



ABSTRACTS



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TRANSIENT OSTEOPOROSIS OF THE HIP IN A PILOT: IS IT RELATED TO IMMOBILIZATION DURING FLIGHT

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Transient osteoporosis of the hip (TOH) is a rare clinical disorder of unknown etiology, but possibly under diagnosed one.

This is a case of 48-year-old male 310 airbus commercial pilot in Royal Jordanian Airlines presented with a two-week history of constant pain in right hip. No history of preceding trauma or other medical or surgical diseases. Tuberculosis was excluded. X-ray of the affected hip showed diminished bone density around femoral head. Hip MRI showed a characteristic low-density signal in T2-weighted images, so TOH was put as a diagnosis. Patient received conservative treatment only. Immobilization was not necessary. Literature is reviewed and discussed about TOH, with a particular Focus on the topics of association between long-haul flights and immobilization, and TOH. Localized osteoporosis in males and prevention of such cases related to long flights is discussed.

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TACTILE DISPLAYS FOR ORIENTATION CUEING

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Information displays to aid pilots and divers have become increasingly complex. Visual, audio, and now tactile displays have been developed to increase the information baud rate to the pilot during flight. Visual displays for the pilot have now been moved from the instrument panel to helmet-mounted displays, allowing the pilot to remain heads-up with his/her eyes out of the cockpit but able to view critical flight symbology via virtual displays presented on visors or optical systems. Tactile cueing has also been investigated by developing small "tactors" that are arranged in an array of 24 to 48 units in a garment worn by the pilot. These tactors form rows and columns that are driven by a computer to convey orientation information to a pilot. Such Tactile Situation Awareness Systems have been developed and are being evaluated for both fixed- and rotary-wing applications.

Wicab, Inc, is developing a High Density Tongue Display (HDTD) Module with a 100 X 100 electrode array. The tongue has a spatial resolution of nearly four times that of the fingertip. The density of the mechano-receptive receptors on human fingertips is about 300/cm². A 10,000 element tongue module should provide reasonable conditions for transfer of information to the tongue. The Wicab BrainPort concept is that visually-impaired users of the technology (individuals who are blind, pilots who have no out-the-cockpit visibility, underwater divers) can use the HDTD to interpret the tactile cues on the tongue as orientation cues and can then navigate in the absence of vision. This presentation will review the evolution of tactile displays for orientation and navigation and discuss the approach Wicab is taking in the development of a high-density tongue display module. Potential Air Force and Navy applications will be discussed.

A SYSTEMS ENGINEERING APPROACH TO ROTATORY WING BROWNOUT

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Rotary wing operations are a critical part of mobility (insertion and extraction) and rescue missions. Desert operations have led to an unacceptable number of terminal area aborts, mishaps and fatalities involving rotary wing aircraft and pilots. Brownout is the condition in which sand (or snow - whiteout) stirred up by the rotary wing aircraft and renders out the cockpit visibility impossible. Helicopters generate lift by accelerating air downward through the rotor system. In a hover, some of this air tends to re-circulate around the helicopter in a large circular pattern. The very high velocity downwash tends to pick up any loose dirt or snow on the ground below and around the hovering aircraft. Under the right conditions, this dirt and snow will re-circulate around the aircraft creating a total obscuration for the pilot under normal human vision, or enhanced with night vision devices, current Infra Red sensors, etc. Airborne dust and snow not caught in the re-circulating pattern may also stay aloft, creating a further hazard for operations in the area. Close formation landings (multiple aircraft) can be extremely hazardous in this type of environment.

The purpose of this presentation will be to present rotary wing mishap statistics in the US Air Force, Army, and Navy and to describe the Air Force Research Laboratory project developed to reduce or eliminate the rotary wing brownout problem. An autonomous, self-contained capability for rotary wing aircraft to safely perform brownout landings and takeoffs, as well as to address snow whiteout and sea spray operations for "first in" missions is one approach. Innovative on-board and off-board solutions will be presented that would provide a capability for supported landing zones. The Pilot Vehicle Interface is of special interest and potential solutions to low/no visibility via helmet-mounted systems, audio and tactile displays, and training will be presented.

PHYSIOLOGICAL, ENVIRONMENTAL AND OPERATIONAL RISK FACTORS FOR CREW AND PASSENGERS OF FUTURE COMMERCIAL ORBITAL SPACE VEHICLES

LES FACTEURS DE RISQUE PHYSIOLOGIQUES, ENVIRONNEMENTAUX ET OPÉRATIONNELS POUR SERT D'ÉQUIPIER ET DES PASSAGERS DE FUTURS VÉHICULES SPATIAUX ORBITAUX UTILITAIRES

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Manned commercial space travel will generate its own kind of risk factors that must be dealt with in order to ensure the health and safety of crews and passengers. This presentation will discuss a number of physiological, operational and environmental risk factors for the occupants of future commercial space vehicles. These risks include exposure to high acceleration and deceleration flight profiles, decreased barometric pressure, microgravity, solar and galactic cosmic radiation, non-ionizing radiation, noise and vibration, temperature and humidity extremes (heat and cold), and cabin air quality. Of particular concern are the effects of exposure (short-term and long-term) to microgravity on the cardiovascular, neurological, endocrinological, musculoskeletal, and gastrointestinal systems, on both healthy and diseased passengers. In addition, there is no clear scientific understanding of the metabolism and effectiveness of a number of medications used by individuals during exposure to microgravity. Furthermore, U.S. and Russian experience regarding space physiology and medicine involve short-term and long-term space flights, but does not address the effects of: 1) Frequent repetitive exposure (several times a week) to flight profiles involving: normal gravity (pre-flight) - acceleration (launch/take off) - microgravity (space) - deceleration (return) - normal gravity (post-flight), 2) Frequent repetitive exposure to solar and galactic cosmic radiation, and 3) Exposure to microgravity among individuals who have select medical pathology. There is also a potential for occupant injuries (closed and open) during intra-vehicular activities in microgravity. Other potential risk factors for the occupants of commercial space vehicles include unexpected exposure to: rapid and/or explosive decompressions, in-flight cabin fire, cabin air contaminants (biological, chemical, particulates, etc.), electric shock hazards, structural cabin hazards, impact forces during crash landings, post-crash fire, emergency evacuation, and post-evacuation survival. (word count: 276)

Preferred mode of presentation is oral using PowerPoint for visual aid.

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AEROMEDICAL EXAMINATIONS, REDUNDANT OR DUE FOR A CHANGE ?

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Introduction: The content and periodicity of aeromedical examinations on pilots as part of the flight safety system vary around the world, often due to local medical tradition. The aeromedical requirements in ICAO Annex 1 forms the minimum requirements. In central and northern Europe it has been customary to conduct relatively extensive examinations on pilots. The European JAR-FCL 3 medical requirements are more detailed and in some areas even more strict than the ICAO requirements. During the last years the periodicity and content of aeromedical examinations have been challenged. However, scientific evidence for changing the periodicity and the requirements are so far not well documented.

Method: The Aeromedical Section in the Norwegian CAA has for many years maintained a database where all information on reasons for disqualifications of commercial pilots has been stored. For this presentation we have examined our data for the years 2001 through 2006. In this period the decision making was according to JAR-FCL 3 medical requirements.

Results: During this period 23 921 examinations were conducted on applicants of class 1 medical certificates. Of these, 133 pilots were permanently disqualified from flying duties. The primary source of flight safety relevant medical information came from the AMC and the AMEs. A significant part was reported by the pilots themselves. Other healthcare institutions also contributed, according to Norwegian legislation.

Discussion: Experience shows that pilots don't get sick on the day they visit the AME for revalidation of the medical certificate. Most of the disqualifying conditions are specific to the flight environment, showing the importance for the examining physician to have aviation medical competence. Furthermore, many of the conditions are diagnosed to a large extent from history and an evaluation of the pilot's symptoms. This shows how important it is to establish a close and reliable contact between the pilot and the AME where the pilot can seek advice when problems occur. The aeromedical centre is important for making more specialised evaluations and giving advice to the AME and to pilots.

Our data indicate that a change in emphasis toward a more preventive approach may be called for in the aeromedical examination.

ALTITUDE OF 10,000 FT DURING NIGHT CONDITIONS.

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Introduction: Many un-pressurized aircraft are flown without supplemental oxygen up to 10,000 feet. Extended (12 hrs) exposure to light hypoxia and moderate exercise at 10,000 ft may have some limited physiological effects and may possibly trigger minor initial symptoms of acute mountain sickness during long-lasting flights which may require air-refueling. However, the effects of low-grade hypoxia exposure with a moderate workload during night conditions up to 12 hours have not been adequately assessed.

Methods: Hypobaric exposures in a dark environment were conducted in a hypobaric chamber with 30 military female and male personnel. Each subject accomplished one session at slightly above ground level pressure and one session at 10,000 ft altitude pressure, both lasting 12 hours. The subjects were divided into a very low and a moderate workload group (15 in each group). The moderate workload group performed 10 minutes of mild exercise at about 70% of the calculated maximal heart rate every two hours on a cycle ergometer. At the end of each 2-hr period subjects completed a survey covering subjective symptoms of hypoxia and acute mountain sickness. The subjects' blood oxygen saturation was measured every hour with finger oximetry as well as the heart rate.

Results: Mean resting oxygen saturation was significantly higher at ground level than at 10,000 ft, and was steady over the 12 hours for both conditions (range: 96.4-97.4% and 89.2-90.5%, respectively). Acute mountain sickness and hypoxia questionnaires showed significantly higher rates of headache, lightheadedness, fatigue and lack of concentration at 10,000 ft. However, there was no difference in reported symptoms in the exercising versus the non-exercising group.

Conclusion: Since acute mountain sickness usually starts with headache, an increase of reported headache at 10,000 ft could be a sign of imminent mild acute mountain sickness. However, the increase was not more pronounced with the moderate exercise.

TREATMENT OF DEPRESSION IN FLIGHT ATTENDANTS: SOME CONSIDERATIONS

LE TRAITEMENT DE LA DEPRESSION AUX HOTESSES DE L'AIR : CERTAINS CONSIDERATIONS

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Background: The adjustment disorder is one of the most common psychiatric problems among aeronautical staff. Sources of psychological stress vary widely from family problems, job pressure, financial difficulties, and many others. Symptoms like depression, anxiety and many others impair occupational and social functioning. It is also an increased risk of suicide attempts and suicide.

Methods: Between 2002-2006 were recorded 15 cases of flight attendants who suffered from depressive symptoms alone or associated with anxiety. They had the DSM IV criteria for adjustment disorder with depressive symptoms or with anxious and depressed mood. The subjects were evaluated clinical and with HAM D (Hamilton for depression scale) on baseline and during the treatment at 7, 14, 28, 56, 84 days, with CGI – S and CGI-I (Clinical Global Impression-Severity and Improvement Scale).

Results: 10 female and 5 men, mean age 31,5 years, no significant past medical history, with a family traumatic event or a premise, an incident of flying. They received either sertraline 50-150 mg/day (n=8, mean dose 118,75 mg/day) or tianeptine 37,5 mg/day (n=7, mean dose 37,5 mg/day). Subjects had a significant improvement on HAM D score (from mean 20,26 to 5,13 at 84 day) and at 28 days HAM D mean score 15,13. CGI-S was decreased from 4,53 (baseline) to 3,26 (day 28); CGI-I: mild improvement in 10/15 subjects and much improvement in 5/15 after 28 days of treatment . No important side effects were recorded, only 3 subjects treated with sertraline presented sexual side effects, 3 nausea at the beginning of the treatment.

Conclusions: Sertraline and tianeptine represent a safe and efficient medication for this type of symptomatology in flight attendants. At 84 days of treatment all subjects were without depressive symptoms. All subjects have been characterized of fit for flying after 30 days from the cessation of medication.

Learning objective: The audience will learn that depression is treatable and doesn't anymore a reason for unfit for flying.

AEROMEDICAL TRAINING IN THE UNITED STATES NAVY

FORMATION A LA MEDICINE AERONAUTIQUE DANS LA MARINE AMERICAINE

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Introduction: The United States Navy has developed a unique and highly innovative program for training Aeromedical Officers in the challenging environment of aviation operations. Based at the Naval Aerospace Medical Institute in Pensacola, the program includes training at all levels through residency trained Aeromedical Specialists. The program is based on the fundamental principal of the aeromedical officer functioning as an integral and fully capable member of the operational aircrew.

Methods: The curriculum is a comprehensive and in-depth program incorporating didactic training in aviation medicine, environmental physiology, occupational medicine, and aeronautical training. Aviation Medicine training includes all disciplines with a special focus on Otorhinolaryngology, Ophthalmology, Internal Medicine, Psychiatry, and Neurology. Environmental physiology training is presented through a combination of didactic elements and direct exposure training devices simulating acceleration, hypoxia, spatial disorientation, and dysequilibrium. Aeronautical training involves full integration into student naval aviator classes. Classes include weather, basic aerodynamics, navigation, communication, aircraft and emergency systems, and safety procedures. Water and land survival skills are also taught through a series of highly realistic devices and scenarios. Actual flight training, consists of a combination of fixed wing and rotary wing flights designed to expose the student aeromedical officer to a wide variety of flight profiles and environments.

Results: The program produces over 100 graduates each year, including a dozen board eligible Aeromedical Specialists. The quality of training has proven instrumental in the reduction of U.S. Navy mishaps and the overall quality of care provided to aircrew throughout the world.

Conclusion: The Aeromedical Officer Training Program at Naval Aerospace Medical Institute provides an exceptional opportunity for training in the unique elements of Aviation and Aerospace activities

THE WORKLOAD-TECHNOLOGY PARADOX: AUTOMATION AND THE CHALLENGE TO HUMAN FLIGHT PERFORMANCE

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Introduction: Increased employment of automation-based aerospace system design is considered one of the keys to achieving optimal human-machine performance and force readiness in line with reduced manpower requirements. In defining the capabilities of a highly automated human-centered aerospace system, it is necessary to first understand the full range of impacts of full and semi-automated systems on skill-based human performance. This knowledge-base is critical as the increased reliance on cockpit automated systems may result in a workload-technology paradox; that is, workloads may increase (rather than decrease) and negatively impact situational awareness in ways not observed in lesser automated systems.

Methods: An overview of emerging automation-based variables associated with flight mishaps will be provided, concentrating on performance decrements due, at least in part, to out-of-the-loop unfamiliarity, loss of mode awareness, complacency, issues of trust and lack of human-centered design in automated flight systems. Military and commercial mishap case studies will be cited to illustrate the effects of the workload-technology paradox on human flight performance.

Results: Mishap investigation and research data support the existence of the workload-technology paradox and suggest that increased human monitoring induces complacency and dependency, may lead to loss of situation awareness, cause erosion of operating skills and in shifting performance-dependent resources from “psycho-motor” to “cognitive” demands, may introduce new forms of “human error”.

Discussion: The implications of the workload-technology paradox suggest that the increased use of automation does not necessarily provide the panacea for workload-based loss of situational awareness (LSA). Indeed, performance decrements from LSA, loss of mode awareness, and increased human error could prove hazardous to users/maintainers and systems; impacting system capabilities and leading to reduced operational readiness and increased life-cycle costs. However, effective automation should be adaptive/flexible and designed to keep humans central to aircraft system operation.

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NATO RTO HFM TG-039 'SPATIAL DISORIENTATION TRAINING': MISSION AND PURPOSE

OTAN RTO TG-039 ' L' ENTRAINEMENT DE DESORIENTATION SPATIALE' : MISSION ET BUT

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Introduction: Spatial Disorientation is a major cause of flight accidents. Although demonstrating and training (student) pilots about the causes and consequences of SD is common practice in most armed forces, there are no standardized training procedures, nor are there standardized trainers/ demonstrators. In view of interoperability it would be desirable to request at least a minimum level of aviator experience in this respect. Since there is a lot of dispute going on about how training should be implemented, and since training devices vary from small to large, from pure demonstrators to flight simulators, an assessment was needed on existing and desired courses.

Method: In 2003 NATO RTO assigned Task Group 039 with the objective 'to produce recommendations for the improvement of aircrew training which should reduce the incidence of orientation accidents'. The TG consisted of 22 experts across 10 countries. Sub-groups prepared the different topics which had to be covered in the report.

Results: The TG prepared a report entitled 'Spatial Disorientation Training, demonstration and avoidance', containing chapters on SD accident statistics, present SD training approach, ground-based and in-flight SD training possibilities, SD aspects of Night Vision Devices, Optimisation of SD avoidance training, Instructors, and Pilot hand-outs.

Conclusion: With this report it is possible to compose an optimal SD training program for (student) pilots by taking into account relevant issues like the optimal schedule in the training, the envisioned operating theatre, the different training devices and the choice of operators.

SPECTACLES AND CONTACT LENSES IN AVIATION ACCIDENTS, INCIDENTS AND OPERATIONAL PROBLEMS 1980-2007

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Introduction: Many pilots are dependant on artificial visual correction in the form of spectacles or contact lenses to meet international aviation eyesight requirements. Given the reliance on these devices, their loss or failure can therefore potentially create a flight safety risk, especially during critical phases of flight. This study examined civil aviation accidents and incidents where problems with contact lenses or spectacles were contributing factors between 1st January 1980 and 27th March 2007.

Methods: The Federal Aviation Administration (FAA) Incident Data system, the National Transportation Safety Board (NTSB) Aviation Accident/ Incident Database and the UK Air Accidents Investigation Branch (AAIB) database were queried with search terms related to spectacles or contact lenses for the period 1980-2007. All highlighted reports were reviewed to determine whether problems with eyewear were actually a causative factor in the adverse event. In addition, the FAA Aviation Safety Reporting System (ASRS) and the UK Confidential Human factors Incident Reporting Programme (CHIRP), which allow aviation personnel to report actual or potential deficiencies involving the safety of aviation operations, were likewise reviewed for the same period.

Results: The FAA and NTSB database search revealed 22 reports in which lost/broken spectacles, problems with sunglasses, incompatibility with personal oxygen masks, inappropriate or new ophthalmic prescriptions and contact lenses, were found to be causative factors in adverse events. Additionally, pilots voluntarily submitted 66 ASRS and 7 CHIRP reports describing operational problems where spectacles, sunglasses or contact lenses were perceived to have adversely affected aviation safety. No AAIB reports were found.

Conclusions: Corrective appliances used by pilots have been implicated in aviation accidents, incidents and near-miss operational problems. The lessons learned from these database reports are useful to provide practical information to pilots, and for aviation authorities to consider when specifying spectacle limitations and appropriate corrective appliances.

TORQUE 2006. PHYSIOLOGICAL & PSYCHOLOGICAL STRAIN OF POLICE HELICOPTER PILOTS DURING THE SOCCER WORLD CHAMPIONSHIP 2006 COMPARED TO ROUTINE MISSIONS

TORQUE 2006. LES CONTRAINTES PHYSIQUES ET PSYCHOLOGIQUES ACCRUES DES PATROUILLES D'HELICOPTERES LORS DE LA COUPE DU MONDE 2006 PAR RAPPORT AUX MISSIONS HABITUELLES

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Introduction: Literature shows a strong correlation between work environment and mental / physical strain. However, there are only few later studies on judges and other professions taking factors like shift-design or differences in tasks into account. There are hardly any published studies in the field of helicopter special operations. Thus, a new combined approach with methods like HRV (Heart Rate Variability) measurement and cortisol aside of psychological parameters was established, considering two different work environments.

Methods: Physiological and psychological strain parameters of a German Police Helicopter Squadron were measured in routine flying tasks and during special operations during the Soccer World Championship 2006 in Germany. The following instruments were used over a cumulated time of eight weeks with four measuring sessions per subject (n=8, 32 measuring sessions total): a multidimensional subjective questionnaire (MDBF), long-term ECG/HRV and the measuring of cortisol in saliva.

Results: Significant correlations could be found between the diurnal position of one routine-mission shift and the “calm-uncalm”-scale. The cortisol level at the end of the first WC-shift was significantly correlated to the hours on flying duty. The HRV minimal power correlated to the duration and diurnal position of one Worldcup-shift. There were significant correlations between various HRV parameters and the “awake-tired” scale.

At an individual level two subjects (1 Pilot, 1 flight technician) with low to medium scores in the “calmness”-scale showed excessive scores in the HRV proving a very high vegetative strain.

Conclusion: Diurnal position and length of shifts under extraordinary task circumstances seem to have an impact on vegetative strain. Shift-design and behavioural training for vegetative stimulated or vago-sensitive personnel should carefully be monitored when planning and conducting special ops in police work. Possibly a routine HRV-test could be established for substituting personnel evaluation. However, further research should support the still weak correlations.

DEVELOPMENT AND IMPLEMENTATION OF COUNTER-FATIGUE TRAINING

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Introduction: Operator fatigue has been identified as a significant risk factor in aerospace and other environments. Scientifically-validated counter-fatigue strategies are available, but it is challenging to ensure that information about these strategies is accessible to the personnel who need it most.

Methods: In order to enhance the widespread dissemination of fatigue-management information, we have developed training materials, short briefings, and classes designed to educate pilots, soldiers, physiologists, physicians, and others within the operational community. Printed materials are made available at conferences and by email and telephone request. Short briefings are provided on a cost-only basis to a variety of military and civilian organizations. One- and two-hour classes are taught at U.S. Army and U.S. Air Force training locations. Counter-fatigue workshops are offered independently and at scientific conferences.

Results: Although formal data-collection efforts have not been undertaken, there is significant evidence that these educational efforts are valuable to operational personnel. The majority of workshops are filled to capacity, requests for printed materials are continuously being processed, and numerous inquiries about upcoming courses and briefings are submitted each month. A formal survey is being developed to determine the extent to which tailored counter-fatigue information is reaching target audiences.

Conclusions: Effective fatigue-management guidance is an appropriate risk-reduction strategy, and novel educational efforts are ensuring that needed information reaches the operational personnel who need it most.

WALL MOUNTED SANITIZER EFFECTIVE FOR MILITARY AIRCREW

SANITIZER FIXE AU MUR DE MAIN EFFICACE POUR L'EQUIPAGE MILITAIRE

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Introduction: Alcohol based hand sanitizer (HS) is effective in killing most organisms that cause acute illness. This observational study compared aircrew illness rates before and after the instillation of wall mounted hand sanitizer in aircrew work areas.

Methods: Wall mounted HS dispensers were placed in half of the aircrew work areas in November 2005 and all aircrew work areas in November 2006. The rates of acute illness were compared for the winter months (01 November to 01 March) for the two intervention winters (2005-6, 2006-7) and the preceding winter (2004-5). The number of days that personnel were restricted from aviation duties due to acute illness was determined from medical records. Acute illness was defined as: gastroenteritis, conjunctivitis, upper respiratory infection, pharyngitis, sinusitis, bronchitis, otitis media and pneumonia.

Results: Acute illness rates for aircrew without hand sanitizer available were 2.45%. Acute illness rates for aircrew with hand sanitizer available were 0.80%. These rates were statistically different ($p < 0.001$) using a two sample binomial proportion. This correlates with 480 additional work days at a cost of less than 300 USD. No complications from HS use were documented.

Conclusion: Hand sanitizer was remarkably effective in reducing acute illness and lost work days. This intervention was cost effective and not associated with side-effects or injuries.

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TROPICAL MALARIA AMONG MOLDAVIAN PILOTS

LA MALARIA TROPICALE AUX PILOTES MOLDAVES

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Introduction: Malaria imported into Moldova, as well as into other European countries, still presents a big problem. We examined the malaria infection among Moldavian pilots who operate in Africa, Middle East and Indonesia – regions with risks of extremely dangerous infections, including tropical malaria. Difficulties in effective prevention of malaria are analyzed.

