



Poster Abstracts

P01

English: **PRE-SERVICE EVALUATION OF PORTUGUESE INTERNATIONAL COMPETENCES**

French: **ÉVALUATION DES COMPÉTENCES INTERNATIONALES PORTUGAISES EN PRÉ-SERVICE**

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Experience Portuguese international Competences are evaluated, as in many countries, continue to be the subject of discussion in Portugal. This Study reports on pre-service - Bordalo evaluations of international curriculum regarding its adequacy to attain subject- specific competences. A total of 154 pre-service Bordalo from five different state universities participated in the study. Results revealed that almost half of the participants evaluated the Portuguese Experience Bordalo - international education curriculum as moderately adequate in attaining 15 of 27 sub- competences across six domains in Peso da Regua.

The most problematic competency domains were School-family in Peso Relationships, Social and Ethnical Issues and Professional Development. This result implies the need to improve the content of existing courses and to add new courses to the Bordalo a new concept of Curriculum especially related in Bordalo use Pro-actives strategies and professional development methods. Implications are discussed.

Keywords: Bordalo Competencies, BORDALO curriculum national PESO DA REGUA, Bordalo curriculum Internacional PESO DA REGUA.

P02

English: **LIFESTYLE OF PILOTS AND FLIGHT ATTENDANTS AND ITS INFLUENCE ON OXIDATIVE STRESS**

French: **MODE DE VIE DES PILOTES ET DES AGENTS DE BORD, ET SON INFLUENCE SUR LE STRESS OXYDATIF**

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Introduction: Oxidative stress is a factor in early aging and numerous disorders, e.g. cardiovascular disorders, neurodegenerative disorders, metabolic disorders, chronic bronchitis, cataracts and some types of cancer. A healthy diet provides the body with energy and protective substances, including those that protect us against oxidative stress. Important defense factors include avoidance of environmental pollutants, unhealthy habits and excessive sunbathing, mitigation of emotional stress, moderate and regular physical activity, quality sleep, etc. Methods: We were interested in the lifestyles, food habits and physical activity of pilots and flight attendants. We present the most interesting findings of a questionnaire forwarded to 100 pilots and 100 flight attendants of the Slovenian national carrier.

Results: The sense of general well-being among pilots was somewhat higher than among flight attendants. Pilots perceive their job as more stressful than flight attendants. Most drink more than 1.5 liters of fluid and are physically active 30 to 60 minutes a day. Most go to sleep before midnight, sleep for about 7 hours and judge their sleep as good and relaxing. There are statistically significantly more smokers among flight attendants. Most eat 3 to 4 meals a day: their diet is mixed and varied and they all eat meat more than once a week, while pilots eat vegetables once and flight attendants multiple times daily. Few use dietary supplements. Pilots have statistically significantly lower consumption of coffee and green tea; there are no disparities in alcohol consumption, while drugs are more often taken by flight attendants.

Conclusion: We will use these results to create activities that would encourage pilots and flight attendants to lead a healthier lifestyle in order to improve their defenses against oxidative stress and thus indirectly their health, their sense of well-being and professional efficiency and safety.

P03

English: **EXPLORING THE RELATIONSHIP BETWEEN COGNITIVE FUNCTIONS AND SLEEP IN YOUNG AVIATORS**

French: **L'ÉTUDE DE LA RELATION ENTRE LES FONCTIONS COGNITIVES ET LE SOMMEIL CHEZ DE JEUNES AVIATEURS**

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Introduction: It is well-known that cognitive performance is affected by sleep loss. It is widely assumed that sleep loss especially impairs executive functions involved in more complex tasks. It is crucial for aviators to have good executive functions in order to perform well on a mission, and it is our primary interest to monitor their skills and abilities in order to maximize their performance in the air. Therefore, it is important to investigate the relationship between night sleep and executive functions. We retrospectively reviewed the results of CogScreen- Aeromedical Edition (AE) ®. from 126 healthy students aviators, aged 21-27. It is a well-known battery (Kay, 1995) that was designed to measure the underlying perceptual, cognitive and information processing abilities associated with flying. CogScreen-AE consists of a series of computerized cognitive tasks, each self-contained and presented with instructions and a practice segment.

