

English: DIAGNOSIS OF THE PREVALENT DISEASES IN AIRCREW MEMBERS USING AN ALTITUDE CHAMBER

French: DIAGNOSTIC DES MALADIES PRÉVALENTES CHEZ LE PERSONNEL NAVIGANT EN UTILISANT LA CHAMBRE HYPOBARE

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Introduction: The Cardiovascular Diseases lead the Health Statistics of Morbi-Mortality In Argentine and also have the major impact in the career of Aircrew members, conducting to temporary or definitive termination of their flight duties.

In way to detect them in a early clinical phase (asimptomatic) we decide to practice the C.V. studies in a Hypobaric Chamber that simulate the Cabin Altitude of the Jet aircraft.

Methods: 30 individuals with antecedents of Cardiovascular, Pre-diabetes and Metabolic Syndrome Risk Factors underwent the named Ergometric Radioisotopic Test sensibilized by Hypoxia (in altitude level of 2438 meters=8.000 feet), technique that is currently utilized in our Institution.

Other 10 individuals with antecedents of heaviness feelings, oedema or slight varicose veins in lower limbs were studied for Thrombogenesis.

Finally 2 persons with visual symptoms after staying in ultralong haul flight in wich the ofthalmologic evaluation were negative were studied.

Results: In 8 cases with C.V. risk it was demostrated Myocardial Hypoperfusion in wich could not be detected at ground level, permitting implement the correspondent preventive treatment and close control.

The 10 individuals suspected to have veins compromise were evaluated with radioisotopic Tc 99, demostrating in all activation of the Coagulation cascade and deep vein endothelial damage with segmental stopped flow and in 3 cases with Pulmonary impact typical of Thromboembolism. All were treated with Fractioned Heparin and one week later a new study was performed in wich the images were totally normalized. Finally the 2 cases with Visual symptoms induced by prolonged international flight but without precise diagnose were studied with EEGraphy and radioisotope brain perfusion showing image of hypoperfusion localized in the occipital region of the brain related with the visual cortex. Both were treated and are under control by the Neurologist.

Conclusion: In our experience the use of Altitude Chamber are the best way to detect evidence of these important deseases, but very important in their early clinical phase of developing and proguesion,

English: MYOCARDIAL BRIDGING AS POSSIBLE CAUSE OF VENTRICULAR ARRHYTHMIAS IN AVIATORS

French: PONT MYOCARDIQUE COMME CAUSE POSSIBLE D'ARYTHMIE VENTRICULAIRE CHEZ LES AVIATEURS

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Introduction

Myocardial bridging is a condition in which a segment of major epicardial coronary artery is tunneled within LV myocardium. It is found in approximately 30% of cases at necropsy, but is visualized during angiography in less than 5% of patients. Mostly this condition is of little clinical significance.

Occasionally it has been associated with exercise-related sudden death and exercise-induced angina pectoris. Clinically significant bridges are associated with regional ischemia. Treatment options include medical management, coronary stenting, and surgery.

The clinical significance of myocardial bridging has still remained controversial. Some investigators suggest that this is a benign condition, and others report a variety of acute coronary syndromes, ventricular tachycardia, and increased risk of SCD as possibly associated.

Case report

We present 39 yrs old male aviator with significant, asymptomatic, monomorphic, single ventricular extrasystolia (more than 20 000 per 24 hrs). In cardiological examination from 2002 earliery suspected atrial septal defect was excluded with TEE and radionuclide ventriculography.

Since no conclusive reason for VES was found at that time, among other examinations cardiac MRI was performed in 2008 to exclude arrhythmogenic right ventricular dysplasia. Following that cardiac-CTA was performed to exclude CAD or anatomic malformations of coronary arteries. Normal anatomy of coronary arteries was found and no CAD as well. In the middle LAD-segment two short, separated bridging were found. This was assumed as possible reason for patients VES.

For this reason Ca-channel antagonist, beta-blocker, statin and acetyl-salycile therapy was introduced.

Conclusion

Aviators with myocardial bridging of an epicardial coronary artery and no evidence of myocardial ischemia at rest or during exercise can participate in all activities as appropriate for their exercise capacity.

CCTA can be useful in some patients with ventricular arrhythmias when echocardiography does not provide accurate assessment of LV and RV function and/or evaluation of structural changes.

English: THE INFLUENCE OF TERRORISM ON AIR TRAFFIC EFFICIENCY
French: L'INFLUENCE DU TERRORISME SUR L'EFFICACITÉ DU TRAFIC AÉRIEN

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This contribution deals with the contemporary terrorism phenomenon and the necessity of counter-terrorist measures, as well as with the influence of such terrorism on air traffic organisation. A special emphasis has been put on the influence of counter-terrorist measures on air traffic efficiency and competitiveness as compared to other traffic modalities. The paper aims at bringing attention to the need of establishing objective criteria to be applied with validation of necessity and validity of counter-terrorist measures, with the view of preservation of efficiency and competitiveness of air carriers operating on the market. It elaborates the impact of counter-terrorist measures employed in air traffic not only on passengers and crewmembers, but on the global healthcare organisation as well. Bottom-line, a multidisciplinary research of criteria to be employed to the goal of impartial assessment of necessary counter-terrorist measures with the view of safety risk lowering and air traffic efficiency and competitiveness improvement, has been suggested.

English: BLOOD RETINAL BARRIER IN HYPOXIC CONDITIONS

French: LA BARRIÈRE HÉMATO-RÉTINIENNE DANS DES CONDITIONS HYPOXIQUES

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The blood retinal barrier (BRB) plays an important role in the homeostatic regulation of the microenvironment in the retina. The BRB consists of inner and outer components, the inner BRB (iBRB) being formed by the tight junctions between neighbouring capillary endothelial cells and the outer barrier (oBRB) by tight junctions between retinal pigment epithelial cells. Astrocytes, Muller cells and pericytes contribute to the proper functioning of the iBRB. Retinal hypoxia develops in many clinically important conditions such as ischemic central retinal vein thrombosis, diabetic retinopathy, respiratory diseases and in sojourns to high altitude. We investigated some of the factors such as hypoxia inducible factor 1- α , vascular endothelial growth factor (VEGF), nitric oxide (NO) and aquaporin-4 (AQ4) which may be involved in enhancing the permeability of the retinal vessels resulting in development of vasogenic edema and tissue damage with consequent adverse effects upon vision following a hypoxic injury. Enhanced production of VEGF, NO, AQ4 and some inflammatory cytokines was observed in the retina following a hypoxic insult in an animal model. Increased permeability of iBRB was evidenced by leakage of intravenously or intraperitoneally administered tracers. Experimental studies in our laboratory have shown melatonin to be a protective agent for the iBRB in hypoxic conditions as it suppresses the production of VEGF, NO, AQ4 and reduces vascular leakage of tracers. The oBRB did not show any disruption following the hypoxic exposure.

English: SOLAR RADIATION STORM EXPOSURE IN TRANSPOLAR FLIGHTS OF ARGENTINE AIRLINES
French: EXPOSITION À UNE TEMPÊTE DE RADIATION SOLAIRE DES VOLS TRANSPOLAIRES DES
COMPAGNIES AÉRIENNES D'ARGENTINE

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Background.

The ICRP consider Aircrew members as being Ionizing Radiation Occupational Exposed.

The European Community indicate the maximum Annual Level permitted of 6 mSv/year.

However in the dose rate there is no consideration of the Solar Radiation Storms dose.

Material and Methods.

It was evaluated the major Solar Events of the Solar Cycle 23 and their Dose Rates.

In July 14, 2000 (Bastille day) was produced one major Solar Event with a calculated Doses in the Aircraft Cruise altitudes of 200 microSv/h, others were in dec 2000, april and dec 2001, but with lower intensity.

In Oct and Nov 2003 (Halloween storms) were so intense that FAA emitted Advertisements Bulletins in way to re-program their North Transpolar Routes and/or modify high Latitude Flights in course and to descend Altitude at no more 28 000 F in way to reduce the over-exposure to radiation of Crew members and Passengers.

In Jan 20, 2005 and Dec 13, 2006 during the period of minimum Solar activity were detected the two major Solar Radiation Storms in the last 15 years. That produced the more elevated dose rate known in Transpolar Routes, but with more intensity in the South Polar region were the Argentine Airlines flew the Transpolar Route over the Pacific ocean, that are one of the most prolonged flights in the planet with 14 to 15 hs. And the Effective Dose rate received in only one Flight exceeded the annual maximal dose rate permitted to general population (1 mSv).

Conclusions.

Actually Solar Cycle 24 begun and NOAA indicated that will be more intense (2010- 2013) than the previous Cycle.

For these reasons our Aeronautic Authorities should control precisely the Dates of Solar Monitoring performed by NOAA, in way to put in action the Radiowatch and Radioprotection practices.

Finally, the ICRP should study the best form to add these Solar Radiation Dose rates to the Cosmic Radiation observed in their recommendation.

English: AEROMEDICAL EXAMINATIONS BASED ON A COUNTRY WIDE SOFTWARE SOLUTION
French: EXAMENS AÉROMÉDICAUX BASÉS SUR UNE SOLUTION LOGICIELLE À L'ÉCHELLE
NATIONALE

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Introduction: In Europe several years ago civil aviation authorities and their appointed aeromedical examiners (AMEs) were using paper to document medical fitness checks and to issue medical certificates. This method bears the risk for many mistakes, is not efficient and leads to a large amount of work for the aviation authority (screening process).

Method: EMPIC developed an on-line software solution based on Internet technology. JAR FCL-3 and ESARR 5 regulations are built-in, additionally national regulations can be implemented. The AMEs now use this special software to manage applicants, to calculate extent of examinations, to document the findings in several forms, to attach documents to the examination and to communicate with the authority. Workflow procedures integrate experts to perform sub-examinations. Data can be re-used; authority can set warnings; AMEs get immediate screening reports about suspicious and unfit values. The system calculates the data for the new medical and issues the certificates. The solution handles several applicants at a time and larger institutes like aeromedical centres can distribute the workload among several users, even integrating the applicant himself filling in the application form.

Medical confidentiality of data is assured via encryption, smart card technology and client software certificates.

The multi-licence approach offers the opportunity to examine several licences (like pilot and air traffic controller) in parallel for an applicant with just one examination session.

Result: User feedback shows a significant increase of quality of medical examinations. Less time is needed, too; experts can be integrated in the electronic process. AMEs have complete access to historical examinations (just the own and after pilots agreement also to others). Authorities can export data for statistical purposes.

Aviation Authorities of Austria, Greece, Ireland, Italy, Hungary, Luxembourg, Netherlands, Slovenia, Sweden and Switzerland already decided for this solution.

English: DETECTION OF DRUG USERS IN THE FRENCH PRINCIPAL AEROMEDICAL CENTRE
French: DÉPISTAGE DES DROGUES ILLICITES AU CPEMPN

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Introduction: Le dépistage des drogues illicites est réalisé dans les centres
d'expertise médicale du personnel navigant français depuis 1988. Ce travail
examine les résultats obtenus au CPEMPN sur une période de dix ans.

Méthode: Durant la période comprise entre 1998 et 2007, 52565 tests de
dépistage
urinaire du cannabis, de la cocaïne et des opiacés ont été réalisés. A partir
des résultats obtenus, les avantages et les limites du dépistage urinaire sont
évalués.

Résultats: 777 tests de dépistage ont été déclarés positifs. Le taux de
positivité global est de 1,48 %. Le cannabis est la drogue illicite la plus
souvent retrouvée. Aucune toxicomanie à l'héroïne n'a pu être affirmée. Les
résultats obtenus en cours de carrière chez les militaires diffèrent
ouvertement
de ceux obtenus lors des visites d'admission.

Conclusion: Au vu des résultats obtenus, il est apparu licite de faire évoluer
la stratégie de dépistage. La recherche des opiacés a été supprimée à partir du
1er septembre 2008 et remplacée, pour les militaires, par la recherche de
l'ecstasy.

English: DEVELOPMENT OF EUROPEAN MEDICAL REQUIREMENTS FOR PILOTS
French: DÉVELOPPEMENT DES EXIGENCES MÉDICALES EUROPÉENNES POUR LES PILOTES

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In February 2008 the European Aviation Safety Agency became responsible for Flight Crew Licensing, Air Operations and Third Country Operators and started the process of developing the European rules in these fields. The medical provisions for commercial and private pilots are based on the presently valid JAR-FCL 3 requirements and new rules for medical fitness are being proposed for pilots who hold the also newly established leisure pilot licence.

The structure of the new rules will differ significantly from JAR-FCL 3 mainly because the detailed provisions have been transferred from rule to acceptable means of compliance. The requirements for the medical certificate for the leisure pilot licence will be sub-ICAO standard.

The presentation will provide information about the transfer of powers from the Member States to the European Aviation Safety Agency and the shared responsibilities of both in aviation. The proposed rules for medical fitness and the preliminary results of the outcome of the consultation of the medical provisions will be outlined shortly.

English: THE VASCULAR THEORY OF GLAUCOMA: DIAGNOSTIC POSSIBILITIES IN FLYING PERSONNEL
French: LA THÉORIE VASCULAIRE DU GLAUCOME: POSSIBILITÉS DIAGNOSTIQUES CHEZ LE PERSONNEL NAVIGANT

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Purpose: Many details of the pathogenesis of glaucoma are still unknown. Epidemiological studies have shown that only 30 % patients with increased intraocular pressures will develop glaucomatous optic nerve damage. Two principal theories for the pathogenesis of glaucomatous optic neuropathy have been described - mechanical and vascular theory.

Methods: The measurement of retrobulbar blood flow was performed by CDI. The blood velocity in the ophthalmic artery (OA) and the central retinal artery (CRA) were measured. Using Heidelberg Retina Flowmeter (HRF) the retinal and the optic nerve head (ONH) microcirculation was examined.

Results: Three groups of respondents - pilots were examined. We have found statistically significant difference in the RI (AO, CRA) between the control group and POAG and NTG. The other CDI parameters (PSV, EDV) were not significantly different.

At the eyes with POAG and NTG the blood flow in the ONH and in the juxtapapillary retina was significantly reduced to an age - matched group.

Conclusion: There is some evidence that glaucomatous optic nerve atrophy is associated with a decrease of the retinal and ONH macro - and microcirculation.

English: MEDICAL EVALUATION OF PASSENGERS FOR COMMERCIAL SUBORBITAL SPACE FLIGHT
French: ÉVALUATION MÉDICALE DES PASSAGERS POUR UN VOL SPATIAL SUBORBITAL
COMMERCIAL

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Introduction: Commercial space flight participants (SFPs) represent a broader range of ages and medical conditions than has been previously exposed to space flight or its training modalities. Medical evaluation for the Virgin Galactic (VG) Founders group was undertaken to clear them for acceleration training at the NASTAR Center. This paper presents the medical clearance process and results for the group of VG Founders who have participated in centrifuge training.

Methods: The medical clearance process included the review of an initial screening medical history and physical examination performed by each individual's personal physician. A resting ECG was required for everyone. Additional medical data, including exercise stress testing, echocardiography, fasting glucose level, lipid profile, and medication usage were requested, when necessary, to further characterize the medical status of some individuals. In some cases, a telephone consultation between the VG Chief Medical Officer and the Founder's physician was conducted to further elucidate the medical status of an individual.

Results: Eighty-seven of the Founders were medically screened and we obtained sufficient medical data from 81 on which to make a clearance decision. Of these 81 individuals, 84% were men and 16% were women. The age range at the time of evaluation was 22 to 88. The average age was 50. Thirty-four percent were taking medications. The most significant medical conditions of concern were hypertension, cardiovascular disease, hyperlipidemia, diabetes, gastrointestinal disease, and spine disorders. Four individuals were declined for full centrifuge training due to cardiovascular medical conditions.