Methods: The epidemiological situation of imported into Moldova malaria among general and pilot's population is shown in more details for the period of 2000 – 2007. We present 2 cases of severe tropical malaria where non-observance of common rules among doctors and patients themselves led in the first case to death and in the second case to severe acute renal failure and double recurrence of malaria. The data are obtained from the database of Aeromedical Section of CAA and in the Chisinau Center of Preventive Medicine.

Results: There were 63 cases of tropical malaria among pilots that constituted 48,09% of the total number of malaria cases imported into Moldova during the period of 2000 – 2007 (till May). The majority (57) were caused by *P. falciparum*, with the location of infection in Congo, Angola, Equatorial Guinea, Eritrea, Liberia and Sudan; 4 cases- by *P. ovale*, 1 case – by *P. vivax* from Afganistan; 1 case –by *P. falciparum* together with *P. ovale* from Liberia. The main errors that could lead to complications and even death are the disregard of potential danger, loss of time, wrong medication and wrong dosage. These are referred to pilots and to doctors as well.

Conclusion: The reputable medical advice given in the Chapter “Tropical Medicine” of JAR-FCL 3 Section 2 should be provided mandatory for the flight crew before each trip to the tropics. In addition, the air operators must supply the flight crew with the antimalaria drugs. These measures could partially make up for the lack of doctors' experience and limited choice of antimalaria drugs in some free from malaria countries where these flying personnel come from.

ADVANTAGES AND DISADVANTAGES OF TWO DIFFERENT SYSTEMS OF AM CERTIFICATION

LES AVANTAGES ET LES DESAVANTAGES DE DEUX DIFFERENTS SYSTEMS DE LA CERTIFICATION AEROMEDICALE

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Introduction: The global development of aviation is more and more in demand of coordination and integration process between countries and continents. Under the ICAO Annex I regulation many countries are still using different medical requirements with different approach to aeromedical certification, fulfilling the same task and respecting the same aim – providing the flight safety. Even after the implementation of the same requirements, as JAR-FCL 3, by most of the European countries the certification process is not yet harmonized.

Methods: We are presenting the analysis of two different systems for the aeromedical certification that have been made use of in Moldova. Structures and procedures of the former and the present systems of medical regulation are underlined. We draw a comparison between stringent, unchangeable regulation as opposed to updated and reliable. We compare the unique training of AME(s), uniformity in medical examinations for hundred of thousands of pilots, covering vast territories with the possibility for pilots to choose the medical examiner or the country for certification, where there is no access to any data for the medical examiner. The evidence of advantages is based on statistical data from our experience before and after 2000, when JAR-FCL 3 was implemented in Moldova. The review of the aeromedical certification over a period of the last 7 years has been done. The rate of disqualification for medical reason and comparative assessment of flight personnel's health is considered.

Results: Advantages that we have by using the less stringent, current medical requirements of JAR-FCL 3 are reflected in the lower rate of pilots' disqualification for medical reasons – 1,0-2,8% from all pilots certified between 1990-1995 and 0-1,4% between 2000-2006. The structure of diseases among pilots shows the prevalence of cardio-vascular pathology – 20,6 – 35,5%, gastro-intestinal diseases – 12,5 – 28,9%, neurological diseases – 2,9 – 8,1% in relation to the total number of pilots examined during the period 2000 - 2006.

Conclusion: Less stringent and advanced requirements allow keeping pilots longer in the aviation industry; create the more objective and reliable relationship between AME and a pilot. Pilots represent not a healthy population in general. That should always be considered with respect to safety, especially when total freedom is given to the pilots to choose and change their medical examiners. The need for the genuine harmonization of the requirements among states and common database of pilots' fitness is imperative. Ongoing research on statistics on active commercial pilots' morbidity and mortality would help to analyze how do actually requirements reflect the real needs of flight safety and assure it.

TRAINING IN AVIATION MEDICINE IN EUROPE.

ENSEIGNEMENT EN MÉDICINE AÉRONAUTIQUE EN EUROPE.

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Introduction: The differences in history, traditions, experience and training lead to considerable variations in the practice of aviation medicine in Europe. European countries also have different capacities for conducting training in aviation medicine. The general globalization, also affecting aviation, requires the creation of common guidelines in this field and also accessibility to such training for aviation medical practitioners.

Methods: One of the tasks given to the General Assembly (GA) of ESAM in Brussels (18 November, 2006), where 17 European associations of aviation medicine were represented, was to analyze the situation regarding aviation medicine training, including the possibility for harmonization. 14 Aviation Medicine associations have completed a questionnaire incorporating the main problems regarding the type of training, its regularity, the language, the institution's database and the person responsible for the training.

Results: The Executive Committee (EC) of ESAM received answers from 14 aviation medicine associations from 13 European countries: Austria, Belgium, Bulgaria, Croatia, Denmark, Finland, Germany, Netherlands, Lithuania, Moldova, Norway and United Kingdom. In 11 states – a Basic Course is available, in 9 states – both Basic and Advanced Courses, and in 3 states a postgraduate course or Diploma in Aviation Medicine is available. Some kind of refresher training is provided in nearly all states. Four countries offer training in English, which is valuable for the international attendees.

Conclusion: It is clear that the potential to conduct training in aviation medicine depends on different conditions within the state. A common database of available training in aviation medicine, as well as of competent lecturers, should be created in order to fulfill the requirements of those who need help in this type of education. The opportunity to coordinate or unify aviation medicine training should be considered within the framework of ESAM.

HEALTH RISKS ASSESSMENT AND DISEASE PREVENTION FOR AIRLINE TRANSPORT PILOTS

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Introduction: Factors of aviation safety are mostly related to human. This study aimed to investigate airline transport pilots' work-related physical activity, exercise habits, risk factors of metabolic syndrome, and tendency in chronic fatigue syndrome.

Methods: A subjective questionnaire survey and subjective records of physiologies were conducted on a total of 199 airline transport pilots in Taiwan. Percentage and Pearson Chi-Square Test were adopted in data analysis.

Results: Most of the airline transport pilots (92.3%) had an excessively long period of working at a sitting position. However, a majority (56.9%) of them still maintained the habit of doing regular exercises. We found that 27.3% of the pilots were at a high risk for metabolic syndrome, and 6%, 11.6%, and 16.1% of the pilots had the symptoms of hypertension, excessive triglyceride value and total cholesterol. The impact of age ($p<0.05$) and BMI ($p<0.001$) was statistically correlated with the risk factors of metabolic syndrome. Exercise habits and chronic fatigue syndrome were also correlated ($p<0.01$). Fortunately, in this special working environment, most of the pilots (91.5%) did not suffer from chronic fatigue syndrome, and only 2.2% of them are at a high risk.

Conclusion: Flight surgeons monitor the blood pressure, triglyceride, and blood sugar of pilots who are at a higher age level, who have no exercise habit, and who suffer from obesity, and try to prevent them from the high risks of metabolic or chronic fatigue syndromes.

OVERSEAS AIRLINES DOCTORS: MIXING CLINICAL SCIENCE WITH COMMON SENSE AND COST EFFECTIVENESS: A REVIEW OF RELEVANT CASES.

MEDCINS DES LIGNE OUTRE MER: MELANGEMENT LES SCIENCES CLINIQUE AVEC LA LOGIQUE ET CONTROLE DES COUTS; REVUE DES CAS A PROPOS

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Introduction: To emphasize the fine art of medical decision making and advise in usual and unusual situations encountered by the designated Airline Company Physician in overseas destinations within the framework of a delicate balancing between the clinical situation, the disposition of the case in a cost effective manner and the ethical and commercial standards of the Corporation.

Methods: A review of the clinical files of the last 15 years with retrieval of the pertinent cases involving care and support of crew members and approval of transportation of sick passengers.

Results: Details and dynamics of the cases in point with evolution and outcomes to be narrated

Conclusions: Both usual "business as usual" and unusual cases (some bordering the bizarre) are part of the routine encountered by the Medical Officer and in the particular case of the unusual or unexpected a once wise combination of science, common sense and financial considerations must be exercised. When considerable doubt exists, a consultation with the home base Medical Director may be in order.

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A BRIDGE TOO FAR? – AEROMEDICAL CERTIFICATION DECISIONS IN AIRCREW WITH MYOCARDIAL BRIDGING

UN PONT TROP LOIN ? – LES DECISIONS DE CERTIFICATION DE AEROMEDICAL DANS L'EQUIPAGE AVEC UN PONT MYOCARDIQUE

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Introduction: The recent development of multi-slice, multi-detector Computed Tomography (CT) scanning has allowed advances in the non-invasive investigation of the coronary circulation. The relatively low cost and safety of the technique has led to its adoption as a screening tool for coronary atherosclerosis, but the significance of incidental positive findings is not yet fully established. This paper discusses one such incidental finding – myocardial bridging – using two pilot cases as examples.

Material and Methods: Two pilots with coronary artery narrowing due to myocardial bridging, reported as an incidental finding on CT angiography. A review of the medical literature was undertaken to assist in making informed decisions regarding pilot medical certification and follow-up.

Results: Myocardial bridging is a frequent finding at autopsy (15-85%) and has been associated in some case reports with angina, myocardial infarction and sudden death. Atherosclerotic plaques occurring in the coronary artery segment proximal to bridges have also been reported. However, there is no evidence of a threat from myocardial bridging in asymptomatic patients with clean coronary arteries and normal functional test results using standard aviation cardiology protocols.

Conclusion: The aeromedical certification of pilots with incidental positive findings on multi-slice CT angiography alone is hampered by the lack of robust prognostic data. For the present, standard techniques of exercise stress testing and follow-up (if indicated) with myocardial perfusion imaging and coronary angiography should continue to guide aeromedical certification decision processes in these patients.

Educational Objectives: The presentation offers a practical template for the investigation and aeromedical certification of aircrew with incidental CT findings of myocardial bridging.

FLYING ON ANTIDEPRESSANTS

VOL PENDANT QUE ÉTANT TRAITÉ AVEC LES ANTIDÉPRESSEURS

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Depression is a common illness with a lifetime risk of developing a depressive illness of 30% in the Western World. The lifetime risk of a major depressive illness is 8%. It is likely that the incidence of this disease is similar in the pilot population.

Historically, aeromedical certifying authorities have prohibited the use of antidepressants by aircrew and pilots with a diagnosis of depression who have required treatment, have been grounded. This policy originated when the commonly used antidepressants were tricyclic antidepressants and monoamine oxidase inhibitors. These groups of drugs had significant and common side effects, which would definitely degrade the performance of the flying task.

Depression is now usually treated with Selective Serotonin Re-uptake Inhibitors (SSRIs) which have a relatively side effect free profile. Modern psychiatric practice increasingly calls for the long-term use of SSRIs. There is evidence that pilots who become depressed and are prescribed SSRIs often choose not to take their medication in order to maintain valid certification, or do not declare the fact they are on treatment to their National Aviation Authority (NAA). Neither of these circumstances is desirable for maintaining flight safety.

The pros and cons of allowing aircrew to fly whilst taking SSRIs will be discussed, including which SSRIs may be compatible with the flying task. A draft protocol will be presented detailing how an NAA may regulate aircrew on SSRIs.

LE TRANSPORT AERIEN DES PASSAGERS MALDES AIR FRANCE/ KLM

DONNE JP, T FEHR. P KNAPE
France

Introduction : Lorsqu'un malade ou opéré récent doit voyager et que les conditions de faisabilité sont réunies, l'avion de ligne apparaît comme le moyen le plus sûr et le plus rapide pour effectuer ces transferts.

Méthodes : Les grandes compagnies suivent la résolution IATA 700 qui organise le transport des passagers malades (ou handicapés) en harmonisant les procédures. Air France et KLM utilisent des procédures comparables, même si elles ne sont pas identiques.

Résultats : Les données numériques sont proportionnelles à la taille des compagnies.

Conclusion : Avec le doublement prévu du nombre de passagers intercontinentaux pour 2020, une augmentation des transports médicaux est à prévoir dans le respect des résolutions IATA et en utilisant les formulaires électroniques récents.

Air France Paris France, Tel +33143172220/14

A SURVEY OF FATIGUES ISSUES AND FLIGHT SCHEDULES AMONG CORPORATE PILOTS ACROSS THE STATE OF TENNESSEE SINCE THE TRAGIC EVENTS OF SEPT. 11

RESULTATS D' UN SONDAGE DE PILOTS COMMERCIALES AUX E.U. A PROPOS DE LA FATIGUE ET LES HORAIRES DE VOL DEPUIS LES EVENEMENTS TRAGIQUES DU 11 SEPTEMBRE

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Introduction: The National Transportation Safety Board has reported fatigue as a probable cause in many airline accidents in the United States. Most of the data from pilot fatigue studies have been conducted before the terrorist attacks of September 11, 2001. This is particularly important as since the events of 911 many pilots were furloughed and many corporate flight departments went bankrupt. Indeed, it has been estimated that many pilots are flying 15 to 25 percent more hours that they were before the bankruptcy era.

Methods: For this study, a survey consisting of 33 questions was derived from a previously published NASA survey. The survey was distributed to flight departments across the state of Tennessee.

Results: In this study the vast majority (75%) reported that fatigue was a moderate (42%) or serious (33%) concern in corporate flight operations. More than half (55%) reported that "crew fatigue" was a common occurrence in flight operations. Seventy-two percent reported that when fatigue occurs in flight, the approach and landing phase is most affected. Almost three-quarters of the respondents (71%) indicated that they had "nodded off" during a flight. An ANOVA revealed that pilots who flew Part 135 ranked fatigue as a more significant concern than pilots who flew Part 91. Of the pilots that reported that they had "nodded off" during a flight, more than three quarters (77%) indicated that it had occurred more than once. Less than half (40%) of the respondents indicated that their company offered training related to fatigue issues.

Conclusion: These findings support previously published research that fatigue is a significant concern in corporate aviation. However, this study revealed no direct correlation between flight schedules, length of duty days, and pilot fatigue concerns. It appears that regardless of flight schedules or duty day lengths, fatigue continues to be a concern for corporate pilots.

PUSH-PULL EFFECT AND LBNP

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Introduction: The high level of the long lasting acceleration with both an extensive gradient of the acceleration onset and vector alterations belong to the flight specificity in a cockpit of agile aircraft with high manoeuvring capabilities. In these cases the so-called push-pull (PP) effect has its particular significance. This means tolerance decrease to the plus gravitational acceleration after an exposure to the microgravity on the acceleration level between zero and +0.8 Gz or after previous action of negative acceleration values. The resulting activation of the sympathicus during plus gravitational acceleration process is up to several seconds behind time and pilot's performance is reduced. At the same time both an impairment of the threshold of the vision failure and G-LOC occur. The gravitational acceleration fatigue effect escalates, too.

Method: A group of 27 Czech Air Force pilots was examined. A simulation of the load was formed by the LBNP (lower body negative pressure) method. A two stage examination technique was prepared. Pilots are examined in a sitting position. Both anti-g trousers and anti-g manoeuvres aren't applied. PP effect is simulated in the first step. The plateau of the microgravity in time duration of one minute is simulated so that the LBNP device is tilted backwards to the horizontal position. There is atmospheric pressure in the LBNP chamber. +Gz load is simulated by the creation of negative pressure in the LBNP chamber with a simultaneous elevation of the LBNP device to the vertical position. Negative pressure level is -70 mmHg and this value is achieved during one second. An elevation of the LBNP device to the vertical position takes 7 seconds. Time duration of the simulated +Gz load is two minutes. A short rest follows after ending of the load and then the second step of the examination begins. The response to the isolated LBNP load is assessed during this step. Load parameters: negative pressure level of -70 mmHg, negative pressure onset of 70 mmHg.s⁻¹, exposure time duration of two minutes, sitting vertical position.

Results: results of this test are determined by subjective and objective tolerance and physiological data changes of the examined pilots. Evaluation of the course of BP (continuous blood pressure) changes proves statistical significant differences between a simulated PP and an LBNP load. PP induces more progressive and greater BP decrease as well substantially slower course of compensatory responses. These changes indicate +Gz tolerance impairment.

Conclusion: The mentioned method seems to be one of the possibilities of the utilization of an LBNP load to a pilots' training in conditions of PP effect such as a partial substitution of the human centrifuge training.

NATO RTO TG-039 'SPATIAL DISORIENTATION TRAINING': IN-FLIGHT AND GROUND-BASED TRAINING

OTAN RTO TG-039 'L' ENTRAINEMENT DE DESORIENTATION SPATIALE' : ENTRAINEMENT EN VOL ET AU SOL

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Introduction: Due to the many difficulties associated with integrating new sensory technologies in aircraft, the only readily available solution to the spatial disorientation (SD) problem seems to be through the improvement of training practices and with the implementation of better SD-capable devices (e.g. SD trainers or the aircraft). With this theme in mind, a NATO group of subject-matter-experts joined together to form a working group aimed at the development of improved spatial orientation training recommendations for aircrew.

Methods: Experts from the disciplines of physiology, psychology, human factors, flight simulation, engineering, physics, aeronautics and piloting met to collect and review existing practices across member-nations, while discussing potential changes that could be instituted at all levels of training.

Results: After the first meeting it was agreed that SD countermeasures training should be divided into three basic parts: academic instruction, demonstrations, and hands-on training. Academic instruction is the traditional classroom lectures which can vary from one to four hours; demonstrations include the basic experiences of the visual and vestibular illusions that underlie SD; and hands-on training is where the aircrew experiences SD and continues to maintain aircraft control. Depending on the level of detail desired, training can be experienced in either ground-based devices or the actual aircraft. However, due to safety concerns, in-flight illusions are limited to basic demonstrations. Hands-on training is by far the most productive type of training, if given the proper level of sophisticated technology.

Conclusion: All three types of SD training are described with special emphasis on ground-based devices. It has been concluded that all air forces should review their SD training programs and use the recommended architecture suggested in this NATO product.

LE TRANSPORT AERIENNE DES PASSAGERS A MOBILITE REDUITE ET HANDICAPES MENTAUX SUR AIR FRANCE

T. FEHR, JP DONNE
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Introduction : Selon la recommandation IATA 700, tout passager handicapé doit être accepté sans accord médical si son handicap est stabilisé et si il n'a besoin que d'une assistance spéciale à l'aéroport pour embarquer et débarquer.

Air France a décidé d'aller plus loin que IATA en créant le service SAPHIR en 2002 (service d'assistance aux personnes handicapés pour les informations et les réservations).

Méthode :

2 cas de figure :

1 – Handicap physique stabilisé :

Pas d'accord médical. Seuls les critères d'autonomie en vol seront demandés par le service SAPHIR

2 - Handicap physique non stabilisé ou handicap mental voyageant seul :

Accord médical obligatoire – questionnaire adressé au médecin avec critères d'autonomie

Décision du médecin de la compagnie de laisser voyager seul ou pas et création de la carte SAPHIR pour 1 à 5 ans

La validité de la carte SAPHIR est de 5 ans maximum

La validité de l'accord médical va de l'accord ponctuel à une durée de 5 ans.

Résultats :

8 000 cartes SAPHIR créées en 2007

Croissance permanente des demandes

Recul après 5 ans d'existence

Conclusion : Le succès du service SAPHIR es tellement grand que nous sommes sur le point de prévoir une expansion et une internationalisation du service. Ainsi se créé un centre à Fort Lauderdale, à Wembley, à Montréal et probablement un autre en Asie dans le futur.

Il remplace l'ancienne carte FREMEC.

Air France Paris France tel +33143172214/20

BACK PAIN ON HELICOPTER PILOTS USING NIGHT VISION GOGGLES, DIAGNOSTIC PROCEDURES AND OPTIONS FOR TREATMENT

LA DOULEUR DORSALE SUR L'HELICOPTERE PILOTE A L'AIDE DES LUNETTES DE VISION DE NUIT, PROCEDURES DE DIAGNOSTIC ET OPTIONS POUR LE TRAITEMENT

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Introduction: Many studies show that there is a high prevalence of back problems in helicopter pilots. The use of night vision goggles brings more weight on the helmet of the flying personal. We took the values of strenght of trunk muscles to see whether there is enough trunk stability not to get backproblems during flight.

Methods: In the timeperiod of 2004-2007 we tested helicopter pilots of the Austrian Airforce who joined a training for flying with night vision googles. Everybody of this group ran a checkup of the maximum isometric strength of the upper body. The instrument we used for measurement is the so called Back Check[®] System. We tested 49 helicopterpilots, mean age 38 yrs (SD +/-11), mean weight 78,8 kg (SD +/-8,7), mean height 180 cm (SD +/-6,4), mean body mass index 24,3 (SD +/-2,3).

Results: The mean maximum force in extension of the trunk was 137% from normal 100% (SD +/- 32), flexion 129% (SD +/-28). By testing the side flexion we saw a relation of maximum force between right and left of 52,2% to 47,2%. 6% of the tested crewmembers had a deficit in the force of the backside of trunk and 14% in the force of the front side of the trunk muscles.

Conclusion: Some of the pilots we testes for maximum isometric force had a distinct deficit of the strenght of trunk muscles. We developed solutions in training for flying personal on one side and in optimizing the design of helmets on the other side.

SPECTRUM OF HAEMATOLOGICAL MALIGNANCIES IN AVIATORS

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Introduction: Hematological malignancy (HM) in an aircrew may result in disqualification from flying. In the present study an attempt has been made to look at the profile of HM in aircrew with the view to look at their aeromedical concerns.

Methods: The medical documents of all aviators with hematological malignancy between Jan 1997 to Dec 2006 were reviewed. Clinical examination, investigation and treatment administered as per the record were analyzed.

Results: During the period between Jan 1997 and Jan 2007, 09 cases of hematological malignancies were diagnosed in aviators, 05 civil commercial pilots and 04 Air Force pilots (02 from fighter stream and 02 from transport stream). 05 of the 09 cases (03 civil commercial pilots and 02 Air Force pilots) were subsequently returned to flying duties with waivers. The remaining 04 cases (01 case of Waldenstrom macroglobulinaemia, 01 case of non-Hodgkins lymphoma, 01 case of hairy cell leukemia and 01 case of essential thrombocytosis), are still under treatment and continue to remain grounded.

Conclusion: Hematological malignancies can be picked up early in aviators as they undergo stringent periodic evaluation. Reflighting of aircrew after adequate observation in sustained clinical remission post therapy is a definite possibility today in light of the potential cure for many disorders; this will lead to optimal utilization of highly skilled manpower.

Key words: Hematological malignancies, aviator, waiver

LUFTHANSA MEDICAL EQUIPMENT - NEW ONBOARD ITEMS

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Introduction: Lufthansa offers a wide range of onboard equipment since many decades.

Methods: In 2006 we have added and substituted some items in our First Aid and Doctor's Kits. In addition we have improved the arrangement of all the First aid items within the kits to keep the equipment needed more distinct.

We have inaugurated a new emergency report form to help our staff and the helping doctor to fix the essentials of an emergency. We monitor this system and feed back the results to our First Aid training department.

Conclusion: We have improved our on board equipment for medical emergencies. We expect more convenience for both our customers and the First aid team – our Flight attendants and may be a doctor. We indent to improve the evaluation of our flight reports and give our First Aid Instructors a feedback

PROTECTION EFFECT OF PBG ON ACCELERATION ATELECTASIS

PROTECTION EFFET DE PBG EN ACCELERATION ATELECTASIE

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Introduction: The purpose of this study was to explore the protection effect of pressure breathing for +Gz (PBG) on acceleration atelectasis.