Methods: We analyzed 19 response speed variables obtained from CogScreen- AE, and compare between executive abilities and non-executive abilities.

Results: We found a negative correlation between the number of hours the aviator slept in the previous night and performance on mental flexibility (Shifting Attention Test) and mental rotation ability (Manikin Test). No other significant correlations were found.

Conclusions: Sleep loss among aviators deteriorate mostly cognitive functions that are executive in nature and more specifically switching and mental spatial rotation which is dependent upon visual working memory. The brief duration of CogScreen subtests make them less sensitive to partial sleep deprivation than measures of sustained attention or vigilance.

Further investigation is needed in order to understand the mechanisms involving sleep, circadian rhythm and cognitive functioning in aviators.

P04

English: **SERUM SELECTED C-REACTIVE PROTEINS IN CADETS DURING TRAINING ON THE SPECIAL AERIAL GYMNASTICS INSTRUMENTS**

French: **PROTÉINES C-RÉACTIVES SÉRIQUES CHEZ LES CADETS DURANT L'EXERCICE AVEC DES APPAREILS SPÉCIAUX DE GYMNASTIQUE AÉRIENNE**

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Introduction: To C-Reactive Proteins include ferritin, transferrin, and ceruloplasmin- metalloproteins.

Objectives: The study aimed at assessing an effect of training on the Special Aerial Gymnastics Instruments (SAGI) on changes of serum ferritin, transferrin, and ceruloplasmin and cadets physical fitness in comparison with a control group.

Methods: Fifty-five cadets in the mean age 20 years were included into this study. They were divided into two groups: Group A (N=41) trained on SAGI and Group B (N=14) trained according the standard program of physical education (control group). In both groups, blood was a material for assays. Samples were collected twice before and after training at the start of the program (Series I), during (Series II), and after education program completion (Series III). Commercially available kits were used to assay blood serum ferritin, transferrin, and ceruloplasmin. Cadets physical fitness was evaluated with exercise tests before and after education program completion.

Results: In Group A, serum post-exercise ferritin decreased statistically insignificantly in Series I and II and increased in Series III in comparison with pre-exercise values. In Group B, post-exercise serum ferritin decreased statistically insignificantly in Series I and III and significantly increased in Series II in comparison with the pre-exercise values.

In Group A, serum transferrin decreased statistically insignificantly in Series I, and significantly increased in Series II, whereas in Series III it increased insignificantly in comparison with pre-exercise values. In Group B, post-exercise serum transferrin increased statistically significantly in Series I, Series II, and Series III in comparison with pre-exercise values. In Group A, serum ceruloplasmin decreased in all three series in comparison with pre-exercise values. In Group B, serum ceruloplasmin increased significantly in Series II.

Conclusions: It was showed that the training on SAGI significantly decreased serum ceruloplasmin in Group A in all three series of assays and did not produce

P05

English: **LONGITUDINAL STUDY OF PSYCHOMOTOR FITNESS OF POLISH AIR FORCE ACADEMY STUDENTS IN CONTEXT OF TRAINING ON SPECIAL AVIATION GYMNASTIC INSTRUMENTS.**

French: **ÉTUDE LONGITUDINALE DE L'APTITUDE PSYCHOMOTRICE DES ÉTUDIANTS DE L'ACADÉMIE DE L'AIR POLONAISE DANS UN CONTEXTE D'EXERCICE AVEC DES APPAREILS SPÉCIAUX DE GYMNASTIQUE AÉRIENNE**

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Introduction: The health of the aviation personnel is an important factor in their professional effectiveness. Thus, the program of studies in the PAFA is focused not only on acquiring knowledge in general and engineering subjects, but also on shaping pro-health activities and psychophysical fitness. Psychomotor fitness is especially important in extreme situations and during aerial acrobatics which are part of the training of military pilots and are present in sport aviation. In order to improve the fitness of the students, they take part in physical education classes as well as training on special aviation gymnastic instruments (SAGI). The main goal of training on SAGI is to increase sight-movements coordination, spatial orientation, psychomotor fitness, and equilibrium. In Polish aviation, the term SAGI refers to the following amenities: looping, aero wheel, three-plane wheel, and so-called gyroscope. SAGI forces movement in all body axes, causing certain muscle parts to work together, while putting load on the circulatory and the respiratory system as well as the central nervous system.