Conclusions: Basic medical screening, with augmentation of medical data where necessary, resulted in medical clearance for 93% of the Founders. However, this process was very time consuming and required frequent requests for further information. A more streamlined medical evaluation process using specially trained aerospace medical examiners around the world may be required as the volume of SFPs increases in full commercial operations.

English: HEAD MOVEMENTS IN MICROGRAVITY SIMULATED BY 08 HOURS OF DRY FLOATATION : EFFECT ON SUSCEPTIBILITY TO MOTION SICKNESS.
French: MOUVEMENTS DE LA TÊTE EN MICROGRAVITÉ SIMULÉ DURANT 8 HEURES EN RÉSERVOIR DE FLOTTEMENT À SEC: IMPACT SUR LA SUSCEPTIBILITÉ AU MAL DES TRANSPORTS

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Background & Objectives- After the successful launch of Chandrayaan I, India will be in the stage of launching manned space flight in future, requiring the Indian aerospace medicine community to undertake the dedicated research in space physiology and to develop our own database. The vestibular system is particularly sensitive to microgravity of the space environment. A functional vestibular system is a pre-requisite for motion sickness to occur. In the microgravity of the space environment, head movements, especially, the pitch movements lead to Space Motion Sickness. The present study is a basic research to examine the quantum of change in one of the vestibular parameters viz., elicitation of motion sickness by head movements after 08 hrs of simulated microgravity by Dry Floatation.

Learning objectives- Space Motion Sickness has various predisposition including genetic and ethnicity. Before defining countermeasures, vulnerability to SMS needs to be studied. In this direction, this study aims at finding out the vulnerability of a small sample population of Indians to SMS.

Material and Methods- 16 healthy male subjects volunteered for the study. Microgravity was simulated in the Dry Floatation Tank. Symptoms of motion sickness were studied and noted on Motion Sickness Rating Scale (MSRS) after head movements pre and post exposure to simulated microgravity. Also, HR, BP and HRV were studied before and after head movements in normal gravity and simulated microgravity.

Results and Conclusion- The simulated microgravity of the Dry Floatation Tank did cause fluid shift, as evidenced by the CVS response due to simulated microgravity alone. However, the fluid shift could not provoke motion sickness following vestibular stimulation in the form of provocative head movements. This was proved by the lack of development of any sign or symptom of motion sickness in the form of lack of change in MSRS, CVS parameters ($p > 0.05$) and HRV parameters ($p > 0.05$). The etiology of space motion sickness as per the latest studies point out to a neural mismatch occurring within a

English: VISUAL EFFECTS OF LONG TERM ACTIVE SMOKING: ARE AIRCREW FLYING NVG AIDED MISSIONS AT A DISADVANTAGE?

French: EFFETS SUR LA VISION DU TABAGISME À LONG TERME: LES ÉQUIPAGES DES MISSIONS SUPPORTÉES PAR NVG SONT-ILS EN DÉSAVANTAGE?

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INTRODUCTION: The best corrected visual acuity with NVGs is around 6/12. It is known that smoking reduces visual acuity due to the carbon monoxide content of cigarette smoke & other mechanisms. Since visual acuity with NVGs is already degraded, it is possible that smoking may reduce it further. Aircrew who smoke, may thus be at an additional disadvantage while flying with NVGs. This study aimed to find out whether long term smoking has any adverse effect on visual acuity & field of vision (FOV) through NVGs.

METHODS: 90 subjects (29.3 ± 3.2 yrs) with 6/6 distant vision & N5 near vision participated in this study. They were divided into 3 groups: non smokers, light smokers & heavy smokers. The smokers had a history of smoking for at least 5 years. Their blood COHb levels were measured. Their NVG aided visual acuity was recorded in 3 simulated night sky conditions and FOV was measured. ANOVA was used to find the significance of Snellen VA between 3 groups and Post-hoc Tukey test was used to find the pair wise significance. Kruskal Wallis test with Mann Whitney U test for pair wise significance was used for FOV measurements.

RESULTS: The blood carboxyhemoglobin levels were found to be significantly higher in light & heavy smokers (pvisual acuity was also found to be significantly lower in light & heavy smokers

in all illumination conditions (psignificantly reduced in heavy (psmokers.

DISCUSSION: This study shows that smoking adversely affects visual acuity in light & heavy smokers. These effects on visual acuity last for more than 12 hours. Aircrew flying NVG aided missions have an already reduced visual acuity due to the inherent properties of the NVG. This additional decrement in vision could have an adverse effect on flight safety during NVG aided operations.

English: ALCOHOL & DRUG TESTING PROGRAMS FOR US AVIATION INDUSTRY PERSONNEL IN SAFETY-SENSITIVE POSITIONS

French: PROGRAMMES DE DÉPISTAGE D'ALCOOL ET DE DROGUES POUR LE PERSONNEL DES POSITIONS À SÉCURITÉ ÉLEVÉE DE L'INDUSTRIE AÉRONAUTIQUE AMÉRICAINE

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The FAA is responsible for the oversight of drug and alcohol testing programs in the U.S. commercial aviation industry. These programs target employees occupying safety-sensitive positions such as flight crews, flight attendants, flight instructors, aircraft dispatchers, maintenance and preventative maintenance personnel, aviation screeners, ground security coordinators, and non-FAA air traffic controllers. There are more than 7,000 aviation companies with drug and alcohol testing programs covering more than 450,000 safety-sensitive employees. Testing is authorized under the following conditions: 1) Pre-employment {mandatory for drugs & optional for alcohol}, 2) Random, 3) Reasonable cause {drugs} or reasonable suspicion {alcohol}, 4) Post-accident, 5) Return to duty, and 6) Follow-up. Drugs tested for include marijuana, cocaine, amphetamines, opiates, and phencyclidine. Alcohol testing targets breath alcohol content (BAC) of 0.02 or greater. The current random drug testing rate is 25% of companies' safety-sensitive employees. Alcohol random testing rate is set at 10% of those employees. Pre-employment and random testing represented the majority (47.2% and 50.8% respectively) of the 196,127 drug tests reported to the FAA in 2006. Random testing represented the majority (92%) of the 49,641 alcohol tests reported to the FAA in 2006. The 2006 drug testing violation rate for 2006 was 0.84% (1,640 tests). Reasonable cause yielded the highest proportion of positive drug tests. There were 40 drug testing refusals in 2006 that were considered violations. The distribution of positive tests in 2006 by type of drug were; marijuana (63.1%), cocaine (27.7%), Amphetamines (7.7%), Opiates (1.2%), Phencyclidine (0.4%). Some individuals tested positive for more than one drug. The 2006 violation rate for alcohol testing was 0.29% (129 tests) at BAC levels of 0.04 or higher, and 0.09% (46 tests) at BAC levels of 0.020-0.039. Reasonable suspicion yielded the highest proportion of alcohol violations.

English: CURRENT TRENDS IN AEROSPACE MEDICINE RESEARCH AT THE FAA CIVIL AEROSPACE MEDICAL INSTITUTE (CAMI)

French: LES TENDANCES ACTUELLES DE LA RECHERCHE EN MÉDECINE AÉRONAUTIQUE À L'INSTITUT CIVIL DE MÉDECINE AÉRONAUTIQUE DE LA FAA (CAMI)

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Forensic Toxicology research involves state-of-the-art analysis of drugs, alcohol, toxic gases, and toxic industrial chemicals in the remains of flight crew victims of fatal aircraft accidents. Biochemistry research identifies biochemical factors that affect humans in the aerospace industry, including the toxicity of combustion gases and pharmaceuticals, and the development of new and sensitive analytical procedures. Radiobiology research analyzes the effects of radiation on living systems paying particular attention to the characteristics of radiosensitive tissues, identifies radiation hazards within the aerospace environment, studies methods for personal protection, and develops guidance and advisory methods to prevent individual exposure to such hazards. Bioinformatics research involves the analysis of data contained in various CAMI databases provides an improved understanding of aerospace medical safety issues, including the implementation of new evidence-based approaches to better address aircrew health and airman medical certification decision-making. Functional Genomics research analyzes gene expression changes in response to a variety of stress factors that affect civil aviation safety such as alcohol, fatigue, and hypoxia. Biodynamics research uses advanced computational and impact testing techniques to assess the benefits of advanced protective technologies to enhance human survivability in aircraft accidents, as well as to assess the injury potential of using new materials and structures. Cabin Safety research addresses cabin safety concerns pertaining to the emergency evacuation of aircraft and post-egress survival issues. Environmental Physiology research analyzes cabin environment factors that may be detrimental to human physiology, performance, and safety during flight. Aircraft Accident Investigation research studies aircraft accident causes and mechanisms of occupant injury, and analyzes accident/injury related medical, engineering, and human factors issues. Vision research focuses on assessing ophthalmic deficiencies and corrective methods that may impact aerospace safety. Vision scientists develop the necessary information to support airman certification, identify aircraft/airport environment vision hazards (including LASER hazards).

English: CURRENT TRENDS IN AEROSPACE HUMAN FACTORS RESEARCH AT THE FAA CIVIL AEROSPACE MEDICAL INSTITUTE

French: LES TENDANCES ACTUELLES DE LA RECHERCHE SUR LES FACTEURS HUMAINS EN AÉRONAUTIQUE À L'INSTITUT CIVIL DE MÉDECINE AÉRONAUTIQUE DE LA FAA (CAMI)

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CAMI's Flight Deck Human Factors Research Laboratory conducts a broad-based program of applied human factors research on causal factors associated with aviation accidents and issues involving the design, operation, and maintenance of flight deck equipment in the National Airspace System (NAS). Research includes assessing the impact of advanced technologies, measurement of flight performance and risk, evaluating pilot/controller information transfer, determining the effects of stressors on human performance, identifying human factors involved in accidents and incidents, and quantifying the effects of advanced displays, procedures, and tasks design on pilot performance. CAMI's NAS Human Factors Safety Research Laboratory conducts a broad, integrated program of research on the relationship of factors concerning individuals, work group, and organizations as employees perform their jobs. Research is focused on improved person-job fit through selection, training, and organizational interventions and changes to technology. This laboratory also conducts applied research to develop, validate, and evaluate aerospace personnel selection procedures by conducting job analyses, developing assessment methods such as tests and questionnaires, developing individual and group job performance metrics, and establishing scientific evidence of the validity of aerospace personnel selection procedures and their utility in achieving agency organizational and NAS operational objectives. Performs research on the impacts of advanced technologies on ATCS performance, information transfer and human/machine design by utilizing real-time ATC simulation capabilities to investigate human factors operations concepts. Investigates work environment issues that affect employee job performance such as workload, shift management, age, fatigue, adverse physical conditions, stressors involving drug and alcohol usage, and color perception. Assesses the effectiveness of remedial actions, procedural or policy changes, or individual strategies and countermeasures to reduce performance decrements and enhance individual performance. Performs applied field research to assess relationships between workforce perceptions, attitudes, beliefs and expectations on organizational and team. performance and other outcome measures such as employee and customer satisfaction.

English: DUTY/REST AND FATIGUE MITIGATION DURING ULTRA LONG-RANGE FLIGHTS
French: TRAVAIL/REPOS ET ATTÉNUATION DE LA FATIGUE AU COURS DES VOLS TRÈS
LONG-COURRIERS

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Introduction: Knowledge about circadian physiology, sleep, fatigue, alertness, and performance has grown appreciably. Transitioning scientific recommendations into regulatory practices and aviation operations has been difficult. The introduction of aircraft capable of flying ultra long-range (ULR) flights (i.e., >16 hr) for which there are no U.S. crew duty/rest regulations has presented significant challenges for the industry and regulatory authority.

METHODS: A non-standard Operation Specification approved for one major US carrier, required a field study during city-pair service from New York to Mumbai. Twenty-three pilots and 20 flight attendants were asked to (a) complete log book data entries (sleep times, mood, and sleepiness); (b) 4 psychomotor vigilance task (PVT) sessions; and (c) wear a wrist activity monitor from departure to return. Doubly repeated multivariate analysis of variance procedures were used to analyze the data along with an assessment using the Fatigue Avoidance Scheduling Tool (FAST").

RESULTS: Average total sleep for pilots vs. flight attendants were: Outbound = 5.0 vs. 3.7; Layover = 8.2 vs.10.5; Inbound = 6.0 vs. 4.5 hr. Pilots were scheduled for a second layover day and averaged 12 hr sleep. There were indications that pilots and especially flight attendants, who were scheduled to rest shortly after departure from Mumbai, experienced the greatest fatigue upon arrival in New York due to a more lengthy time of continuous wakefulness.

CONCLUSIONS: Consistent with the Singapore ULR investigations, these results revealed important benefits obtained by studying actual flight operations to guide crew duty and rest scheduling. Some results of this investigation prompted changes in crew scheduling. Though the OpSpec procedure has been challenged, a standardized protocol for comparing long-range with ULR flights is currently underway. Regulatory attention is presently focused on the development of the framework for a fatigue risk management system (FRMS) approach to assist in fatigue mitigation in aviation operations.

English: EXTENDED FLIGHT DUTY PERIODS AND ALERTNESS-RELATED FLIGHT SAFETY
French: LES PÉRIODES PROLONGÉES DE VOL ET LA SÉCURITÉ RELIÉE À LA VIGILANCE

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Introduction: Alertness and vigilance may reach unacceptably low levels when max. permissible Flight Duty Periods (FDPs) are extended. Effectiveness of crew augmentation depends on quality and quantity of in-flight rest, length of the FDP, and circadian factors. We performed a field study involving 14 hr FDPs with 1 extra pilot and in-flight rest facilities consisting of 3 adjacent economy seats.

Method: During one complete duty roster, 36 pilots performed tests at wake-up, pre-duty, pre-rest, post rest, and top of descent (TOD). Sessions involved completion of the 7-point Samn-Perelli scale (fatigue), Karolinska Sleepiness Scale, a 5-min computerized vigilance task (VigTrack), and questions about sleep, comfort, and operational conditions. Objective sleep data were collected using an actigraph device.

Results: The mean onboard rest period was 135 min. Mean in-flight sleep efficiency was 16%, while 42% of the pilots did not sleep at all. Sleep was disturbed by light, noise, and passengers. Compared with pre-duty scores, fatigue and sleepiness at TOD had increased with 105% and 100% respectively and vigilance was impaired with 32% (tracking error), and 11% (reaction time). Longer FDPs showed higher fatigue and sleepiness levels and lower vigilance at TOD. Longer in-flight sleep was associated with lower fatigue and sleepiness at TOD.

Conclusion: The conditions in the onboard rest facility are not conducive to sleep and much should be done to improve in-flight sleep quality and efficiency in these extended FDP operations. Mean fatigue, sleepiness, and vigilance scores at TOD approached the alertness-related risk zone. Frequency distributions of scores indicated that in 20% of the pilots the level of alertness can be considered as insufficient to safely perform flying tasks. Criteria to assess alertness-related flight safety and recommendations to implement a Fatigue Risk Management System (FRMS) will be discussed.

English: SILENT CORONARY HEART DISEASE IN PILOTS OF THE POLISH AIR FORCES IN A RETROSPECTIVE ASSESSMENT
French: MALADIE CORONAIRE ASYMPTOMATIQUE CHEZ LES PILOTES POLONAIS - ANALYSE RÉTROSPECTIVE

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Introduction: Despite the spectacular progress in the field of diagnostics on ischemic heart disease, relatively earlier diagnosis of its clinically silent form leaves a lot to be desired. It is worth to mention, that silent coronary disease is the most important problem of the clinical aviation medicine. The primary aim of this study was the retrospective assessment: 1.Frequent of occurrence of clinically silent coronary heart disease in pilots during the ten-year period.2.Loading of the atherosclerosis risk factors till the time of establishing the diagnosis.3.Accuracy of applied methods of the preventive and diagnostic procedures in non-symptomatic persons.

