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REPORT ON THE 2nd INTERNATIONAL CONGRESS OF AVIATION MEDICINE, LISBON (PORTUGAL), 3–5 OCTOBER 2024

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Abstract: The 2nd International Congress of Aviation Medicine (ICAM), held in Lisbon on October 3–5, 2024, brought together international specialists to discuss current developments and challenges in aviation and space medicine. This report presents selected congress topics, with particular attention to their relevance to military aviation and the Polish Air Force. Key themes included mental health, fatigue prevention, cardiovascular screening, aeromedical certification, and pilot training. Presentations highlighted the role of coronary artery calcium scoring in cardiovascular risk assessment and the need for individualized evaluation of medical conditions affecting fitness to fly. Military sessions addressed sleep apnea, rest and recovery, psychiatric disorders, and brain lesions in aircrew. Other discussions covered hypoxia, spatial disorientation, ophthalmological assessment, and the effects of high acceleration on the retina. Commercial space travel and preparations for future Mars missions illustrated the expanding scope of the discipline. The congress emphasized prevention, early diagnosis, and comprehensive support for aircrew health. Its findings support updating aeromedical assessment and certification practices in the Polish Air Force, while anticipating the growing influence of artificial intelligence, flight automation, and telemedicine.

Keywords: aviation medicine; space medicine; scientific meeting, international congress

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REPORT

On October 3–5, 2024, the 2nd International Congress of Aviation Medicine (ICAM) 2024, one of the most important events in the field of aviation medicine, took place in Lisbon. The Congress brought together experts in aviation and space medicine, psychology, aviation engineering, and representatives of the aviation industry from around the world. The purpose of the event was to exchange the latest research and experience and to discuss the challenges faced by aviation medicine in the context of rapidly evolving technologies and increasing aviation safety requirements.



Fig. 1. Representatives (from left to right) from the Military Institute of Aviation Medicine, the Military Aviation Medical Commission, and the 23rd Tactical Air Base attending the congress.

Congress Program

The Congress opened with an official ceremony led by Pui Pombal, Chair of the ICAM Organizing Committee. After a brief introduction, participants attended the inaugural lecture delivered by Duncan Hughes, Medical Director of Virgin Galactic. In his presentation titled "Space – new frontier", he discussed health challenges and qualification principles for commercial space travel, which is currently a rapidly advancing area within aviation and space medicine. At present, the qualification process is conducted exclusively at the company headquarters in the United States. However, due to the growing popularity of these flights, plans for international cooperation were presented to increase access to qualification examinations in travelers' home countries.

Throughout the three-day Congress, numerous important topics related to aviation and space medicine were addressed. Participants could choose from a wide range of plenary sessions and workshops, and explore poster sessions, company exhibitions, and scientific society stands. Three plenary sessions were held simultaneously, which made it impossible to attend all presentations. The selection of topics presented below is subjective and reflects the issues that, in the opinion of the authors of this report, were the most interesting. On the first day of the conference, the panel Clinical Aviation Medicine – Mental Health focused on early detection, prevention, and treatment of mental health disorders, including depression and substance misuse. The issue of fatigue in aviation was also repeatedly discussed, as well as the need to raise awareness among crews regarding lifestyle rules and proper behavior, especially before flights, and the importance of promptly reporting any symptoms of indisposition.

Another panel held on that day was Clinical Aviation Medicine – Cardiology. The first lecture concerned screening for cardiovascular diseases. The significance of proper interpretation of the resting electrocardiogram was emphasized, along with the very limited role of the exercise electrocardiographic test (with a proposal to discontinue this examination). Considerable value was attributed to the coronary artery calcium score (CACS) as a screening tool. This relatively inexpensive, safe, and widely available test provides strong predictive value for determining the advancement of coronary atherosclerosis. Flying personnel, especially pilots, should undergo CACS screening depending on baseline coronary risk calculated using appropriate tools (for example, Astro-CHARM), in accordance with the recommendations of the NATO Occupational Aviation Cardiology Working Group. The issues presented by Eddie Davenport from the United States align with scientific research conducted in 2024 by the Department of Internal Diseases of the Military Institute of Aviation Medicine and with proposed changes to periodic examinations of pilots of the Polish Air Force.