Aim: The aim of the research was an assessment of influence of training using SAGI on psychomotor fitness of students of pilotage.

Method: In order to prepare the air force academy student to an effective way of executing aviation missions, a specialist 40-hours physical training is conducted using SAGI. To assess the influence of the training using SAGI, a psychomotor coordination was examined using specialist computer-based psychological tests. The longitudinal examinations were conducted using the pretest and posttest method. Two groups of cadets were examined, the former was trained using SAGI while the latter was a control group which didnt use SAGI.

Results: The results obtained show a much greater psychomotor fitness in students taking part in training using SAGI than in students that did not take part in the training.

Conclusion: Training using SAGI contributed to an increase of psychomotor fitness of air force students taking part in 40-hours specialist training.

P06

English: **TEMPERAMENT DETERMINANTS OF EFFORT EFFECTIVENESS AMONG AIR FORCE ACADEMY STUDENTS.**

French: **LES DÉTERMINANTS TEMPÉRAMENT DE L'EFFICACITÉ DE L'EFFORT CHEZ LES ÉTUDIANTS DE L'ACADÉMIE DE L'ARMÉE DE L'AIR**

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Introduction: Executing aviation missions requires appropriate preparation by large, multidisciplinary team of professionals. They are trained in academies and specialized courses where they obtain professional knowledge and form their fitness. Psychological resistance for acting in situations of deficit of time and stress is also a very important characteristic. Thus, the following is searched for:

- a) Methods of assessing effort effectiveness,
- b) Determinants of effective functioning in extreme situations.

These determinants are verified during entrance exams to air force academy and before starting a practical training in the air.

With reference to a): In our case the assessment is realized through:

- A general test of physical fitness,
- A specialist exam, i.e. synthetic aviation test.

With reference to b): One of the major factors of effective functioning in situations of deficit of time are the features of temperament. They are related mainly to formal attributes of behavior and they embrace two aspects:

- Energy level of the action (reactivity and activity),
- Time characteristic of the reaction (speed, tempo, durability, repeatability, regularity, mobility).

Aim: The goal of the paper is to assess psychological determinants of effort effectiveness

Material and method: The examined group consisted of 30 students of air force academy who were candidates for the pilot of jet planes field of study. The psychological instruments used included Strelau & Zawadzki's Temperament Questionnaire.

Results: The results obtained show that temperament features such as jauntiness, durability, and activity are good predictors of effort effectiveness.

Conclusion: Assessment of temperament is an important tool in selection of candidates for pilots.

P07

English: **CARDIAC INDEXES IN YOUNG SUBJECTS WITH AND WITHOUT BICUSPID AORTIC VALVE**

French: **INDEXES CARDIAQUES CHEZ DES SUJETS JEUNES AVEC ET SANS VALVE AORTIQUE BICUSPIDE**

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Objectives: To evaluate a possible association between BAV with or without aortic regurgitation (AR) and cardiac and aortic morphology in young healthy subjects.

Methods: Air force academy applicants undergo routine echocardiography as part of the screening process. All echocardiographic examinations performed in the years 2004-2011 were evaluated. Applicants in whom BAV was identified were divided into those with and without aortic regurgitation. Both groups were compared with a age-matched group of applicants in whom echocardiography was interpreted as normal. All M-mode parameters were compared between the three groups.

Results: 7042 echocardiographic examinations were performed in the years 2004- 2010 and 95 applicants (1.35%) were diagnosed with BAV. Of them, 34 applicants had AR (36%) and 61 had no evidence of AR. When compared with normal subjects, systolic blood pressure was higher in applicants with BAV (127 mmHg vs. 123 mmHg, $p=0.01$). Aortic root diameter, left atrial diameter, left ventricular end systolic volume, interventricular septum thickness and posterior wall thickness were all increased in applicants with BAV compared with applicants without BAV. In those with BAV, no statistically significant differences in M- mode characteristics were noted between applicants with and without aortic regurgitation.

Conclusions: BAV in young healthy subjects may influence cardiac morphology irrespective of the presence of aortic regurgitation.