Methods: We retrospectively reviewed records of 34 pilots, in which the silent coronary heart disease was diagnosed. In all of them the values of the body mass index (BMI), total cholesterol (T-C) and glucose concentrations (G-C), mean arterial blood pressure(BP) and number of daily smoked cigarettes were determined.

Results: In the assessed group at least one atherosclerosis risk factor was diagnosed in 33 of them. Only 1 pilot was loaded of 5 atherosclerosis risk factors and one pilot was not diagnosed with any. In 30 pilots T-C was abnormal. 22 of pilots were loaded of cigarettes smoking. Abnormal mean BMI was in 11 pilots . Abnormal mean values of G-C we found in 6 pilots and elevated values of BP in 4 cases. The reason for referring pilots to the clinic was MI in 5 cases and in the remaining ischaemic ST-T changes in standard or dynamic ECG . In no cases the reason of referral was ECG changes recorded during the G-force tolerance test .

Conclusions: The results indicate the necessity, that exercise stress test should be performed in pilots on supersonic as early as at the age of 35 and routinely once a year. Positive electrocardiographic and scintigraphic stress test result is the reason of coronarographic examination for military pilots.

English: FITNESS TO FLY AFTER RADIOFREQUENCY CATHETER ABLATION OF OUTFLOWTRACT VENTRICULAR ECTOPY/ TACHYCARDIA
French: APTITUDE AU VOL APRÈS ABLATION PAR RADIOFRÉQUENCE DES TRACTUS GÉNÉRANT DES ARYTHMIES VENTRICULAIRES

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FITNESS TO FLY AFTER RADIOFREQUENCY CATHETER ABLATION OF OUTFLOWTRACT VENTRICULAR ECTOPY/ TACHYCARDIA

APTITUDE AU VOL APRES ABLATION PAR RADIOFREQUENCE DES ARYTHMIES VENTRICULAIRES IMPORTANTES

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Introduction: Ventricular ectopy from the outflowtract is considered benign in the absence of relevant structural heart disease. However it can be incapacitating in some patients (pts). Radiofrequency catheter ablation (RFCA) is often used as curative method. In a 33 years old commercial pilot who had undergone RFCA, the question of fitness to fly was raised. Follow-up data of pts having undergone RFCA are the basis for a clear assessment of fitness to fly.

Methods: In a single center 17 consecutive pts with outflowtract ventricular ectopy or tachycardia, aged 52 ± 14.8 years (mean \pm std), 13 male, 4 female, underwent RFCA. Three pts had concomitant coronary artery disease and three pts mild valvular heart disease. Left ventricular ejection fraction was normal in all pts ($60 \pm 5.0\%$). Holter ECG was performed before and after ablation. Results: Pts presented with ventricular ectopic beats (41%) or with ventricular tachycardia (59%) before RFCA. Holter ECG before RFCA revealed $18.6 \pm 12.1\%$ ventricular ectopic beats. The arrhythmia originated in the right (15 pts) and in the left outflowtract (2 pts). One pt exhibited no ectopic beats during the procedure and could not be ablated. One pt refused ablation. In two pts, the ablation failed. The success rate after a follow up of 5.7 ± 6.0 months was overall 76%, and 88% in pts in whom ablation was tempted. There were no complications.

Conclusion: RFCA is a safe and successful method for the treatment of

outflow tract ventricular ectopy or tachycardia. Therefore pilots having undergone successful RFCA may be considered for fitness to fly.

English: AVIATION STRESS AND DENTAL ATTRITION
French: USURE DENTAIRE ET STRESS AU TRAVAIL DANS L'AVIATION

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Introduction: Voluntary contraction of the teeth is a common maneuver used to facilitate peripheral monosynaptic reflexes and motor system excitability. It has also been indicated that an aggressive biting is associated with a significant attenuation of the stress-induced increase of nor-adrenalin turnover in the brain. Therefore, occlusion of the masticatory organ contributes significantly to an individual's ability to manage stress. Pathological tooth wear is often associated with bruxism, which appears in turn to be influenced by psychosocial factors. Variables such as general stress, work-related stress, and personality traits have been increasingly considered as initiating, predisposing, and perpetuating factors for bruxism. Bruxism can cause pain and irreversible damage to the teeth, periodontium, masticatory muscles, and temporomandibular joint. Bruxism in an otherwise normal dentition can be recognized as a valid system prophylaxis for all stress related situations.

Material & methods: Subjects were 100 Indian Air Force officers of Flying pilot stream who were undergoing routine annual dental examinations at an Air Force Dental clinic during a 4-wk period. One Dental officer using set criteria examined each subject and estimated the tooth wear. Subjective evaluation was based on questionnaire including conscious awareness of bruxism, hypersensitivity and temporomandibular joint pain or discomfort. Awareness of bruxism was also noted as to whether continuous and persistent, momentary while undertaking flying tasks and maneuvering or nocturnal while resting.

Results: Bruxism was found in 51 % of the overall group of pilots: 61% of the helicopter pilots, 57 % of fighter pilots and 32% of the transport pilots. Of the total group, twelve subjects had a score of over four and required immediate attention for the condition. 37% of the subjects were aware of their parafunctional habit and resorted to the same as a measure to overcome occupational stress.

Conclusion : The study attempts to correlate the incidence of dental attrition amongst aircrew to occupational stresses related to aviation.

Key Words: Aviation Stress, Dental Attrition, Bruxism

English: NECK INJURIES AMONG FIGHTER JET PILOTS
French: LES TRAUMATISMES CERVICAUX CHEZ LES PILOTES DE CHASSE

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Gz induced neck injuries are a relatively common occurrence in pilots of high performance fighter aircraft. It is considered to be a significant occupational and aerospace medical problem. Acute neck injuries have increased with current high performance fighter aircraft such as the F-16 which are sustaining load factors up to +9Gz. These types of injuries also occur frequently at lower G levels. Newman (1997) reported that the greatest number of injuries occurred at 4 -5 G in pilots of the F IA/18
In flight it is not possible to directly measure the forces being produced by the neck muscles. In order to measure the effects of high Gz forces on the cervical spine, we have to use indirect methods such as a surface integrated electromyography (IEMG) which records mass action potentials from the cervical muscles. By comparing these potentials with the potential created by a maximal voluntary contraction force (MVC) produced by the same muscle, it may be possible to calculate the relative strain on the cervical muscles. The method also allows for long-term recording up to several hours.

Aims of the study

- 1- To determine the relationship between the force and EMG activities of the neck muscles in normal male and female subjects.
- 2- To collect information on the force generated by the neck muscles in males, females and pilots.
- 3-A subsidiary study will examine the inflight data on EMG in one pilot in order to calculate the forces experienced during manoeuvres.

Methods:

Twenty-six healthy subjects (12 males and 14 females) participated in this study. They ranged in age from 20-40 years with no history of any musculoskeletal problems. The study was approved by the Kings College London Research Ethics Committee. The participating subjects were provided with a subject information sheet, and asked to sign a consent form. (Appendix 1). Six fighter pilots (all male) were recruited from the Fast Jet Test Squadron (FJTS), QinetiQ Boscombe

Results : Majority 22 out of 24 (above 80%) demonstrate linear relationship between EMG/ Force for sternoclavicular muscle and more than 60% in the erector spinae muscles

- 1- the force of the female neck muscles found to be 75% that of the male
- 2-neck strength in pilots were 37-55% stronger than non pilots male subject

- 3- post flight the strength of the pilot neck muscles was less due to fatigue
- 4-General muscle strengthening and neck training is beneficial in preventing neck injury and increasing the pain threshold among Fighter Pilots
- 5-EMG tool is a very reliable tool in assessing the strain on the neck muscles
- 6-Bracing the head against the canopy found to be useful preventive strategy, reducing the strain on the neck muscles by 90%

English: HANDLING OF THE AIR PASSENGER MISCONDUCT (AIR RAGE) IN THE SKY
French: GESTION DES INCONDUITES DES PASSAGERS EN VOL

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AirRage is defined as event of air passenger misconduct as being occurrence of hostility to crew, co-passengers, and/or the aircraft which threaten the safety of aircraft and its passengers. Air passenger misconduct is a new phenomenon of civil aviation experienced all over globe.

Epidemiology- There is no data in India however at Delhi airport mild grade 1 cases of misconduct are 150 in a year while gr2-3 are 4to 10 in 2007.

A new insight on cause- variables of airport tumult, factors of air craft ambiance and matrix of dimensions of health dynamics of individual interplay with each other leading to increase in stress on the P²-S²(Physical-Psychic-Social-Spiritual) unit more than the stress tolerance limit (STL) of the concerned person. This is grouped in Aero-Nomadic Stress Complex (ANSC)

Handling of air-rage- The act of air passenger misbehavior can be classified in six grades depending on the gravity of act in relation to safety and security of passengers/ crew and of aircraft. Methodology of handling rogue passenger on air needs proper training of crew as well as to concerned helpful volunteering health care professionals traveling as co-passenger.

Key words: Air rage, Stress tolerance limit, Aero Nomadic Stress, Airport tumult, air craft ambiance, health dynamics, flight diversion, Good Samaritan Law

English: MULTIPLE SCLEROSIS IN ISRAELI MILITARY AVIATORS
French: LA SCLÉROSE EN PLAQUE CHEZ LES PILOTES MILITAIRES ISRAÉLIENS

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Background: Multiple sclerosis (MS) is a common disease of the central nervous system (CNS) with a chronic course, affecting young adults. The evolution of symptoms is usually within hours to days; however, there are paroxysmal symptoms such as seizures that occur abruptly. These features and the fact that the treatment itself, which includes corticosteroids and disease modifying agents, have major adverse effects could potentially be incompatible with safe performance of military aviation duties and hence, it is widely accepted to disqualify them from military flying.

Methods: We present three cases of Israeli military aviators with a diagnosis of MS. Results: Two of the pilots were diagnosed with MS according to McDonald's criteria, the third was highly suspected of having MS due to an episode of optic neuritis and other neurological deficits found on subsequent examinations, but the diagnosis was not verified according to the required criteria. The aviators underwent a thorough neuropsychological assessment which demonstrated above than average achievements. They were all treated with a short course of corticosteroids and the two verified cases of MS were treated with IFN β -1a. After a period of follow-up they were all returned to active flying duties with the restriction of another aviator accompanying them, and a follow-up neurological examination every three months. This was due to the fact that no residual neurological deficits were found, the chronic nature of the disease, the minimal risk of sudden incapacitation and the good reliability of the aviators involved in reporting any change in the disease status. Moreover, the stress associated with disqualification from military flying could have potentially aggravated their disease status.

Conclusion: although MS is generally considered as a disease which disqualifies from military flying, in some cases, aviators with no residual neurologic damage can return to active duties under close surveillance.

English: USE OF MEDICATIONS AND AIRPLANE SAFETY
French: USAGE DE MÉDICAMENTS ET SÉCURITÉ AÉRIENNE

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Introduction: As a physician authorized to give medical examinations to airplane pilots, I am often asked about medications that my patients are using: whether these are safe to be used when flying an airplane, whether the used dose is appropriate and whether the patients understand the possible side-effects.

Methods: One-hundred and twenty-two pilots of a Slovenian airline have taken part in our research that included filling out an extensive questionnaire about medication use in the last year.

Results: The average age of the pilots in our study was 37 years. Three-quarters have taken medications in the last year, from those 29 % were prescribed medications by their personal physician, 8 % by a specialist, 33 % bought medication in drug stores and 26 % used medication already present in their home. Only 41 % have consulted with their personal physicians about medication safety and side-effects, 10 % discussed this with the specialist and 28 % with the pharmacist. They read medication instructions in 66 % and in 21 % have also consulted their medications with physicians provided to them by their employer. The medication most often used were for decreasing body temperature, to treat lung infections, pain, digestive problems, allergies, ocular hypertension and antiaggregation drugs. Around 21 % have noticed side-effects, such as drowsiness, tiredness, diminished concentration and vertigo.

Conclusion: The gathered data show how important it is for pilots to approach medication seriously. Use of medications can diminish the pilots ability to operate an airplane, therefore question, such as 1) do I feel confident in my abilities to fly, 2) do I really need medicating, 3) have I noticed any side-effects, and 4) have I received enough information about medications that I am using, should be asked and answered before each flight.

English: RESULTS OF THE SURVEY "FATIGUE AND STRESS IN AERONAUTICS" - 2ND PART
French: RÉSULTATS DE L'ENQUÊTE "FATIGUE ET STRESS EN AÉRONAUTIQUE" - 2ÈME PARTIE

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Method: a multicentre descriptive survey by questionnaire has been conducted in France in 2008 (2368 questionnaires exploited). This 2nd part presents the results of subjective scales evaluating tiredness (Pichot and MFI20), sleepiness (Epworth) and stress (Karasek and SPPN).

Results: for all scales, no correlation was found with age. Flight attendants (FA) significantly showed the highest score in the 3 scales assessing tiredness and sleepiness (averages: 13.4 for Pichot, 9.2 for Epworth and 9.1 for MFI20). The differences were less significant between other specialties (6.9 to 8.7 for Pichot, 7.4 to 8 for Epworth and 6.6 to 7.8 for MFI20) and between the sub-specialties of military pilots.

The stress Karasek score evaluates 3 dimensions: job decision latitude (DL), psychological demand of work (PD) and job social support (SS). FA is the only speciality to be at risk for stress at work with low DL (58.7), high PD (23.5) and low SS (23.2). Military pilots and navigators reported a high PD but they were protected by a high DL and a high SS. The others (civilian pilots, flight engineers, air traffic controllers) can be considered as relaxed workers.

The stress SPPN scale distinguishes between negative stress (NS) and working positive stimulation (PS). FA were the most stressed workers with high NS (18.6) and low PS (23.2). Military pilots, navigators and air traffic controllers have intermediate scores. Other specialties (civilian pilots, flight engineers) seemed protected.

There was a significant gradient depending on the type of flight for civilian pilots and FA: according to scales dealing with tiredness, sleepiness and stress, they were more embarrassed by long-haul flights compared to other flights.

Conclusion: the study provides interesting results. However, one should note that it took place during a period of a major reorganisation of the MoD and social disputes in several air carriers.

English: A CONSIDERATION OF SAFE ASPECT FOR ROLLER COASTER RIDERS
French: CONSIDÉRATION À PROPOS DE LA SÉCURITÉ DES USAGERS DES MONTAGNES RUSSES

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Introduction: Roller coaster is one of the most attractive facilities in the theme park. In recent years, it was heard that some accidents occurred in domestic and foreign amusement parks. Some safe aspects should be noted by visitors and need for examining.

Methods: This study was conducted in four famous theme parks in Taiwan. It consisted of field study using a questionnaire and cardiovascular measurement using a wrist-worn monitor. We randomly measured heartbeat and blood pressure for some young visitors before and after their riding.

Results: Field study indicated that a number of visitors did not fully understand the potential risk for riding those breath-taking facilities because the warning slogans were not very detailed. The measurement showed that both swing-type and rolling-type facilities induced bradycardia in 70.2% of riders. Later on we also found that up to 33.3% of those who rode roller coaster with -Gz/ +Gz transition within 30 minutes right after riding above two type facilities presented their slower heartbeats. Among them, bradycardia appeared in 23.1% of subjects after both swing/rolling and roller coaster riding. Therefore we consider that two rides only with a short break will potentiate the vagal tone, particularly for susceptible individuals. This finding was evidenced again in our cool water-immersion experiment.