Methods: The centrifuge experiments were conducted on 7 subjects, breathing 100% oxygen, using simulated aerial combat maneuvers (SACM). The SACM profile was composed of +5.0Gz for 15s and 45 s, two +4.5Gz for 90 s, +3Gz baseline in-between, and with a total ride time of 246 s. The experiment was carried out in three groups as follows: with slight overpressure of oxygen system; without slight overpressure; without slight overpressure, but with PBG. Chest X-ray, vital capacity (VC), force vital capacity (FVC) were measured before and after +Gz exposure. Subjective ratings of chest pain, coughing, and shortness of breath were obtained after +Gz exposure.

Results: The first group experienced an average of 0.27 L reduction in post-SACM VC, but no obvious reduction in FVC, and the subjective ratings was very low. An average of 0.69 L $p < 0.01$ and 0.29L $p < 0.05$ reduction in VC and FVC in the second group, and the symptoms of chest pain, coughing, and shortness of breath were reported by all subjects. The subjective ratings were higher than that of first group ($p < 0.05$). The representative atelectasis image appeared in the chest X-ray pictures of 6 subjects. In the third group, there was no significant reduction in VC and FVC ($p > 0.05$), no report about symptoms of atelectasis by most of the subjects. The subjective ratings were lower than that of the second group ($p < 0.01$). The atelectasis image was also found in the chest X-ray pictures of 6 subjects, but the severity reduced obviously than that of the second group.

Conclusion: Acceleration atelectasis could be obviously alleviated by PBG. and slight overpressure of oxygen system prohibited the occurrence of acceleration atelectasis. Inadequate supply of oxygen flow may be another important cause of acceleration atelectasis.

LIPEMIC AND ATHEROSCLEROSIS RISK IN COMMERCIAL PILOTS AND FLIGHT ATTENDANTS

LIPEMIC ET RISQUE DE L'ATHÉROSCLÉROSE DANS LES PILOTES COMMERCIAUX ET LES MEMBRES DE L'ÉQUIPAGE

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Introduction: Aircrew members are continuously exposed to many risk factors for developing coronary heart diseases, during their working activities. Important changes in the environment of the aircraft are needed to keep it functioning properly. Those alterations interfere with men's physiologic systems, specially the lipid metabolism that may be affected by hypoxia, unsuitable dietary intake, and lack of physical activities.

Increased cholesterol levels are a well known risk factor contributing for cardiovascular disease. Nevertheless the relation between low density lipoprotein cholesterol (LDL) and high density lipoprotein (HDL) is rarely taken in account.

Objectives; To describe the prevalence of lipemic risks, specially the abnormal values for total cholesterol, LDL and HDL –cholesterol, separately and emphasizing the relation between HDL + LDL in flight personnel. **Methods;** This study was carried out with 90 aircrew members, 48 male commercial pilots (mean age = 41years old) and 42 flight attendants. From those 42 flight attendants, 23 were men (mean age =35years old) and 19 women (mean age =33years old). Biochemical evaluations were performed in Roche equipments using Roche Diagnostics reagents.

Results: Observed prevalence of abnormal lipid profile analyses in commercial pilots and flight attendants is described as follows: Pilots:

60 % showed increased total cholesterol levels and 67% LDL-cholesterol, 46 % presented decreased levels for HDL—cholesterol. When the HDL and LDL are added we saw that 81% of the pilots presented a bad relationship (19% were shown without risk) Among the flight attendant total cholesterol, LDL and HDL cholesterol were within the expected range. However when men and women were separated, 78% of the male flight attendants showed high levels of the relation HDL+LDL, characterizing the presence of lipemic risk factor.

Conclusion: The high prevalence of abnormal lipid profile results for both aviators and flight attendants in the sample studied, specially focusing on the relation between HDL/LDL, could constitute a new parameter for evaluating lipemic or atherosclerosis risk.

THE EVOLUTION OF AEROSPACE MEDICINE IN BRAZIL

L'ÉVOLUTION DE MÉDECINE AÉROSPATIALE AU BRÉSIL

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Introduction: The evolution of Aerospace Medicine in Brazil and its future perspectives were introduced in 2005, during the 53th ICASM. At the present moment, we are reporting how this area of knowledge has been developing from that moment on. In Brazil, besides the Universities Centers little is known about Aerospace Medicine. The professionals that have to deal with it during their daily routine work are fighting to become it a specialty. Until today, in Brazil, the execution of the Annex I of the International Civil Aviation Organization regulations stay under the protection of the Aeronautics Special Health Committees. The physicians that are the experts in aviation medicine take their Aerospace Medicine Courses provided by the Air Force University. Those courses could be provided by any private or public University, Gama Filho University could be an example.

Methods: In 2001 we started to fight for the legalization of this specialty through our Medicine Federal Council, Brazilian Medical Association and National Commission of Medical Residence. Unfortunately, this could not become reality. May be different from other countries, the medical class organs in Brazil have the power to decide whether the physician can work in one specialty or not. If the class organs deny to recognize Aerospace Medicine as a specialty, in Brazil, any kind of physician can work on the area, even knowing nothing about the subject

Results: The Specialty Mixed Commissions concluded that Aerospace Medicine was not considered a specialty but could be introduced in the Traffic Medicine Performance Area. Soon after, we got in touch with Traffic Medicine Association with our request and they accepted it, and on the 15th of December, Aerospace Medicine was ratified as a Traffic Medicine performance area

Conclusion: After that new process, the Mixed Commission finally recognized the Aerospace Medicine as Traffic Medicine sub-specialty.

COMPARISON OF MUSCULOSKELETAL COMPLAINTS BETWEEN HELICOPTER AND AERO PLANE PILOTS

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Introduction: Some previous surveys have indicated on high prevalence of low back pain in helicopter pilots, but there are a few studies about comparing of musculoskeletal complaints between helicopter and aero plane pilots.

Methods:An interview based Nordic questionnaire was carried out in 150 aero plane pilots and 209 helicopter pilots.

For this analytical study, we used χ^2 and fisher exact test for comparing qualitative variables, and for quantitative variables with normal distribution we used parametric tests. Odds ratio (OR) and %95 CI were used for comparing the proportion of risks estimate.

Results:

The means of monthly flight hours were 12.6 ± 10 and 54.5 ± 12 in helicopter and aero plane pilots, respectively.

After flight's low back pain was prevalent among both groups %42 and %40 in helicopter and aero plane pilots, respectively. Classification of other musculoskeletal complaints ware %35 and %37 for upper back, %33 and %30 for neck, %32 and %30 for shoulder and arm, %25.4 and %32.8 for knee and leg, %25 and %23.3 for thigh and buttock and %18 and %30 for ankle and foot in helicopter and aero plane pilots, respectively. (all results were with p-value >0.005).

Odds ratios (OR) for comparing of risk estimate between helicopter and aero plane pilots were not significant after flight in any site. But, ORs for effect of musculoskeletal pain on normal daily activity during the last year were 6.2 (95%CI: 1.4-26.8) for low back pain, 8.4 (95%CI: 1.12-63.43) for upper back pain and 9.6 (95% CI: 1.2-72) for neck pain.

Conclusion : This study showed that after flight's low back pain was more prevalent in nearly two groups. And normal daily activity affected by musculoskeletal complains was significantly more prevalent in helicopter pilots. But for accurate conclusion we need more data.

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PRE PERIMETRIC GLAUCOMA: CONCEPT AND DIAGNOSIS, AVIATION PERSPECTIVE

GILL HS

India

Glaucoma by definition is characterized by a progressive loss of retinal ganglion cells from apoptotic damage, in excess of the normal age related loss, progressing to Glaucomatous Optic Neuropathy characterized by morphological changes in the Intra papillary and para papillary region of the optic nerve head and retinal nerve fibre layer. This structural damage to the optic nerve head, has by convention been documented by assessing the functional loss on automated perimetry. White on white perimetry is the current gold standard to assess this damage to the optic nerve head. However 40% of the retinal ganglion cells need to be damaged, for it to manifest as a change on automated perimetry. Since the damage from glaucoma is irreversible the question is, do we need to wait for 40% of the ganglion cells to be lost before we start the treatment? More so in aviation scenario field defects can lead to disastrous consequences and loss of trained pilots and hence the significance of pre perimetric glaucoma cannot be over emphasized.

The concept of pre perimetric glaucoma delves into identifying early structural damage to the optic nerve in the presence of normal white on white perimetry. It is important, especially in pilots to identify those at risk of developing glaucomatous, to ensure early treatment to preserve visual function.

A number of techniques are available for evaluation of early structural changes to the optic nerve head which include, red - free ophthalmoscopy, retinal thickness analysis, optical coherence tomography, retinal topography(contour analysis) by confocal scanning laser ophthalmoscopy and scanning laser polarimetry.

The importance of these techniques and their clinical significance will be discussed and highlighted, with special reference to a civil aviation pilot.

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PRE TAKE-OFF HEAT STRESS IN FIGHTER COCKPIT: A DETERMINING FACTOR FOR OPERATIONAL READINESS

PRE LA TENSION DE CHALEUR DE DECOLLAGE DANS LE POSTE DE PILOTAGE DE COMBATTANT : Un FACTEUR DETERMINANT POUR L'EMPRESSEMENT OPERATIONNEL

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Introduction: Fighter pilots are exposed to severe heat stress during the summer months. The bubble canopy of modern fighter aircraft aggravates this stress. Exposure to heat stress may adversely compromise physiological tolerances due to aviation stresses during low level flight or in combat. The air conditioning system (ACS) maintaining cockpit temperatures in comfort zone has restricted cooling efficiency prior to take-off due to reduced engine power. This study was undertaken to assess the cockpit heat stress before takeoff for a sortie.

Methods: This field based study from 8 operational sorties was undertaken during summer months in Northern India. A heat stress monitor (HSM) was secured near the cockpit gyro gun-site of a fighter aircraft; for online computation of WBGT, as per protocol, prior to start up till take off.

Results: The pre take-off period was from the time a pilot sits inside the cockpit till take off. The cockpit and ambient WBGT during this period ranged from 31.5 to 43.9°C, and 25.3 and 32.3°C, respectively. The duration in different pre take-off phases was: 4 – 19 min in phase – I (prior to engine switch on); 1 – 5 min in phase II (from switch on to canopy close); 11 – 20 min in phase III (canopy close to warm up); and 1 – 3 min in phase IV (warm up till take off).

Conclusion: This study revealed that the cockpit heat stress remains high prior to take off. More importantly, this stress largely remains unnoticed and unreported, but severely compromises the operational readiness of the aircrew and mission safety in turn. Intervention is possible during phase I and III. Hence Aerospace Physicians and flying supervisors must plan interventional strategies to reduce the heat stress, to maintain the occupant's performance capabilities. Remedial measures have been suggested.

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EPISODIC LOSS OF CONSCIOUSNESS IN MILITARY TRAINEE AVIATOR: A CASE REPORT

LA PERTE EPISODIQUE DE CONSCIENCE DANS L'AVIATEUR DE STAGIAIRE MILITAIRE : Un RAPPORT DE CAS

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Introduction: Episodic loss of consciousness (LOC) during military training is occasionally known to occur amongst young trainees. In a military aviation academy, with trainees aspiring to pursue career in aviation, such episodes of LOC can be detrimental to the budding pilots. Besides personal anxiety about fitness, there would be apprehension amongst the executives about the cost of training and future employability. Hence there is increased expectation from the Aerospace Physicians to ascertain the cause of LOC and to determine the fitness of the trainee aviator for aviation duties. Among various causes of LOC, solitary episodes of neurally mediated syncope (NMS) alone is considered compatible with aviation duties.

Methods: This paper analyses a case report of syncope in a military aviator trainee, including the protocol followed. This has been compared with another case where the trainee was declared fit for aviation duties.

Results: The trainee was found to be unfit for aviation duties.

Conclusion: Episodic LOC is a challenge in aeromedical decision making (ADM). The Aerospace Physician depends on multi-disciplinary evaluation protocol before ascertaining the fitness for continuing training or disqualifying the patient from future military employment. ADM in cases of LOC have a bearing not for the patient alone but also leads to the wastage of training effort and money, in case of disqualification. A stricter screening protocol at the time of selection is not an answer, since there is no gold standard for forecasting syncope. Thus the existing practice of extensive evaluation after episodic LOC, though costly, is the only option available to define future employability. This paper analyses the reasons for recommending termination of training for the trainee, comparing it with another case which was found fit for aviation duties.

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EFFECT OF PROFESSIONAL SKILL ON SIGNAL DETECTION PERFORMANCE IN A SIMULATED STRESS SITUATION

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Introduction: For years, we have been involved in developing a system to determine visual working capacity. This system, in addition to traditional static clinical ophthalmic examination methods, includes methods for assessing visual information processing such as the Two-Hand Coordination Tracking Test, Time and Movement Perception Test, and 3D Coordination Test (the latter serves testing of three-dimensional orientation and the associated visuomotor activity). In our current series of studies we used the Signal Detection Test.

Method: The signal detection test was performed in 2 experimental setups by 42 practically healthy male helicopter pilots aged 36 years on average ($r=2.4$). Of the subjects of Experiment 1, 14 people performed the task at zero meter, 14 other in hypobaric hypoxia only, and 14 pilots in Experiment 2 were tested in both situations.

Results: Task difficulty suggested a deterioration of the parameters in hypoxia but reaction speed and accuracy did not differ significantly from those of the control group.

Discussion: Presumably, these results were caused by the short-term effect of stress, expressed as the mobilization of psychic reserves.

Conclusion: Beyond response speed and accuracy, the results also give us some hints at the study subjects' workstyle, carefulness or attitude to risk taking. The method is now used both in the selection of pilot candidates and, if necessary, in the annual medical screening of active pilots. Besides aviation, it can be useful in various applications from attention testing to psychopharmacology.

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KF: WEARABLE MULTI-PARAMETER BIOMEDICAL MONITORING SYSTEM AND APPLICATION IN AEROMEDICINE

LE SYSTEME DE MONITORAGE BIOMEDICAL DE MULTIPLES PARAMETRES PORTABLES ET L'APPLICATION EN MEDECINE AERONAUTIQUE

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KF (KangFei) system is a wearable multi-parameter biomedical monitoring system, designed for pilots' in-flight monitoring by Beijing Institute of Aviation Medicine, China. It is the first biomedical monitoring product fitting pilots in-flight and has the advanced technology of body monitoring in the world. The invention has applied and obtained multinomial patents and has had the trademark registered. The advanced characters of KF represent as below: the wearable biomedical monitoring clothing (waist belt or shirt) integrates all parts (electrode, sensor, electronic components, wire); two axis-accelerometer and multi-physiological parameter (one or three lead ECG, respiration, skin temperature) are measured synchronously, which distinctly show the pilot physiological change with flight state; the reliably and comfortable dry-electrode structure is used for ECG pickup. The system can record data to flash card or wirelessly transfers data for real-time monitoring. It has been employed in hundreds sorties for pilots examination on different flight task. It was also used for pilots' daily on-ground or sport examination. Without interfering with the pilots' activities, it has been completely accepted by pilots. As excellent performance in mobile environment, the KF system has also been utilized by home health care, patients monitoring, medical study, psychology study, sport and recreational surveillance etc.

CHARACTERISTIC'S OF THREE HUNGARIAN GENERAL AVIATION FORMATION FLIGHT ACCIDENTS.

LES TRAITs CARACTERISTIQUES DE TROIS ACCIDENTS D'AVIATION GENERALE VOLANT EN FORMATION

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Introduction: In 2005 it happened three hungarian General Aviation (GA) formation flight accidents in the airspace on neighbouring countries (Croatia & Slovakia). They caught the eye of the investigating organisations on the operational basis of the hungarian GA.

Methods: In the Flight Year 2005 3 GA accidents occurred during formation flights. 14 airplanes were involved in the three flights and 5 of them crashed, causing 5 casualties and 3 badly wounded pilots & passengers. The Human Factor issues of the accidents were analysed upon the official report of the designated investigation organisations.

Results: Analysis reveals that all the 4 levels of failure within the aviation system (Reason's (1990) model) are accountable for these unfavourable safety rates.

1. Insufficient Legal base: failure to implement of JAR's, missing national regulations
2. Poor control & Legal enforcement of the national CAA.
3. Flight Training Organisations looking for cost saving solutions
4. Individual Factors: No retentiveness power of the actions made by CAA if they detected any violations of the rule. Increased risk taking behavior.

Conclusion: Due to the lack of national regulation of formation flight, the investigation organisations involved in the accident analysis set up joint safety recommendations for flying groups visiting neighbouring countries.

SOME EVIDENCE FOR A NOVEL CONCEPTUAL APPROACH TO ATTENTION TERMED THE “RADAR BEAM THEORY OF ATTENTION”-- AN IMPROVED (?) CONCEPTUAL MODEL FOR SOME VISUAL AND OTHER HUMAN PERFORMANCE CHARACTERISTICS UNDER WORKLOAD AND FATIGUING CIRCUMSTANCES

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Introduction: Enhancements in medical/computer technology have led to an explosion in writings regarding how the brain functions at a neural level, and what we understand about the science of the mind (Edelman, 1992; Kandel, 2006). These Nobel Laureates and others have argued that one of the critical mental processes needing better understanding is “attention”— How do we selectively encode certain information under a wide variety of conditions? Some have referred to such processes as the “spotlight of attention”, components of Multiple Resource Theory, etc. All of these models have positive attributes, and yield functional insights.

Methods: A diverse body of literature has been consulted to support a novel “Radar Beam Theory” of attention with some data. These studies include the fMRI Studies of Novice and Experienced Pilots (Peres et al., 2000), Peripheral Dynamic Vision Under Workload/Verbal Intrusion by Holland (2001), Complex Psychomotor and Visual Performance Studies with/without Fatiguing Conditions (Russo et al., 2004, 2005, 2006), among others.

Discussion: This new approach to the issue of attention deems the “spotlight of attention” framework as conceptually narrow. Rather, attention is proposed to act somewhat analogously to a sweeping “radar beam” as it “lights up” aircraft (in this model the “Radar Beam of Attention” causes certain neural networks to be more actively “highlighted”). Some of the attributes of the proposed attentional radar beam are: uniqueness in individuals in terms of the speed, bandwidth, and capability to process certain types of information, experiential factors, expectations, workload levels, fatigue issues, and psychological, or purely motivational types of issues.

Conclusions: There may be converging evidence from many studies that enables us to think in new ways about how “attention” in the mind can be modeled; and, how this new approach might be a better conceptual framework for future human factors, aviation safety-related, and mind-brain research study purposes.

SPECIAL METHOD FOR ASSESSING HEART RATE VARIAB. DURING PSYCHOL.TESTING

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Introduction: Flight as a work activity requires that the pilot coordinate several different cognitive processes. Using Heart Rate Variability for the analysis of changes in cognitive performance is well known from literature, but the results are contradictory. In our study we focused on task/ECG synchronisation and some special personality characteristics (e.g. repression/sensitisation).

Method: For this reason, in our current study we monitored and analysed the changes in the mean frequency range of heart rate variability as an objective variable, computed from the RR distances on the basis of the ECGs of 28 study subjects – 32±2.5 yrs old, practically healthy male engineer volunteers – (taken by an onboard data recording device which we had tested and adapted) while they were performing a two-hand coordination tracking test in a laboratory setting. We took into account the values of the NASA Task Load Index questionnaire (frustration scale and workload score) as a subjective variable for the evaluation of the results.

Results: On the basis of the data received, heart rate variability significantly decreased in the periods of mental efforts during the work activity.

The study subject's aptitude for a special task and maybe stress tolerance could be determined on the basis of the trend of this parameter during further psychological tests graded according to difficulty, and the subject's underlying psychological characteristics.

Conclusion: The analysis of data obtained in the circumstances of simulated stress may largely contribute to the improvement of training methods and thus to reduction of the inherent risks of work activity.

NEW WAYS FOR OPTIMISED TREATMENT IN MEDICAL EMERGENCIES ON BOARD OF LUFTHANSA AIRPLANES: DOCTORS CARD AND TELEMEDICINE EQUIPMENT

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Introduction: On board of future aircrafts like the A380 and the Boeing 747-800 will be very many passengers during long-haul-flights and among them will be a number of persons with serious diseases.

Subject: In case of medical emergencies, the first aid of a doctor on board, who is willing to help, is a great relief for the crew and the care of the sick passenger. Many doctors are offering their help in medical emergencies during flights, are interested in airline medical equipment, the logistic of Lufthansa Medical Services and aviation medicine topics. The Lufthansa Doctors Card offers the opportunity to unite these interests of physicians and a quick identification of help-offering medical specialists by our Lufthansa crews, in order to achieve a better medical emergency treatment.

A further step to optimised treatment is telemedicine equipment.

It provides the possibility for our crews to contact a physician on a ground station via video conference and data transmission of vital parameters via satellite connection.

Also a doctor on board can use the equipment for easier decision making about the best treatment of the sick passenger in cooperation with a colleague on the ground.

This talk will outline the perspectives of these two new possibilities and their actual status.

Conclusion: Larger airplanes and increase in long haul flights of passengers with severe diseases make it necessary to develop new ways for optimised treatment in medical emergencies on board of airplanes. The Lufthansa Doctors Card and the telemedicine equipment are such new options and will be outlines in this talk.

MEDICAL EMERGENCIES ON BOARD OF COMMERCIAL AIRCRAFT

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Introduction: At this very moment, approx. 1 million people around the world are in the air. IATA airlines transport 2,000 million people, Austrian Airlines transports approx. 10 million passengers a year.

There is one emergency for every 10,000 airline passengers; there is one serious medical emergency for every 50,000 airline passengers.

Small interventions involve opening 15,000 on-board first-aid kits a year; major interventions occur approx. 90-100 times a year. Diversions “due to medical problems” happen 5 times a year; fatalities “on board” or at “check-in” 1-2 times a year; defibrillators are used on board approx. 5 times a year.

The total number of fatalities on the 250 IATA airlines is approx. 2500 a year. In spite of this, there has been no emergency medical provision until now for the approx. 350 passengers who suffer acute illnesses each day.

Methods: In 2004, MTE - Medical Training Europe – initiated the “DOC ON BOARD” project in collaboration with Austrian Airlines. Physicians and emergency paramedics are specially trained to deal with medical emergencies on board and are available to provide skilled assistance to crews even during their private journeys.

A two-day training session, complying with ERC recommendations, is held at the Austrian Airlines Training Centre to train physicians and practising emergency paramedics, in conjunction with cabin crew, to deal with emergencies of this sort, working as a team. The training includes intensive practical exercises on professional emergency and full motion simulators under the guidance of emergency physicians, emergency paramedics, psychologists, communications trainers and experienced emergency first-aid assistants.(CRM)

Results: What are the most common emergencies? What equipment is available on board? What is the legal position? How do flight crews regard medical emergencies and communication with these assistants? Are these assistants (physicians/emergency paramedics) authorised to request a stopover? Who bears the responsibility and who meets the costs? What is the limit of the paramedics' competence in an emergency?

Conclusion: This lecture presents the initial results of training sessions, the experiences of physicians and paramedics, and reports on the limits and future possibilities for First Aid on board commercial aircraft.

AEROMEDICAL IMPLICATIONS OF TRANSIENT GLOBAL AMNESIA IMPLICATIONS SANITAIRES PAR AIR D'AMNÉSIE GLOBALE PASSAGÈRE

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Introduction: Transient global amnesia is a syndrome characterised by the abrupt onset of amnesia, without any focal neurological features. It usually lasts 4-6 hours and no longer than 24 hours. The precise pathophysiology is unknown. Episodes of TGA may recur and may be associated with complications such as cognitive impairment, epilepsy and migraine.