P08

English: **CARDIOLOGICAL CASE REPORTS OF TWO AIRTRAFFIC CONTROLLER AT HUNGARIAN ANS**

French: **RAPPORTS DE CAS DE DEUX CONTRÔLEURS DE LA CIRCULATION AÉRIENNE PRÉSENTANT DES PROBLÈMES CARDIAQUES PAR L'ANS HONGROISE**

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At the same time three cases presented different cardiological events that lead to unfit status as ATCO for up to 6 months. This situation caused a problem for Hungarian ANS because they have to be replaced to another workplace under this time. On the poster two similar cases from the three are demonstrated.

The first case shows a 58 years old male, without any symptoms, with normal rest ECG. Exercise ECG test was made as screening examination, gave positive result and echocardiogram showed hypokinetic wall motion. Segmental occlusion was found by selective right coronarogram. Right coronary revascularization was practiced in two steps, firstly two DES stents were placed, two months later another DES stent implemented with redilatation of previous ones. Secondary prevention treatment was used.

The second case shows a 54 years old male having mild chest pain on exertion, abnormal rest and exercise ECG. Segmental occlusion was found by selective left coronarogram and one BMS stent was placed and secondary prevention treatment was used.

Flight safety investigation of Hungaro-control found no significant risk planner ATCOs acute incapacitation that could lead to an incident. The international cardiological studies came from multiple registries confirmed that most cases of stent thrombosis (up to 60 percent) occur within the first 30 days after placement. Late stent thrombosis occurring after 30 days, rate of that at one year is about one percent.

The Hungarian CAA made decision according to the evidences above, in the second case after 3 month gave a fit assessment with SSL limitation "valid only as planner air traffic controller", after 6 months based on satisfactory

cardiological review cancelled the limitation. In the first case was given temporarily unfit assessment after second intervention up to 6 months.

P09

English: **INDICATORS OF PHYSICAL ACTIVITY IN THE PILOTS OF CIVIL AVIATION**

French: **INDICATEURS D'ACTIVITÉ PHYSIQUE CHEZ LES PILOTES EN AVIATION CIVILE**

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Introduction: Low physical activity is a risk factor of such diseases as obesity, diabetes type 2 and cardiovascular disease, some types of cancer (colon cancer, breast cancer), osteoporosis... Regular physical exercise includes both sports and daily physical activity.

Subjects: 173 civil aviation pilots 54-68 years (main group) were compared to 32 graduate students of a university of civil aviation (comparison group 1) and 38 aviation medicine personnel (comparison group 2) - 21 physicians and 17 nurses.

Methods: An anonymous standard survey with physical activity questioner.

Results: Average duration of daily physical activity per week for pilots was $816,07 \pm 46,7$ min; for students - $1303,12 \pm 185,17$ min and aviation medicine personnel - $857,37 \pm 121,47$ min. The average duration of total physical activity (daily physical activity and sports) $819,23 \pm 46,67$ min; $1305,37 \pm 185,11$ min and $861,05 \pm 121,54$ min respectively. Physical activity of the students was significantly higher as compared with the other two groups.

Greater physical activity was shown in summer in all three groups. The biggest number of respondents not engaging in sports was among medical worker- 21.1% and the fewest number among the students - 3.1% (pilots - 14.5%). At the same time high indicators of total physical activity (more than 180 minutes per week, over 30 minutes per day) was indicated in students (96.9%); pilots (91.9%) and aviation medical personnel (86.8%). Significant difference in this respect was observed in students if compared with pilots. More or less equal physical activity both in winter and in summer characterizes aviation medicine personnel in 39.5%; pilots - 19.1%; students - 18.8%.

Conclusions: Total physical activity was not bad performance at all. However physical activity among the pilots may be increased at the expense of engaging involvement in sports persons who are physically inactive. It is advisable to be physically active during the whole year.

P10

English: **PROTECTUM GINKGO INFLUENCE ON VISUAL FUNCTIONS AND EYE HAEMODYNAMICS.**

French: **INFLUENCE DU PROTECTUM GINKGO SUR LA FONCTION ET L'HÉMODYNAMIQUE OCULAIRE**

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Introduction: In the last few years quite a number of preparations appeared under the general term as food supplements, in the preamble of which is a positive influence of visual analyser function. One of them is Protectum Ginkgo, a preparation consisted of Ginkgo Bilopba, Lutein, Astaxantin and Omega 6 saflor oil.