Conclusion: Even though sympathetic nervous system and adrenal gland will be stimulated and thus produce compensatory response to +Gz when riding roller coaster. But over-stimulation of parasympathetic nerves during diving phase of roller coaster riding could cause bradycardia more rapidly and even cause arrhythmia. For those considerations we suggest that a minimum 30-minute break should be taken for challenging themselves in roller coaster in case of having swing and roll previously.

English: ESTIMATION OF LABOUR CONDITIONS OF AVIATION SPECIALISTS BY ACTIVITY WITH NOISE AND MEASURES OF PROPHYLAXIS

French: ÉVALUATION DES CONDITIONS DE TRAVAIL ET DES MESURES DE PRÉVENTION DES SPÉCIALISTES EN AÉRONAUTIQUE TRAVAILLANT DANS UN MILIEU BRUYANT

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English: ESTIMATION OF LABOUR CONDITIONS OF AVIATION SPECIALISTS BY ACTIVITY WITH NOISE AND MEASURES OF PROPHYLAXIS

French: L'ÉVALUATION DES CONDITIONS DE TRAVAIL DES SPÉCIALISTES AÉRIENS TRAVAILLANT AVEC LE BRUIT ET LES MESURES DE PRÉVENTION

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Introduction: The noise control problem is actual for Air Force especially for technical-engineering personnel. Questioning of aviation specialists has shown, that the most adverse factors for them are acoustic noise (100% interrogated), exhaust gases of automobiles (81%), activity with fuels and lubricants oils (65%), microclimatic conditions (55%), microwave range of electromagnetic radiation - 20%.

Methods: Research of acoustic conditions on workplaces of aviation specialists conducted at service of flight vehicles during preflight preparation and during flights.

Results: The level of a sound on workplaces of technical-engineering personnel was in a range 95 dBA, an aircrew - 81-103 dBA. The sound pressure level (dB) in all octave bands at all types of airplanes exceeded EPL, except for an octave band with compound frequency of 31,5 Hz. The maximum of spectral density of sound pressure depends on type of flight vehicles. At bombers it fell to a range of octaves with compound frequencies of 2000-4000 Hz, at fighters - 500-4000 Hz, at helicopters and transport airplanes - 250-4000 Hz, at airplanes of a long-range aviation - 31,5-63 Hz. The equivalent noise level changed from 94 up to 121 dBA, that exceeds EPL (85 dBa). The noise dose changed from 8 to 4112 con. units.

Conclusion: Preliminary tests of existing individual noise-protective devices have shown their good acoustic efficiency in the field of sound frequencies and an infrasound.

English: CAPABILITIES OF THE RUSSIAN ENGINEERING MEANS OF AEROMEDICAL EVACUATION ON RENDERING EMERGENCY MEDICAL HELP OF VICTIMS IN EXTRAORDINARY SITUATIONS
French: CAPACITÉS DU MATÉRIEL TECHNIQUE RUSSE D'ÉVACUATION AÉROMÉDICALE PROCURANT DES SECOURS D'URGENCE AUX VICTIMES DE SITUATIONS EXTRÊMES

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Mobile medical complexes on modern technical base have crucial importance at liquidation of medico-sanitary consequences of emergency situations. Teamwork of leading experts of the Ministry of Emergency Situations of Russia, Russian Federation Defense Ministry, the Ministry of Health and Social Development and the industries has allowed to develop in the shortest terms special medical modules (further - Modules) to equip additionally helicopter MI-8 and an airplane IL-76 TD to conduct ground and special flight tests of Modules to form packages of the design and operational documentation. As have shown the conducted calculations and practical experience, the medical brigade rendering qualified reanimation help of the evacuated persons directly onboard of the flight vehicle, should consist as a minimum of the doctor reanimatologist and two medical nurses. Mean duration of stay the wounded on evacuation transport means makes not less than 6 hours, i.e. medical experts should be ready to a long-period operation, is especial at an evacuation airplanes like IL-76 TD.
Maximum available time of Modules for activity: helicopter - up to 20 min., airplane - up to 40 min. Modules possess their own technological systems of maintenance: an electrical power system and the medical system of oxygen supply. The medical equipment is certificated and allowed to application onboard of flying vessel, stable to climatic effects provides electric safety.

English: SPEECH DISCRIMINATION TEST IN THE COCKPIT NOISE FIELD
French: TEST DE DISCRIMINATION AUDITIVE DANS LE MILIEU SONORE D'UN COCKPIT

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Introduction : Speech discrimination in the cockpit noise field is very important to aviation safety. If the hearing level of class 1 pilot is under limits, they must pass a speech discrimination test in noise interference. However none of the clinic tests are standardised. But if satisfactory auditory comprehension in a noise field corresponding to normal flight deck conditions during all phases of flight can be demonstrated, a fit assessment may be considered at revalidation or renewal (JAR appendix 16). We have developed this type of testing to be used easily by centers.

Methods: Noise fields of different cockpits (airliners, aircrafts, helicopters) have been recorded, verified and measured during flight. We have do the same with recording ATC messages (> 350 ATC messages in English with different accents) The pilot finds himself with noise level corresponding to his usual aircraft, can use different headsets with or without ANR and must repeat ATC messages. This program is available on the CD.

Results : 150 class 1 pilots have been tested with this procedure (89 with normal hearing level, 35 with moderate hearing loss and 26 with substandard hearing comprehension level) For all, this test conforms to real flight conditions

Conclusions : This program-testing is in accordance to JARs, reproducing real flight conditions, accepted by pilots, can be upgraded and respond to the demands of flight safety.

English: VALSALVA FROM THE MAN TO THE MANEUVER
French: VALSALVA DE L HOMME À LA MANOEUVRE

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Valsalva de l homme à la manoeuvre

historique: Valsalva Antonio 1666-1723. Né à Imola, figure historique de la médecine italienne, il devient docteur en médecine de l université de Bologne où il fera toute sa carrière. Il devient professeur d anatomie de cette université en 1664.

Avec son oeuvre le traité "tractus de aure humana" il est le premier médecin à utiliser l éponyme anatomique "trompe d eustache" et met au point la manoeuvre qui porte son nom

Physiologie: la manoeuvre de Valsalva est une expiration forcée à bouche fermée. Cette manoeuvre de base de médecine aéronautique est bien connue du personnel navigant civil et militaire car elle permet dans de nombreuses circonstances d éviter l apparition d otites barotraumatiques.

Conclusion: le médecin aéronautique doit informer le personnel navigant tout comme le passager de la physiologie de la trompe d eustache et de la manoeuvre d équipression. D autant que l otite barotraumatique est un incident en vol fréquent dans les compagnies aériennes.

Valsalva from the man to the maneuver

History: Valsalva Antonio 1666-1723 was born in Imola and was a historical figure in Italian medicine. Doctor of medicine and philosophy, he graduated of the university of Bologna when he made his career and he became a professor of anatomy at this university in 1694.

In his main work, the "tractus de Aure humana", he was the first physician to use the anatomical eponym "eustachian tube" and invented the maneuver to which he gave his name.

Physiology: The Valsalva maneuver is performed by forcibly exhaling against a closed airway.

This basic maneuver in aviation medicine is well-known to air crew as it often helps to avoid ear barotraumas.

Conclusion: The same has to inform aircrew and passengers about physiology of Eustachian tube.

It is always possible to do the maneuver.

It is true that barotraumatic otitis is frequent event in the airlines.

English: RESULTS OF THE SURVEY "FATIGUE AND STRESS IN AERONAUTICS" - 1ST PART
French: RÉSULTATS DE L'ENQUÊTE "FATIGUE ET STRESS EN AÉRONAUTIQUE" - 1ÈRE PARTIE

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Introduction: A study about recurring fatigue and stress complaints during aeromedical examinations.

Method: A multicentre descriptive survey by questionnaire has been conducted in France in 2008 (2368 questionnaires exploited; 1/3 of military staffs and 2/3 of civilians). Its purpose was to assess the subjective answers by crew members through diverse questions (1st part) and validated scales (2nd part).

Results: since 1 year, 26.7% of the population presented a sick leave and 6.8% suffered from an occupational accident. Cabin crews were twice as affected as the other specialties, with no difference between men and women. Fighter pilots and long and medium-haul airline pilots declared a slightly higher number of sick than the other categories of pilots.

23.8% of military staffs were involved in foreign military operations during the last year.

Conclusion: The military personnel usually lived near their workplace, while the civilians lived further (325km for pilots and 216km for the cabin crew). The number of nights away from home also differs.

Participants were then given the opportunity to specify the most tiring experiences through 4 questions exploring the operational, aeronautical, non-aeronautical and private aspects. The most frequently reported conditions were: short nights (54.6% of the population), noise (42.5%), air conditioning and pressurization (31.9%), family constraints (29.4%), night-work (27.8%)&. and jet lag (20.6%). These answers were then studied in each specialty. The civilian helicopter pilots laid stress on heat, home work commuting and hierarchical problems. Pilots of business aircrafts complained about waiting periods and the length of working time. Long-haul pilots reported night-work, jet lag and duration of flights. Flight attendants (mainly long-haul crew) indicated night-work, jet lag, air conditioning and duration of flights but reported few concerns about extra-aeronautical constraints. Military pilots rather insisted on ergonomics, thermal strains and additional tasks.

English: PERSONALITY MANEUVERS FLYERS FATIGUE! - INDIAN CIVIL AVIATION SCENARIO
French: LA PERSONNALITÉ INFLUENCE LA FATIGUE DES PILOTES! - LA SITUATION DANS L'AVIATION CIVILE INDIENNE

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Introduction: Pilots work in a demanding environment and it requires a lot of physical and mental fitness to handle the situation. This study investigated the relationship between the personality domains and fatigue dimensions in the Indian civil pilots.

Method: 53 civil pilots reported for their annual medical examination voluntarily participated in the study. The data of 3 pilots was found inadequate and hence could not be considered for analysis. The NEO-FFI questionnaire is used for personality and the Chalders Fatigue scale for fatigue dimensions. A demographic inventory was administered for demographic characteristics of the sample. Statistical analysis (N=50) was done with PASW Statistical 17 Package.

Results: The mean age of the sample (N=50) is 41.68 ± 11.2 yrs. The mean years of service (N=50) are 14.27 ± 10.61 yrs with an average of 7013.38 ± 5821 total flying hours. The descriptive data showed that the civil pilots were in an average range profile of the adult population norms on the domains of personality except on neuroticism and agreeableness dimensions where the sample has obtained low scores. The data also reveals that the sample manifests average levels of physical fatigue and mental fatigue. There was significant positive correlation ($r = 0.354$; $p < 0.05$) between openness and physical fatigue

and a significant negative correlation ($r = -0.479$; $p < 0.01$) between conscientiousness and mental fatigue. ANOVA was computed for any significant difference in mean values on physical fatigue and mental fatigue across demographic characteristics.

Discussion: The results show that those pilots who perceive their career as a demanding profession rather than being enthusiastic and appreciating their vocation experience high physical fatigue and depleted energies while those adhering to the rules, procedures and protocols experience less mental fatigue.

Conclusion: The personality traits and demographic characteristics to certain extent influence the pilots perception to physical and mental fatigue and these aspects must be borne while assigning flying duties.

English: OPERATION CARNAVAL 2008: HELICOPTER RESCUE DURING THE NATIONAL HOLIDAY OF A DEVELOPING COUNTRY

French: OPÉRATION CARNAVAL 2008: SAUVETAGE PAR HÉLICOPTÈRE DURANT UNE FÊTE NATIONALE DUN PAYS EN DÉVELOPPEMENT

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SAMU 192 (Serviço de Atendimento Móvel de Urgência or Service of Urgency Mobile Attendance) is a Brazilian public emergency medical service which was settled in 2002, in order to provide fast care to people involved on possible fatal situations. The service is regulated by a physician, who receives telephone calls and then decides which kind of help will be more suitable: orientation and/or ambulance. Ambulances may be manned by two nurse technicians (basic support unit or BSU) or by a nurse and a physician (advanced support unit or ASU) and they are dispatched depending on the severity of the case. We describe the experience of associating an ASU SAMU 192 staff with a Federal Road Policy (FRP) helicopter crew (pilot and flight assistant) during the Carnival holiday (February 1st up to 10, 2008), called Operation Carnival. Professionals trained on air emergency rescue manned a Bell 407, manufactured in 1999, adapted for patient transfer. Ground ambulance support (BSU or ASU) was contacted as needed. Calls arrived from the FRP, Fireman Corporation or SAMU 192 offices. Only primary trauma attendance was performed. The covered area was about 100-300 km radius from Belo Horizonte, corresponding to the main federal roads on the center of the state of Minas Gerais (BR040 and BR381). A total of 449 accidents occurred in this state, with 19 deaths. SAMU 192-FRP rescue attended 20 victims in 5 accidents, including one accident with 9 severe cases and 2 deaths. Since trauma is the most important cause of morbidity and mortality in Brazil, air rescue by helicopter must be encouraged, because it is safe and fast. The association between SAMU 192 and helicopter FRP staffs in periods of greater incidence of trauma events may be the ideal option, by optimizing rescue and reducing morbimortality.

English: EVALUATION OF STRATEGIC AEROMEDICAL EVACUATION FOR AN ENTIRE MILITARY OPERATION - THE BRITISH EXPERIENCE IN IRAQ (2003 - 2009).

French: ÉVALUATION DE L'ÉVACUATION AÉROMÉDICALE STRATÉGIQUE POUR LA TOTALITÉ D'UNE OPÉRATION MILITAIRE - L'EXPÉRIENCE BRITANIQUE EN IRAK (2003 - 2009)

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Introduction

Military operations and public confidence rely on robust aeromedical systems to repatriate ill and injured personnel. In times of conflict, aeromedical systems are regularly required to provide the full spectrum of patient care.

The aim of this study was to analyse the strategic aeromedical evacuation records for Op Telic, and determine if there were observable trends to improve delivery and indicate future planning needs.

Methods

The UK Aeromedical Evacuation Control Centre databases of aeromedical patients were searched for patients transported from Op Telic. The electronic recording of information was commenced just after the deployment of UK forces. To obtain the full dataset, paper based mission records were recalled from archive to retrospectively populate the database. Cross-checking with other published data and data validation processes were undertaken.

Results

The total number of UK Op Telic strategic patient movements was calculated; a peak in patient transfers was noted at the outset. The monthly number of patients moved was determined. The proportion of stretcher and seated patients was calculated. The numbers of critical care patients was established.

Discussion

The archival system was observed to be unreliable; an improved system was adopted. Electronic record quality was observed to under-report data by 10%; a process of internal data validation was commenced. Governmental interest in data accuracy led to the initiation of an external validation process. Database records contained information about patient priorities, classification, dependency and diagnoses, further data could have been collected to improve analyses, namely recording of causal mechanism (battle

injury or disease non-battle injury) and the last known Medical Employment Standard (a military occupational medical grading system). The requirement to capture additional data changed policy. Further work is required to electronically capture this data within the future database.

English: MEDICAL EXAMINATION FOR APPLICANTS CLASS 1 A COST/BENEFIT COMPARISON OF JAR-FCL 3 VS. INTERNAL SPECIFICATIONS

French: L'EXAMEN MÉDICAL POUR LES CANDIDATS À LA CLASSE 1: UNE COMPARAISON COUT/BÉNÉFICE ENTRE JAR-FCL 3 ET DES SPÉCIFICATIONS INTERNES

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First examinations for Class 1 applicants according to JAR-FCL 3 are not very detailed. Therefore the question arises if an airline with its own aviation school and continuous regular training might profit from demanding higher standards internally and examining applicants in a more detailed manner in order to improve the probability of lifelong fitness for aviation duties.

