination at the age of 60. The number of applicants has increased remarkably since 1997 in part because of the revised regulation and the establishment of new domestic airline companies.

Laboratory findings at the first examination are shown in the left column of Table II. Body mass index was 24.0 ± 2.2 . Systolic BP was 127 ± 15 mm Hg and diastolic BP was 78 ± 9 mm Hg. Pulmonary function tests showed that the percent vital capacity was $117.6 \pm 17.5\%$ and FEV_{1.0}% was $79.3 \pm 12.1\%$. Serum lipid studies revealed total cholesterol of 208 ± 31 mg · dl⁻¹, triglyceride of 114 ± 55 mg · dl⁻¹, and HDL-cholesterol of 57 ± 14 mg · dl⁻¹. Distant visual acuity was 1.04 ± 0.39 for the right eye and 1.03 ± 0.38 for the left eye

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TABLE I. CONTENT OF ADDITIONAL MEDICAL EXAM
(MAY 14, 1991).

1) Tests performed at the age of 60 years old
Pulmonary function test
Treadmill-exercise electrocardiography
Electroencephalography
Brain CT
Color perception (Ishihara, HRR, and Anomaloscopy)
2) Tests performed at 6-month intervals after 60 years old
Serum lipid estimation (Total cholesterol, Triglycerides, and HDL cholesterol)
Resting ECG
Middle distance vision: Intermediate vision
Night vision (using a night vision analyzer)
3) Tests performed annually after 60 years old
Echocardiography

without correction. In Japan, distant visual acuity is measured at a distance of 5 m and shown in figures such as 0.1, 0.5, 1.0, or 1.5, which are equivalent to 20/200, 20/40, 20/20, or 20/13 in the U.S. All findings at the age of 60.5, 61, 61.5, 62, and 62.5 are also shown in Table II. There are no statistical differences for the data obtained at any age for BP, total cholesterol, and non-correcting distant vision. For reference, Japanese normal values for the age of 60 to 69 are shown in the right column of Table II (7).

Two pilots failed the first examination because of a positive treadmill exercise test, two due to brain infarction (low density area on brain CT), and one due to CRBBB on ECG. One failed the examination at the age of 62 after developing silent coronary ischemia and another failed at the age of 62.5 after developing atrial fibrillation. Thirteen pilots retired before the age of 63, but the reasons were unknown. At the time of the study, 44 pilots had retired at age 63.

Total flight time for all aged pilots before the age of 60 was $17,716 \pm 3106$ h. Subsequent flight time of the aged pilot was $83,872$ h (617 ± 483 h) in total with monthly flight time of 41 ± 27 h. Japan Aircraft Accident Investigation Commission reported 323 accidents, including 27 corresponding air transport accidents over the past 10 yr. There were no accidents involving older pilots.

DISCUSSION

Body mass index and the serum lipid levels of the aged pilot are slightly higher than the Japanese normal values, but all data are within normal ranges. Airline pilots in Japan are considered to be in the "upper class" and, therefore, their dietary habits may affect the data. McCall (6) et al. surveyed the serum lipid levels of airline pilots and reported no increase in serum lipid levels during the fifth decade of life. Although the follow-up period was only for 2.5 yr, our data support their results. The FAA has already deleted the lipid examination from aviation medical requirements, but the Joint Aviation Requirement (JAR) (5) requires it at the initial examination and at age 40. Japan may re-evaluate the validity of lipid examination for additional aviation medical examinations.

For non-correcting distant vision, Hirsch (3) reported that a slow deterioration started at the age of 50, but no change was found in our investigation period. Our follow-up period might not have been long enough to detect the deterioration.

Aged pilots can fly if they pass the aviation medical examination and the 6-month proficiency check, but there may be some problems that are not detected by either of these two tests. To identify other problems, the author interviewed each of the aged pilots when they came in for their examination. Through the interview, some admitted sensing a slow deterioration of their memory or cognitive functions. They also stated that this deterioration was compensated for rather easily by their extensive experience. Most of the aged pilots are hired as contract staff, so their duties are limited. They are required to work only 14 to 16 days per month. Many stated that they have more than enough time to recuperate and are really happy to be flying.

Chapter 2 of Annex 1 (Personnel Licensing) to the Convention of International Civil Aviation (4) states that "A Contracting State, having issued pilot licenses, shall not permit the holders thereof to act as pilot-in-command of an aircraft engaged in scheduled international air services or non-scheduled international air transport operations for remuneration or hire if the license holders have attained their 60th birthday." In the U.S., FAR 121.383 (C) (2) states, "No certificate holder may use the services of any person as a pilot on an airplane engaged in operations under this part if that person has reached his 60th birthday. No person may serve as a pilot on an airplane engaged in operations under this part if that person has reached his 60th birthday." Since 1999, the Joint Aviation Requirement permits pilots to fly until the age of 65, similar to the restriction in Japan.