Methods: 11 cases of pilots with transient global amnesia have been seen at the United Kingdom Civil Aviation Authority in the last 18 years.

Results: The clinical features of the pilots will be described. The current literature on transient global amnesia will be reviewed and the aeromedical implications will be discussed.

Conclusions: Proposed guidance for the aeromedical assessment of pilots following an episode of transient global amnesia will be presented.

PREDICTING OXYGEN DESATURATION AMONG AFRICANS DURING AIR TRAVEL

DETERMINANTS DE LA DESATURATION EN OXYGENE CHEZ DES AFRICAINS AU COURS D'UN VOYAGE AERIEN

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Introduction: *Background:* The altitude exposure-related stimulated sympathetic nervous system induces an increase in blood pressure (BP) and obese individuals have the potential for significant oxygen desaturation at this high altitude.

Objective: To determine whether anthropometric parameters and BP explain the variations of oxygen desaturation during pressurized flight.

Methods: *Design:* Cross-sectional study for evaluating black passengers within a commercial aircraft of 4122 feet.

Setting: 51 minutes in flight . Participants: 41 men.

Measurements: Body weight, height, waist circumference, duration of flight, systolic and diastolic BP on the ground (SBPG and DBPG) and during the flight (SBPF and DBFF), desaturation during the flight (SaO_2 ground - SaO_2 flight) were measured. Multiple linear regression was used with desaturation as the dependent variable.

Results: 36% of the variations of desaturation (adjusted $R^2=0.355$) were explained by body weight (Beta=0.451; P=0.001) and SBP during the flight (beta=0.336; P=0.014).

Conclusion: Increased body weight and SBP during the flight are related to the development of desaturation at altitude exposure.

THE IMPACT OF SEX, OVERALL AND ABDOMINAL OBESITY ON RESPIRATORY FREQUENCY, OXYGEN SATURATION AND OXYGEN DESATURATION IN BLACKS ON THE GROUND AND DURING FLIGHT AT DIFFERENT ALTITUDE LEVELS

L'IMPACT DU SEXE, DE L'OBESITE GENERALE ET DE L'OBESITE ABDOMINALE SUR LA FREQUENCE RESPIRATOIRE, LA SATURATION EN OXYGENE ET LA DESATURATION CHEZ LES NOIRS AU SOL ET A DIFFERENTES ALTITUDES DE VOL

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Introduction: The rates of overall and abdominal obesities are becoming epidemic in sub-Saharan Africa. Obesity is associated with oxygen desaturation at altitude exposure.

The objective was to determine the impact of sex, general obesity and abdominal obesity on respiratory frequency (RF), oxygen saturation (SaO₂) and desaturation on the ground and during the flight at different altitudes.

Methods: Men and women (n=28) were compared as well as obese and non obese participants at altitude of 1000 feet (ground), 3200 feet (30') and 12000 feet (30'). 23 men, 5 women, 21 overweight/obese (75% overall obesity : BMI \geq 25kg/m²), and 20 with abdominal obesity (71.4%: waist circumference \geq 94 cm) were the participants.

Results: Women had higher BMI (33 \pm 3 kg/m² vs 28 \pm 3; P=0.019), RF on the ground (25 \pm 2/min vs 21 \pm 3/min, P=0.05) and RF at altitude of 3200 feet (29 \pm 4/min vs 23.6 \pm 3/min; P=0.016). Individuals with overall obesity had higher levels of RF at altitude of 12000 feet (32 \pm 6/min vs 26 \pm 2/min; P=0.016), Delta RF (3200 feet – ground = -10 \pm 4/min vs -6 \pm 1.4/min; P=0.006) and desaturation (3200 feet-ground= 2 \pm 1.2 vs 0.07 \pm 1.3; P=0.021). Those with abdominal obesity had higher levels of RF at altitude of 12000 feet (33 \pm 6/min vs 26 \pm 2/min; P=0.001) and at altitude of 3200 feet (25 \pm 4/min vs 22 \pm 2/min; P=0.011), lower level of Delta RF (3200 feet – ground: -3 \pm 2/min vs -1.3 \pm 1/min; P=0.028), Delta RF (12000 feet-ground: -10.6 \pm 3.5/min - 5 \pm 1/min; P<0.0001), and saturation at 3200 feet (95 \pm 1.4% vs 96.3 \pm 1.2; P=0.05).

Conclusion: Hyperventilation and hypoxemia during the flight occur more easily in women, obesity and altitude in general and more worsen in abdominal with overall obesity, and at altitude of 12000 feet in comparison with altitude of 3200 feet.

EVALUATION OF RELATIONSHIP BETWEEN OCULOMOTOR RESPONSES AND BALANCE SYSTEM IN PATIENTS WITH VESTIBULAR DYSFUNCTION TESTED IN “ HYPERION” FLIGHT SIMULATOR*

L’EVALUATION ET RELATION DES RÉSPONSES OCULOMOTEU7RES ET LE SYSTEME VESTIBULAIRE CHEZ LES PATIENTS AVEC LES DISFONCTION D’APPAREILLE VESTIBULAIRE PENDANT LE TEST ” HYPERION ”

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Introduction: The “Hyperion” simulator is used in the Military Institute of Aviation Medicine to determine an effect of visual stimuli on the balance system, posture stability, spatial orientation as well as the level of sight disability. The data is presented on the simulator’s screen installed in such a way that they create a system partially reflecting a sphere with wide range of the visual field. In the base of the Hyperion simulator a posturograph mounted as its integral element.

Methods: The study involved 30 normal subjects and 30 patients with unilateral lesion to the vestibular organ prior to and after complete central compensation. In the tested subjects 3 tests evaluating posture stability were performed. The first comprises of following with the eyes of the moving point; the second and the third: following with the eyes both vertical and horizontal with black-and-white strips moving at the speed 15, 30, and 45^{0/sec}. “Jazz” multisensor was used to follow oculomotor stimuli while body balance disorders were recorded with posturograph. Recorded parameters were analyzed statistically.

Results: It was found that the best differentiating oculomotor stimulus are the black-and-white strips moving with the speed of 15 and 30^{0/sec}. Oculomotor stimulus moving at 45^{0/sek} seems to be too strong as it produces chaotic body movements, independent on the direction of stimuli.

It was found that population of the normal subjects and patients centrally compensated do not differ statistically whereas the results obtained in the group of patients prior to and after central compensation are markedly different.

Conclusion: The obtained results suggest that the tests with the use of “Hyperion” simulator enable to evaluate the degree of deviation from the normal values in patients with unilateral vestibular dysfunction and the course of central compensation process and consequently their recovery. Performed tests showed a value of “Hyperion “ simulator to examine in future pilots, machine operators, drivers and to train flying personnel.

INVESTIGATION OF THE FATAL AIRCRAFT ACCIDENT IN CZECH AND SLOVAK REPUBLIC

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Introduction: Authors report about investigation of civil and military fatal aircraft accident in the Czech and Slovak republic during the years 1993 - 2006

Methods: We used investigative methods of the Annex 13 by ICAO, according which we have performed inspection of the crash site, external and internal examination at the mortuary with special regard on laboratory examination(histology, serology, alcohol, drugs and biochemical tests). Very important part of Final Report of the BOI were medical report and findings of an aviation pathologist.

Results: We have compared the interwieuus of witnesses, medical records, dental chards, diagram of crash site and investigated circumstances as well with autopsy findings, including laboratory examination. During investigation of Aircraft Accident we have discovered in several cases pathological findings of the cardiovascular and central nervous system . In some cases pilots were affected by alcohol and drugs.

Conclusion: As world literature says, in more than 80 % of Aircraft Accident , the main case was human factor.

THE ROLE OF MOTION CUES IN SIMULATOR BASESED DISORIENTATION RECOVERY TRAINING

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Introduction: Disorientation recovery training is an established procedure for military pilots. Jet-pilots show a superior performance and tend to show less psychophysiological stress reactions during unusual attitude recoveries after training in a motion base simulator. These results could be transferred to a training for VFR-Pilots. The role of motion cues is crucial for VFR-Pilots, as they are normally trained in fix-base simulators.

Methods: 42 VFR pilots were randomly assigned to one of three anti-disorientation training conditions: training with motion, training without motion, control flights with motion. The training was conducted in an AMST Airfox® Spatial Disorientation Trainer. Training effects were evaluated in a test session using different profiles, which may cause spatial disorientation. Performance measures were supplemented by physiological strain indicators, subjective measures and post experimental interviews.

Results: Significant training effects were obtained for the profile “inadvertent flight into IMC”, “Take-off with pitch illusion”, and “Spin recovery”. Performance results indicate positive effects primarily for the motion based training. The no-motion training showed less positive effects or even worsened performance (e.g. in the spin recoveries). The superior performance of the motion-based training was well reflected in heart rate during the exercises, and in subjective measures.

Conclusion: The positive effect of the motion-based training was not restricted to motion sensitive profiles but appeared even significant in the standard situation of inadvertent flight into IMC. Thus the more realistic motion based training should be considered for future developments of trainings, which address human performance limitations. The results fit well into integration of mental trainings in the training of pilots.

CASE REPORT: DEEP VEIN THROMBOSIS (DVT) IN THE MILITARY PILOT

PRÉSENTATION DU CAS: IA THROMBOSE VEINEUSE PROFONDE(TVP) CHER DE PILOT DE L' ARMÉES

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Introduction: In civil aviation cases of deep vein thrombosis (DVT) are well described in medical literature, but cases of DVT among military pilots were rarely mentioned. At CRO/AMC-002 in November 2006 there was a case of DVT suffered by the military pilot of MIG-21. Both prehospital and hospital diagnoses, the treatment and the impacts of the disease on the working ability of the 39 year-old military pilot have been described.

Methods and results: The military pilot with over 1000 flying hours was regularly examined at periodical examinations. During a trial flight on October 16, 2006 he had problems with controlling the plane so for about 30 minutes his right leg was in an uncomfortable position under mild or moderately G-pressure. After 5 days he had a backache so a general practitioner gave him intramuscular injection of diclofenac and dexamethason. Five days before visiting an internist at CRO/AMC-002 he noticed that his right leg has become swollen. The examination indicated: right leg was visibly swollen, D-dimer was increased: 0,41(0,06-0,25) and Doppler of veins in legs showed DVT. He was hospitalised in November 2-15 in UHC Zagreb where thorough examinations were carried out. Due to positive family anamnesis (sister had DVT) he was tested for thrombophilia. After the therapy with low-molecular-weight heparin and warfarin the clinical status has been improved. The patient was released with the therapy: warfarin (6 mg per day) and elastic bandage. PCR analyses showed: FV R506Q negative and FII 20210A spotted mutation. The patient was suggested to do control Doppler of veins. The pilot was forbidden to fly.

Conclusion: The possible causative factors for case DVT in the military pilot are: FII 20210A spotted mutation, lesion of the endothelium in deep vein as a result of an uncomfortable position during the flight and therapy with dexamethason.

MYASTHENIA GRAVIS AND FLYING - THE EXPERIENCE OF THE ISRAELI AIR FORCE

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Introduction: Myasthenia gravis (MG) is the most common primary disorder of neuromuscular transmission. The major pathophysiological mechanism is the formation of antibodies against acetylcholine nicotinic postsynaptic receptors at the myoneural junction. the reduction in the number of acetylcholine receptors results in a characteristic pattern of progressively reduced muscle strength with repeated use of the muscle (fatigue) and recovery of muscle strength following a period of rest. Although MG may affect any voluntary muscle, the extraocular muscles are affected most commonly. Given the current treatment that combines cholinesterase inhibitors, immunosuppressive drugs, plasma exchange, immunotherapy, and supportive care, most patients with myasthenia have a near-normal life span. The literature regarding MG and aviation is scant and no reports considering limitations regarding pilots with the disease can be found.

Methods: We present two cases of military aviators with MG. One was a helicopter navigator who had a myasthenic syndrome presenting with diplopia that rapidly evolved to a generalized disease with bulbar involvement and generalized weakness. Symptoms were controlled with corticosteroids and IVIg. The second was a skyhawk pilot who developed ocular myasthenia that responded to corticosteroid therapy. Both aviators continued their aviation duties between attacks and were grounded during symptomatic periods.

Results: These cases present the two extremes of MG in terms of severity from a relentlessly progressive generalized disease to a purely isolated ocular myasthenia. The implications in terms of flying capabilities are important. **CONCLUSION:** Current guidelines disqualify myasthenic aviators from flying and no waivers are allowed. Based on our limited experience with myasthenic aviators we believe that when the disease is adequately controlled grounding is not necessarily mandatory during asymptomatic periods.

PRELIMINARY EFFECTS OF HUMAN RELATIONS AND INTERPERSONAL TRAINING USING NASA'S COMPUTER BASED TASK

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Introduction: This research project examined the preliminary effects of Human Relations and Interpersonal Training on participants who engaged in NASA's computer-based task. Performance results on the computer-based task were compared to performance results of untrained participants. The goals of Human Relations and Interpersonal Training are to increase individual awareness of cultural differences (e.g., how people see the world, their expectations, norms and roles), and to increase awareness that interactions, rather than "difficult individuals," cause group friction.

Training Method: Each of the two pilot sessions of Human Relations and Interpersonal Training was conducted in 25-hour sessions over 3 days. Each session had eight participants. Participants engaged in a variety of experiential exercises to challenge their usual methods of assessing, reflecting, generalizing, evaluating, and communicating.

Training Evaluation Method Using NASA Task: Teams of four (n=64 total participants) worked on a computer-based task over four days. Participants engaged in the computer-based task twice daily. Forty-eight participants were untrained and 16 were trained with Human Relations and Interpersonal Training.

Results: The mean performance score of all trained participant groups was higher than the mean performance of untrained participant groups.

Future Hypothesis: When sample size of trained participants increases, a statistically significant performance difference between trained and untrained groups is expected.

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NOISE AND VIBRATION AS A CAUSE OF ANXIETY IN ROYAL JORDANIAN AIR FORCE CREW MEMBERS

LE BRUIT ET LA VIBRATION COMME CAUSE D'INEQUIÉTUDE DANS L'ARMÉE DE L'AIR JORDANIENNE ROYALE SERVENT D'ÉQUIPIER DES MEMBRES

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Introduction: individuals occupationally exposed to noise and vibration can be affected physically and psychologically .This study was designed to establish the relationship between the effect of long-term exposure to noise and vibration on psychological status and in consequence on safety in Royal Jordanian Air Force. The study population consisted of aircrew and working staff members on rotary wing aircrafts in Royal Jordanian Air Force.

Methods: A retrospective study during a period of 5 years between (1999-2004) by reviewing and analyzing the records of the flight surgeon and the psychiatry clinics in Royal Jordanian Air Force Medical Services.

Results: A total number of (386) persons of our selected group aged (21-35) years with main age of (28) years who are working in noise and vibration environment with large pressure amplitude and low frequency noise , evaluated physically and psychiatrically and found that (147) persons (38%) of them to have mild to moderate anxiety disorder.

Conclusion: Long-term exposure to noise and vibration may cause anxiety in susceptible individuals especially those who do not use hearing protective measures.

POSTUROGRAPHY AS AN INDICATOR OF FATIGUE AND ITS APPLICATION IN AVIATION MEDICINE

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Fatigue has been reported to be one of the main causes for aviation accidents. As subjective evaluation of fatigue is unreliable, it must be measured with objective methods. On the other hand physiological parameters sensitive to fatigue (EKG, EEG, rectal temperature, blood pressure) are inconvenient to use, difficult to interpret and cost ineffective. An innovative posturographic technique (Tetrax Interactive Balance System) appears to be an objective, practicable, non-invasive and reliable tool to measure fatigue. The device measures vertical pressure on four independent platforms, yielding measures of stability, parameters of weight distribution, synchronizations and intensity values within 4 frequency bands of the Fourier spectrum of postural sway. These frequency bands are differentially sensitive to disturbances of the three main sub-systems of postural control, the visual, vestibular and somato-sensory respectively. Six independent studies carried out with Tetrax on fighter pilots and civilians, deprived of sleep for 24 to 36 hrs, have shown:

- 1) Fatigue causes instability, showing a circadian pattern with a peak at 5 am and a recovery towards 10 a.m.
- 2) The destabilization increases with closed eyes.
- 3) The vestibular system appears to be the most sensitive to fatigue as shown by Spectral Analysis.
- 4) Fatigue induces a weight shift from right toe to left heel, correlating with fighter pilot performance, REM sleep and sleep apnea.
- 5) The circadian patterns of postural measures of fatigue are significantly correlated with changes of rectal temperature, the results of the Stanford Sleepiness Inventory, the PVT system assessing pupil contraction, and Flight Simulator performance.
- 6) There are individual differences in the circadian peaks of fatigue. These differences are controlled by a quick fatigue screening device, the Tetrax FIT Scan.

MODERN DRUGS IN ONCOLOGY AND FITNESS TO FLY

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Introduction: Today's approach to improve results in oncology is to personalize the treatment of malignant diseases by using targeted therapies.

Since we learned to understand tumour biology better and since molecular techniques helped us to research the pathways and mechanisms of increased cell division, new strategies to reduce tumour growth by using antiangiogenic substances, tyrosinekinase inhibitors, metalloproteinase inhibitors, proteasome inhibitors, multienzyme inhibitors, antihormones, and inhibitors of epithelial growth factor receptors and the combined use of these drugs or their use together with chemotherapy have been developed.

Some of these new therapies have to be administered orally some intravenous.

Methods: Studying the published monographs about these modern drugs which are used for the treatment of oncology patients a variety of side effects can be seen in some of them which conflict with the fitness to fly as aircrew member.

The FAA, the JAA / EASA and the aviation medical experts have to evaluate these side effects and how they affect aircrew members suffering from malignant diseases who were put on these medication

Most common side effects of these new oncology drugs are fatigue, skin rash, diarrhoea, chills, fever like symptoms, vision impairment etc.

Results: A variety of the modern targeted therapies in oncology have similar side effects to chemotherapy and therefore pilots, air traffic controllers and flight engineers who were put on these regimens shall not use the privileges of their licences during the period of therapy.

But there are also some of the modern drugs in oncology with less or no side effects which can be tolerated for the therapy of pilots without risk of reduction of aviation safety, like imatinib which was found to be successful for the treatment of chronic myeloic leukaemia or antihormones which are used to treat hormone dependent tumours.

Conclusion: There is a lot of promising modern oncology drugs already on the market or in the pipeline of pharmaceutical companies for a very personalized treatment of malignant diseases based on a targeted approach. Therefore an urgent need exists to evaluate the side effects of each of these new regimens separately, whether they affect aviation safety negatively or not.

AEROMEDICAL EXAMINATIONS BASED ON A COUNTRY WIDE SOFTWARE SOLUTION

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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 pilot's agreement also to others). Authorities can export data for statistical purposes.

EMPIC FCL-M creates a virtual community of all AMEs within one country. Aviation Authorities of Austria, Greece, Hungary, Netherlands and Switzerland already decided for this solution.

Conclusion: Every aviation authority should support their AMEs with a system like EMPIC FCL-M. Aviation authorities save a lot of time due to automation of standard cases.

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SUDDEN INCAPACITATION. NEUROLOGICAL AND AEROMEDICAL EXPERIENCES.

INCAPACITE SUBITE. EXPERIENCES NEUROLOGIQUES ET AEROMEDICALES.

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Introduction, method : I retrospectively reviewed my 626 (65%) neurological and 338 (35%) psychiatric aeromedical expert opinions for risk of sudden incapacitation.

Results: the two in-flight acute psychotic confusional states (Gen. Aviation) disturbed near airport traffic. They did not show up with sudden inability to act like the neurological cases.

The main neurological diagnostic groups are:

12 (2%) , arachnoidal cysts in the middle cranial fossa(AC), 43 (7%) cerebrovascular malformations (CVM: aneurysms,AN; arteriovenous angiomas,AVA; cavernous aniomias,CAV),

44 (7%) strokes, 50 (8%) intracranial neoplasms and seizures/syncopies of unidentified

causes. Complicated forms of migraine can be a symptom for CVM, f.e. AN or AVA and need

aequivalent evaluation. AN bear a high risk of subarachnoidal hemorrhage (SAH) often with acute loss of consciousness (LOC) and a high risk of mortality and morbidity. AVA tend to present with cerebrovascular ischemia and like CAV and some intracranial neoplasms with epileptic seizures.

Every aeromedical case of the mentioned diagnostic groups presented with acute neurological symptoms. This includes single cases of in-flight LOC due to SAH or seizures, survivable only in the two man cockpit.

Simultaneous seizure- and EEG-video recordings (GM, absence, temporal-, parietal-, occipital lobe seizures) will demonstrate the high risk for aviation safety.

Conclusion: for waivers early diagnoses and treatment is essential. Unfortunately pilots often offer symptoms rather late and more often even empty histories. Thus all complicated forms of migraine could not be diagnosed prior to the acute neurological events caused by ruptured vascular malformations. Most of the intracranial neoplasms could have been diagnosed and treated earlier. In some stroke cases the obvious multiple risk factors were not adequately considered by the AME or the pilot. The necessary better prevention depends on medical histories. This needs ongoing efforts of the AME and the pilot, not only in the field of neurology.

Acknowledgement: Prof. Dr. C.E. Elger, Dep. of Epileptology, University Bonn generously provided the simultaneous seizure- and EEG-video recordings.

INTERNATIONAL PARTNERSHIPS WITH THE UNITED STATES AIR FORCE SCHOOL OF AEROSPACE MEDICINE: THEN AND NOW, A MODEL OF SUCCESS

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Introduction: The U. S. Air Force School of Aerospace Medicine (USAFSAM) has a rich educational heritage that began nearly ninety years ago, continues today, and will extend well into the future. Of course, in addition to training the U.S. military in aerospace medicine, international partners share a long history of valuable contributions to this legacy, and we are expanding widely the diversity of international involvement. Of course, the flagship international offering at USAFSAM is the Advanced Aerospace Medicine for International Medical Officers (AAMIMO) course; building relationships and cooperation between nations. The first class graduated in 1960, and, since, nearly 140 countries have participated. Currently, many other learning opportunities are offered to international partners including Aerospace Physiology, Bioenvironmental Engineering, Public Health, etc. Furthermore, our international networking has recently grown to include the export of courses to sponsoring countries; some 20 of these five-to-ten day courses bring the classroom to the student in their country. The 2011 transition of USAFSAM and its components to Wright Patterson Air Force Base, Ohio, will enhance our international opportunities for learning and training.

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

Conclusions: Declining world-wide manpower and financial resources and exponential knowledge growth, compounded by rapidly expanding technological advances, presents a daunting task for the international aeromedical community to stay current. The USAFSAM model offers opportunities for 'World-Wide Team Aerospace' to achieve goals of higher level quality and safety, all the while fostering life-time cooperative international relationships.

HSP 70 AS A MOLECULAR MARKER OF THE BODY CAPABILITY TO PERFORM AERIAL TASKS UNDER HEAT STRESS LOAD

HSP70 COMME UN MARQUEUR MOLÉCULAIRE DE LA CAPACITÉ DU CORPS D'EXÉCUTER LES TÂCHES AÉRIENNES SOUS LA CHARGE DE LA CONTRAINTE DE LA CHALEUR

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Introduction: Heat shock protein (HSP) stabilizes intracellular structures and prevents cell damage due to its protective action. An attempt was undertaken to use HSP70 (Heat Shock Protein 70) as a molecular marker of the body capability to perform aerial tasks under heat stress load.