At the Lufthansa German Airlines Medical Services, serving at the same time as Aero Medical Center Frankfurt, during a period of nine months 139 applicants (127 male, 19 female) underwent their first examination. A number of examinations that JAR-FCL 3 does not require at all or only for special indications were included in the routine as listed below:

Extended personal medical history, chest X-ray, EEG with photostimulation and hyperventilation, computerized topography and tonometry, funduscopy in mydriasis, fasting blood sugar, cholesterol (including HDL and LDL), creatinine, alkaline phosphatase, uric acid, bilirubin, TSH, HIV-test, CDT, drug screening (12 substances) including an additional evaluation by a psychiatrist

Already at the extended medical history six candidates were revealed to have limitations of class 1 fitness, so more specific examinations were performed. In the end, of the total of 139 candidates eight (5,75%) did not meet the medical criteria, four of them did not even stand a chance of a waiver.

Four applicants were detected only through the extended ophthalmological examination because they had concealed their disorders and/or the fact that they had already undergone therapies. Two more candidates were identified as not fit for flying according to JAR-FCL 3 requirements.

If you look at the cost of a regular examination of –307.52 and –820.66 for the enhanced routine examination,

English: SHAKY LANDINGS: A CASE PRESENTATION
French: UN ATERRISSAGE DOUTEUX: UNE PRÉSENTATION DE CAS

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As a 52 year old senior captain for a major US air carrier applied left toe brake for taxiway exit the airplane shook. The aircraft was shut down, towed, and inspected with no discrepancies found. The captain ferried the empty aircraft to another aircraft for maintenance, and upon landing the aircraft again shook when brakes were applied on turnoff. Repeat inspection was again normal. After several uneventful months there was a third occurrence in another aircraft as brakes were applied at the gate. The captain feared the aircraft would strike the terminal and was grounded for medical evaluation.

History included a complaint of a nuisance discomfort in the left hamstring on long flights. A mild hand tremor had been noted for years in fine motor activity such as handwriting, carving a decoy, oil painting, and using a wood burning tool. The captain's son noted a tremor when his father used a light plastic fork to eat chicken salad. There was a family history of tremor in his mother and maternal grandmother. On rare occasions, the captain noted left foot tremor when placing his left foot on the rung of computer desk at home.

Neurological examination was normal with the exception of a fine postural hand tremor and evidence of tremor in a handwriting sample.

The captain was given a diagnosis of familial tremor and treated with propranolol 10mg three times daily. After a period of observation for side effects he returned to flying for another eight years, retiring at age 60.

The epidemiology, clinical characteristics, and treatment of familial tremor and essential tremor are reviewed and the aeromedical implications of these conditions are discussed.

English: ESTIMATION OF LABOUR CONDITIONS OF AVIATION SPECIALISTS BY ACTIVITY WITH NOISE AND MEASURES OF PROPHYLAXIS
French: L'ÉVALUATION DES CONDITIONS DE TRAVAIL DES SPÉCIALISTES EN AÉRONAUTIQUE TRAVAILLANT EN MILIEU BRUYANT ET LES MESURES PRÉVENTIVES

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Introduction: The noise control problem is actual for Air Force especially for technical-engineering personnel. Questioning of aviation specialists has shown, that the most adverse factors for them are acoustic noise (100% interrogated), exhaust gases of automobiles (81%), activity with fuels and lubricants oils (65%), microclimatic conditions (55%), microwave range of electromagnetic radiation - 20%.

Methods: Research of acoustic conditions on workplaces of aviation specialists conducted at service of flight vehicles during preflight preparation and during flights.

Results: The level of a sound on workplaces of technical-engineering personnel was in a range 95 dBA, an aircrew - 81-103 dBA. The sound pressure level (dB) in all octave bands at all types of airplanes exceeded EPL, except for an octave band with compound frequency of 31,5 Hz. The maximum of spectral density of sound pressure depends on type of flight vehicles. At bombers it fell to a range of octaves with compound frequencies of 2000-4000 Hz, at fighters - 500-4000 Hz, at helicopters and transport airplanes - 250-4000 Hz, at airplanes of a long-range aviation - 31,5-63 Hz. The equivalent noise level changed from 94 up to 121 dBA, that exceeds EPL (85 dBa). The noise dose changed from 8 to 4112 con. units.

Conclusion: Preliminary tests of existing individual noise-protective devices have shown their good acoustic efficiency in the field of sound frequencies and an infrasound.

English: CARDIOPULMONARY RESUSCITATION AT ALTITUDES UP TO 8,000 FEET
French: RÉANIMATION CARDIO-PULMONAIRE EN ALTITUDE ALLANT JUSQU'À 8,000 PIEDS

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Introduction: The oxygenation of a patient during cardiopulmonary resuscitation (CPR) depends upon the composition of the expired gas which the practitioner delivers to the lungs and the absolute pressure of the environment. The effects of mild hypoxia upon the composition of the expired gas inflating the lung of a modified CPR mannequin and the value of providing supplemental oxygen to the practitioner were investigated.

Methods: Study A: Ten volunteers performed 5 min of CPR at ground level once breathing air and once breathing 15.3% oxygen through an oronasal mask. The PO₂ and PCO₂ of the gas flowing through the mask were recorded.

Study B: Eight volunteers performed 5 min of CPR on three occasions in a hypobaric chamber: - breathing air at ground level; breathing air at 8,000 feet and breathing air at 8,000 feet with a continuous flow of oxygen [4.1 litre (NTP)/min] delivered through nasal cannulae. The volume, PO₂ and PCO₂ of the mixed gas expelled from the "lung" of the mannequin were recorded.

Results: The mean \pm SE end-tidal PO₂ in the last 2 min of CPR in Study A were 102.7 \pm 1.4 mm Hg when breathing air and 67.7 \pm 1.4 mm Hg when breathing 15.3% oxygen. In Study B the mean values of the PO₂ of the mixed gas flowing from the "lung" in the last 2 min of CPR were 114.2 \pm 0.6 mm Hg at ground level, 78.7 \pm 1.1 mm Hg breathing air at 8,000 feet and 112 \pm 3.9 mm Hg with nasal oxygen at 8,000 feet.

Conclusion: Ascent to 8,000 feet produces a 30% to 35% reduction in the PO₂ of the gas delivered by the practitioner into the patient's lungs. Delivery of oxygen to the practitioner through nasal cannulae can correct this hypoxia and perhaps help to sustain the performance of CPR.

English: CARDIOPULMONARY RESUSCITATION IN AEROSPACE ENVIRONMENTS
French: RÉANIMATION CARDIO-PULMONAIRE EN MILIEU AÉROSPATIALE

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Introduction: A series of joint studies of the performance of Cardiopulmonary Resuscitation (CPR) in aerospace environments (microgravity, simulated hypogravity and altitude) have been conducted by the Microgravity Centre/PUCRS and the Aerospace Physiology Group, Kings College London (KCL). This presentation summarises the standards of performance of CPR required by the resuscitation authorities and the methods which have been employed in the studies conducted by PUCRS and KCL.

Standards for CPR: The present American Heart Association standard for a lone rescuer is a chest compression (CC) depth of 40 - 50 mm at a rate of 100 CC/min with 2 breaths every 30 CC (every 15 CC prior to 2005).

Equipment and methods: A CPR Mannequin (ResusciAnne Skill Reporter, Laerdal Medical Ltd, UK) was modified to provide a visual display and recording of the rate and depth of compression of the chest and of the rate and tidal volume of the lung inflations. The compressibility of the chest of the mannequin was varied by fitting appropriate springs. Simulation of microgravity and hypogravity at 1G were produced by the total or partial body suspension of volunteers by a body harness and counter weights system. Studies were also conducted in parabolic flight which provided repeated exposures to microgravity. The volume and composition of the expired gas ventilating the mannequin were recorded by passing the gas expelled from the lung through a mixing box and using respiratory mass spectrometry and pneumotachygraphy. The degree of flexion/extension of the elbow joints of the practitioner was recorded by a pair of single-axis electrogoniometers attached to their arms. The measurements of depth and rate of compression and flexion/extension of each elbow were processed using Data Q. The volunteer CPR practitioners employed in the studies underwent a standardised training programme in CPR at 1G using the modified CPR mannequin.

English: CARDIOPULMONARY RESUSCITATION DURING PARABOLIC FLIGHT
French: RÉANIMATION CARDIO-PULMONAIRE DURANT UN VOL PARABOLIQUE

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Introduction: If a cardiac arrest occurs in microgravity the aim of emergency procedures is to treat the patient in a restrained position with the aid of emergency apparatus. Unrestrained treatment will be necessary during the 2-4 min required to prepare the current medical restraint system for conventional Cardiopulmonary Resuscitation (CPR). The capability for one unaided person to successfully perform free-floating CPR is important. The Evetts-Russomano (ER) method involves the practitioner placing his/her left leg over the right shoulder of the patient so that the left foot is behind and across the patients back. The practitioners right leg is placed around the patients back so that the practitioners right foot is in the region of the inter-scapula area. Once in this position the practitioners ankles are crossed to aid muscular stability, thereby reducing the work of the upper limb muscles. From this position both external chest compressions and mouth-to-mouth ventilation are performed.

Method. Three subjects performed the ER method on an instrumented CPR manikin during microgravity in parabolic flight and at +1Gz pre/post flight. The manikin was modified to provide measures of the depth of chest compression and lung ventilation in microgravity. **Results.** The mean (\pm SE) depth and rate of chest compression in microgravity were 41.3 ± 1.0 mm and 80.2 ± 3.4 compressions.min⁻¹ respectively. The mean microgravity rate of compression was significantly less than ($p < 0.05$). However, chest compression depth did not differ ($p > 0.05$) from +1Gz values

(43.6 ± 0.59 mm). The mean (\pm SE) tidal volume in microgravity was 491 ± 50.4 ml, which did not differ ($p > 0.05$) from +1Gz values (507.6 ± 11.5 ml).

Conclusion. Although some difficulties occurred in performing this method during parabolic flight, the study suggests that it is possible to conduct unaided, single person CPR successfully

English: CARDIOPULMONARY RESUSCITATION IN SIMULATED HYPOGRAVITY
French: RÉANIMATION CARDIO-PULMONAIRE EN HYPOGRAVITÉ SIMULÉE

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Introduction: Hypogravity of different magnitudes will be experienced during the planetary or lunar surface elements of future exploration missions. Cardiopulmonary resuscitation (CPR) methods developed for microgravity may not be applicable during the surface elements of these missions as gravity is present, albeit reduced. In addition, the standard method employed at 1G, may also not be applicable if weight is reduced in hypogravity to an extent that the force exerted on the chest no longer produces adequate compression.

Method: A series of studies using the body suspension device to simulate hypogravity, the instrumented CPR mannequin and elbow electrogoniometers were conducted to investigate the effectiveness of standard terrestrial CPR in hypogravity, and the influence of the mass, height and gender of the practitioner on CPR performance under different gravitational forces including Earth gravity 1G (9.8m/s^2), and simulated Martian 0.38G (3.7m/s^2) and Lunar 0.17G (1.6m/s^2) gravities.

Results: 10 men and 10 women, matched for age (male: 24 ± 1.62 yr; female 26 ± 5.65 yr) and BMI (male: 23 ± 3.09 kg/m²; female: 21 ± 3.04 kg/m²) maintained adequate external chest compression (ECC) rate (105.6 ± 4.9 bpm for men & 99.5 ± 12.5 bpm for women) in all three conditions. Males achieved adequate ECC depth in all gravitational environments. The chest compression depths produced by the females, which were mean 44.6 ± 2.2 mm at 1G, were inadequate in both Martian (mean 34.9 ± 6.3 mm) and Lunar conditions (mean 32.4 ± 5.3 mm). All volunteers significantly increased elbow flexion during ECC in hypogravity as compared to control (1G) ($4.6\pm 1.4^\circ$) with no differences between genders for Mars $13.1\pm 1.8^\circ$ and Lunar $17.7\pm 1.6^\circ$ simulation.

Conclusion: This study suggests that the "straight arm terrestrial method of performing ECC is not adequate in a hypogravity environment. Adequate chest compression depth may be possible when flexion and extension of the elbow joint provide additional muscular force.

English: THE EFFECT OF ELBOW FLEXION ON THE PERFORMANCE OF EXTERNAL CARDIAC MASSAGE
French: IMPACT DE LA FLEXION DES COUDES SUR L'EXÉCUTION DU MASSAGE CARDIAQUE EXTERNE

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Introduction: CPR effectiveness is reduced when the practitioner's upper body strength is low or the patient's chest stiffness is high. Studies show that elbow flexion increased compression depths achieved when performing CPR in body suspension. This study investigated whether allowing elbow flexion during CPR performance on a mannequin with high thoracic stiffness increased the depth of chest compressions achieved by the practitioner.

Methods: A standard and a stiffer chest spring (spring rates 1.0 and 0.546 mm/kgf respectively) were fitted to the mannequin. 16 male and 16 female subjects performed CPR in four test conditions in a random balanced order: straight arms on a standard spring, body suspension simulating microgravity with arms free to flex on a standard spring, straight arms on a stiffer spring, and arms free to flex on a stiffer spring. Each condition was performed for three minutes. Depth and rate of compressions and elbow angulations were recorded.

Results: All subjects demonstrated adequate compression depth and rates during standard straight arm CPR, but were unsuccessful while in body suspension despite significant elbow flexion. Both groups significantly increased compression depth when they used left elbow flexion during CPR on a stiffer spring. Males increased elbow flexion (mean \pm SD) from 7.5 ± 3.2 to 9.9 ± 3.9 degrees ($p=0.025$) and improved their depth from 35.5 ± 6.9 to 38.7 ± 6.9 mm ($p=0.006$). Females increased elbow flexion from 6.6 ± 2.1 to 10.4 ± 3.8 degrees ($p=0.0009$) and improved their depth from 20.8 ± 4.4 to 23.0 ± 5.7 mm ($p=0.013$).

Conclusions: Elbow flexion is an effective method of increasing cardiac compression depth on patients with stiffer chest walls when the standard CPR technique is inadequate. Mastery of the elbow flexion technique and some minimum level of upper body strength may be important factors for improving cardiac compression performance.

English: ANTARCTIC MEDEVAC OF A PATIENT WITH A DISSECTING THORACIC AORTIC ANEURYSM: A CASE REPORT

French: ÉVACUATION AÉRIENNE À PARTIR DE L'ANTARTIQUE D'UN PATIENT PRÉSENTANT UN ANÉVRISME DISSÉQUANT DE L'AORTE THORACIQUE: DESCRIPTION D'UN CAS

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ANTARCTIC MEDEVAC OF A DISSECTING THORACIC ANEURYSM : A CASE REPORT

This is a case report of a dissecting thoracic aneurysm successfully medevaced from the South Pole Scott-Amundsen station during the 2008 Antarctic summer season.

A 55 year old crewmember reported to the station clinic complaining of chest pain radiating into the left scapula of approximately 2 hours duration unrelieved by motrin. He had believed he had simply strained a muscle during exertion but when he developed some degree of shortness of breath was concerned. His past medical history was significant for hypertension.

Upon examination, the South Pole physician noted a systolic murmur which had not previously been recorded and of which the patient was unaware. The chest was clear to auscultation. There was no significant chest wall tenderness, but questionable discomfort with left arm abduction. (The patient had performed some heavy work the day prior. The BP was 164/86 right arm and 158/88 left arm. The mediastinum was not notably widened on CXR. The ECG demonstrated only LVH. The patient was stabilized on a Nipride drip and beta blockade, with Morphine for pain control.