The next lecture discussed the management of pilots diagnosed with a patent foramen ovale (PFO) or a ventricular septal defect. It was emphasized that PFO, a common finding present in 25–30% of the general population, should not constitute a routine cause for disqualification from piloting aircraft. Another presentation prepared by physicians from Germany concerned coronary computed tomography

angiography. This now widely used diagnostic method allows for noninvasive and highly sensitive and specific detection not only of coronary artery disease but also other structural heart disorders. The session concluded with a lecture on the association between gut microbiome imbalance and the prevalence of cardiovascular diseases. In the final panel of the day, the Ernsting Panel, topics related to public health were discussed, including changes introduced after the SARS-CoV-2 pandemic and the solutions implemented in that period. The necessity of preparing aviation for potential bioterrorism threats was also emphasized.

The second day of the conference also offered a wide range of panels and topics related to aviation medicine. Both Military Symposium sessions were particularly interesting from the perspective of military aviation medicine and addressed issues that are also the subject of research at the Military Institute of Aviation Medicine. The Portuguese Air Force Search and Rescue (SAR) system was presented, together with statistics on rescue operations and the equipment installed on aircraft used in these missions. A study conducted among Portuguese Air Force pilots was discussed, evaluating the importance of rest for physical and mental condition. Proposals to counteract fatigue in aviation, as well as rest and recovery programs, were presented. Attention was drawn to attempts to modify the organizational structure of aviation units by recommending an individual approach to pilots and their needs (nutrition, training, physiotherapy). The next presentation focused on the training regimen of high-performance aircraft pilots in the Portuguese Air Force. Following that, the issue of sleep apnea among pilots was addressed. Data from the United States Air Force for the period 1997–2022 confirmed the increasing prevalence of this disorder and its associated problems. Another highly valuable lecture concerned the qualification process for United States Air Force pilot candidates in 2021–2023. The ten most common causes of disqualification were presented, including asthma, myopia, impaired stereoscopic vision, advanced astigmatism, and hearing loss. Psychiatric causes of unfitness for flying were also discussed. A study conducted in 2017–2023 examined the number of psychiatric diagnoses made among aircrew members (13.4% of those evaluated). Diagnoses included depression and low mood (49%), adjustment disorders (22%), substance dependence (17%), PTSD (12%), and psychotic disorders (4%). Among individuals diagnosed with mental health disorders, 45% were cleared for continued service after thorough specialist evaluation, with recommendations for further observation and follow-up. In the final presentation of this session, Jonathan Monik from France discussed the recommended approach to managing brain lesions detected in military aircrew and the conclusions of the aeromedical certification process. Among more than 1,000 individuals evaluated, 3.8% were found to have a brain lesion. Of these, 71% were declared unfit for flying due to the location of the lesion and increased risk of seizures and cognitive impairment.

Another session concerned preparations for future missions to Mars. Research projects from various Earth-based facilities designed to simulate Martian conditions were presented.

A particularly interesting panel was Physiology – news from the core. Various approaches to pilot training were presented, and the topics of hypoxia training, night flights, barotrauma, and spatial disorientation were discussed in detail. The final day began with the ophthalmology panel. The first presentation addressed a new method of assessing color vision in aircrew and air traffic controllers (AOCAS). This was followed by a discussion on fitness for flight after laser refractive surgery and required follow-up. One lecture in this session also addressed the evaluation of risk and prevalence of cataracts in flying personnel. It should be noted that this session included a presentation by Katarzyna Sowa from the Military Institute of Aviation Medicine, who discussed the impact of +9G acceleration on retinal condition. During the Congress, a course for aviation medical examiners also took place.

In addition to the lectures, many valuable discussions were held informally among aviation medical professionals, during which participants exchanged experience regarding qualification procedures, periodic examinations, and management of flying personnel.

CONCLUSION

In summarizing the Congress, it should be noted that the development of modern technologies such as artificial intelligence, flight automation, and telemedicine will have a profound impact on the future of aviation medicine. In the face of increasing challenges in both traditional commercial aviation and space exploration, it is necessary not only to develop innovative medical solutions but also to invest in the mental and physical health of pilots and crews. Owing to the rapid progress in medicine, it is now possible to detect diseases earlier, identify risk factors, and implement preventive measures. Therefore, new strategies and innovative solutions should also be introduced into aeromedical certification and aviation medicine in the Polish Air

Force.

A new but rapidly growing area is commercial space tourism, which includes individuals of various ages and diverse health conditions. The next International Congress of Aviation and Space Medicine will take place in October 2025 in Singapore.

AUTHORS' DECLARATION

Manuscript Preparation: Magdalena Rola. The author declares that there is no conflict of interest.