Methods: The study was performed in the Department of Aviation Physiology, the Military Institute of Aviation Medicine in 17 healthy male volunteers (age 31 ± 5 years, height 179.5 ± 3.8 cm, body weight 89.7 ± 10.4 kg), not acclimated to heat. Prior to the exposure to heat (climatic chamber, $T_a = 55^\circ \text{C}$, RH = 55%, 60 minutes at rest, with rehydration) venous blood was collected for the laboratory tests (hematology, biochemistry, ionogram). HSP70 was assayed in the venous blood leukocytes with western blot technique. Acceleration tolerance was assessed in the human centrifuge laboratory with SACM program (Simulated Aerial Combat Maneuver), measuring the number of increasing acceleration intervals up to the value of +5.5 Gz (1.5 G/sec.). The same tests were repeated after completion of the exposure to heat in the climatic chamber.

Results: An increase in body temperature by $0.9 \pm 0.11^\circ \text{C}$, decrease in +Gz tolerance by mean 45%, an increase in HSP70 expression by mean 24% were noted after the exposure to heat. Higher HSP70 levels were seen in volunteers with better +Gz tolerance.

Conclusion: The obtained results enable to conclude that the HSP70 leukocyte levels are correlated with the individual +Gz tolerance under heat stress load.

TRANSCUTANEOUS ELECTRICAL NERVE STIMULATION ATTENUATED LOWER BODY NEGATIVE PRESSURE/ INDUCED PRESYNCOPE VIA THE MECHANISM OF CARDIOVASCULAR ADAPTATION AND CEREBRAL REGIONAL BLOOD FLOW REDISTRIBUTION

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Introduction. The highly maneuverable property of jet fighter could let physiological tolerance of human to acceleration (+Gz) be easily exceeded, resulting in G-induced loss of consciousness (G-LOC) due to insufficient cerebral blood flow. Lower body Negative Pressure (LBNP) has been used to study the effect of G-force on human. In present study, Presyncope was induced by the exposure of Lower body Negative Pressure (LBNP) in adult healthy man. We like to evaluate the effect of Transcutaneous Electrical Nerve Stimulation (TENS) on LBNP-induced presyncope.

Methods. Nine healthy male were exposed to LBNP (-40 mmHg) until presyncope. Systolic blood pressure (SBP), heart rate (HR), and middle cerebral blood flow (SSmax) were monitored through the experiment. SPECT was performed for evaluating the regional blood flow in brain after LBNP exposure. In the TENS group, the subjects received TENS treatment during LBNP exposure.

Results. LBNP induced presyncopal symptoms including dizziness, nausea, clammy skin, sweating, blood pressure decrease and visual disturbance. LBNP also impaired cognitive dysfunction in items of total trials administered, % errors, % non-perseverative errors and % conceptual responses. During LBNP exposure, SSmax decreased (from 71.4 ± 2.6 to 63.4 ± 2.7 cm/s, respectively, all $p < 0.05$) but SBP and HR increased (from 118.6 ± 7.8 to 145.5 ± 11.4 mmHg, from 67.6 ± 3.9 to 83.5 ± 3.0 beat/min, respectively, all $p < 0.05$). However, SBP dropped suddenly before presyncope happened ($\Delta SBP = 28.6 \pm 5.7$ mmHg, $p < 0.05$). The LBNP-induced presyncopal symptoms decreased in TENS group ($p < 0.05$). TENS also attenuated the SBP drop ($\Delta SBP = 17.0 \pm 3.8$ mmHg, $p < 0.05$). LBNP reduced cerebral regional blood flow in Brodmann area 18, 6, 36, and 2, but increased the regional blood flow of pons ($P < 0.001$). TENS attenuated the decreasing of cerebral blood flow induced by LBNP and increased more significantly in the regional blood flow of pons ($P < 0.001$).

Conclusion. TENS can protect subjects from LBNP-induced presyncope via the adaptation of cardiovascular response and cerebral regional blood flow redistribution.
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AVIATION MEDICINE CONSIDERATIONS IN LONG DISTANCE DELIVERY FLIGHT OPERATIONS

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In 2004 the author flew as a pilot on two long distance ferry flights. One involved the delivery a Beechcraft King Air twin engine turboprop aircraft from Australia to Oklahoma in the United States and the other a Cessna Caravan single engine turboprop aircraft from Scotland to Chicago. Both flights involved extended flight over hostile terrain and ocean. This pictorial presentation outlines some important aviation medicine and human factor considerations that are involved in this type of operation. Factors include cabin egress, survival, toxic substance, fatigue and the increasing problems with bureaucracy as a non scheduled international aircraft in this world of terrorist anxiety.

THE APPLICATION OF HUMAN CENTRIFUGE IN AVIATION MEDICINE

APPLICATION DE CENTRIFUGEUR HUMAIN EN MEDECINE AERONAUTIQUE

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Introduction: The high performance human centrifuge (HC) incl. dynamic flight simulation in Beijing Institute of Aviation Medicine, China, was introduced from AMST Systemtechnik Ges.m.b.H., capable of creating acceleration between $-10\text{ }+10\text{ Gx}$, $-6\text{ }+6\text{ Gy}$, and $-5\text{ }+15\text{ Gz}$. We carried out the screening and training for pilots on the HC.

Methods: 64 fighter aircraft pilots completed +Gz tolerance screening, among which 25 pilots performed high G training on the HC. In addition, 12 pilots experienced DFS flights and 8 pilots had -1.5Gx and -2.0Gx experience on the HC.

Results: The mean +Gz tolerance and qualified rate were $4.25\pm 0.37\text{ G}$ and 70.83%. 16 pilots accomplished the profile of $+7\text{Gz}$ for 10 s, another 4 fulfilled a series of aerial combat maneuvers (SACM), of which the peak plateaus consisted of $+6.5\text{Gz}$ for 45 s, $+7\text{Gz}$ for 10s, $+8\text{Gz}$ for 10s respectively. All the pilots reported that centrifuge experience had a positive effect on their acceleration tolerance improvement.

Conclusion: Centrifuge training appears effective to improve acceleration tolerance. Dynamic flight simulation can further increase the effectiveness of G-tolerance training. The use of modern centrifuge with dynamic flight simulation for training aircrew is absolutely essential. Through ongoing centrifuge-based training and research, a curriculum about centrifuge training may be established.

NATO RTO TG-039 'SPATIAL DISORIENTATION TRAINING': ORGANIZATION AND OPTIMIZATION

OTAN RTO TG-039 'L' ENTRAINEMENT DE DESORIENTATION SPATIALE' : ORGANISATION ET OPTIMISATION.

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Introduction: Research on the underlying mechanisms of SD and hardware improvements will eventually provide substantial protection against spatial disorientation (SD). However, research and technological improvements that deal with SD will require a great deal of effort and resources to implement; decisive changes are a distant goal. For the near term, the only practical approach is to enhance SD awareness training for pilots that can be addressed without delay.

Methods: Current aircrew training in spatial orientation is primarily composed of academic instruction, demonstration and hands-on training. A subgroup of the TG worked on the optimal implementation of the SD training in the curriculum.

Results: This presentation considers a number of issues regarding spatial orientation training: the target audience, for example, pilots, navigators, aircrew (other than pilots), flight surgeons and aerospace physiologists; different pedagogical techniques of instruction to the above groups; timing of training (initial, refresher, transition to type); the feasibility of having different phases of ground-based training in a pilot's career; and finally who should be the trainers. At each phase, essential versus desirable demonstrations of sensory inadequacies and conflicts and discussion of SD traps in type-specific aircraft during operational mission profiles should be discussed. In addition, we will provide recommendations of possible ways to recover from SD. The type of SD demonstration that is more suitable to be presented as ground based as opposed to in-flight will be differentiated. Recommendations also include a guideline for formal evaluation of the pilot's knowledge on SD after training. General and practical advice to enhance SD awareness in aircrew and to maintain the interest of spatial orientation in aeromedical operations for flight surgeons and aerospace physiologists will be given.

Conclusion: With the discussed suggestions it is possible to implement an optimum SD training program for aircrew.

AIRBORNE AEROMEDICAL ANALYSIS CAPABILITY (A³C)

CAPACITÉ D'ANALYSE AEROMEDICAL AÉROPORTÉE

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Introduction: To better understand how pilot state is influenced during flight, the Flight Research laboratory (FRL) of the National Research Council of Canada and the University of Iowa Operator Performance laboratory (OPL) have established an airborne aeromedical research capability that integrates psychophysiological and physiological recording technologies into two flight test platforms consisting of the NRC-FRL Bell 412 Advanced Systems Research Aircraft (ASRA) and the University of Iowa's Computerized Airborne Research Platform (CARP).

Methods: A series of physiological and neurophysiological correlates of pilot performance were measured during real flight that isolated pilot performance on a series of motor, cognitive and perceptual tasks. To analyze the large data files that were generated a custom analysis tool referred to as the Cognitive Avionics Tool Set (CATS) was developed. The Cognitive Avionics Tool Set (CATS) enables multi-sensory operator state classification. Through CATS, it is possible to integrate and synchronize aircraft and mission state data with a multitude of physiological sensors (e.g. EEG, ECG, GSR).

Results: The current results showed differences in EEG patterns across different flight maneuvers and psychophysiological tasks. This initial test case allowed OPL and FRL to ascertain the fidelity of aeromedical recording technologies during flight. Further, the current results show the functionality of CATS.

Conclusions: Pilot state classification in cognitive avionics applications requires sensor solutions that function at a high technical readiness level (TRL) and that are fully synchronized with aircraft state data. The capabilities described herein are available for international collaborative research projects to conduct critical simulated airborne aeromedical experiments. These measurement techniques can be used in the following broad aeromedical programs: (1) Pilot screening and diagnostic measures, (2) The development of new cockpit technologies, (3) Enhancing Safe flight by monitoring pilot state and providing mitigating responses and (4) a basic tool for understanding the physiological mechanisms contributing to flight.

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BRUGADA SYNDROME AND FITNESS TO FLY: RISK STRATIFICATION IN TWO APPLICANTS

SYNDROME DE BRUGADA ET APTITUDE AU VOL: STRATIFICATION DU RISQUE CHEZ DEUX CANDIDATS

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Introduction: Brugada syndrome is characterized by a peculiar ECG pattern and the risk of sudden death. Until recently the fitness to fly for applicants presenting Brugada syndrome has been denied. We raised the question, if a subset of subjects with Brugada syndrome could be defined where fitness to fly is justified.

Methods: Two applicants for an initial JAR-FCL-Medical-Class 1-certificate were referred for cardiological evaluation because of ECG's suspicious for Brugada syndrome. The ECG-patterns were further evaluated by placing the electrodes in different positions and by provocative tests. Risk stratification was performed, and the results were related to the 1%-rule for sudden incapacitation.

Results: The two patients, both male, being 46 (pt 1) and 21 years old (pt 2), had a negative family history for sudden death and had been asymptomatic with regard to tachyarrhythmias or syncope. Pt 1 showed spontaneously as well type 1 Brugada-ECG as type 2 Brugada-ECG and pt 2 only type 2 Brugada-ECG. In both subjects the diagnostic type 1 Brugada-ECG was provoked by application of sodium channel blockers. The risk stratification revealed an annual risk for sudden death of >1% in pt 1 and of <1% in pt 2. Pt 1 was denied for the medical certificate, whereas pt 2 was declared fit to fly.

Conclusion: Applicants with Brugada syndrome can be classified for fitness to fly according to the results of modern risk stratification. Asymptomatic applicants without spontaneously appearing type 1 Brugada-ECG and with negative family history form the lowest risk category and may be considered for fitness to fly.

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Maennedorf, 29.05.2007

AVIATION SAFETY FOR PATIENT SAFETY: TAXIING OR TAKING OFF ?

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Introduction: The techniques of enhancing safety in high reliability industries include anonymous reporting systems, regulations and procedures, error resistant design, mechanization of tasks for reliability, use of checklists, direct supervision, and strong leadership emphasis on error detection and correction. Many healthcare organizations have considered, or adopted some of these. Progress in adoption will be reviewed, with emphasis on the role of aerospace medicine experts in accelerating patient safety.

Methods: Peer-reviewed and general patient safety sources were evaluated. Progress in adoption over the last four years will be presented. Where known, reduction in error rate, and improvement in patient outcomes, will be cited.

Results: Error reporting methods are more widely used, and are sometimes mandatory. Standardization in the form of regulations and procedures is more accepted. Cognitive aids are not widely used, but rare examples have shown dramatic reductions in infection rates. Error resistant mechanical designs are improving. Mechanization of tasks is not often seen. Leadership emphasis on error detection varies. Automation of processes, particularly medication ordering and dispensing, continues, but is fully or partly used in only 27% of US hospitals. Bar-coding systems for bedside medication administration are used in 14%, almost tripling in 3y. Computerized medical records are being adopted, but interoperability and portability is not uniform. Structured communication tools are more widely taught, and fatigue management among hospital staff has significantly increased. Principles of Crew Resource Management are taught by a rapidly increasing number of private and public firms, and can reduce errors by up to 58%, but adoption is not widespread. One CRM derivative, Rapid Response Teams, has demonstrated that resuscitations outside of intensive care units can be reduced by up to 50%. Systems theory and human factors engineering receive more emphasis. Aviation-style simulation for task training is being adopted at a rapid rate, but such simulation is rarely used for team evaluation. Transparency and error reporting to patients and families has significantly increased. Cultural changes away from traditional physician-led hierarchies continue.

Conclusions: Adoption of high reliability organizational culture is increasing, but not exponentially. We are still “taxiing”. The reliability of acute care medicine would increase exponentially if aviation medicine and aviation safety techniques were more rapidly adapted to healthcare settings. Aerospace medical experts can act as catalysts for change by example, teaching, analysis, and personal advocacy.

OPERATIONAL SAFETY HUMAN ERROR FROM THE FIGHTER PILOT TO THE FLIGHT SURGEON

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Introcuccion: Error counting as a method to increase the safety of any operation in the field of aviation was a well known method. The Swiss cheese model of James Reason (1990) is a often used method for this circumstances and it works very well. The problem of this approach is that you need incidents or accidents which you can analyse and it is a model for the past hoping that the future does not chance the implications. Therefore Reason (2003), Dekker (2005) and Hollnagel (2006) proposes the idea of resilience engineering. This means that we need models created under actual circumstances anticipating, where the error points are, which errors can occur, how can the working people recognise that the error has occurred and how this people then to react have. The approach takes into account that normal accidents are caused by normal people under normal circumstances doing their everyday work (Dekker, 2005) which didn't lead to an accident yesterday. This means that most of the accidents have a probability lower than 1: 10 000 000 and we don't want to wait for accidents like Tenerife in the longer past or kaprun in the recent past causing the death of many people to analyse what we should have done that these people would have survived.

Method: Review of actual literature

Results and Conclusion: The postmodern view of the world is an answer to the fact that our working area is much more complicated than all the years before. Due to the glasscockpipts in civil and military aviation and modern diagnostic and therapeutic approaches in the hospital and the consulting room of the flight surgeon the information overflow and with that the increase of possible human errors is a well known fact. Therefore new non linear models of safety management and the transcript from the field of aviation to the field of military operations and special aspects of the area of medicine will be discussed.

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ARTICULAR PATHOLOGY IN AERONAUTICS

PATHOLOGIE ARTICULAIRE EN AERONAUTIQUE

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Introduction : Les études françaises sur la pathologie articulaire en aéronautique sont anciennes et ne concernent que le rachis, oubliant les articulations périphériques. Aussi, une nouvelle enquête a semblé utile. Son objectif était descriptif : évaluer le ressenti des contraintes aéronautiques et l'importance des problèmes ostéo-articulaires.

Méthode : Un auto-questionnaire anonyme a été distribué à 2000 personnels navigants (PN) professionnels (civils et militaires de toute spécialité) vus en visite révisionnelle au CEMPN de Bordeaux ou de Toulon au cours du premier semestre 2006. Le taux de retour exploitable est de 87 % (1732 questionnaires). L'échantillon étudié est composé d'une majorité d'hommes. L'âge moyen est de 38 ans et 10 mois. L'activité aéronautique est harmonieusement répartie entre militaires et civils. La fonction «pilote» prédomine.

Résultats : La fréquence des douleurs articulaires liées au vol (17 %) est peu élevée, comparativement aux données de la littérature. Un navigant sur quatre a présenté une pathologie ostéo-articulaire dans les trois ans précédant l'enquête. Les atteintes concernent presque autant les articulations périphériques que l'axe rachidien. Le genou est l'articulation périphérique la plus touchée (2,6 %), tandis que la répartition des topographies rachidiennes s'équilibre entre les différents segments. Un parallélisme est retrouvé entre le niveau de contrainte des vols et la fréquence des problèmes articulaires.

Conclusion : Les pathologies présentées sont essentiellement fonctionnelles, mais aussi dégénératives, traumatiques et peu souvent inflammatoires. L'impact sur l'aptitude est faible mais celui sur la sécurité des vols non négligeable (1,6 % des navigants estiment avoir mis en jeu la sécurité).

PATIENT TRANSPORT COMPARTMENT

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Accidents and illness during vacations abroad happen much more frequently than one would expect. This is because on the one hand in many countries, particularly in Asia, there simply is a higher risk of accidents happening and vacationers often ignore this and on the other hand because there is generally also a greater risk of falling ill.

Taking a plane home - be it a scheduled flight or a charter flight - is then complicated and requires all kinds of precautions. Particular preparations are necessary in such cases and one also needs a physician with special knowledge of the requirements and special conditions of air transport of patients. This is particularly important when these patients suffer from very severe or even critical illness or traumas from accidents where intensive medical care might have to be provided during the flight.

For about 10 years now Deutsche Lufthansa AG has been the only airline worldwide to offer the possibility of installing a booth-type structure on board of the wide-body aircraft Boeing 747 and Airbus A340 offering a separate space for physician and patient. Inside there is a complete ICU offering the full range of treatment options from ventilation of intubated patients to suitable infusion therapy, cardiovascular monitoring up to defibrillation. Even simple laboratory analysis like O₂ saturation, determination of haemoglobin and blood sugar levels can be performed.

The installation always takes place at the Lufthansa base in Frankfurt. The space required is that of 3 or 4 rows of seats, the time needed about 45 minutes. The booth offers enough space for the patient to be transported lying down plus an additional 45 cm (approx. 18 inches) at the head end of the bed/stretchers. It has enough room for 2 people with all the necessary medical equipment. The space is also sufficient to work comfortably looking after the patient and offering the necessary medical care. All of the equipment installed is tested for suitability of operation under air transport conditions and calibrated accordingly.

The PTC is equipped with the medical devices and medication specified by the user. There is always a flight attendant, i.e. Lufthansa PTC-escort, accompanying the PTC, who on top of his special training as a rule also has some additional training in intensive medicine.

Our PTC offers the enhanced treatment options of an ICU. It provides for complete separation of patient and physician from the regular passengers, who neither see or hear anything from its inside. It also has its own separate power supply. Intercontinental ambulance transports are possible without expensive stopovers, which of course is a big advantage. However, it can only be used on regular scheduled flights. The lead time between the first request for its installation and the installation proper is 48 hours. By now we have an average of 70 critically ill patients transported every year with a clear upward trend of this number. Medical indications range from internal medical disorders to severe traumas due to accidents.

MYSTERIOUS ILLNESS OF AN AEROSPACE WORKER IN A MOLD CONTAMINATED ENVIRONMENT: A CASE REPORT

LA MALADIE AEROSPATAL: LA REPORT.

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Introduction: An interesting case of illness occurred in the summer of 2006 following two years of hurricane damage at the Kennedy Space Center. This involved an employee who was stationed in a water damaged area for a prolonged period during which repairs were being performed in buildings throughout the center. He became ill with an apparent respiratory illness requiring hospitalization for a period of two weeks. He reported for medical evaluation to occupational medicine after the illness, suspecting that mold contamination might have been a factor.

Methods: An Environmental Health evaluation was conducted for the work area, including mold sampling and speciation. The employee was referred to his primary physician for allergy testing. Information regarding the proposed etiology of the illness was requested from the hospital records.

Results: The Environmental Health Evaluation did reveal mold contamination of various species commonly found following water intrusion damage in the ceiling, walls and subfloor. The allergy testing, however did not confirm any significant mold allergies in the employee. The hospital record revealed no known etiology for the illness. The respiratory symptoms were found to recur when the employee was returned to the area, and resolve when he was relocated. Some other employees also had symptoms, but had confirmed allergies.

Conclusion/Discussion: No etiology could be confirmed as the cause of the employee illness (Toxic, metabolic, infectious, cardiovascular or specific pulmonary). Although "mycotoxins" have been suggested as a cause of illness in a few mold exposed individuals, The ACOEM American College of Occupational and Environmental Medicine stance has been that this type of response would require unusual amounts of exposure such as internal bodily intake which is unlikely from undisturbed mold.(even when a mycotoxin producing mold is present). Improved methods of detecting the effects of mold exposure on humans might help solve some of these mysterious cases.

ENHANCING TEAM PERFORMANCE FOR EXPLORATION MISSIONS

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Introduction: Interpersonal tensions during long-duration space missions can threaten mission safety and success. Mission success will depend on the crew's ability to respond adaptively to unanticipated problems and to collaborate under highly stressful conditions. Our research explores effective team interaction, stress-coping strategies, and the effects of training on team performance and cohesion.

Methods: Sixteen gender-mixed teams of five engaged in a search for water in a computer-simulated Lunar environment. Crews were randomly assigned to one of four team training or control conditions: Interpersonal Relations Training (IRT), Team Adaptation and Coordination Training (TACT), Familiarity Control (FC), and Control. Task Stress and Training were manipulated, and Individual Performance, Team Performance, Group Environment, and Cognitive Readiness to perform were measured.

Results: Individual performance reflected task difficulty: higher points were achieved in Moderate than in Difficult missions, $F(1, 60) = 416.18, p < .001$. Individual performance was influenced by training condition, $F(3, 60) = 6.793, p = .001$: Control and TACT players performed significantly better than IRT players. The influence of training condition on individual mission performance differed depending on the difficulty of the missions, $F(3, 60) = 5.705, p = .002$. Team mission success differed across training conditions, $F(3, 12) = 4.815, p = .020$. TACT teams were more than three times as likely to complete a mission as IRT teams. GES subscale scores were tested to determine training effects on cohesion, but no differences were found. Measurement of cognitive readiness using WinSCAT found that Running Memory was the best predictor of performance (RT, Accuracy, and Lapses).

Conclusion: TACT training led to more successful individual and team performance than IRT training. TACT teams completed both Difficult and Moderate missions, suggesting that TACT training helped them adapt to extremely challenging tasks. The Running Memory subtest of WinSCAT proved useful for predicting individual task performance.

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THE ROLE OF THE ALLERGOLOGIST IN THE PRACTICE OF AEROSPACE MEDICINE.

LE RÔLE DE L'ALÉRGOLOGUE DANS LA PRATIQUE DE LA MÉDECINE AÉROSPATIALE.

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Objective: the allergic diseases are considered today as systemic inflammatory diseases produced by physiopathological mechanisms which are both redundant and self-amplifying. The exponential increase, in last decades, of the prevalence of the allergic diseases has a profound impact on all the professional categories; the patients in the aerospace domain require a particular "tailored" approach, guided by efficiency and safety.

