

U.S. Department of Transportation: Pilot Health Study

The FAA Aeromedical Research Program has included the study of diseases such as atrial fibrillation and diabetes that increase with age and their significance in aviation safety. The research provides the basis for ensuring the opportunity for aging pilots to continue to fly safely.

Lead Agency:

Department of Transportation (DOT) – Federal Aviation Administration (FAA) – Office of Aviation Safety (AVS) – Office of Aerospace Medicine (AAM) – Civil Aerospace Medical Institute (CAMI) – Aerospace Medical Research Division (AAM-600).

Agency Mission:

FAA: Federal Aviation Administrations mission is to provide the safest, most efficient aerospace system in the world.

Aviation Safety and the Office of Aerospace Medicine's mission is to enhance aerospace safety through surveillance, research, education, medical standards, and the prevention of illness and injury.

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Partner Agency:

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General Description:

Insulin is required to move glucose into cells where it can be metabolized. Diabetes is a disease in which the body is dysfunctional in the production or use of insulin. While still under investigation, both genetics and environmental factors appear to contribute to the development of the disease. The International Diabetes Federation projects the worldwide incidence of diabetes to climb from 5.1% in 2003 to 6.3% in 2025. It also estimates that the world adult population (age 20-79 yr.) will be 5.3 billion by 2025. By then, 333 million people will have diabetes. This figure signifies an increase from 2003 of 1.2% in the prevalence of world diabetes. The highest prevalence of diabetes is in the North American Region, expected to reach 9.7% by 2025. In 2005, more than 9,000

diabetic pilots were certificated by the Federal Aviation Administration (FAA) medical certification process.

Atrial fibrillation (AFIB) is an abnormal heart rhythm characterized as irregular, disorganized, electrical activity of the upper chambers (atria) of the heart. The atria quiver instead of regularly beating which causes them to move around 300-600 times a minute (instead of 60-80 times a minute). Because the upper chambers are quivering so rapidly, the blood is not allowed to completely empty and causes pooling in the atria. Atrial fibrillation affects approximately 2.2 million adults in the United States and is the most common sustained heart rhythm disturbance observed in clinical practice. The rate of atrial fibrillation increases with age, from <1% among persons aged <60 years to approximately 10% among persons aged ≥ 80 years. Civil aviators with AFIB may, after the appropriate examination and follow-up, receive a special FAA medical issuance to enable flying status. By 2003, 2,446 diabetic pilots were certificated by the FAA medical certification process.

Worldwide aeromedical specialists have made significant changes in the criteria for allowing individuals with diabetes and atrial fibrillation to pilot aircraft. The progress that continues in the treatment of these diseases (medications, insulin pumps, tissue/organ transplantation), the monitoring of diabetes (glycosylated hemoglobin, glucometers), and improved diagnostic classification of the same (types 1 and 2), promise to push the frontiers of safety concerns in the future. With the rapid worldwide increase in the prevalence of diabetes, especially type 2 diabetes, along with an increase in the population age, more individuals with diabetes will be entering the aviation system as pilots, flight crew, air traffic controllers, and passengers. Likewise, the incidence of atrial fibrillation will increase as the pilot population ages with time. Each group of individuals with these conditions can affect safety in aviation. Factors that are of interest to assess the potential risk to aviation implied by these diseases have included the progression of the condition, associated pathologies, medications, flight experience, and accident/incident events if any experienced throughout the pilot's career. Thus, the aerospace medicine specialist will be relied upon to make wise, scientifically based decisions that ensure aerospace safety while simultaneously allowing individuals with diabetes or atrial fibrillation to have the maximum latitude to participate in aerospace activities.

Excellence: What makes this project exceptional?

The civilian pilot population is aging. Specific diseases such as atrial fibrillation and diabetes increase dramatically with age. Civilian pilots with these medical problems have been considered a risk for flying because of the potential for sudden in-flight incapacitation associated with the disease, associated co-morbidity, and treatment. This research project has allowed the FAA to develop an understanding of aging pilots with the diseases and verify the medical certification decisions that can allow them to fly longer and simultaneously ensure safely.

Significance: How is this research relevant to older persons, populations and/or an aging society?

More than half of the 16 million Americans estimated to have diabetes are over age 60. Of those over age 65, almost 1 in 5 has diabetes, mostly type 2. According to the American Diabetes Association, approximately 18.3% (8.6 million) of Americans age 60 and older have diabetes. The prevalence of the disease increases with age; an estimated 50% of all diabetes happens in those aged 55 and older. The risk of developing type 2 diabetes also increases with age. Atrial fibrillation affects approximately 2.2 million adults in the United States and is the most common sustained heart rhythm disturbance observed in clinical practice. The rate of atrial fibrillation increases with age, from <1% among persons aged <60 years to approximately 10% among persons aged ≥ 80 years. Over the last 23 years there has been a continuous decline in the size of the population of civil aviation pilots as well as an increase in age of both male and female pilots. To maintain this pilot population and ensure their medical certification as well as their optimum flight performance, this research was conducted to increase our understanding of aging and its relationship to medical conditions that may render a pilot unable to safely continue his or her flying activities. As a pilot grows older medical problems that include atrial fibrillation and the current epidemic of type 2 diabetes become extremely important to understand so as to assess the potential risk to aviation implied by these diseases. The information gained from this line of research effort will expand the FAA's understanding these diseases and will assist in medical certification decision-making processes involving the U.S. aging pilot population.

Effectiveness: What is the impact and/or application of this research to older persons?

This research increases the opportunities for pilots in both the private and commercial aviation to continue the safe participation in flying as they age, even when medical problems associated with aging are present. Diseases that have a greatly increased frequency with increasing age and were once totally disqualifying can now be carefully managed through proper fact-based medical certification that ensure individual and public safety. The cardiac problem of atrial fibrillation is a growing public health problem especially in our aging population. The incidence of atrial fibrillation in the United States currently is estimated at 2.3 million with a projection to increase to 5.6 million by 2050. Atrial fibrillation is associated with increased risk of stroke, heart failure, cognitive dysfunction, and premature death and has enormous socioeconomic implications. Glucose tolerance progressively declines with age, and there is a high prevalence of type 2 diabetes and the potential for sudden incapacitation associated with diabetes, its co-morbidity, and its treatment. Such problems are of specific concern for flight safety, especially with a pilot population that is increasing in age. Medical certification decision making in aging pilots with problems that increase with age is challenging but armed with fact-based research knowledge continued optimum flight performance of aging pilots can be accomplished while meeting the aviation safety goals of the agency.

Innovativeness: Why is this research exciting or newsworthy?

The FAA is making it possible for the pilots in our aging population to enjoy and earn a living flying for more years, even with disease processes (such as cardiac disease and diabetes that increase as humans age) and to do it safely. The development and utilization of the unique FAA Scientific Information System strengthens the National Aerospace System's medical research infrastructure and advances collaborative data collection efforts. The research represents the first aerospace medical research that integrates several fields of study relative to toxicology, biochemistry, medicine, accident investigation, functional genomics, and sophisticated bioinformatics' data analysis methods. The SIS unique database and analysis system enables the comprehensive review of almost 20 million electronic medical records from 2.5 million pilots who were issued medical certificates between 1983 and 2005 and demonstrates a successful application of Safety Management Systems concepts. The research results provide the required fact-based knowledge to make aging pilot medical certification decisions that ensure safety while expanding the aging and disease related envelope.