A Medevac was called after team consultation with the lead physician at McMurdo station Antarctica, the Polar Services Medical Director , and the National Science Foundation Medical Director. The patient was Medevaced by USAF C-130 aircraft in two flights: the first from the Pole to McMurdo lasting over 3 hours and the second from Mcmurdo station to Christchurch NZ lasting over 6 hours. The patient underwent surgery following chest CT confirming a progressing dissection, and recovered completely. Details of the mission and process will be provided in the poster presentation.

Conclusion: Attention to training, diagnostic, therapeutic, and medevac support can achieve good results even in the most austere environments on earth.

English: HYPOXIC GAS MIXTURES ADMINISTERED VIA A NASAL CANNULA AS A VIABLE METHOD OF TRAINING COMMERCIAL PILOTS

French: ADMINISTRATION PAR CANULE NASALE DE MÉLANGES DE GAZ CAUSANT L'HYPOXIE COMME MÉTHODE VALABLE POUR LA FORMATION DES PILOTES COMMERCIAUX

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Introduction:

The failure of commercial and private pilots to recognise early symptoms and signs of hypoxia has led to aircraft accidents and deaths. Induction of hypoxia by breathing low concentrations of oxygen at ground level has been advocated. However, the use of an oronasal mask to deliver the hypoxic mixture has a negative training effect for those pilots who do not normally wear an oxygen mask. This could be overcome by delivering the hypoxic gas mixture via a nasal cannula permitting experience of hypoxia detection and correction with donning of an oxygen mask. The effectiveness of delivering hypoxic gas using a sealed nasal cannula (Nasal-Aire II, InnoMed Technologies Inc.) has been assessed in comparison with an oronasal mask.

Method:

Twelve healthy volunteers breathed 6.9% oxygen in nitrogen for a period of up to 4 minutes on two occasions, once through a mask and once through the cannula. Half breathed with their mouth closed and half open. The end-tidal oxygen (PETO₂) and carbon dioxide (PETCO₂) tensions, peripheral arterial oxygen saturation (SpO₂) and heart rate were recorded continuously. Symptoms were recorded using a standard questionnaire.

Results:

All of the subjects exhibited symptoms of hypoxia. With the mouth closed there were no significant differences between the mask and cannula runs with the mean PETO₂ both at 32mmHg and the mean SpO₂ at 66% and 64%, respectively, at the end of the hypoxia period. Similarly the mean heart rates and symptom scores were not significantly different. Nasal cannula delivery with an open mouth resulted in significantly high mean PETO₂ (59mmHg) and SpO₂ (87%) and less symptoms. There were two instances of an inboard leakage of air with both the mask and cannula.

Conclusion:

Equal intensities of the hypoxia can be induced by breathing 6.9% oxygen

through cannulae and mask provided the mouth is shut. Ground level experience of hypoxia can be made more realistic for pilots by using sealed nasal cannulae.

English: NECK PAIN: F16 VERSUS EUROFIGHTER - THE ITALIAN EXPERIENCE -
French: CERVICALGIE: F16 CONTRE EUROFIGHTER - L'EXPÉRIENCE ITALIENNE

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The cervical spine of a fighter pilot flying high-performance aircraft is exposed to great physical strain during combat maneuvers under high and sustained +Gz forces. Helmet weight and balance, cockpit configuration, biodynamic and operational issues and G-load are all involved in neck pain occurrence. There are international reports of flight-related neck pain, cervical disk herniations and even fractures of vertebral bodies.

In Italy, this problem was underestimated, because of pilots' fear to become unfit for flying duties. Moreover there is a lack of investigation (CT-scan, MRI) before the pilot upgrading to III or IV generation aircraft to monitor degenerative changes of the spine.

According to our survey 45,7% of F16 pilots and 5,7% of Eurofighter pilots declared to have suffered from at least two episodes of acute neck pain in the last two months. Nevertheless F16 and F2000 samples exhibit similar features in terms of age, total flight hours, G exposure.

The aim of this study is to determine the high-risk movements in hypergravity conditions and the existing differences in terms of ergonomics and aircrew equipment assembly (AEA) of these aircrafts. Night vision devices (NVD) and helmet-mounted display (HMD) system are of particular concern. These systems, in fact, add additional weight to the helmet and shift the centre of gravity of the head further forward. This anterior shift in CG creates larger load moments which require greater supporting forces, even in the neutral neck position. In addition, increased head movements are necessary in order to compensate for the decreased field of view (NVD) and to slew the weapons system for target acquisition and tracking (HMD).

Finally our study suggests some preventive and/or rehabilitative strategies in order to support pilots' health and to enhance their operational effectiveness and in-flight performance.

English: SPATIAL DISORIENTATION IN FLIGHT: CONCURRENT EVOLUTION OF COUNTERMEASURES IN INDIAN AIRFORCE (IAF)

French: DÉSORIENTATION SPATIALE EN VOL : ÉVOLUTION CONCORANTE DES CONTRE-MESURES DANS L'ARMÉE DE L'AIR INDIENNE (IAF)

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Introduction: Spatial Disorientation (SD) can be prevented in several ways and aircrew indoctrination is the single most important measure to control this condition. It is not safe to demonstrate many of the disorienting circumstances during actual flight. Physiological training, to augment the didactics, involving demonstration of illusions and limitations of human orientational mechanisms remains a safe and effective means. Keeping pace with the demands of contemporary advancements in aircraft technology Indian Air Force has continued to find cost effective solutions to combat SD. Methods: This paper provides an overview of a range of indigenous innovative techniques to counter SD over the last couple of decades like Parallel Swing, Gimble Mounted Tumbling Device (GMTD), a prototype Disorientation Simulator developed in 1970 and the use of human centrifuge for SD indoctrination of aircrew. Results: The status of in-flight SD based on a survey and current state of SD awareness generated by the feed back on a dedicated and structured simulator (DISO) based SD training introduced since 2004 is presented. The survey has provided valuable insight to update the SD indoctrination training based on the actual prevalence of various illusions and SD prone conditions in the fast jet, fixed wing and rotary wing operations. The simulator system also serves for medical evaluation of aircrew and motion sickness desensitization therapy (MSD). The MSD based on combination of vestibular habituation, physical exercise therapy and yoga has successfully been utilized to salvage aircrew with recurrent airsickness and return them to flying. Conclusions: IAF has proactively evolved solutions to counter SD. The current indoctrination on a high fidelity SD simulator has been well received by the aircrew. In our effort to continually focus attention on SD prevention strategies research is now directed towards SD modifiable factors and vestibular responses under microgravity.

English: UPDATES IN HARMONISATION OF THE TRAINING IN AVIATION MEDICINE IN EUROPE.
French: MISES À JOUR CONCERNANT L'HARMONISATION DE L'ENSEIGNEMENT EN MÉDECINE AÉRONAUTIQUE EN EUROPE.

Authors: E Cataman, U Stüben, M Vonmuellmann, H Fleischer, S Josephsen, D Di Blasio, E Gulliksen

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Introduction: Since the 55th ICAASM, when for the first time ESAM emphasized the problems that exist in aviation medicine training in Europe, some progress has been achieved on this issue. After the data on training organized by different European states were collected, ESAM with the aim to succeed in harmonization has decided to work out the common curriculum for training in aviation medicine that will reflect most of the standards and demands of contemporary aviation.

Methods: Mutual collaboration between colleagues from Europe has been established. Preliminary work has been done in a format of on-line discussions. Data on the courses that are performed, proposals and views of specialists from 16 European states have been submitted. Culmination of this common work was the meeting in Frankfurt (February 2009) where Curriculum on training in aviation medicine has been elaborated on. The representatives from German, Danish, Norwegian, Italian and Moldovan associations took part in this work.

Results: The uniformed curriculum has been created. The JAA syllabus was taken as a basis for the new curriculum, as most of the states follow this syllabus. The changes were introduced to the topics referring to the practical knowledge and clinical considerations. This curriculum reflects clear division in training of AME(s), who should examine Class 2 pilots and AME(s) for Class 1 pilots. The total number of training hours has been kept the same, as in JAA syllabus, due to exclusion of the repetitive topics. Several new aspects were added to the new Curriculum. Majority of clinical issues were more specified.

Conclusion: Aeromedical certification should take into account all aspects of contemporary aviation and new developments in medicine. The responsibility that lies on the individual AME at present time is very high, as he has to make decisions in difficult medical cases independently. The new proposed curriculum reflects these high demands towards the training in aviation medicine. This unifying curriculum represents a part of harmonization of the training.

English: CORONARY ARTERY DISEASE RISK FACTORS IN MILITARY PILOTS AND FLIGHT ENGINEERS
French: LES FACTEURS DE RISQUE DE MALADIE CORONARIENNE CHEZ LES PILOTES ET LES MÉCANICIENS NAVIGANTS MILITAIRES

Authors: L Belosevic, T Barcan, J Klobucar

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Introduction: Disorders of the circulatory system and in particular sudden cardiac or cerebral episodes constitute a potential risk to flight safety. Coronary artery disease (CAD) is the most frequent cause of disability and permanent grounding of pilots and navigators.

Methods: Data was collected in the Institute of Aviation Medicine from Nov. 2005. to June 2006. We examined following selected CAD risk factors: BMI, waist circumference, waist to hip ratio, glucose level, trygliceride level, total cholesterol, total cholesterol to HDL ratio, blood pressure, family history, smoking history, physical activity and stress at work. The data was descriptively examined. Differences in occurrence of CAD risk factors between observed groups were analysed by Pearson χ^2 test with Yates correction and p

Results: Out of 79 participants 24 were helicopter pilots, 10 helicopter flight engineers, 22 pilatus pilots, 8 canader pilots and 15 canader flight engineers. Mean age was 34 yrs. Only three out of 79 participants did not have any of selected CAD risk factors. In 66% four or more risk factors were present. Additionally, seven and more risk factors were present in 25 % of all participants. Leading CAD risk factors were: waist to hip ratio, hypercholesterolemia, insufficient physical activity, undesirable total cholesterol to HDL ratio, waist circumference > 94 cm, stress at work, overweight and smoking. Differences in occurrence of CAD risk factors between observed groups were not statistically significant.

Conclusion: Our preliminary results suggest that CAD risk factors are present in the population of military pilots and flight engineers. Further investigation is needed. Also, there is a need for careful and thorough consideration of CAD risk factors in this highly selected occupational group. CAD risk factors reduction programs are recommended in order to enhance flyers health and flight safety.

English: INTRODUCTION IN EUSAM
French: INTRODUCTION À L' EUSAM

Authors: U Prof. Dr.med. Stüben

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General Introduction of EUSAM

Prof. Dr.med. Uwe Stüben
Director Medical Services Lufthansa
Head of the German Academy for Aviation- und Travel-Medicine

The German Academy of Aviation and Travel Medicine was established in 1991 as a non-profit enterprise of Lufthansa German Airlines and the German Society for Aero-space Medicine. The German Academy of Aviation and Travel Medicine cooperates with several acknowledged universities and other scientific institutions in order to enhance aviation medicine.

In 2007 the German Academy of Aviation and Travel Medicine established the EURO-PEAN SCHOOL OF AVIATION MEDICINE (EUSAM) to provide training in aviation medicine in the English language to all those interested in aviation medicine.

Scopes of the Academy and EUSAM are training and professional development of aeromedical examiners. Furthermore, research in the area of aerospace medicine is organised and supported.

Each year three courses for AMEs according to the requirements of JAR-FCL 3 for approximately 25 participants take place:

- Basic Course in September
- Advanced Course in December
- Diploma Course in March

A four day Refresher Course as recurrent training for overseas AMEs certified by the FAA and JAA is held every two years.

The 10.000 – scientific Award, endowed by the German Academy for Aviation and Travel Medicine, is presented each year to a young scientist for outstanding scientific achievements as a recognition for progressing the scientific knowledge in the area of aviation and travel medicine. Each year the Academy promotes non-profit research projects in this area as well.

Furthermore, the European School of Aviation Medicine donates every year two scholarships for participation in the Basic and Advanced Course in Aviation Medicine.

The members of the Scientific Advisory Council of the German Academy for Aviation and Travel Medicine are leading academic teachers in the fields of Ophthalmology, Physiology, Cardiology, Occupational Medicine, Neurology, Otorhinolaryngology, Tropical and Travel Medicine. It selects the laureates of the award, the research projects to be promoted and

English: FIFTY YEARS OF FOSTERING INTERNATIONAL PARTNERSHIPS WITH THE UNITED STATES
AIR FORCE SCHOOL OF AEROSPACE MEDICINE
French: CINQUANTE ANS DE PARTENARIAT INTERNATIONAL FAVORABLE AVEC L'ÉCOLE DE
MÉDECINE AÉRONAUTIQUE DE L'ARMÉE DE L'AIR AMÉRICAINE

Authors: LP Krock, RE Bachmann, Jr

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Introduction: The US Air Force School of Aerospace Medicine (USAFSAM) has a distinguished history that began more than ninety years ago, continues today, and will extend well into the future. In addition to providing US Forces with aerospace medicine career education, research, training and 24/7 consultation, our international partners have shared in the legacy of our many valued contributions. The School, along with the newly established 711th Human Performance Wing (711HPW), is expanding widely the diversity of international involvement. The flagship international offering at USAFSAM is the Advanced Aerospace Medicine for International Medical Officers (AAMIMO) Course; one that builds lifetime relationships and cooperation among attending nations. The first class graduated more than 50 years ago and nearly 140 countries have participated. Virtually all courses offered are open to international partners including Aerospace Physiology, Bioenvironmental Engineering, Public Health, etc. Additionally, our international portfolio recently grew to include exporting courses to sponsoring countries; these five-to-ten day "expert" courses bring the classroom into the host nation. The recent historic activation of the 711HPW and Mega-Center construction, in Ohio, will substantially enhance the potential for international opportunities.

Methods and Results: Review of literature, observations of program elements and presentation of educational successes will provide insight into the inherent value this activity brings to the national and international aerospace medicine community.

Conclusions: Partnerships forged through collaborative, education, training, research and consultation can create a multidimensional bridge for solving tomorrow's problems in aerospace medicine. The USAFSAM/711HPW model presents opportunities for "World-Team Aerospace Medicine" to achieve higher-level goals of quality and safety; all while fostering life-time cooperative international relationships.

English: HUMAN-CENTERED AEROSPACE MEDICINE: THE 711TH HPW PREPARING THE WAY FOR ENHANCING OUR MOST IMPORTANT RESOURCE

French: MÉDECINE AÉRONAUTIQUE CENTRÉE SUR L'HUMAIN: LA 711ÈME HPW PRÉPARANT LA VOIE POUR METTRE EN VALEUR NOTRE PLUS IMPORTANTE RESSOURCE

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Introduction: "America's strategic partnerships are more important than ever."

This quote taken from the U.S. Air Force Posture Statement punctuates the Vision

and Mission for the recent historic establishment of the 711th Human Performance

Wing. (711HPW). This one initiative created the first human-centered wing under a single organization with the overarching objective to advance human performance in air, space, and cyberspace through research, education, and consultation. This Center of Excellence was compiled from the Air Force Research

Laboratory Human Effectiveness Directorate, the United States Air Force School of Aerospace Medicine (merging the Air Force Institute for Operational Health into USAFSAM) and the Human Performance Integration Directorate. In the fast-changing global environment, international interoperability with allied partners is essential. The 711HPW is committed to build on past successes and expand critical international partnerships to confront tomorrow's challenges.

Methods and Results: Presentation will describe program elements and activities and will provide insight into the inherent value this Wing brings to the international aerospace medicine community.

Conclusions: Declining world-wide military manpower and financial resources, as well as exponential knowledge growth, compounded by rapidly expanding technological advances presents a daunting task for the international aeromedical community to win today's conflicts. The 711th Human Performance Wing is preparing the way to assist the "World-Wide Team Aerospace" achieve goals of quality and effective human-centered performance.