Purpose: Giving opinion on one - year influence of Protectum Ginkgo for spatial contrast sensitivity and eye haemodynamic in patients - flying personnel, with primary open angle glaucoma (POAG) having been treated by local antiglaucomatics for a long period of time.

Methods: 24 patients with POAG (19 men and 5 women), treated for POAG local antiglaucomatics therapy. One year minimum of an changed local treatment. One year minimum of stabilized visual fiction and intraocular pressure (IOP) value to 21 mm Hg. Protectum Ginkgo twice a day (morning, evening). Before and after treatment (12 months) examination of spatial contrast sensitivity (CSV - 1000, Vector Vission, USA) and pulsatile eye blood flow (OBF System, Paradigma Med. Ind., USA).

Results: Our results after 12 months of complete of local antiglaucoma treatment with Protectum Ginkgo preparation prove:

Improvement of contrast sensitivity in all spatial frequencies 3 - 18 c / dg in the range 6,3 - 10,2 %. Statistical significance has not been proved

Improvement of all followed flow parameters (PA, PV, POBF) by 8,1 - 10,7 %. Statistical significance has not been proved.

Conclusion: Protectum Ginkgo preparation influences in a positive way series of visual functions, contrast sensitivity, macro and microcirculation visual area. Food supplement Protectum Ginkgo has proved to be a suitable supplement of local antiglaucoma treatment.

P11

English: **EPINEPHRINE, NOREPINEPHRINE, CIRCULATION PARAMETERS AND BLOOD GASES DURING ORTHOSTATISM WITH AND WITHOUT SYNCOPE**

French: **ADRÉNALINE, LA NORADRÉNALINE, LES PARAMÈTRES DE CIRCULATION ET LES GAZ DU SANG PENDANT UNE HYPOTENSION ORTHOSTATIQUE, AVEC OU SANS SYNCOPE**

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Introduction: (T)LOC during elevated G-stress is a dreaded risk in aviation.

The underlying cause is always a lack of peripheral vasoconstriction, associated with venous pooling and insufficient cerebral perfusion.

We evaluate circulation regulation of individuals with and without syncope when challenged on a tilt table.

Methods: Lying flat 15min, tilting upwards to 80° for a maximum of 30min, break off in case of syncope. After tilting back to a flat position, measurements at rest for 15min.

Parameters: Blood pressure by arterial measurement via a 4F-catheter; pO₂ and pCO₂; Catecholamines from arterial blood plasma; percentage of HF-HRV and NF-HRV gained by heart rate variability analysis. Cerebral blood flow via neurologic doppler analysis of the arteria cerebri media. Heart rate and heart rhythm were evaluated by 6-channel ecg. Total peripheral resistance by cardiografic impedance.

Measuring points: While lying flat, in 5-minute intervals during orthostatism.

Results: Patients who suffered a syncope, heart rate while lying down was middled 72bpm and blood pressure was 130/80mmHg. During orthostatism there was initially sufficient adaptation until the 10th minute, when blood pressure dropped to 80/40mmHg and heart rate went down to 55bpm and syncope was suffered. The event was accompanied by pronounced hyperventilation which led to a pre-syncope fall of pCO₂ from 31 to 19mmHg as well as a decline in cerebral flow from 60 to 15cm/sec and excessive rise of cerebrovascular resistance (PI) to 3,1. Catecholamines raised from normal values, with a presyncope acceleration in epinephrine rise (76 to 702ng/l). Norepinephrine levels dropped, showing a decrease of sympathetic innervation. This was also documented by a loss in peripheral resistance (TPRI).

The formal change in the arterial pressure curve corresponds to the decrease of TPRI. The raise in heart frequency variability in high frequency ranges (HFnu-RR) shows an additional activation of the vagus nerve in the presyncope phase.

Conclusion: Dysregulation in reflex syncope seems to be a decrease in peripheral sympathetic innervation and as a paradoxical vagus activation.