Methods: in this respect, the role of the allergologist / immunologist who expertises or advices aerospace personnel is directed towards 4 well-defined directions:

- the diagnosis of the allergic diseases and their demarcation of allergic-like syndromes or diseases; some of the anti-allergic medicines may positively influence the natural history or the outcome of an allergic disease
- the judicious use of the medicines, so that the impact on the security of the flight to be the smallest: minimal or no at all impairment of the psychomotor performances, cardio-vascular security; moreover, the publish of explicit educational papers and individualized guidelines
- clinical research (retro and prospective studies, psycho-neuro-allergology, evaluation of the quality of life) as well as fundamental one (immune changes induced by flight stress)
- the alertness of the authorities and of the flight companies about particular aspects (allergy to foods, to peanuts, the self injector with adrenaline).

Conclusions: passing the border between allergology and aerospace medicine means special medical efforts, due to the swift evolution and redefinition of allergology. The adequate training by double specialization represents the most correct and efficient solution for the optimal management of this populational cohort with a major socio-professional impact, i.e. the patient of the aeronautical milieu.

HIV/ AIDS and FLIGHT SAFETY

PERRY I

UK

HIV/AIDS continues its relentless spread across the Planet despite the introduction of the Anti Virals.

My original letter about the subject was published in the Journal of Aerospace Medicine in 1987. The first Paper about the topic was given by me to the Nordic Aviation Medical Association in 2005 in Oslo.

The paper has been updated since then, as more cases appear, where there is a sudden change in consciousness, when patients change from being HIV Positive to full blown AIDs.

The ICAO recent Working Group has recommended that some cases of pilots who are HIV Positive, and who are stable, should be allowed to fly. This goes against the findings in the cases which are presented here, where a sudden loss of consciousness is a presenting , unexpected and unforeseen symptom.

This presents a severe flight safety problem which cannot be ignored or pushed under the carpet for the sake of political correctness. A literature search will confirm that this loss of mental ability is a sudden presenting symptom, when HIV positivity changes to full blown Aids. This cannot be ignored in our Aviation Community.

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Academician

AIRCREW AND LIPIDS—ARE WE DOING ENOUGH, SOON ENOUGH?

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Introduction: Aviation Medicine seeks to protect the health and fitness of aircrew to have a full flying career. Identification of modifiable risks for coronary artery disease (CAD) has long been a major goal of preventive medicine and Aerospace Medicine. With newer treatment modalities, specifically the statin drugs, a review was conducted to evaluate the use of statins and the lipid profile of those aircrew disqualified due to myocardial infarction.

Methods: The US Army Aeromedical Epidemiological Data Register (AEDR) was searched for aircrew with an International Classification of Disease (ICD 9) code for documented Myocardial Infarction (MI), Angina, and Ischemic Myocardopathy. The use of statins and the lipid profiles in these individuals were obtained, if recorded.

Results: The total number of individual aircrew in the AEDR, which was established in 1984, is 130,395 with 663,000 FDME records. The search found 286 aircrew with a ICD-9 code of Myocardial Infarction, Angina, and Ischemic Myocardopathy. Only 7 cases were found to have statin use recorded. Two (2) cases did not have a recorded lipid profile. Sixty nine (69) 24% had complete lipid profiles for analysis which included Total Cholesterol (TC), High Density Lipoprotein (HDL), Triglycerides (TR) and Low Density Lipoprotein (LDL). 73.9% had TC > 200 mg/dl, 58% had HDL <40 mg/dl, 60.9, 76.8% had LDL > 130 mg/dl. Statins were instituted late in the aircrew career average age 51.8 years Lipid profile indicated high TC and low HDL as indication for drug therapy.

Conclusion: Lipid profiles should be evaluated and early drug therapy instituted to insure a full flying career. Review of current recommended lipid parameters and therapies will be presented.

CAUSES OF TEMPORARY INAPTITUDE AMONG AIR FRANCE FLIGHT ATTENDANTS OVER A TWO-YEAR PERIOD (2005 – 2006)

CAUSES D'INAPTITUDE TEMPORAIRE CHEZ LE PERSONNEL NAVIGANT D'AIR FRANCE PENDANT UNE PÉRIODE DE DEUX ANS (2005 – 2006)

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Introduction : Temporary unfitness is extremely frequent among flight attendants during their aeronautical career. In addition The causes are diverse. Between 2005 and 2006, we reviewed all the flight attendants who had stopped their professional activity for a period greater than thirty days to determine the causes of temporary unfitness.

Methods : During the medical visit after the grounding period ends, the medical examiner is required to fill a questionnaire about the cause of the temporary unfitness. This file is then put in a database.

Results : 1,129 flight attendants were examined : 785 females (mean age 37 years) and 344 males (mean age 38 years). The main causes of temporary unfitness are orthopaedic and rheumatologic disorders (439 cases), followed by psychiatric disorders (167 cases) and gyneco-obstetrical events (112 cases). Other causes are described and a comparison is made with the causes of permanent grounding.

Conclusion : A good knowledge of the causes of temporary unfitness is necessary to implement actions of prevention among flight attendants and to limit the loss of aptitude during their career.

UNILATERAL OPTIC DISC SWELLING IN FIGHTER JET PILOT

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Introduction: Optic disc swelling, with or without decreased vision, has a wide differential diagnosis including intraocular vascular obstruction, orbital tumors, intracranial space-occupying lesions, and demyelinating conditions such as multiple sclerosis. Many of these cases resolve with little detriment to the visual function. In the military aviator, etiological causes from the aviation environment itself as well as the possibility of recurrence require careful consideration.

Case History: A healthy 25-year-old fighter pilot presented to the aeromedical clinic complaining of a 2-day decrease in vision. The decrease in vision was noticed the morning after a F16 flight, during which a less than 10 second decompression episode may have occurred. Visual acuity of the affected eye was decreased to 6/7.5. The pupillary function, brightness intensity and color vision were normal. Marked swelling of the entire optic nerve head, with extension towards the macula was seen. Fluorescein angiography suggested the possibility of a retinal ciliary artery occlusion. Because of the possibility of a ciliary artery occlusion due to decompression illness, the patient underwent hyperbaric chamber treatment. Neurological assessment, including MRI, and inflammatory and clotting work-ups, were negative. His signs and symptoms improved over time and he returned to high-performance aviation. Two years of follow-up, during which he returned to high-performance aviation, has revealed no problem.

Discussion: In spite of extensive investigation, we were not able to definitively define the etiology of this case of unilateral transient decreased vision with optic disc swelling. Nitrogen bubbles ciliary artery occlusion, with a good response to hyperbaric chamber treatment, remains a possibility.

RETURN TO FLIGHT DUTIES AFTER SPONTANEOUS CORONARY ARTERY DISSECTION.

RESTITUTION DES PRIVILEGES DE VOL A LA SUITE D'UN EPISODE DE DISSECTION SPONTANEE D'UNE ARTERE CORONAIRE.

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Introduction: Spontaneous coronary artery dissection is a relatively rare cause of acute myocardial ischaemia affecting mainly young people, predominantly women. Although only around 200 cases had been reported in the literature, the condition is under-recognised and increased use of coronary angiography in patients with troponin elevation will likely identify more patients with spontaneous dissection.

Methods: We report the case of a 38 year old airline pilot with a spontaneous coronary dissection, review the literature and present some recent local data pertaining to this condition.

Results: The patient presented with an acute inferior myocardial infarct. Angiography demonstrated a spontaneous dissection of the proximal posterior descending branch of the right coronary artery, with normal coronary flow, no coronary disease or dissections elsewhere and well-preserved left ventricular function. He was subsequently asymptomatic, had no evidence of inducible myocardial ischaemia and repeat angiography 12 months later showed the dissection flap to be completely healed. 38 patients have presented to Green Lane/ Auckland City Hospital with spontaneous dissection since 1994; 27 (71%) women, aged 19-68 (mean 44) years. 10 had multiple dissections involving more than one vessel at the time of presentation and 2 (both women) developed further dissections during followup.

Conclusion: A decision to return to flying a pilot affected by this condition can only be made on a very individual basis, principally by the exercise of medical judgment in view of the current paucity of medical evidence. The next few years should improve our knowledge and our ability for rational decision making in this difficult area.

PILOTS WITH ALCOHOL & DRUG PROBLEMS, CHANGES BETWEEN 1960 AND 2007

PILOTES AVEC DES PROBLEMES D'ALCOHOL ET DE DROGUES, CHANGEMENTS ENTRE 1960 - 2007

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Introduction: Management of substance abusing pilots has changed dramatically during the past four decades because of significant changes in pilots' personality traits and the mores of their culture.

Methods: I have studied over one thousand such pilot cases between 1960 and 2007. The data is based on the findings of the pilot's Aviation Medical Examiners, psychological testing, psychiatric evaluation, course in rehabilitation and follow-up monitoring data after the pilot's return to flight duty.

Results: Two basic groups emerge from the above data. (1) In the 1970's pilots were military trained in an alcohol-oriented, happy-hour society. Psychological tests revealed conformist, action-oriented, athletic, family men with respect for authority and with obsessive-compulsive, schizoid and mildly anti-social personality traits. After uneventful rehab. They returned to flying with over 90% success rates. (2) By 2007 gradual changes had taken place. Most pilots today are civilian-trained in a multiple drug-permissive society. Psychological tests reveal emotional immaturity, passive-aggressiveness and narcissistic entitlement with non-conformist, litigious problems and attitudes of "flying is my right." Success rates after rehab are declining.

Conclusion: Since genetic predisposition is affected by the patient's personality traits, cultural mores and litigious practices, substance abuse among pilots has increased. Treatment is more complicated because of more frequent psychiatric diagnoses, legal problems and relapses. After-care monitoring time has increased from 2 years to 5 years and more; success rates are declining.

ESSENTIAL THROMBOCYTOSIS

LA THROMBOCYTOSE ESSENTIELLE

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Abstract: Although essential thrombocytosis is a relatively rare illness, it does occasionally occur in aircrew members posing a very difficult challenge regarding aeromedical disposition. With high platelet counts, there is an increased risk of clotting and bleeding that could compromise flying safety. This paper will describe the basics of this illness including signs and symptoms, diagnosis, complications, treatment, and prognosis. Emphasis will be placed on aeromedical considerations concluded by recommendations regarding aeromedical disposition.

AEROMEDICAL ISSUES IN THE SELECTION PROCESS OF CANDIDATES TO THE SPANISH ARMED FORCES. FIVE YEARS EXPERIENCE.

CONSEQUENCES AEROMEDICALES DANS LE PROCES DE SELECTION DE CANDIDATES DANS LES FORCES ARMEES ESPAGNOLES. CINQ ANNEES D'EXPERIENCE.

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Introduction: The aeromedical evaluation and selection process for entering Military Academies is a significant task from many perspectives, but for those who want to pursue a military career as a pilot, the aeromedical related issues are critical. In this paper we analyzed the experience of the Armed Forces Aeromedical Center (CIMA) in relation to the aeromedical reasons for flying disqualifications. We have no evidence of similar data already published in the context of Spanish Armed Forces.

Methods: We have reviewed all physical exams and results corresponding to a period between 2002 and 2006 (5 years), with a total of 2685 exams. We have considered all causes of disqualification included in the Physical Requirements (OM 387/2002) applied for selection processes in our Armed Forces.

Results: We have collected all global data, enclosed in the physical exam form, divided by areas and systems. Data showed the most frequent causes of disqualification. Also we described the correlation between cause of disqualification by year from 2002 till 2006. Ophthalmological findings are far away the most common cause (57,73%), followed by body weight related disorders (2,96%), ENT problems (1,90%), cardiovascular (0,33%) and metabolic (0,25%).

Discussion: We have compared the data obtained with similar experiences produced and published. Reasons for eventual findings are explained in the context of the way, procedures and requirements employed.

Conclusions: The number of physical exams and diagnostic tools used are critical issues for proper application of actual requirements. Several organs and systems play a definitive role in the final causes of disqualification. The specialist in Aerospace Medicine play a key role in the identification of those aeromedical related issues that lead to disqualification.

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ARE AEROMEDICAL EXAMINATIONS IMPORTANT, WHY AND SHOULD THEY BE PERFORMED?

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Ireland

Chief Medical Officer Ireland

According to JAR-FCL-3 pilots shall undergo regular medical assessments to get their medical certificate issued or be recertified.

In continental Europe we have been used to well performed extended medical examinations that not only assessed the present fitness for the medical certificate requested, but also predicted future fitness further than the term of validity of the certificate.

Pilots were used to an Aeromedical Expert and consultant specialists who informed them regarding present fitness, but also on how to stay fit to perform the privileges of the licence required or held.

Under the present regulations and probably future ones the frequency of the medical assessments becomes less and less and the contents get less and less and the requirements become more and more flexible.

How can we explain to industry, private pilots and the public that the medical assessments serve the purpose they are intended for and how shall we assess the applicants?

The role of the cockpit crew member is changing from active input to process control. However, an abnormal situation may arise which can lead to an emergency situation when incorrect decisions are made.

Mental and physical fit cockpit crew, who will stay fit during extended flight duty periods, are required to handle the situation.

The presenter would like to discuss her views on this subject with the audience

POLICY REGARDING ALCOHOL AND DRUGS AT EUROCONTROL MAASTRICHT UPPER AREA CONTROL CENTRE

RODENBURG PE

The Netherlands

Authorized Medical Examiner class 1, President of the Netherlands Society of Occupational Medicine

Affiliation : AME at EUROCONTROL UAC

Introduction : The international organization EUROCONTROL provides Air Traffic Control services through its Maastricht Centre on request of 4-States(above 24000 ft).

European Safety Regulation (ESARR) requires that air traffic controllers do not use psycho-active substances and that management has systems in place to monitor the use of these types of substances. In order to serve Health & Safety in the best possible way, a system to prevent use of Alcohol and Drugs was installed. Additionally a general alcohol-banning-program exists and a healthy life-style is promoted.

Methods : After social dialogue with staff representatives and Unions a system of random testing for the use of alcohol and drugs was introduced.

Before entering the Ops-Room an air traffic controller may be asked to do a breathing-test on alcohol or/and to deliver a saliva-smear, with which a test on the use of several drugs can be done. This is all under the responsibility of the Prevention & Protection-officer. Medical secret is not involved in that stage, but of course the privacy is protected.

When there is a positive result (i.e. the use of alcohol or drugs is determined) the involved line-manager will be informed. Next to other actions, disciplinary measures may be taken. Head of Divisions will inform Medical Service and Welfare Officer. The case will be monitored and help will be offered. Testing on drugs is also done on student air traffic controllers, starting years of training.

Conclusions : In the period 2005 – beginning 2007 a number of ca. 300 alcohol-tests was done, in 1 case too recent use of alcohol was detected. Drugs testing – before years of training and during operational life - resulted in 1 case, where the use of drugs was detected. Appropriate actions were taken.

AN ANALYSIS OF MENTAL WORKLOAD IN PILOTS DURING TRAINING FLIGHTS ON THE BASIS OF PSYCHOPHYSIOLOGICAL INDICATORS

L'ANALYSE DE LA CHARGE COGNITIVE DES AVIATEURS PENDANT DES VOLS DE FORMATION A L'AIDE DE FACTEURS PSYCHOPHYSIOLOGIQUES

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Introduction: In most research projects worldwide dealing with mental workload in pilots on the basis of physiological measurement an ECG recording is used. On the basis of an ECG a number of indicators can be derived, among which the heart rate (HR) is used most often. This indicator is considered to be sensitive to changing flight demands and pilots' experience as well. Heart rate variability (HRV) is another indicator sensitive to mental workload. In spite of its potentially high usefulness and diversity of data for interpretation it has been used in research on mental workload in pilots for less time. This results from high complexity of HRV analysis. The ECG measurement in the training process gives also some information on other occurrent changes. Basing on psychophysical concepts we can draw conclusions about the progress made within the training process or individual differences among pilots.

Methods: The main elements of the simplified measuring structures used in this research are: a system registering ECG signals, an on-board system registering technical and environmental parameters, a system servicing the Flicker Fusion device, a Vienna Determinant Unit and a CISS (Coping Inventory for Stressful Situations) form. This presentation is focused on the analysis of heart rate variability on the basis of ECG record in flight. The analysis involves 24 pilots performing flights in the first stage of their training (138 flights including 566 circles altogether). This stage was specified by repeatability of tasks consisting of basic flight elements performed within specific time regimes and with prescribed flight parameters.

Results: The results of mental effort analysis in the first stage of training show a clear difference between the resting period and that in which the flight is performed. An individual analysis of the LF parameter in normalised units as well as the LF/HF ratio measured in ms^2 , enables to classify the examinees and to distinguish these pilots whose behaviours expressed by means of LF, LF/HF and HR values are distinct from the population average. Such an identification of the examined pilots allows for the assessment of aviation tasks performed by particular pilots. This information can be useful for the instructor, who can decide to change the training process, introduce additional flights, etc.

Conclusion: Due to the complexity of measures and problems associated with their unequivocal interpretation, a full view can be assured only by a wide range of indicators. A complex approach is therefore required using the results of detailed ECG signal analysis, level of task performance, personality, attention processes, mental fatigue, all of which are included in the proposed simplified measuring structures.

THE EFFECT OF SIMULATED MICROGRAVITY ON PROLIFERATION AND VIABILITY OF IMMUNOLOGICAL CELLS

L'EFFET DE LA MICROGRAVITÉ SIMULÉE SUR LA PROLIFÉRATION ET VIABILITÉ DES CELLULES IMMUNOLOGIQUES

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Introduction: Exposure to microgravity may produce changes in the performance of the immunological system at the cellular level as well as in the major physiological systems of the body. Weightlessness suppresses lymphocytic functions involved in the immunity process, such as cell locomotion and expression of antigen.

Objective: The present study was designed to investigate whether the proliferation and viability of lymphocytes are reduced by exposure to rotation in a 3D-Clinostat, which is used to simulate microgravity for cells.

Methods: Twenty milliliters of peripheral blood was collected from each of ten healthy subjects by venopuncture. Peripheral blood mononuclear cells were isolated by centrifugation over a Ficoll-Hypaque gradient. The cells were then divided into two tubes, which were placed in an incubator (37°C; 5% CO₂). One tube was rotated in the 3D-Clinostat (24h and 48h, 1.6RPM) and the other was static at 1G (control). When the microgravity simulation was completed, the cells were cultured in 96-well microplates in complete culture medium for 96h. Stimulation by the selective T-cell mitogen phytohemagglutinin (PHA 2, 1 and 0.5%) was performed in triplicate. The proliferative responses were determined by a modified colorimetric assay.

Results: The results indicate a non-significant decrease in the proliferation and cellular viability to the mitogen stimulation in 24h of simulated weightlessness ($p=0.146$). There was however a very significant ($p= 0.012$) decrease in proliferation and viability after 48h rotation in the 3D-Clinostat. A comparison between 24h and 48h of clinorotation indicate a difference between the results ($p=0.003$).

Conclusion: The present study indicates that the immunological depression associated with spaceflight is not just related to the psychological and physiological stresses that the astronaut are subjected to, but it seems to be also caused by microgravity per se that affects the proliferation and cellular viability.

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BACK PAIN IN PLANES(COCKPIT ERGONOMICS, FUNCTIONAL NEUROORTHOPEDIC THERAPY)

MAL DE DOS DANS LES AVIONS

SCHINDLER BA

Austria

Introduction: Every year the number of pain patients increases. Dysfunctions of the vertebral column represent a major part. Often a connection to different work place systems can be drawn concerning the causes of pain. Our musculoskeletal system is not designed for static work places, where it is not forced to a certain level of physical activity, such as some airplane cockpits. One-sided permanent strain on those workplaces may lead to long term disorders, such as tensions or atrophy in the musculoskeletal system or the spine, as well as dysfunctions in the vertebral joints.

Main: A introduction to different cockpit work places in airplanes will be given. Pointing out the causes and negative effects of bad postures and uncomfortable personal equipment.

Conclusion: Back pain in aviators is a known consequence of constraint workplaces such as in airplane cockpits. Manual therapy and osteopathy can be a helpful treatment for back disorders. Performed with good medical practice there are no negative side effects and JAR-FCL will not be affected in terms of medication.

HUMAN FACTORS IN AIR TRAFIC CONTROL OPERATIONAL ERRORS

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Introduction: Of the thousands of operations handled by controllers each day, only a small number result in an OE; the rate per 100,000 operations in 2003 was .78. Given the projected increase in air traffic, the FAA has focused on reducing OEs. Historically, the data show that many OEs occur during the first 20 minutes after a controller assumes responsibility for a position. This study was designed to assess the human factors involving workload and time-on-position.

Methods: OE data were extracted from the FAA database (1996 - 2004). Analyses were directed toward understanding the relationship between amount of traffic, time of day, and time-on-position.

Results: Of the 8,887 errors in the database, 16% occurred in the first 10 minutes on position; another 16% took place during the next 10 minutes. The percentage (62%) that occurred during the first 30 minutes of the workday was considerably higher than that occurring in the first 30 minutes on position during the remainder of the workday (38% to 47%). The results were roughly consistent across years and type of facility (en route center, terminal, and tower cab). Controller workload (average number of aircraft) did not differ significantly across time-on-position, with 60% to 74% of OEs involving 9 or fewer aircraft.

Conclusions: Temporal factors appear to have a clear role in the occurrence of an operational error, with amount of traffic playing a more limited role. An initial exploration of recently gathered time-on-position data for controllers at two centers suggests that the error frequency may be relatively consistent with the frequency with which position changes occur. The higher incidence of OEs during the first duty period in the work day suggests that "readiness to perform" may be a factor. Additional human factors data are needed to clarify the role of several factors.

Word Count = 297

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PERSONALITY DIMENSIONS IN AIR TRAFFIC CONTROL SPECIALISTS

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Introduction: The 16PF has been routinely administered for four decades to individuals entering the air traffic control profession in the USA. A subset of 38 items has been used to identify candidates that may be medically unfit for the occupation and require further psychological/psychiatric evaluation. More recently efforts have been focused on potential use of the Minnesota Multiphasic Personality Inventory-2 (MMPI-2). This presentation will focus on an overview of the 16PF results as well a recent exploratory study of the administration of the MMPI-2.

Methods: Comparisons of the 16PF profiles of the 2,336 entrants were made with those who completed training and remained in the profession some 17 years later. Information will also be provided regarding the results from the administration of the MMPI to 1,014 students while in training in Oklahoma City.

Results: As a screening tool, the 16PF typically identifies less than 1% of the applicants that require additional evaluation, nearly all of whom are subsequently cleared for entry. Results from the 16PF reveal that the profile of successful trainees is similar to that of all entrants. Generally, controllers are bright individuals, with low levels of tension, bold, self-disciplined, and emotionally stable. Female applicants were markedly bolder than the normative group. The MMPI-2 profiles of the applicants were, with some notable exceptions, within normal limits. A small percentage (approximately 5%) would be considered to be extreme outliers on the MMPI-2.

Conclusions: There was little evidence that any of the 16PF personality dimensions predicted success in the academy screen program. Furthermore, results suggest limited utility of the 16PF to identify applicants who, because of psychological reasons, are poor candidates for air traffic control. The MMPI-2 appears to be a better candidate for use as a case identifier.

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EARLY CATARACT SURGERY FOR PILOTS ? – AN UPDATE

v. SETTEN G

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Purpose: To inform about the current state of the art in cataract surgery in order to decrease the fear for early cataract surgery. **Methods:** Illustration of current state of the art cataract surgery and a review over available intraocular lens implants and rules for surgery and return for duty according to JAR regulations.

