Aeromedical Research: Protecting the Safety of All Who Fly

By Fred Tilton, MD

HELLO, EVERYONE. In previous editorials, I have addressed pressing medical certification and aviation medical examiner training issues. I decided to "break" that tradition to brag about our two research divisions. AAM-500, the Aerospace Human Factors Research Division, and AAM-600, the Aerospace Medical Research Division, are located at the Civil Aerospace Medical Institute (CAMI) in Oklahoma City.

The mission of the Office of Aerospace Medicine is not limited to the certification and training of pilots, air traffic controllers, and aviation medical examiners. The scientists, engineers, and physicians in the research divisions conduct research on an enormous variety of subjects in order to improve the safety of the world's airspace. Recently, aerospace medical research teams examined medical certification records and accident investigation reports of diabetic pilots. Their findings revealed that a significant number of diabetic pilots do not report or are unaware of their condition. Researchers also found that 75% of insulin-dependent pilots were either overweight (44%) or frankly obese (31%).

In another study, our researchers determined that the prevalence of ischemic heart disease (IHD) in commercial transport pilots is lower than the prevalence of IHD in the U.S. general population. Researchers have also validated our atrial fibrillation special issuance policy by demonstrating that none of the mishaps involving a pilot with AFIB were associated with the pilot's medical condition.

On a daily basis, aerospace medical researchers provide support to Federal Aviation Administration (FAA) and National Transportation Safety Board (NTSB) aircraft accident investigators by consolidating toxicology information, pilot medical certification history, and autopsy data. The information the researchers provide enables the accident investigators to determine if pilot medical issues, sudden incapacitation, or adverse pilot performance have contributed to an accident. Their findings also help us to assess our medical certification quality assurance program and to determine if our regulatory standards are sufficient.

The toxicology and biochemistry research programs are internationally recognized. They routinely receive autopsy samples from all different modes of transportation from around the world. Biomedical research engineers developed new criteria for the child- and infant-sized test dummies used to test restraint systems. They also conducted crash test evaluations on the new dummies to ensure their adequacy and to develop new design criteria that allowed industry and FAA certification agencies to appropriately evaluate and certify the new restraint systems. Still other researchers are working on gene expression in medicine and tracking radiation hazards from lasers and cosmic sources.

Our Aerospace Human Factors Research Division conducts approximately 30 field and laboratory research projects every year in response to Aviation Safety and Air Traffic research requirements. For example, flight deck researchers teamed with industry representatives from the Air Transport Association to study airline maintenance and ramp operations during normal situations to develop Maintenance and Ramp Line Operations Safety Audit (LOSA) processes.

LOSA was first designed in the 1990s to assess cockpit operations as a formal process so that trained peer observers could collect safety-related data on performance in a non-jeopardy environment. LOSA gives an organization a diagnostic snapshot of safety strengths and weaknesses. It is a proactive approach that uses risk management principles to evaluate trends and incidents in order to interrupt a chain of events that might otherwise result in an accident. The team will shortly provide all these materials to the public for implementation.

Air Traffic researchers in the division are working to identify the aptitudes that will be required for individuals to enter the air traffic control specialist occupation as the world transitions to the new method of managing the national airspace system (NAS), known as *NextGen.* NextGen plans include monitoring air traffic by Automated Dependent Surveillance Broadcasts instead of radar; communicating primarily by datalink rather than voice; and using automation to manage the flow of traffic via computer-to-computer communication.

As you can see, NextGen will require fundamental changes in the way we manage traffic in the NAS, and this research will enable the air traffic organization to select individuals with the right skills to accommodate the changes.

Whether it be the latest application of gene expression in medicine; or utilizing state-of-the-art laboratory equipment to analyze tissue samples; or developing new protocols to evaluate the employee of the future; our world-renowned scientists play key roles in our mission to protect the safety of all who fly. I am very proud of them and their accomplishments, and I hope you are as well.

—Fred

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