P12

English: **CREATING A RESEARCH FRAMEWORK: PEDIATRIC HEALTH CARE IN MICROGRAVITY ENVIRONMENTS**

French: **CRÉATION D'UN CADRE DE RECHERCHE: SOINS DE SANTÉ PÉDIATRIQUE DANS DES ENVIRONNEMENTS EN MICROGRAVITÉ**

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With the intensifying plans for space colonization, Pediatric healthcare specialists need to begin to formulate plans for care delivery system and on- going longitudinal research projects. Physical growth and developmental milestones will be adapted to the gravitational fields of the environment, as humans evolve towards Homo Spacialis (M. Rogers).

The need for updating current Earth related evidence-based practices will be of primary importance to healthcare providers as expected norms demonstrate variances in growth and developmental patterns. Analog primate studies maybe of significant predictive value for identification of gravity levels required for bone growth. Anticipatory Guidance of parents will need to be adapted to the varied physical and gravitational environments of space habitats.

P13

English: **AEROSPACE MEDICINE: THE SKY IS NOT THE LIMIT, SPACE IS NOT THE FINAL FRONTIER!**

French: **MÉDECINE AÉROSPATIALE: LE CIEL N'EST PAS LA LIMITE, L'ESPACE N'EST PAS LE DERNIÈRE FRONTIÈRE!**

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NASA, European Space Agency and other space agencies around the world have embarked on different missions from walking in space, landing on the moon, walking on the moon, building the international space station and soon new missions to an Asteroid and Mars by 2018. All these missions have played an important role in the expansion of the role of the Aerospace Medicine Physician. This paper reviews Aerospace Medicine globally, some common role of Aerospace Medicine Physician today and their expanding role in other fields of medicine and interdisciplinary research.

P14

English: **SURVEY OF AVIATION METEOROLOGY IN ETHIOPIA: THE CASE OF ADDIS ABABA BOLE INTERNATIONAL AIRPORT**

French: **SONDAGE DE MÉTÉOROLOGIE EN AVIATION EN ÉTHIOPIE: LE CAS DE L'AÉROPORT BOLE À ADDIS ABABA**

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Introduction: Ethiopian is a member of the International Air Transport Association, and, since 1968, of the African Airlines Association (AFRAA). The airline is a Star Alliance member since December 2011. Its hub and headquarters are at Bole International Airport in Addis Ababa. Aeronautical meteorological service plays a key role in mitigating the impact of adverse weather on flight operation. The main reason for saying this is adverse weather remains one of the leading causes of aviation accidents and a primary factor responsible for reduced capacity in the air transportation system. The airport authorities have found that the expansion of the airport has turned Bole Airport into one of the major aviation capitals of Africa. Bole is now one of the main pilot training and aircraft maintenance centers in Africa. The provision of easy international connections at Bole has been a key element in the ambition of Addis Ababa to become one of the most global cities in East Africa. Good air connections are essential in attracting new business to the capital. Thus in order to improve aviation meteorological service level it is important to understand the possible constraints thoroughly. The aim of this study is to explore the competence level of Addis Ababa Bole International Airport meteorological office and to discover how to improve it.

Methods: This study employed descriptive research design and non probability sampling method. In this study both primary and secondary data are used. The main instrument used in this study was questionnaire and personal observation. Results:

Based on the findings of the study the customers service satisfaction level of Addis Ababa Bole International Airport meteorological office is poor and there is lack of coordinated system; besides a wider demand for meteorological services.

Conclusion: Thus a coordinated effort should be made to improve services and to cop up with the demand of the increasing users and the required national and international demand.

P15

English: **AN LBNP METHOD-BASED APPARATUS FOR ASSESSING AUTOCONTROL MECHANISMS OF THE HEART-VESSEL SYSTEM IN PILOTS TRAINED IN CONDITIONS OF ISCHEMIC HYPOXIA AND ORTHOSTATIC STRESS**

French: **UN APPAREIL À BASE DE LA MÉTHODE LBNP POUR ÉVALUER LES MÉCANISMES D'AUTOCONTRÔLE DU SYSTÈME COEUR-VAISSEAUX CHEZ LES PILOTES FORMÉS DANS DES CONDITIONS D'HYPOXIE ISCHÉMIQUE ET DE STRESS ORTHOSTATIQUE**

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Introduction: Ischemic hypoxia affects mainly pilots of highly maneuverable aircraft, where long-lasting G forces not seldom reach 6-8 +Gz. Additionally, pilots are subjected to orthostatic hypotension in which abnormally low blood pressure is caused by pressure adjustment disorder and decreased stroke volume when changing body position rapidly.