Results: It will be outlined that today's cataract surgery is safe and efficient and can be recommended already much earlier than before.

DILEMMA IN AEROMEDICAL DECISION MAKING IN CASES OF LOW G TOLERANCE

LE DILEMME DANS FAIRE DE DECISION D'AEROMEDICAL EN CAS DE LA TOLERANCE DE G BASSE

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Introduction: Cases of low G tolerance are mostly discovered during centrifuge training amongst trained fighter pilots. At times, trainee pilots are referred from Flying Training Establishments (FTE). Challenging the diagnostic skills of the Aerospace Physicians is the absence of suggestive or definitive patho-physiology or inability to rule out low motivation for flying. This paper presents case report of low G tolerance, and the aeromedical decision making issues involved for disposition of such cases.

Methods: Two cases of low G tolerance were referred from FTEs to the Institute of Aerospace Medicine, India, for aeromedical evaluation and fitness for fighter flying. The first case had three episodes of G-induced loss of consciousness (GLOC) while executing combination aerobatics during basic flying training in a turbo-prop aircraft. The second case reported visual symptoms of grey out and black out but no GLOC during his first solo sortie in a jet fighter aircraft after successful conversion sorties with an Instructor.

Results: The evaluation of both the referred cases presented no patho-physiological findings detrimental to aviation duties. Yet both were finally found unfit for flying fighter aircraft.

Conclusion: Referral of cases with suspected low G tolerance is riddled with dilemma for aeromedical decision making. Apparently, the low G tolerance is caused by the inability of the cardiovascular reflexes to withstand G forces. However, it may be the psycho-physiological and not patho-physiological causes that could be the cause of low G tolerance during training. Moreover, it is a diagnosis of exclusion, with evaluation on human centrifuge as the last but evidence clinching tool. In the absence of human centrifuge, as occurred during evaluation of both the cases, the diagnosis was required to be established. Hence the Aerospace Physicians and Physiologists innovatively arrived at the diagnosis to evaluate both the cases to determine their fitness for military aviation duties.

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A PERSPECTIVE ON THE EMERGING TRENDS IN PRACTICE OF AEROSPACE MEDICINE IN INDIA

Une PERSPECTIVE SUR LES TENDANCES EMERGENTES DANS LA PRATIQUE DE MEDECINE AEROSPATIALE DANS INDE

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Introduction: The steady growth of the economy fuels the growth of the aviation sector in India. Large orders for commercial aircraft are being placed, scores of non-Indian pilots are hired to fill the domestic shortfall, and infrastructure is coming up at a fast pace to handle the passenger traffic. The aviation industry is breaking away from the conventional military clientele. Hindustan Aeronautics Limited has showcased 'Saras', the turbo-prop medium range passenger carrier, and hard-sells its Advance Light Helicopter, both in India and abroad. The geo-political situation dictates that the Indian Military shall have a defined global role for itself. Friendly nations regularly conduct joint exercises, including with the Indian Air Force. Indian Space Research Organization has announced the launch of manned mission to Moon within the next decade. All these developments shall influence and determine the future practice of Aerospace Medicine in India.

Methods: This is a concept paper based on the analysis of existing literature, and interaction with colleagues and practitioners in aviation related fields.

Results: Various aspects discussed are the practice of Aerospace Medicine including perceived changes in the practice of commercial and military aviation medicine; contributions expected from Aerospace Physician in Indian space programme; influences of advances in Information Technology on the day to day practice of Aerospace Medicine; Aviation Safety and Human Factors; and Aerospace Research and Training.

Conclusion: The evolving technology defining the evolving face of aviation and space, in turn, shall influence the practice of Aerospace Medicine in India. Besides the technology driven changes, there shall be changes in the role of the human element. This includes aviation safety, passenger care and safety and human factors; decisions about longevity and employability of the skilled manpower in aviation. Besides there shall be redefining of the role of primary care physician, and aviation related public health issues.

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EUROPEAN REQUIREMENTS FOR FIRST AID AND EMERGENCY MEDICAL KITS- CURRENT DEVELOPMENT

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Air-traffic is mounting with an enormous pace. Size of aircraft, duration of long-haul flights and average age of passengers rise as a consequence. The number of medical emergencies is anticipated to increase as well. Therefore, medical care on-board has got into the focus of legislators and airlines. Annex 6 to the ICAO convention recommends medical supplies to comprise of one or more first aid kits and a medical kit and a list of basic equipment to be included. In the JAA Requirements (Joint Aviation Requirements = JARs) the relevant provisions for instruments and equipment for commercial aircraft are included in the Requirements for Flight Operations (JAR-OPS 1). The contents of First Aid kits and Emergency Medical Kits are promulgated in the relevant Guidance material.

Rulemaking focussed on aviation safety. Thus, passenger care was not in the scope of legislators. However, the past years saw an increasing interest in air passenger health issues. On behalf of the European Civil Aviation Conference, an associated body of ICAO, a working group developed - inter alia - recommendations for medical equipment and training of cabin crew. Several JAA working groups, consisting of aeromedical and other experts, used these recommendations to draft proposals to include an extended list of contents in the relevant JAA provisions. As aviation in and outside Europe may be affected, the new proposals are discussed. The progress of the relevant amendments will be discussed with regard to the change in rulemaking due to the transition from JAA to EASA.

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AVIATION SAFETY AND MEDICAL REQUIREMENTS IN EUROPE – DEVELOPMENT

SÉCURITÉ AÉRIENNE ET RÉGLEMENTATIONS MEDICALES EN EUROPE – DÉVELOPPEMENT

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From the beginning of the 1970ies the harmonisation of aviation safety requirements throughout Europe started. The Cyprus arrangement of 01 July 1990 created the JAA (Joint Aviation Authorities). The member states agreed to develop common requirements (Joint Aviation Requirements = JARs), implement them and use them as sole codes. Working methods were cooperation, consensus (achieved by representation of member states and affected interested parties in the relevant working groups on several levels of rulemaking) in order to achieve harmonisation and standardisation. The aeromedical requirements have been promulgated as JAR-FCL 3. The implementation started from 1999 on in the several JAA member states. The original requirements have been updated several times to reflect changes and practical experience with the new requirements. The latest change was published as Amendment 5 of JAR-FCL 3 in the end of 2006.

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AVIATION SAFETY AND MEDICAL REQUIREMENTS IN EUROPE – FUTURE CHALLENGES

SÉCURITÉ AÉRIENNE ET RÉGLEMENTATIONS MEDICALES EN EUROPE – CHALLENGES FUTURES

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In the beginning of the new millennium the pan-European harmonisation in aviation has reached a new stage. The European Aviation Safety Agency (EASA) was created by EU Regulation 1592/2002 and commenced work in September 2003. Whereas Airworthiness was in the focus first, the competency is going to be extended to Flight Crew Licensing (and Flight Operations) in the near future, including Aviation Medicine. Essential Requirements have been drafted, outlining – inter alia - the scope of aeromedical aspects. The legislative process to transfer the legal competence from JAA to EASA is not yet finalised. A common position between EU Commission, EU Parliament and EU Council of ministers is anticipated at the end of 2007. However, rulemaking has been transferred to EASA already, whereas the JAA approach is still in use during the transition period. Implementing Rules (IRs) – outlining the technical requirements - are drafted by transposition of existing JAR-FCL 3 requirements and associated procedures into the EASA template by a small working group of experts nominated by EASA. Different from the JAA approach, consensus will be achieved by public consultation rather than by participation in the drafting groups. The IRs are going to be consulted on as soon as EASA is fully operative and legally competent for Licensing. After adapting the proposals the new requirements will be published and be binding for the EASA members. A rather contentious issue is the project of a set of lighter requirements for recreational activities in Europe, including a much lighter approach in aviation medicine.

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FAA' AEROSPACE MEDICAL CERTIFICATION'S TOP MEDICAL CONDITIONS

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The current PATHOLOGY CODING system used by the Aerospace Medical Certification Division is its own variant. There are only 1000 codes some of which are administrative. Each of these codes with the exception of the administrative ones are cross referenced to the International Code of Diseases – 9. These codes form the backbone of the FAA Document, Imaging, and Workflow system (DIWS), as they are what cause medical cases to move from one area of the division to the next in its electronic workflow. Of the 620,000 airmen currently certified in the FAA there are 194,000 with some pathology. A search of the data tables for calendar year 2006 was performed. This presentation will inform the academicians of the top ten PATH CODES [hypertension on medication, allergic conditions, alcohol (conviction for Driving While Intoxicated), hernia, kidney stone, use of contact lenses, 2 driving while intoxicated offenses, gastroesophageal reflux disease, hay fever, and a medical appeals case]. We will also discuss the top ten codes for which airmen were issued [the same list as mentioned previously], the top ten codes that our aviation medical examiners deferred issuance [hypertension with medication, allergic conditions, defective hearing, functional murmur, hypertensive cardiovascular condition, kidney stone, special issuance file at examiner's desk, alcohol (same as above), wears contact lenses, and neurosis], and, lastly, the top ten codes that resulted in denials. More details of the certification process for these conditions will be given as time permits.

AIRMEN INPUTTING THE FAA MEDICAL EXAM: FAAMedXPress, MARKETING AND IMPLEMENTATION

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This presentation will discuss the process of allowing airmen to electronically input their portion of the medical history. Numerous meetings were held with legal representatives from the Federal Aviation Administration (FAA) representing the privacy act, electronic record processing, and enforcements branch to develop a secure Internet-based system. The airman side of the system was modeled much after the current FAA's Aeromedical Certification Subsystem (AMCS). This is the FAA system that allows aviation medical examiners (AMEs) to input data from airmen medical examinations. It is mandatory for all U.S.-based AMEs. The MedXPress team was most concerned about the public's perception of the process. Since the team believes that there are still many airmen not well versed using PCs, this process was not made mandatory. Thus, the marketing strategy was felt to be of utmost importance. The development of the system was initiated in November of 2005, and the system was placed in production mode on April 16, 2006. A description of the marketing strategy will be discussed. Various methods for AMEs to manage their office performance of FAA examinations will be presented, and a demonstration of the FAAMedXPress screens will be provided. As of this writing, 2,356 airmen have gone onto the website to input their examinations, and 895 have actually submitted their examinations into the server; 359 examinations¹ have been transmitted to the Civil Aerospace Medical Institute for processing.

¹ At the time of the presentation I shall update these numbers.

RUDDER CONTROL COORDINATION DURING TAKE OFF RUN: NOVICE PILOT VS: INSTRUCTOR

COORDINATION DE GVERNAIL DURANT ACCELERATION S'ENVOLEUR: DEBUTANT VERSUS INSTRUCTEUR

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Introduction: For single engine pilot students keeping the centerline during take off acceleration, counteracting the propeller torque is a main issue. The coordination of throttle control, rudder control and side wind can be difficult. The investigation was done detect foot pressure and to establish a biofeedback tool to improve instruction for students.

Methods: Novel® insoles were used to collect plantar pressure data during take off (T/O) run. These insoles come with 128 capacity sensors for each soft boot (calibrated before flight). The single engine, 100 horse powered DV20 aircraft (Diamond®) was used at LOWN to simulate the torque effect, the foot pressure at the rudder-controls were recorded from lining up at runway 10 (1067mx23m) and during T/O run. The wind-direction and intensity was taken from the tower, start-information. Instructor and student were measured randomized and alternately, centerline deviations were controlled from outside, test with take off point outside a 6m strip from center were not taken into calculation.

Results: The maximum force of the student's foot (l) was 52.58 Newton (N) (+/- 42.3), the mean pressure was 34.19N, (+/- 30.81N). The average pressure per cm² was 3.5N (+/-1.79N). The instructor's maximum force (r) was 76.86 Newton (N) (+/- 24.34), the mean pressure was 47.0N, (+/- 21.13N). The average pressure per cm² was 7.3N.

The instructor brought the pressure in shorter time on the pedal and used mainly the foot tip.

Conclusion:The instructor's foot pressure peaks at the rudder control were higher than the student's foot pressure during T/O run (n=20). The instructor pushed more accurate and focused on the tip.

The student had a slower increase of pressure during counteracting centerline deviation. The graph can visualize the muscle force and coordination, giving a bio feed back and a possibility to improve novice pilot's training. (296 words)

SYMPTOMS OF HYPOXIA REMEMBERED FROM PREVIOUS TRAINING REFLECT T SYMPTOMS AIRCREW REPORT AFTER ACUTE HYPOXIA.

LES SYMPTÔMES DE L'HYPOXIE SE SONT RAPPELÉS DE LA FORMATION PRÉCÉDENTE REFLÈTENT LE RAPPORT D'ÉQUIPAGE AÉRIEN DE SYMPTÔMES APRÈS L'HYPOXIE AIGUË.

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Introduction. A person's manifestations of acute hypoxia are unique and not believed to change dramatically over time. Previous studies have found that significant proportions of aircrew who experienced hypoxia-related incidents were able to recognize their 'hypoxia signature' because of similarity to symptoms they experienced during hypoxia awareness training. This study aimed to explore the degree of similarity between the symptoms experienced during acute hypoxia and those remembered from previous hypoxia awareness training.

Methods. A bilingual (English-Arabic) questionnaire listing 22 symptoms of hypoxia was distributed to aircrew during aviation physiology training - at the beginning of the hypoxia lecture and again after hypoxia awareness training.

Results. Cognitive and psychomotor impairment dominated the symptoms reported after acute hypoxia (73% of aircrew reported poor concentration; 67% reported confusion and slowed reaction time). Cognitive and psychomotor impairment also dominated the symptoms remembered from previous hypoxia training (71% of aircrew remembered poor concentration, confusion, and impaired memory; 69% recalled slowed reaction time and incoordination). Aircrew reported a mean of 16 hypoxia symptoms on both surveys. 65% of aircrew experienced during acute hypoxia the five symptoms they remembered to be dominant from previous training; 57% of aircrew remembered from previous training the symptoms that dominated their experience of acute hypoxia.

Conclusions. The high level of agreement between the symptoms aircrew describe after acute hypoxia and the symptoms aircrew remember several years later suggests that hypoxia awareness training is an effective method of enabling aircrew to recognise their 'hypoxia signature'.

HYPOXIA IN BILINGUAL PILOTS: A REVIEW OF THE LITERATURE.

HYPOXIE DANS LES PILOTES BILINGUES : UN EXAMEN DE LA LITTÉRATURE.

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Background. From 2008, the International Civil Aviation Organization (ICAO) will require all pilots operating in international airspace to speak and understand 'plain English' with vocabulary, syntax, and pronunciation that 'rarely interferes with communication'. Speech during hypoxia is typically slurred, slow, and hesitant; expressive and receptive aphasias have also been reported. However, these effects have been reported for people speaking their first language (L1). Studies have not evaluated the effect of acute hypoxia on second-language (L2) performance, even though this was considered a significant factor in the loss in 2005 of 121 passengers aboard Helios Flight HCY522. The vulnerability to hypoxia of the frontal cortex, basal ganglia, and hippocampus has been well-documented. In the 'declarative-procedural model' of memory adapted by Ullman and by Paradis for bilingualism, a distinction is made between language functions in L1 and L2: L1-syntax is 'procedural', controlled by fronto-basal ganglia circuits, whereas L1-lexicon is stored in 'declarative memory', controlled by the hippocampus. By contrast, both L2-syntax and -lexicon of moderately-proficient late-bilinguals are thought to be a function of the declarative memory system. Neurodegeneration of the hippocampus and of the basal ganglia produce characteristic impairments of L1 and L2 language skills; language of bilingual patients with Alzheimer's and Parkinson's diseases may provide a disease-analogue with which to explore language skills in bilingual aircrew with acute hypoxia. This presentation will review the literature on the effect of acute hypoxia on speech and communication, and explore an as-yet-unknown aspect of hypoxia – its impact on second-language performance. Possible vulnerability of late-bilingual aircrew to mis-communication during loss of cabin pressure, and the implications of this for flight safety will be discussed. Literature from aviation and environmental medicine as well as from linguistics and communication sciences will be reviewed to propose a methodological foundation from which to explore the possible impact of acute hypoxia on second-language performance in late-bilingual aircrew.

LUFTHANSA MEDICAL SERVICE – THE CONCEPT OF PASSENGER´S CARE

LUFTHANSA SERVICE MEDICALE - LE CONCEPT DU SOIN DU PASSAGER

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54 Million passengers chose one of our Lufthansa flights in 2006.

Due to the demographic trend the average passenger becomes older. He/she is normally fit and rich enough to travel around by plane much more intensive as former generations could do. Elder passengers often are chronic sick and must be medically cleared by the airline medical departments before they enter a plane.

In case of accidents or sudden severe illnesses at the destination those passengers request repatriation flights by their carrier. The major carriers do follow two different strategies to cope with these medical transports. By June 2006 one major carrier in Europe stopped stretcher transportation on their flights because these are cost intensive and complicated due to patient related delay or diversions.

Lufthansa decided to follow another strategy.

October 2006 Lufthansa established a new unit responsible for passengers care on all Lufthansa flights. According to the existing system some new components were fitted in and others came under a new organisational roof of the Lufthansa Medical Services. The main goal for LH- Medical Service is a maximum short reaction time for organizing medical transports on request of our travellers or customers like assistance organisations or travel agencies. For this a 24hrs / 7 days call centre for all medical requests was established.

Since November 2006 a new additional oxygen device based on carbonfiber cylinders, 300 bar technology and an intelligent demand oxygen delivery system and integrated pulse oxymetric system is available on board of all Lufthansa long and short haul flights. This oxygen equipment enables our passengers to fly at cabin pressure of 8000ft between 10 and 20 hrs depending on the flow rate which is equal to constant flow rates of 2.6 and 5.5 ltr /min.

The Doctor´s and First aid kits were renewed to a modular system consisting of seven state of the art and self explaining modules. This makes it much easier for helping medical doctors on board to understand the content of Doctor´s - and First Aid Kits and to use it correctly. New medication which were frequently asked by intensive care specialists like Amiodaron, Ketanest or Dormicum are now available on board of our aircrafts. These kits are in operation since April 2007.

The Lufthansa Passenger Transport Compartment is now integrated in our new medical service unit .Three of these PTC - intensive care units are in operation now. Two for B 747 and A 340 are operating out of Frankfurt Hub. One for A – 340 is operating out of Munich Hub. The PTC is well accepted. We expect that 2007 more than 100 transports will be done.

BIO SIGNATURES IN STRESS AND FATIGUE RELATED PSYCHOLOGICAL MILIEU

LES BIO SIGNATURES GENETIQUE POUR LES ETUDIES PHYSIOLOGIQUE (PAR EXEMPLE FATIGUE ET STRESS)

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Introduction: Specific genetic response suites in human lymphocytes in response to microgravity are necessary to further study for physiological adaptation to new milieu. Blood traverses through most organs and hence is an overall physiological predictor. Animal models such as the hind limb suspended mouse were also used to corroborate the human “*in vitro*” studies.

Methods: Human lymphocytes from 5 normal donors and were cultured in 1g (T flask) and modeled microgravity (MMG, rotating wall vessel) for 24 and 72 hours. Cell samples were collected and subjected to gene array analysis using the Affymetrix HG_U95 array. Data was collected and subjected to a two-way analysis of variance. The mouse studies were initiated in hind limb suspended mice (microgravity model) for one week and gene regulation in control (1g) and hind limb suspension (micro g) were analyzed similarly.

Results: Genes related to the immune response, cardiovascular system and stress response were then analyzed. These three groups focus on human adaptation to new environments. The phosphoinositide kinase (PI3K/Akt) and Raf/MEK/ERK signal transduction cascades are pivotal in transmitting signals from membrane receptors to downstream targets that regulate apoptosis, gene expression, and cell growth. Our results show down regulation of key genes in this pathway. This pathway has also been shown by others to be sensitive to ionizing radiation. Cardiovascular biomarker expression placental induced growth factor (PIGF- < 6 fold, $p < 0.001$) and stress response gene expression (HSP 90- $<$, < 3 fold, $p < 0.001$) also presented an aberrant response in analog microgravity. These results were also confirmed in the mouse model of microgravity.

Conclusions: Differential responses in stress related effects such as the immune response, cardiovascular biomarkers, and stress genes will be presented. Usually these genes are up-regulated in response to stress. The down regulation of these key genes might indicate detrimental changes in the immune system and cardiovascular system. PIG-f is now clinically considered a more specific biomarker for predicting stroke and heart attacks than C-reactive protein. It can also be detected in early onset of cardiovascular dysfunction. In analog microgravity the expression of this gene is up-regulated by more than six fold indicating deregulation of cardiovascular signaling pathways. These studies are especially relevant to civil aviation, defense (fatigue studies), space exploration and high altitude environments.

ASTHMA IN MILITARY AVIATORS: A WORK IN PROGRESS

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Introduction : Asthma in an aviator raises concerns due to its episodic nature, seasonal exacerbations and potential for incapacitation in flight during an acute episode. Military aviation, like solo flying in high performance aircraft and combat flying, exposes aviators to additional stresses not normally encountered in civil aviation (Hypoxia, positive pressure breathing, pulling of high G-forces, anti-G maneuvers). Aspirant aviators with past history or current evidence of bronchial allergy/asthma, at entry level, are made permanently unfit for military flying. This study summarizes our experience with trained and experienced military aviators suffering from bronchial asthma, their evaluation, management protocols and final medical disposal with regards to flying fitness.

Material and Methods : The medical documents of all aviators diagnosed as bronchial asthma between Jan 1997 to Dec 2006 were reviewed. Clinical examination, investigation details and treatment administered recorded by a physician and aviation medical specialist were analysed.

Results : In the period between Jan 1997 and Dec 2006, 20 cases of bronchial asthma were diagnosed in military aviators., of these 19 were pilots, 01 a Indian Navy helicopter pilot. 3/20 (15%) never recovered and continued to have moderate to severe asthma and were permanently grounded, 2 cases were still under observation on ground category with mild asthma while 2 were given waiver for restricted flying in multi crew transport aircraft. The remaining 13/20 (65%) were returned to flying

Conclusion : With proper evaluation and treatment a significant fraction of aviators with asthma can be reflighted. A proper protocol for the evaluation and treatment of asthma in aviators needs to be followed. A protocol is suggested.

Learning objectives for the delegates:

Asthma in an aviator should be diagnosed after proper adherence to diagnostic criteria. With proper management, a large number of aviators with asthma can be returned to the cockpit.

SLEEP, CIRCADIAN RHYTHMS AND FATIGUE IN AVIATION: A SURVEY OF THE AWARENESS AND ATTITUDES OF FIGHTER PILOTS

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Introduction: Fatigue subsequent to sleep loss, circadian rhythm disruption and shift work in aviation is an insidious threat to aviation safety because of the resultant impairment in alertness and performance. It is imperative that any intervention program for fatigue utilizes and incorporates relevant indigenous data. There has been no detailed study on the causes of fatigue among aircrew in the IAF. Therefore any countermeasures adopted or suggested in its absence would remain theoretical. This study was therefore undertaken to develop an understanding of the awareness of fatigue among aircrew with regards to sleep, circadian rhythms, shift work and fatigue.

Methods: This comprehensive questionnaire study was carried out from Dec 2003 to Feb 2005 at the Department of Human Engineering and Human Factors in IAM.

Results: A total of 83 aircrew participated in this questionnaire. The mean age of the respondents was 28.90 ± 3.72 years. Almost a third of the aircrew (33.7%, $n = 28$) stated that they had felt sleepy/drowsy in the cockpit due to sleep deprivation at some time or the other. The most frequently identified manifestation of fatigue was loss of concentration followed by a feeling of laziness. Aircrew rated decreased attention, increased reaction time, lapses in concentration and poor aircraft handling as the four predominant performance parameters that were affected with fatigue. For majority of the aircrew, tea/coffee was the preferred countermeasure.