Mohler (8) reported the calendar age of 60 is no longer medically justifiable as an upper age limit for an airline pilot. Stuck (9) et al. reported that through the improved medical certification and adequate performance testing, age 70 would seem justified. Recently, Vereen (10) said that if the "age-60 rule" were changed, it would be a voluntary program. As mentioned above, only a small number of pilots are hired in Japan and

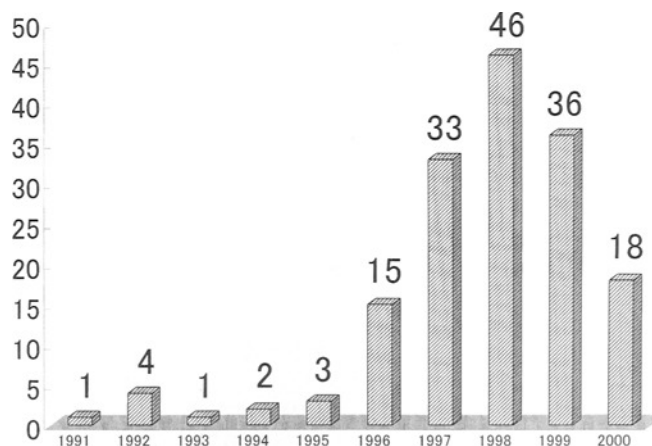


Fig. 1. Number of aged pilots at the first exam.

TABLE II. RESULTS OF ADDITIONAL MEDICAL EXAM. RESULTS ARE MEAN $\pm$ SD.

	Age	60	60.5	61	61.5	62	62.5	National Norm 1997 (60–69 yo)
N		159	143	115	81	60	36	552
Flight time (hrs)		17,716 $\pm$ 3106						
Body mass index		24.0 $\pm$ 2.2		24.1 $\pm$ 2.2		23.9 $\pm$ 2.0	24.0 $\pm$ 1.6	23.2 $\pm$ 2.9
Systolic blood pressure (mm Hg)		127 $\pm$ 15	127 $\pm$ 15	128 $\pm$ 14	127 $\pm$ 14	128 $\pm$ 13	127 $\pm$ 12	141.0 $\pm$ 18.7
Diastolic blood pressure (mm Hg)		78 $\pm$ 9	79 $\pm$ 9	80 $\pm$ 8	79 $\pm$ 8	79 $\pm$ 9	79 $\pm$ 7	84 $\pm$ 11.6
% Vital Capacity		117.6 $\pm$ 17.5						
FEV 1.0%		79.3 $\pm$ 12.1						
Total Cholesterol (mg $\cdot$ dl ⁻¹)		208 $\pm$ 31	206 $\pm$ 31	207 $\pm$ 29	214 $\pm$ 34	214 $\pm$ 37	217 $\pm$ 28	199.1 $\pm$ 34.9
Triglyceride (mg $\cdot$ dl ⁻¹)		114 $\pm$ 55	128 $\pm$ 72	127 $\pm$ 74	112 $\pm$ 52	119 $\pm$ 62	113 $\pm$ 44	160.8 $\pm$ 97.8
HDL-Cholesterol (mg $\cdot$ dl ⁻¹)		57 $\pm$ 14	53 $\pm$ 15	53 $\pm$ 15	54 $\pm$ 15	53 $\pm$ 14	55 $\pm$ 17	53.3 $\pm$ 16.0
Non correcting distant vision (rt)		1.04 $\pm$ 0.39		1.03 $\pm$ 0.38		1.07 $\pm$ 0.40		
Non correcting distant vision (lt)		1.03 $\pm$ 0.38		1.03 $\pm$ 0.38		1.09 $\pm$ 0.40		

most of them are contract staff after the age of 60, so the Japanese system is conceivably a voluntary program. Almand (1) also reported CAMA members' opinion that the age-60 limitation should be raised to age 65.

In conclusion, 159 aged pilots flew a 10-yr total of 84,000 h without accident since 1991 in Japan. Japan now has a 10-yr history of employing elderly aircrew members and we believe that our experiences and data represent the first reference to the aged pilot. This review suggests that the elderly aircrew members who are deemed medically qualified by the official notice criteria are flying safely. Further review and discussion of the age limit issue, examination criteria, and waiver considerations is necessary.

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