English: CORONARY ARTERY DISEASE RISK FACTORS IN MILITARY PILOTS AND FLIGHT ENGINEERS
French: LES FACTEURS DE RISQUE DE MALADIE CORONARIENNE CHEZ LES PILOTES ET LES
MÉCANICIENS NAVIGANTS MILITAIRES

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Introduction: Disorders of the circulatory system and in particular sudden cardiac or cerebral episodes constitute a potential risk to flight safety. Coronary artery disease (CAD) is the most frequent cause of disability and permanent grounding of pilots and navigators.

Methods: Data was collected in the Institute of Aviation Medicine from Nov. 2005. to June 2006. We examined following selected CAD risk factors: BMI, waist circumference, waist to hip ratio, glucose level, triglyceride level, total cholesterol, total cholesterol to HDL ratio, blood pressure, family history, smoking history, physical activity and stress at work. The data was descriptively examined. Differences in occurrence of CAD risk factors between observed groups were analysed by Pearson χ^2 test with Yates correction and p was considered significant.

Results: Out of 79 participants 24 were helicopter pilots, 10 helicopter flight engineers, 22 military pilots, 8 Canadian pilots and 15 Canadian flight engineers. Mean age was 34 yrs. Only three out of 79 participants did not have any of selected CAD risk factors. In 66% four or more risk factors were present. Additionally, seven and more risk factors were present in 25 % of all participants. Leading CAD risk factors were: waist to hip ratio, hypercholesterolemia, insufficient physical activity, undesirable total cholesterol to HDL ratio, waist circumference > 94 cm, stress at work, overweight and smoking. Differences in occurrence of CAD risk factors between observed groups were not statistically significant.

Conclusion: Our preliminary results suggest that CAD risk factors are present in the population of military pilots and flight engineers. There is a need for careful and thorough consideration of CAD risk factors in this highly selected occupational group. CAD risk factors reduction programs are recommended in order to enhance flyers health and flight safety.

English: IRRITABLE BOWEL SYNDROME

French: SYNDROME DU COLON IRRITABLE: POINT DE VUE DE LA MÉDECINE AÉRONAUTIQUE

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IRRITABLE BOWEL SYNDROME

SYNDROME DU COLON IRRITABLE: REFLECTIONS DU POINT
DU VUE DE LA MEDICINE AERONAUTIQUE

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Irritable bowel syndrome is a very common disorder affecting as many as 15% of the population. Its etiology is unknown. The illness can cause abdominal pain, bloating, diarrhea, and constipation with mild to severe discomfort. Treatment options include diets, antispasmodics, antidiarrheals, and antidepressants. Because of the variable symptoms, some of which are potentially incapacitating, and the side effects of some treatment regimens, aeromedical disposition can be vexing for the flight surgeon and aviation medical examiner. This presentation will review the symptoms, prognosis, and treatment of this common illness and recommend aeromedical disposition.

English: U.S. FEDERAL AVIATION ADMINISTRATION POLICY ON THE USE OF ANTIDEPRESSANTS IN PILOTS

French: LA POLITIQUE DE L'ADMINISTRATION FÉDÉRALE DE L'AVIATION CIVILE AMÉRICAINNE CONCERNANT L'USAGE DES ANTIDÉPRESSEURS CHEZ LES PILOTES

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The medical diagnosis of active depression and related disorders in a pilot is disqualifying for all flying duties and cause for denial of a medical certificate. In addition, a pilot may not exercise the privileges of his/her FAA medical certificate while taking or under the influence of any psychotropic drug. This has been the customary policy of the FAA for a number of years. Due to increasing acceptance, prevalence and safety of usage of second generation antidepressant medications (e.g. Selective Serotonin Reuptake Inhibitors - SSRI's,) in the general population worldwide over the last 15 - 20 years, the FAA has considered a revision of policy regarding the treatment of depression with these and similar medications. Over the last several years, the FAA conducted a balanced review of its policy and the rationale for a possible change. Emphasizing a strong safety focus, the FAA has decided to revise current policy. The revised policy will allow for favorable consideration of a diagnosis of mild to moderate depression, with excellent response to treatment, and a history of substantial stability for at least 1 year. A limited number of antidepressant medications will be considered for possible Special Issuance of a medical certificate. Each pilot will be evaluated on a case by case basis, and if found acceptable after a thorough review of medical history and current clinical evaluations, will be issued a time limited, Special Issuance Medical Certificate. Frequent, thorough monitoring by a specially trained Aviation Medical Examiner, a psychiatrist, and psychologist during the validity period of the Special Issuance Medical Certificate will be required. The detailed protocol of the Special Issuance evaluation and monitoring process will be presented.

English: AIRCRAFT ACCIDENT - COPILOTS SURVIVAL (CASE REPORT)
French: ACCIDENT D'AVION - LA SURVIE DES COPILOTES (UN CAS)

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Abstract:

In this paper we described the survival of an Italian pilot who was involved in aerial application aircraft accident during a firebombing in July 2007. His health was seriously affected after the accident but thanks to efficient medical intervention and his strong motivation for flying duties, he successfully recovered. One year after the mishap he was examined in our Medical center (AMC Ljubljana) and granted with first class medical certificate.

English: USE OF TISSUE RATIO AS A MEASURE OF DECOMPRESSION SICKNESS RISK UNDER VARIED CONDITIONS

French: L'UTILISATION DU RAPPORT TISSULAIRE COMME MESURE DE RISQUE D'UNE MALADIE DE DÉCOMPRESSION SOUS DIVERSES CONDITIONS

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Introduction: Tissue Ratio (TR) is used to describe the level of supersaturation of tissues following decompression. The equation for TR includes a term for prebreathe with 100% oxygen to reduce risk of decompression sickness (DCS). It is the ratio of the initial partial pressure of nitrogen in the tissues divided by the total final pressure. NASA has used TR as one means of estimating the level of DCS risk and level of prebreathing required prior to extravehicular activity (EVA). Methods of predicting DCS risk have been investigated which include additional parameters. In this study, the correlation between DCS incidence during previous research efforts and the TR at the beginning of those exposures include another factor. Metabolic cost of the activities, as reported recently, was included to determine if it allowed a better correlation between TR value and DCS incidence.

Methods: Research reports on DCS incidence from four-hour exposures to altitudes from 378 mm Hg (18,100 ft; 5,517 m) to 226 mm Hg (30,000 ft; 9,144 m) were compared. The TRs ranged from 1.5 to 2.3 representing incidences of 0% to 87% DCS following 1 to 60 min of prebreathe.

Results: Plots of TR vs. DCS incidence showed high correlation (>0.94) when prebreathe times were either zero or 60 min and when activities while decompressed were identical. Analysis of exposures when the activities while decompressed were dissimilar and various levels of prebreathe were accomplished, show lower correlation (square root of the highest metabolic cost in any one minute of these disparate activities results in a better correlation (>0.86)).

Conclusion: TRs may remain a useful tool in evaluation of DCS risk with limited variables. Inclusion of a term for metabolic cost of activity while decompressed may improve the predictive value of the TR metric.

English: ANTI-STRESS MIND & BODY TRAINING AND SPECIFIC PATTERNS OF REACTION AND RELAXATION

French: ENTRAÎNEMENT ANTI-STRESS PHYSIQUE ET MENTAL ET MODES SPÉCIFIQUES DE RÉACTION ET DE RELAXATION

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Introduction: Based on the experience gained with education of several generations of Croatian pilots, hosted by the Faculty of Transport and Traffic Sciences University of Zagreb, within the frame of Aviation Medicine and Aviation Psychology courses the author has developed a specific mind and body programme. Students and instructors are constantly and substantially exposed to occupational and everyday stressors; however, their engagement in most of the common sports and the use of classical relaxing techniques are inapplicable under specific work, flight, and living conditions. The problem was how to find and create a system which could use the most effective principles of soft martial arts, and serve the needs of the population in reference.

Methods: The anti-stress programme in reference consists of a group of selected techniques stemming from Eastern martial arts which put the emphasis on psychological approach and non-aggressive problem-solving techniques. These are combined with nonverbal testing of psychological and physical stability, and relaxation and perception. In addition, special breathing exercises, blood pressure control, backbone flexibility, and joint and muscle relaxation are also engaged.

Results: Students have noticed an increase in their response rates in stressful situations, and have claimed the attainment of higher concentration levels. They have learned how to clearly distinguish the state of true relaxation and gradually upgrade their sensor and perceptive capacities and eliminate unnecessary muscle tension, also how to remain calm and relaxed not only before or after a stressful situation, but even when the heat is on,.

Conclusion: Alike numerous professional categories, pilots and flight instructors have emphasized the need for constant anti-stress education and mind and body training, It should be introduced as a system of anti-stress exercises to be practised both individually and in adequate groups. Such a system should be viewed as a specific form of teamwork and team-building carried out through regular trainings. That system should be developed in collaboration with psychologists and physicians.

English: REPEATABILITY OF ANTIGRAVITY MANEUVERS IN THE CENTRIFUGE TESTS. PRELIMINARY REPORT

French: RÉPRODUCTIBILITÉ DES MANOEUVRES ANTI-GRAVITÉ DURANT DES TESTS EN CENTRIFUGE. RAPPORT PRÉLIMINAIRE

Authors: L Kopka, E Zawadzka-Bartczak, M Kopka

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Introduction: It is known that antigravity maneuvers enable to increase acceleration tolerance by about +2 to +4 Gz, The protective benefits of the AGSM are only, as great as the effectiveness of its performance. The study aimed at answering the following questions: 1. Is the same a technique of respiratory antigravity maneuvers (RAM) performed by the experienced pilots at identical +Gz values during tests in the human centrifuge GOR and ROR? 2. Does training of antigravity maneuvers under stationary conditions exerts an effect on breathing technique in the control centrifuge tests? Methods: Five clinically healthy pilots of F-16 aircrafts were included into the study. The pilots aged between 31 and 39 (mean: 35.8 years). Tolerance of acceleration in the human centrifuge was determined prior to and after a 2-months training RAM in all pilots positioned as in armchair (supporting the back only). +Gz values at which the pilots started RAM, number of such maneuvers under the said +Gz values, mean duration of each maneuver and maximal tolerance of acceleration were determined. Results. The mean value of +Gz at the start of RAM was 3.4G prior to the training vs. 3.68G after. The mean frequency of RAM execution and mean time of their duration were respectively 16 and 2.81s before vs.13,4 and 2.94s after the training. Conclusions. +Gz values at which experienced pilots start to execute respiratory antigravity maneuvers, their frequency and mean duration of a single maneuver at identical +Gz value are not the same. Training RAM and prolonged tension of the lower limbs muscles under stationary conditions exerts an effect on the technique of these maneuvers and maximal tolerance of +Gz.

English: EVALUATION OF FLIGHT TRAINING PROGRESS USING FREQUENCY-DOMAIN HRV PARAMETERS

French: EVALUATION DU PROGRÈS DE LA FORMATION AU VOL EN UTILISANT LES PARAMÈTRES DU DOMAINE FRÉQUENCIEL DE HRV

Authors: L Dziuda, K Rozanowski, FW Skibniewski, M Krej

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Introduction:

Fatigue and decrease in operational efficiency during flights pose a serious problem both in military and civil aviation. This can be observed not only in case of pilots carrying out long-lasting flights and flight missions but also during short yet intensive missions. It can cause a loss of situational awareness. The aim of this work is to verify the hypotheses on the assessment of the progress made during flight training: (1) pilot's excitement should be lower before flight than during flight; (2) pilot's excitement should be higher during more demanding flights; (3) the excitement in pilots should become lower and lower before subsequent flights.

Methods:

The study was carried out in 25 cadets of the Polish Air Force Academy. The ECG signals were recorded using the Agat device for recording psychophysiological parameters, developed at the Military Institute of Aviation Medicine and used by the Polish Air Force. The recorded signals were analyzed using HRV Analysis Software developed at the University of Kupio.

Results:

Hypothesis 1 has been confirmed in 33 of the 62 analyzed flights. Hypothesis 2 proved to be true in 48 of the 46 analyzed cases. A comparison of mean values proved that hypothesis 3 was true. A bigger change was observed between flights

1 and 5 than that between flights 1 and 2. This can be interpreted as reflection of the progress made during the training.

Conclusion:

The presented analyses generally suggest the usefulness of applying an interpretation of the heart rate changes in pilots during flight trainings. This issue, however, needs further studies and incorporation of other cardiovascular indices and psychomotor factors (e.g. individual differences in temperament). A development of good method for specifying flight performance accuracy seems to be significant. Determining the optimal level of excitement related to flight for each pilot individually is an important issue as well. The relation between the excitement level and flight performance has the shape of an inverted "U".

English: ASTHMA AND BRONCHOSPASTIC DISEASE IN AIRCREW- AN AEROMEDICAL PROBLEM
French: ASTHME ET MALADIE BRONCHOSPASTIQUE CHEZ LE PERSONNEL NAVIGANT- UN
PROBLÈME AÉROMÉDICAL

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INTRODUCTION: Aviation Medicine seeks to protect health and fitness of aircrew for a full flying career. Identification of asthma and bronchospastic disease in aircrew requires the aviator to undergo comprehensive evaluation of pulmonary function with emphasis on determining underlying triggers resulting in significant risk to flying safety. Presentation of new, or recurrent, episodes of airway obstruction, are considered disqualifying. This review was conducted to determine the prognosis of newly discovered obstructive airway in entry and trained aircrew.

METHODS: The US Army Aeromedical Epidemiological Data Register (AEDR) was searched for aircrew with an ICD 9 codes for asthma, bronchospastic disease, and Chronic Obstructive Pulmonary Disease (COPD). The initial entry history of pulmonary disease and subsequent diagnosis of obstruction were sought in the Flying Duty Medical Examinations (FDME).

RESULTS: Total number of aircrew in AEDR, established in 1984, is nearly 143,000 with approximately 680,000 FDME records. The search found 211 aircrew with ICD-9 codes of 493.0, 493.1-2, 493.9, and 491.2 for asthma and obstructive airway disease. Review of initial waivers granted indicated 16.6%. Of the initial waivers, eleven waivers (31%) were documented as continuing up to 5 years. The age of diagnosis was found to be primarily the early third decade. The inclusion of older civilian aircrew in fifth decade noted four (4) with sustained continued waiver. Waiver continuation was based on stable pulmonary function and absence of recurrent episodes of bronchospasm. Review of current regulations will be presented.

CONCLUSIONS: Trained aircrew with history of asthma or obstructive lung disease should be followed yearly to determine the earliest development of progression and resulting decremented pulmonary function. Following comprehensive pulmonary evaluation aircrew can be considered for return to flying duties, however, long term sustainability for flying duty is limited.

English: SOME RISK FACTORS FOR BAROOTITIS MEDIA IN AVIATORS
French: CERTAINS FACTEURS DE RISQUE D'OTITE MOYENNE BAROTRAUMATIQUE CHEZ LES AVIATEURS

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Introduction: Barootitis media is a frequent reason for aviator's grounding. Preexisting medical conditions (allergic rhinitis, acute upper respiratory infections), phase of flight, decent rate, oxygen use and weather conditions represent contributing factors for otic barotrauma in aviators. Audiometry and tympanometry are reliable diagnostic methods.

Methods: Data was collected in Institute of aviation medicine from March 2000. to March 2001. We analyzed medical records, audiometric and tympanometric findings as well as data related to type of aircraft, phase of flight and season of the year. We also analyzed duration of grounding due to barootitis media. Data was descriptively examined.