Conclusion: This study provides insights into aircrew attitudes on various aspects related to fatigue. They appear to be incurring sleep debt during the workweek that they repay during the weekend. A sense of overconfidence /complacency possibly explains the belief that they may be able to operate with full flying efficiency despite 1-2 hours of sleep loss. Aircrew are aware of the decrements in flying performance subsequent to fatigue but are not well versed about the beneficial effects of napping to improve performance when fatigued. They consider their squadron medical officer to be the best person to educate them on fatigue, however the content and dissemination of information about fatigue needs to be reinforced.

UNRAVELING CLINICO- RADIOLOGICAL INCONGRUITY IN AIRCREW WITH MUSCULOSKELETAL DISABILITIES

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Introduction: Aircrew with musculoskeletal disabilities, in particular, those affecting the spine do not exhibit similar patterns of recovery. Despite poor correlations between radiological findings and clinical symptoms, clinico-radiological correlation does remain an important component of aeromedical decision making. We have coined clinico-radiological incongruity for the syndrome complex where clinical symptoms are not commensurate with the radiological findings. Psychosocial factors at home and work place that could influence recovery in such cases need to be explored.

Methods: Representative case details are described in brief. Case I. A 28 yr old fighter aircrew had low backache with radiological evidence of mild disc bulge L5-S1. He responded well to conservative management but developed low back pain on exposure to Gz stress. Psychological assessment revealed a possibly lowered motivation for fighter flying. After two years of follow up, he was eventually re-streamed to transport flying. Case II. 24 year old navigator was managed conservatively for sprain left ankle. Clinical and radiological examination did not reveal any abnormality, but the aircrew continued to complain of ankle pain even one year after the sprain. During his psychological evaluation, he admitted that he did not want to fly. He was counseled, and after six months up graded to flying category. Case III. 32-year-old helicopter pilot was diagnosed as a case of bilateral patello-femoral arthritis. Psychological evaluation brought out lowered motivation for flying. At the end of two years of observation in non-flying category he was made permanently unfit for flying duties.

Conclusion: These case reports represent a spectrum of cases where the clinical profile does not match that described for the particular illness. Motivation for flying as well as psychosocial factors affecting recovery need to be looked into when evaluating such aircrew.

THE INFLUENCE OF APRL MANEUVER ON THE RESIDUAL EFFECT OF CORIOLIS ILLUSION

L'INFLUENCE DE MANOEUVRES APRL SUR L'EFFET RESIDUEL D'ILLUSION CORIOLIS

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Introduction: Coriolis illusion, which is caused by tilting one's head during whole-body rotation, is recognized as a very dangerous scenario in flight. Its cross-coupled stimulus to the semicircular canals will cause vestibular nystagmus and result in impairing visual acuity. Moreover, it will lead to overwhelming, incapacitating spatial disorientation. The APRL maneuver, a repeatedly yelling action generated by contraction of abdominal muscles, was previously developed by us and it's the acronym of Aviation Physiology Research Laboratory. Neurological studies have evidenced its effectiveness in shortening the disorientation duration by awakening the cerebral cortex or by modifying the ascending vestibular input. This study continues our previous research and investigates if APRL maneuver can depress the sweeping motion of eyes after cross-coupled stimulation.

Methods: Twenty-one flight surgeons (18 males, 3 females) voluntarily participated in this study using a disorientation demonstrator (DISO). They were asked to tilt their head and relocate some switches when the DISO had been accelerated to 25 rpm for 30 seconds. Then they repositioned their head and started to read a visual acuity test card 5 seconds after yelling or not. Meanwhile, EEG and EOG were recorded simultaneously and computed later using a fast Fourier algorithm.

Results: We arbitrarily classified the subjects into ineffective group (N=10) and effective group (N=11) based on the depression of EOG. By comparing the two groups, we found higher EOG activity (9.4 ± 0.3 vs $8.5\pm 0.4\mu V^2$) and lower EEG activity (12.0 ± 1.0 vs 12.7 ± 1.0 Hz) in the ineffective group, whereas lower EOG activity (7.5 ± 0.6 vs $9.0\pm 0.2\mu V^2$) and higher EEG activity (13.2 ± 0.8 vs 11.9 ± 1.2 Hz) was recorded in the effective group. On the other hand, the APRL maneuver significantly reduced the time consumed in card reading even though it did not improve the visual acuity significantly.

Conclusion: Performing APRL maneuver when occasionally exposed to Coriolis acceleration can facilitate recovery from illusion. Proper practice of this maneuver may also inhibit nystagmus.

TELEMEDICINE FOR AVIATION INDUSTRY / THE PRACTICALITIES

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With the increasing duration of long-range flights, combined with a rise in passenger demographics and litigation risk, airlines are actively looking to address the issue of in-flight medical incidents. It is important that telemedicine solutions focus on the specific requirements of the aviation industry if they are to offer a practical response. This presentation discusses the practicalities of using telemedicine to assist in the handling of in-flight medical incidents. Have telemedicine devices progressed to a level of simplicity where they can offer genuine support to airlines and their crew and how have communication issues surrounding the transmission of vital signs data been resolved?

The paper will focus on a case study built around a real life in-flight cardiac incident handled using telemedicine equipment on a commercial aircraft. It will show video and audio footage of the actual incident and discuss whether the crew and ground-based doctors felt the systems offered genuine support and improved the outcome of the incident.

It will address the key issues associated with using telemedicine devices in the aircraft environment:

- Do they add real value or are they just a “nice to have”?
- How practical are these devices for the crew to use on an intermittent basis?
- What are the communication issues?
- Can these devices aid faster treatment if required?
- What are the litigation issues?
- Can they help during most or only a few specific medical incidents?

The paper concludes that appropriately designed telemedicine solutions do prove an effective solution to handling in-flight medical incidents on long haul routes and decrease litigation risk, while improving the overall quality of both crew and passenger care.

SPATIAL DISORIENTATION TRAINING IN THE NETHERLANDS

L' ENTRAINEMENT DE DESORIENTATION SPATIALE DAN LES PAYS-BAS.

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Introduction: Some twenty years ago Spatial Disorientation (SD) was a major cause of flight accidents in the RNLAf. Countermeasures consisted of academic instruction about SD and demonstrations of the underlying visual-vestibular illusions. In order to diminish the incidence rate, upgrades of the motion platforms were needed for demonstration of flight-related SD illusions. Since night vision devices, such as night vision goggles (NVGs) and thermal imagers, have their limitations that may lead to SD, more attention in the course to these effects was deemed necessary as well.

Method: Based upon the experience we gathered with SD demonstrations and training in the Airfox Diso, we specified Desdemona, an advanced motion platform for SD countermeasures training. Recently Desdemona became operational in Soesterberg.

The SD course was also upgraded with demonstration of basic night vision goggles and thermal imagers related visual illusions, whereas the in-flight illusions are demonstrated with a night vision model board.

Results: The SD training program for the RNLAf is now up to date and operated by the Center for Man and Aviation (CMA) together with TNO. The flexible programming structure used for Desdemona allows for aircraft type specific SD demos or demonstration of SD threats due to specific environmental circumstances.

Conclusion: The SD training course provided by CMA and TNO for the RNLAf is in line with the recommendations as formulated in the RTO TG-039 report on 'spatial disorientation training: demonstration and countermeasures'.

AEROSPACE MEDICINE – WORLDWIDE HARMONY

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Flight Surgeons are responsible for the health and welfare of pilots and other individuals working in the Aerospace environment. During World War I surgeons took on the added responsibility for pilots and the “Flight Surgeon” was born. Those first Flight Surgeons were isolated from their peers, so each of them was on his own to determine whether or not a pilot should fly on a given day. There were no common data bases. Each case was decided on its own merits with the outcome being very dependant on the experience of the individual Flight Surgeon. The world is much “smaller” now. People wake up on one side of the globe, and go to bed 12 time zones away. This paper will discuss the value of the physical examinations we perform, the value of consistent medical standards, and the reasons for members of the aerospace community to work together.

**DOES THE AEROMEDICAL ASSESSMENT PLAY ALSO A PREVENTIVE
ROLE OF EXAMINATION ?**

EST-CE QUE LES EXAMES MEDICALS SONT AUSSI CEUX PR0VENTIFS ?

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Author thinks about the preventive role of a regular medical check of pilots, explains the medical assessment from the pilot's point of view and from the doctor's point of view which are different. There is also a different attitude of patients and pilots in the consulting room. Pilots feel healthy and they hold back their problems.

Then the author describes a case of 60 years old transport pilot who has dissimulated his problems more than 2 years and he died on stomach cancer after 5 months from the last aeromedical check.

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THE CONCEPT OF PILOT PROFESSIONAL HEALTH PROTECTION

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Introduction. The aim of work is foundation of flight personnel (FP) professional health (PH) concept and the development of efficiency estimation criteria of medicine performance on its preservation and flight safety insurance.

Method. On the basis theoretical development in the field of aerospace medicine, the data of investigation of human organism ability to keep set compensatory and protective mechanisms and to provide professional serviceability in all conditions of activity. The concept of FP PH is based on two basic groups of factors - factors of flight performance and physiological systems participating in their influence realization.

Results. Interaction of these groups of factors was considered on syndrome-similar conditions models, and basic level of realization of interaction - adaptable potential formation and maintenance. The preventive cascade concept of rising of person organism tolerance to the influence of unfavorable ecological, professional social factors was developed. The main principles of the cascade are reduced to an estimation of injuring effects risks on the basis of exposition, absorbed and effective doses ratio. The base for construction of professional health concept is elements of human factor concept (HF). High efficiency and reliability of aviation system functioning is achieved only in condition of development of its components taking into account pilot characteristics. Prophylaxis of erroneous actions is perfection of components of aviation system which are responsible for flight personnel characteristics and determine the contents, organization and conditions of his activity.

Conclusions. Thus, the basic directions of HF safety increase, following from the preventive cascade concept of PH conservation consist in the following: medical and professional selection, the forecast, diagnostics, dynamic medical control, examination; normalization of factors, ergonomics of "man – machine" systems, protection; training and education, development of professionally important psycho physiological qualities, tolerance increase to factors; correction, restoration, rehabilitation.

THE EUROPEAN ASSOCIATION OF AEROSPACE MEDICINE

L'ASSOCIATION EUROPEËNNE DE MEDECINE AEROSPATIALE

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Introduction: In Europe we are heading for a single European regulator, EASA, the European Aviation Safety Agency based at Cologne, which is becoming the Civil Aviation rule maker and all National Authorities of the European Union Member States will have to implement these rules.

Methods: National European Aero-Medical Associations wanted to become a scientific partner for EASA, and influence by their experience and knowledge the political or technical decisions to be made. At the same time the National Associations and their medical cultures have to be kept in a common forum.

A new pan-European Association needed to be created in order to be able to discuss aero-medical issues with the European Union at an international level.

ESAM was founded on 11th March 2006 at Frankfurt by 10 National Associations, and held his first General Assembly on 18th November 2006 at Brussels where 19 Associations attended to vote the Statutes and elect an Executive Committee. Contacts with EASA, the medical group of the AEA and the military European Air Group are established. A questionnaire about aviation medicine training throughout Europe was circulated and a website www.esam.aero created. ESAM is recently accepted as an Affiliated Member to AsMA and was responsible for a panel about "Medical Examination for Flying Personnel" at the 78th AsMA Scientific Meeting at New Orleans.

Military Associations, representative Associations of pilots and ATC are also welcome as associated members.

Conclusions: According to the Statutes ESAM shall work for the safety and health for all persons involved in aviation and space operations, including passengers. It shall be a pan-European, independent forum for aerospace medicine and coordinate European aerospace medicine interests in applicable fora. It shall build decisions on knowledge, evidence and open discussions within the Association. ESAM will work for the harmonisation of aerospace medicine education and medical standards, and develop continuous information and dialogue between the National Aero-Medical Associations and Organisations dealing with aviation matters.

THE EUROCONTROL AIR TRAFFIC CENTRAL FLOW MANAGEMENT UNIT (CFMU)

L'ORGANISME CENTRAL DE GESTION DES COURANTS DE TRAFIC AERIEN D'EUROCONTROL (CFMU)

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Introduction: EUROCONTROL, founded in 1960, is an intergovernmental organisation with 37 Member states and has as its primary objective the development of a seamless, pan-European Air Traffic management system. It has now approximately 3000 experts based in seven countries.

Methods: One of the key pan-European responsibilities assumed by EUROCONTROL is the dynamic management of air traffic flow in the short, medium and long term, carried out by the Central Flow Management Unit. The CFMU, which started tactical operations in 1995 provides Air Traffic Flow Control Management, Flight Planning and Airspace Data operations. All 300 operational staff members are subject to 2-yearly medical examinations.

It creates a single coordinated and integrated air traffic flow management covering all European airspace. At times the capacity of the controlled airspace in certain areas or at airports is not sufficient to accommodate the demand of traffic. This may be due to structural lack of capacity, weather problems, technical outages, industrial actions...

Air Traffic Flow Management provides a service to 1) avoid overload of the Air Traffic Control (ATC) services which might endanger safety 2) minimize the penalty imposed to the aircraft operator by the congestion.

The main ATFM measures are rerouting aircraft over non-congested areas or staggering departures times by imposing appropriate ground delays. The CFMU together with flow managers in each control center, provides the flow management service since march 96.

Since 95 the CFMU is in charge of collecting, validating and distributing to all ATC units concerned, all flight plans of flights under civil air traffic control in the airspace of the ECAC.

Conclusions: According to ICAO, ATFCM is a service complementary to ATC .Its objective is to contribute to a safe, orderly and expeditious flow of traffic by ensuring that ATC capacity is used to a maximum while ensuring that the traffic volume never exceeds the capacity declared by the responsible ATC authority.

The concept of the CFMU gives an answer to greater efficiency, impartiality, convergence and safety in the skies of Europe.

A LOWER PRESSURE HABITAT AND SPACE SUIT FOR MOON/MARS EXPLORATION IS PHYSIOLOGICALLY FEASIBLE

UN HABITACLE À BASSE PRESSION ET UN SCAPHANDRE SPATIAL POUR L'EXPLORATION DE LA LUNA/MARS EST PHYSIOLOGIQUEMENT FIASABLE

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Introduction: NASA has selected habitat and space suit atmospheres for Moon/Mars exploration. Crew physiology, decompression sickness (DCS) prevention, and emergency extravehicular activity (EVA) capability were considerations in that process. The atmospheres recommended by the Exploration Atmospheres Working Group in JSC-63309 (January 2006) are Habitat; 8.0 psia with 32% oxygen and Suit; 4.3 psia with 100% oxygen. This combination would allow zero-prebreathe exploration on the Moon or Mars. The habitat atmosphere selected is one of increased flammability based on the NFPA formula. It also assumes the goal of building a 4.3-psia space suit will be met, with a weight no more than 100 pounds (45.5 kg) while avoiding excessive fatigue and discomfort during many hours of exploration. If such a suit cannot be created, the lowest pressure for the habitat and suit should be known which would allow zero-prebreathe exploration.

Methods: With a goal of obtaining a tissue ratio, TR, of less than 1.4 to match that quoted in NASA/CR—2005–213689, fire-safe habitat and suit atmospheres were adjusted to the minimum consistent with adequate, acclimated, physiologic performance.

Results: A habitat pressure of 6.5 psia with 34.6% oxygen provides alveolar oxygen equivalent to breathing earth's atmosphere at about 10,000 ft. It is hypoxic, but allows normal function with acclimation. The resulting TR with zero-prebreathe decompression to a suit pressure of 2.7 psia is 1.34, safer than allowed for Shuttle and ISS operations (JSC-63309).

Conclusion: The resulting habitat and suit atmospheres provide a greater margin of fire safety iaw the NFPA guidelines while providing a lower TR after decompression to a much lower suit pressure than recommended by the EAWG. The lower suit pressure would allow greater design flexibility in the effort to contain weight and provide optimal flexibility, comfort, and radiation safety.

NON-INVASIVE VENTILATION: A POSSIBILITY TO TRANSPORT PATIENTS WITH RESPIRATORY DIFFICULTIES ON FLIGHTS FOR REPATRIATION?

VENTILATION NON INVASIVE: UNE POSSIBILITE POUR LE TRANSPORT DE PATIENTS AVEC DES PROBLEMES RESPIRATORIQUES EN RAPATRIEMENT?

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Case report: In October 2004 a 75-year old Austrian patient had to be transferred from a Hospital in Hungary to Bludenz (Austria). He was in hospital for increasing cardiac failure, pulmonary oedema and bronchopneumonia.

On the airport, the 182cm tall and 100kg heavy patient presented with a S_{aO_2} of 74% on 10l/min of oxygen over Venturi-mask. His blood pressure was 220/80 mmHg, he had atrial fibrillation at a ventricular rate of 100, respiratory frequency of 45/min and seemed in severe respiratory distress. His GCS was 13.

As the patient appeared sufficiently cooperative we performed a trial of CPAP by mask: respirator Savina (Fa. Dräger), PEEP of 8, F_iO_2 1,0.

We administered 40 mg of furosemide, whereupon diuresis started sufficiently (1400 ml/3 hours).

The patient improved, so we became airborne (maximum cabin height 4500 ft), could reduce F_iO_2 to 0,8 during the flight and reached Innsbruck after 90 min of flight.

On admission in the hospital in Bludenz the patient was in a much better state, cooperative at all times and had a S_{aO_2} of 94% with 5l/ min oxygen over Venturi mask.

In the meantime we used non-invasive ventilation for 5 consecutive patients (3 traumatologic, 1 cardiac failure, 1 cancer patient). It seems to be that non-invasive ventilation is a safe and gainful procedure on repatriation flights, definitely a good alternative of ventilation to avoid the hazards of intubation and invasive ventilation. We intend to perform the same procedure on suitable patients on flights and thus reduce risks of long-time ventilation for our patients.

ON PREFLIGHT AND PRE-SHIFT MEDICAL AND PSYCHOPHYSIOLOGICAL MONITORING OF AVIATION SPECIALISTS

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Decision of problems of preflight and pre – shift monitoring requires the use of modern technologies and program – equipment devices, which must be a simple, informative, with high capacity without special qualified requirements to serving staff. Automatic monitoring is designed for detection of separate specialists, which are not ready to work due to unsatisfactory functional state caused by impairment of adaptation, fatigue, high psycho – emotional stress consequences of stress, application of alcohol.

Such method of medical and psycho – physiological monitoring is realized in the modular program – equipment system (EPS – “Rhythm – MET”), developed for estimation of functional state of operators, working in the field of atomic power engineering.

EPS “Rhythm – MET” consists of microprocessor remote module with built in which sensors, one of records photoplethysmogram with a phalange of finger or an earflap and connects to personal computer. The module may also be equipped by receiving device for provision of wireless communication with a cardiosensor in the form of a belt – transmitter. EPS “Rhythm – MET” has an automatic meter of arterial blood pressure, package of special programs for analysis of cardiac rhythm variability, hemodynamic data, characteristics of variant sensometry and forming of automated decision permit / not permit. The carrying out of pre – shift monitoring of risk – profession operators, working at the atomic electric power station, nuclear - weapons complexes and other works, has showed, that percentage of unfitted persons varies of 1 to 7% .

The results of EPS “Rhythm – MET” approbation among the persons, having an intensive rhythm of work and high psycho – emotional loads, confirmed its high diagnostic efficiency, both at estimation of health state and evaluation of professionally important psychophysiological qualities.

Moreover the results of investigations and its verification with clinical data have showed the high level of revelation of signs of different psychosomatic impairments, especially at latent course.

It has been found advantageous to use the automatic pre – flight monitoring of civil aircraft aircrew before departure, pre – shift check of controllers and drivers of ground transport.

In the present time the program of operational test of “Rhythm – MET” – complex is developed as applied to automatic pre – shift monitoring of civil aircraft aircrew before departure and ATC – controllers at the going on duty.

In conclusion it is necessary to note, that the specialized programs of “Rhythm – MET” complexes may be used for monitoring of efficiency of rehabilitational and sanitary procedures at the consequences of stress, psycho – emotional overstrain, fatigue or overwork.

COMPARISON OF RELAXED +GZ TOLERANCE THROUGH TWO CENTRIFUGES: THREE-AXIS CENTRIFUGE INCL. dfs AND SINGLE-AXIS CENTRIFUGE

COMPARAISON DE RELACHE +GZ TOLERANCE PAR DEUX CENTRIFUGEURS: TROIS AXIS CINTRIFUGEUR INCLURANT DFS ET SINGULIER-AXIS CENTRIFUGEUR

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Introduction: Since the handover of high performance human centrifuge incl. dynamic flight simulation, we have initiated the work and research around the new centrifuge. The purpose of the study is to investigate the relaxed +Gz tolerance of the same group of fighter pilots tested on different human centrifuges: the new one and the old single-axis centrifuge.

Methods: The relaxed +Gz tolerance standard as we have been used in the old single-axis centrifuge was adopted in the study, which was to accomplish +4.25 Gz for 10 s at 1G/s onset rate. The general criteria for terminating an exposure was 100% peripheral light loss or leveling of ear opacity pulse. 24 pilots' completed relaxed +Gz tolerance test on both centrifuges. The data were analyzed by the software of SPSS10.0

Results: The mean relaxed +Gz tolerance of the same 24 pilots on two centrifuge were significantly different ($P=0.006$), 4.25 ± 0.34 G on three-axis centrifuge and 4.41 ± 0.14 G on single-axis centrifuge. 16 pilots got the same results on different centrifuge, and the rest achieved a lower tolerance on the three-axis centrifuge.

Conclusion: There exist many differences in two centrifuges, including the radius, gondola environment, data recording system. After collection of sufficient data, a new standard applicable in the +Gz tolerance screening on the new centrifuge may be established.

BACK PAIN IN PLANES (Cockpit Ergonomics, Functional Neuroorthopedic Therapy)

MAL DE DOS DANS LES AVIONS

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Introduction: Back pains in aviators are common. In an ongoing research project, I investigate causes and treatments as well as operational and social effects. Pilots in pain are either inoperative or dangerous, causing extreme expenses by illness and damages.

Main: Physical fitness is prerequisite for all pilots. However, the number of back pain patients increases, often based on spinal problems from work environment. Our musculoskeletal system is designed for a certain level of physical activity. One-sided permanent strain may lead to long-term disorders in the muscular apparatus of the spine or blockades of vertebral joints. Back injuries can result from bad postures and poor movement patterns. Almost classical are pseudostenocardial symptoms thought to be a heart attack. After extensive diagnosis, very often merely a mechanical dysfunction in the spine is found, often correctable by manipulative medicine.

Basically, we discern conservative and invasive pain therapies addressed by medication, neuroorthopedic and invasive therapy. For my research project, I evaluated cockpit ergonomics as well as weak spots in individual musculoskeletal systems and did research on conservative therapies as offered by osteopathy and chiropractic.

Results: Most forms of spinal pain – localized, radicular and referred – may be treated by “hands-on therapy” with astonishing effects and without harming the pilot as may happen with invasive medicine. Manipulative medicine normally has no side effects.

Conclusion: Manipulative medicine has convincing advantages, such as a considerable decrease in health-related expenses as well as an increase in flight safety. Furthermore, pilots enjoying a high level of physical wellness stay operative longer and don't need to be replaced at high cost so often. Many problems could be reduced by proper prevention techniques.