Methods: For several decades, these effects have been deeply investigated using human centrifuges or lower body negative pressure (LBNP) apparatus. The latter method involves significantly less financial resources to carry out experiments and training, whereas the effects exerted on pilots, and the results of the training are comparable.

Results: Basing on the literature and own experience in constructing LBNP chambers, we have made a thorough review of the state of the art. We present old and known constructions as well as the latest innovative solutions. Finally, we propose

our design of the LBNP chamber with an integrated tilt-table (ORTHO-LBNP technology), which we will be building soon within the framework of Project No. DOBR/0052/R/ID1/2012/03 Development of the ORTHO-LBNP technology for research and training of Polish Air Force pilots under conditions of ischemic hypoxia and orthostatic stress, financed by the Program for National Defense and Security, Poland.

Conclusion: The innovative ORTHO-LBNP chamber based on the cradle principle will be implemented in a modern programme for the selection of aviation candidates, which at present is being intensively developed at the Military Institute of Aviation Medicine, Poland. In addition to such specialized equipment as a high-G centrifuge, pressure chambers, flight simulators, spatial disorientation simulators and Gymnastic Training Equipment for Pilots (GTEP), the proposed

ORTHO-LBNP system will be a powerful diagnostic tool, one of the main elements in the selection procedures.

P16

English: **RESULTS OF THE ANALYSIS OF PHYSIOLOGICAL PARAMETERS RECORDED DURING FLIGHTS TO THE ZONE RELATED TO THE SIZE OF PILOT'S PSYCHOPHYSIOLOGICAL LOAD - CONTINUATION OF THE RESEARCH**

French: **RÉSULTATS DE L'ANALYSE DES PARAMÈTRES PHYSIOLOGIQUES ENREGISTRÉS PENDANT DES VOLS EN ZONE RELIÉE AU NIVEAU DE LA CHARGE PSYCHOPHYSIOLOGIQUE DU PILOTE - CONTINUATION DE LA RECHERCHE**

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Introduction: We present the results of the research carried out among the second-year cadets of the Polish Air Force Military Academy during flight trainings on PZL-130 'Orlik' aircraft in 2011-2012. The results refer to the flights to the zone on missions no. 15 and no. 16. The main objective of the study was to assess the level of fulfilling air tasks on the basis of instructor evaluations, the size of psychophysiological load based on heart rate variability (HRV) and their relationship with psychological variables.

Methods: To measure physiological parameters during flights, a mobile recording system, developed at the Military Institute of Aviation Medicine, Warsaw, Poland, was used. Matlab and Statistica environments were used to perform the analysis of HRV parameters, instructor ratings and psychological variables.

Results: It was found that the standalone flight compared to the training flight with an instructor resulted in a higher level of physiological arousal in the examined pilots. Moreover, maneuvers carried out in the zone turned out to be the most difficult stage in the whole exercises. Finally, some psychological variables proved to be associated with air task performance.

Conclusions: Spectrally analyzed HRV appears to be an effective method for estimating pilot's mental effort induced by the flight. In fact, our studies have demonstrated the compatibility between the level of difficulty of air tasks (instructor assisted flight vs. standalone flight, simple flight vs. flight to the zone), instructor ratings and HRV parameters.

P17

English: **SPMME'S CONTRIBUTIONS TO CHINA MANNED SPACE**

French: **CONTRIBUTIONS DE SPMME (SPACE MEDICINE AND MEDICAL ENGINEERING) AU PROGRAMME SPATIAL HUMAIN CHINOIS**

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Introduction: Space medicine and medical engineering (SpMME) founded in 1988 by Institute of Space Medico-Engineering which was renamed China Astronaut Research and Training Center (CARTC) in 2006 is only one journal reflecting study information of space medicine, space human engineering and space environmental control and life support technology in China and abroad. This paper object is to analyze an affinity between the journal and China manned space.

Methods: Using the methods of literature metrology and literature search, 1988-2012 SpMME data from China national knowledge infrastructure (CNKI) and 2009-2012 SpMME data from Research center for Chinese science evaluation (RCCSE) were diagnosed.