Results: Out of 200 aviators of different types of aircraft 15 suffered from barootitis media. Age of pilots ranged from 30 to 40 years. Relationship between barootitis media and type of aircraft was not found. Barootitis media occurred more frequently during descent compare to ascent (11 vs 4). In 9 out of 15 cases, barootitis occurred during november and december. Acute respiratory infection was the most common reason for barootitis media (9 out of 15 cases). Unilateral barootitis was more frequent compare to bilateral (11vs 4). Disorders of eustachian tube was found in 11 out of 15 cases. First audiometric findings showed low pitched tinnitus in 13 out of 15 cases. Period of grounding was up to 8 days due to acute respiratory infections and up to 15 days due to allergic rhinitis.

Conclusions: Our results support findings that preexisting medical history (allergic rhinitis, acute upper respiratory infections), phase of flight and weather condition represent contributing factors for barootitis media in aviators. There is a need for careful and thorough consideration of allergic rhinitis and acute upper respiratory infections in aviators in order to prevent ear barotrauma and enhance flight safety.

English: CHECK YOUR OXYGEN EQUIPMENT - CASE REPORTS
French: VÉRIFIEZ VOTRE ÉQUIPEMENT D'OXYGÈNE - RAPPORTS DE CAS

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INTRODUCTION: Every aircraft has a preflight checklist which allows the pilot to inspect the ability of the aircraft to fly safely. All military aircraft contain a preflight check of the oxygen system on board as part of the checklist, to be completed before takeoff in a few minutes.

METHODS: In 1993 to 2005 period, during the annual medical examination of the CAF flyers, data on accidental cases of in-flight altitude hypoxia during military aircraft (Mi-8 helicopter and PC-9 plane) flights had been collected.

RESULTS: In that period, eight cases of accidental altitude hypoxia had been registered; based on their causal background they were divided in four groups:

1. Lack of oxygen equipment in a MI-8: Four cases of chronic hypoxia settings (FL 160):(1)Pilot, fasting, neglected to take a meal before flight; (2) Pilot, tired, lack of sleep; (3) Pilot, tired, it was his fifth flight in the last 6 hours; (4) Flight mechanic, increased in-flight physical activity.
2. Ignorance on the proper use of oxygen regulator supplied on board a PC-9. One case of acute hypoxia setting (FL 220):(1) Pilot-FI, oxygen supply lever of the oxygen regulator found in the OFF position.
3. Inadequate use of oxygen mask and helmet onboard a PC-9. Two cases of acute hypoxia settings (FL 250): (1) Pilot-cadets, borrowed oxygen masks from their colleagues, but neglected to check it before takeoff.
4. Misjudgement of the required oxygen level needed with a navigation flight with PC-9. One case of chronic/acute hypoxia setting (FL 160 - FL 220).(1) Pilot, second, in order to spare the oxygen contained in the tanks not to use an oxygen mask and regulator.

CONCLUSION: Flyers preparing to go above FL 100, have "forgotten" that human body lacks specific capability of detecting critical hypoxia levels, so that the best way to protect one from the latter is to properly use the oxygen equipment.

English: PLACENTAL INDUCED GROWTH FACTOR (PIGF) AS A PREDICTOR OF SUSCEPTIBILITY TO CARDIOVASCULAR DYSFUNCTION - PRELIMINARY HUMAN STUDIES
French: PLACENTAL INDUCED GROWTH FACTOR (PIGF) COMME INDICATEUR DE SUSCEPTIBILITÉ AUX DYSFONCTIONS CARDIOVASCULAIRES-ÉTUDES HUMAINES PRÉLIMINAIRES.

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Introduction: Knowledge of the expression levels of key molecules in low gravity and high stress environments such as microgravity, high altitude and other specialized aviation exercises is essential for the development of intervention strategies and prevention of catastrophic aviation events to ensure mission success. The careful study of adaptational responses in both human and closely related mammalian systems will help identify targets and propose interventions for successful aviation and space exploration

Methods: Human blood samples from 30 healthy donors (Johnson Space Center-Dr.Todd Schlegel-Flight surgeon), and thirty three blood samples of cardiac catheterization patients (Dr.Carabello, Chief of Staff) in the Veterans administration Hospital, Houston, TX, were analyzed for PIGf. PIGf is now clinically considered a more specific biomarker than C-reactive protein for predicting stroke and heart attacks. This is a follow up study prior to request for astronaut samples to test if PIGf was elevated in people with cardiovascular dysfunction. Samples were analyzed by Enzyme linked immunosorbent assay (ELISA).

Results: Results indicate strongly indicate that increase PIGf protein expression was consistent in all 33 subjects tested ($> 27\text{ng/ml}$, compared to healthy test subjects and this study has been expanded to collect all cardiovascular risk details about these subjects to analyze correlations with different cardiovascular risk factors. There correlations such as with CRP, blood pressure, lipidemia andn body mass index will be presented in this study.

Conclusions: The attempt is to identify if PIGf is both a cardiovascular, plaque instability indicator and the significance of its up-regulation in microgravity. The search for new, reliable markers of plaque instability are heatedly on and this could be a big first step in this area. The study of this inflammatory marker both in cardiovascular health and in stressful milieu is of paramount importance.

English: COMPETENCY BASED TRAINING FOR DESIGNATED MEDICAL EXAMINERS
French: FORMATION FONDÉE SUR LA COMPÉTENCE POUR LES MÉDECINS EXAMINATEURS
DÉSIGNÉS

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Introduction: An ICAO survey pertaining to current practices of States with regard to the training of Designated Medical Examiners (DMEs) revealed that the approach was very variable. States apply differing systems, responsibilities, entry requirements and training processes, as well as different competency assessments/reviews after training.

Methods: With the assistance of the Medical Provisions Study Group (MPSG), ICAO is formulating the core competencies of DMEs which will be developed into a course curriculum template having performance criteria. It is envisaged that this will improve harmonization in the training of DMEs which will ultimately improve flight safety.

The main assumptions are:

1. The Medical Examiners goal is to optimise flight safety through the management of aeromedical risk.
2. Competency-based DME training should contribute to achieving that goal.
3. The periodic medical examination should use a risk-based approach.
4. Potential examiners are fully registered medical practitioners who already have core clinical skills (although they may require additional training in some specific areas).
5. Potential examiners have currency in medical knowledge and practice.

Results: The aims of the periodic medical examination have been agreed and a task analysis of the process developed. The detailed competency units and elements that make up each task have been described and performance criteria agreed.

Conclusion: The development of a competency based training curriculum for DMEs will improve the harmonization of DME training and should reduce aeromedical flight safety risk.

English: DISTORTIONS TO DECISIONS
French: DES DÉFORMATIONS AUX DÉCISIONS

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INTRODUCTION: Pilots decisions that cause aircraft incidents and accidents are studied and categorized for safety analyses. Most often, their decisions and judgments are examined only in the context of rule-based behaviour. Infrequently examined is judgment-based behaviour, the subtle emotional factors and underlying personality type that may lead to faulty, dangerous decisions.

METHODS: Selected civil and military aircraft accidents were analyzed to search for influences on pilots decisions before and during flight. Taxonomies for accident factors were examined to compare data entries that may permit post-hoc analysis of these influences. Brief comparisons with patient safety and industrial safety were made. The influence of personality type on decisions was examined. The effect of organizational supervision and/or possible punishment by national aviation authorities was included.

CONCLUSIONS: Our understanding of pilot motivational factors that influence aeronautical decision-making is incomplete. Terminology reflects that state, e.g., get-home-itis. The consideration of personality type as an influence varies among cultures and countries. Under stress, prior training and experience supersedes newer, or cognitive, behaviour. Regulations and training are not updated simultaneously with progress in safety systems. Air traffic controllers may be under-trained, and insufficiently aware of, underlying influences on decisions. The schizoid role of the air traffic controller: help, but possibly punish infractions, is a factor. Crew Resource Management often optimizes decisions, but is not available to the solo pilot. Civil aviation is largely unaware of the safety culture of military aviation that promotes safe decisions. Survival systems should be made mandatory in civilian aviation to compensate for the inevitable flawed decisions of pilots. Further research into the acute and chronic factors in aviation decision making is needed. Aviation medical physicians and psychologists should place greater emphasis on the non-cognitive factors in aviation.

English: PRACTICAL ASPECTS OF DRUG AND ALCOHOL TESTING PROGRAMS FOR U.S. COMMERCIAL AVIATION COMPANIES

French: ASPECTS PRATIQUES DES PROGRAMMES DE DÉPISTAGE DE DROGUES ET D'ALCOOL POUR LES COMPAGNIES D'AVIATION COMMERCIALES DES ÉTATS-UNIS

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Implementation of drug and alcohol testing programs that are regulated by the U.S. Department of Transportation Federal Aviation Administration requires a thorough knowledge of the regulations and a strict adherence to detailed procedures.

Although a few of the major airlines operate their programs through in-house staff, most of the commercial aviation companies choose outside Service Agents to assist them in running their programs. While the aviation companies cannot contract away their responsibilities, they often employ outside companies for specimen collections, random selections, Medical Review Officer (MRO) services, employee training, as well as over-all program consultation.

The practical aspects of administering a compliant FAA testing program can often challenge the best Program Managers. The managers must ensure that each regulated employee has a negative drug test prior to hire and is subject to random testing once they begin safety-sensitive duties. For airlines, specimen collectors must be located throughout the U.S. and its territories. Errors by poorly trained specimen collectors, attempts by donors to beat the test, and the potential of applicants and employees refusing to submit to testing cause more challenges. Managers keep safety-sensitive employees in a random pool; however, diluting the pool by inadvertently including employees that are not safety-sensitive can cause a violation at audit time. The aviation company has to conduct random drug and breath alcohol tests in many different locations just prior to, during, or just following duty while keeping the testing unannounced. Further, the company has to be ready to test in a post accident or reasonable cause situation within two hours of the event.

Choosing the correct laboratory and MRO to support the testing program assists the Program Manager in working through the challenges of positive test results, cancelled tests, or refusals to test some of which have to be reported to the FAA within 2 days.

This paper will discuss FAA-regulated testing programs and give examples of the problems that can occur and some solutions to prevent them.

English: NEW METHOD OF PILOTSPUSH PULL TOLERANCE EVALUATION USING LBNP EXAMINATION

French: NOUVELLE MÉTHODE D'ÉVALUATION DE LA TOLÉRANCE DES PILOTES AUX CHANGEMENTS DES ACCÉLÉRATIONS +GZ EN UTILISANT LA MÉTHODE LBNP

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Introduction: The original method of our Lower Body Negative Pressure (LBNP) examination was developed for the pilots pre-selection with low level of +Gz tolerance and Push-Pull (PP) effect tolerance evaluation. This phenomenon is characterized by the rapid and progressive decrease of blood pressure (BP) accompanied by a slower return to normality. At this period pilots performance is reduced.

Method: A group of 29 Czech Air Force pilots was examined. PushPull effect is simulated by means of tilting LBNP device backwards to the 43° HDT (head down tilt) position (corresponds to the plateau of microgravity) for two minutes. There is atmospheric pressure in the LBNP chamber. +Gz load is created by the rapid LBNP exposition (-70 mmHg, two minutes) accompanied with a rapid return of the LBNP device to the vertical position. The second stage LBNP (-70 mmHg, two minutes) is examined only in the sitting position.

Results: BP values were compared at initial 50 s intervals in both examinations: systolic and diastolic BP quiescent values just before an LBNP exposure beginning, minimal attained systolic and diastolic BP values and maximal attained systolic BP value at the 50 seconds interval. Relative minimal and maximal BP values related to their quiescent values were calculated. The statistical test confirmed that all calculated relative BP values were lower in the set with PushPull effect.

Conclusion: The new LBNP examination method demonstrates better the impact of the PushPull effect on circulatory system efficiency. Negative influence of Gz acceleration on +Gz tolerance during new examination method is evidently evincible. BP behaviour indicates that the designed examination method is suitable for a pilots training in conditions of PP effect such as a partial substitution of the human centrifuge training.

English: CERVICAL DISK REPLACEMENT SURGERY AND FITNESS TO FLY: THE U.S. ARMY EXPERIENCE

French: REMPLACEMENT CHIRURGICAL D'UN DISQUE CERVICAL ET APTITUDE À PILOTER: L'EXPÉRIENCE DE L'ARMÉE AMÉRICAINE

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Introduction. Cervical neck pain has plagued aviators for generations. Unique aspects of the aviation environment (e.g., increased vibration, axial and rotational loads, extended range of motion, crash forces) exacerbate what is already a common human ailment. Regulatory bodies must decide which, if any, interventions are allowed for aircrew. The U.S. Army Aeromedical Activity (USAAMA) was recently confronted with the decision whether to allow a new surgical intervention for chronic neck pathology--cervical disc replacement--for US Army aviators. **Methods.** A review of cases in USAAMA's central database from 1984 to 2009 identified 1079 instances of pilots reporting neck pain on their periodic flight physical. Fifty-three waivers for cervical fusion had been granted during that time. The literature was reviewed in order to select a disc prosthesis and procedure that a) had been approved by the US Food and Drug Administration and b) would function well in the aviation population/environment. **Results.** After careful review of biomechanical and safety considerations, one model of disk implant was endorsed for use in Army aviators because of a simple, rugged design, exclusive use of well known bio-compatible material and supporting literature. Five waivers, limited to single level implants and restricting night vision device wear, have been granted thus far. **Discussion.** While preliminary, there have been no indications that disk replacement surgery is any worse than anterior cervical fusion, which is a routinely waived surgical intervention in the US Army (as is microdiscectomy). A comprehensive research program to investigate possible waiver issues is being led by the U.S. Army Aeromedical Research Laboratory. Important considerations include effectiveness of the procedure, chronic effects of head-supported mass, and crash/impact safety.

English: CERTAIN PARAMETERS OF THE UNDERCLOTHING MICROCLIMATE OF A BATTLEDRESS UNDER HEAT CONDITIONS

French: QUELQUES PARAMETRES DU MICROCLIMAT SOUS VÊTEMENT DE LA TENUE DE CAMPAGNE DANS LES CONDITIONS DE CHALEUR

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CERTAIN PARAMETERS OF THE UNDERCLOTHING MICROCLIMATE OF A BATTLEDRESS UNDER HEAT CONDITIONS

QUELQUES PARAMETRES DU MICROCLIMAT SOUS VETEMENT DE LA TENUE DE CAMPAGNE DANS LES CONDITIONS DE CHALEUR.

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The aim of the study was to establish the degree to which the 60-minute exposition to simulated heat conditions modifies the hygienic and functional features of the summer battledress, determined on the basis of the measurement of temperature and humidity of the underclothing space and infrared visualizations (IRV) of a man wearing the battledress.

METHODS: The study enrolled 18 men (age 21 ± 2 y; BMI = 22 ± 2.6 ; mean $VO_2\max = 41 \pm 7.48$ ml/kg/min), not acclimated to heat. The subjects wearing a battledress (seated position) were stayed for 60 minutes in a climatic chamber ($T_a = 50 \pm 1.5^\circ\text{C}$, $RH = 30 \pm 2\%$, air flow and relative humidity (RH) (determined by underclothing hygrometer - Modular

Signal Recorder, Switzerland) in the underclothing space (sternum, arm, thigh, shank) were registered. The readings were compared to the initial values.

RESULTS: The normal RH value were maintained only during the first minutes after the exposition to heat. The values exceeded 70% in the sternum and arm regions after 5 minutes, thigh after 25 minutes, shank after 35 minutes. The mean T_{ac} increased to 37.3 ± 0.3 C (p temperature in the underclothing space was observed in the sternum (38.3 ± 0.4

C) and arm (37.4 ± 0.6 C) (p did not show any regions with the increased insulating power of the clothing

that could hinder the heat dispersion.

CONCLUSIONS: The increase of the humidity in the underclothing space may play a significant role in the worsening of the psychophysical body efficiency and thermal comfort.