Results: The number of articles published by SpMME is 2534 in 1988-2012. The number of web downloads is 169103. There were the biggest rate of web downloads in 2003 (Shenzhou-5 mission), 2005 (Shenzhou-6 mission) & 2008 (Shenzhou-7 mission). The total of cited articles of SpMME has increased evidently since 1999 (Shenzhou-1 mission). Annually average H-index of SpMME is 32 which occupied 84% of military medicine H-index (38) and 41% of special medicine H-index (78). SpMME was selected as 2009-2010 "core journal" of military and special medicine journals and as 2011-2012 & 2013-2014 "authoritative journal" of military and special medicine journals by RCCSE.

Conclusion: This paper shows the tightness relationship between SpMME and China manned space missions, and SpMME journal's important role for promoting continuable and feasible development of space medico-engineering discipline.

P18

English: **DETERMINATION OF FLIGHT HELMET CENTRE OF GRAVITY AND MATHEMATICAL PREDICTION FOR DIFFERENT HEAD MASSES AND CONFIGURATIONS**

French: **DÉTERMINATION DU CENTRE DE GRAVITÉ DU CASQUE DE VOL ET PRÉDICTION MATHÉMATIQUE POUR DIFFÉRENTES MASSES ET CONFIGURATIONS DE LA TÊTE**

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The measurement of Centre of gravity (CG) of the flying helmet requires an anthropometric analogous head form. Using this CG of helmeted head is obtained on mass property measurement system. The shift in head CG w.r.t anatomical origin is evaluated using Knox Box criteria. If the Knox Box boundary is trespassed helmet fails the injury protection limit. Research on cadaveric head indicated that CG of midsized head ranges from (-8mm to 20mm) for X- axis, and from (0 to 50mm) for Zaxis under given anthropometric population. Hence the technique of measuring CG shift using single head form having one head mass and CG is incomplete and not that advantageous. Also using the different head forms for measuring the CG shift of single helmet is not economical. A mathematical formula of balance of mass moment for head and helmet was used to predict the shift in CG of helmeted head. In this equation different head masses and CG were introduced to obtain the final CG of the head. This gives a better prediction of CG shift and injury protection limit for a wider range. The Y axis CG was not predicted considering negligible shift around the mid-sagittal axis.

P19

English: **RAISED INTRACRANIAL PRESSURE AS A CAUSE OF SPACE MOTION SICKNESS AND COUNTERMEASURES**

French: **HYPERTENSION INTRACRÂNIENNE COMME UNE CAUSE DE MAL DE L'ESPACE ET DES CONTRE-MESURES**

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Space motion sickness (SMS) during exposure to microgravity is possibly a consequence of vestibular problems, fluid shift and raised intracranial pressure (ICP).

A non-invasive technique of measuring ICP, the PPLL device by NASA [1] sends an ultrasound wave which maintains a constant distance between the peaks of the outgoing and incoming sound waves by changing its wavelength. Therefore, with rising ICP, if the measurement between the front and back of the cranium increases, so should the wavelength providing a marker for pressure. Another device by NASA [2] studied the tympanic membrane displacement, the stimulus intensity corresponded to a 20-25dB above reflex threshold, and the mean displacement was 194nl, which corresponded to an ICP of 17mmHg.

Invasive technique involved measuring ICP carried out on the primate Macaca Mulatta aboard BION (bio-satellite) [3]. ICP arose in transferring into an anti-orthostatic position, but not above physiological standard. In rabbits with SMS, there was a pressure rise up to 15mmHg, whereas those which were treated with lasix only a rise of up to 7mmHg. In the second BION experiment, within 5 mins of launch, the pressure arose to 13.78mmHg.

ICP is potential parameter for physiological changes during microgravity. A understanding of cerebral haemodynamics, CSF and ICP changes in microgravity require analysis. Our proposal is to use a combination of methods to measure ICP (eg: weekly on the ISS with EEG) and whether increases (eg: 7 mmHg) to trigger sleep disturbance without other clinical manifestations at higher pressures (eg: 15mmHg). If so, controlling raised ICP will be an effective countermeasure to SMS.