
INTRODUCTION. As tactical aviation moves farther into the high-G environment, research exposures above 10 g’s make critical the proper selection of equipment that will sustain the pilot. The need for such equipment is crucial, yet the selection of such equipment and cost of screening has expanded without a clear correlation to benefits. METHODS. A review of all centrifuge related injuries was conducted combining experience in the U.S. and Canada. Consideration was given to the g profile flown, the subject’s previous g-exposure experience, and the selection process or screening criteria. RESULTS. Injuries experienced by training subjects (not prescreened other than on being flight status) would not have been avoided by use of current screening criteria. Experimental subjects may be over screened, with resulting unnecessary expense of selection and exclusion of many subjects. Careful review of screening requirements and selection criteria for high-G exposure should be explored along with a careful expansion of the g envelope.

PHYSIOLOGICAL CONSTRAINTS ON DECELERATION DURING THE ACCELERATION OF BANDED VEHICLES. J. K. Lynch, NASA Ames Research Center, Moffett Field, CA 94035.

INTRODUCTION. The peak deceleration load allowed for aerobraking of manned vehicles is a critical parameter in planning future excursions to Mars. However, considerable variation exists in the limits used by various investigators. The goal of this study was to determine the most appropriate level for this limit. METHODS. Since previous U.S. spaceflights have been limited to 8 g’s for all flight entry exposure except weights, and no data on high-G flights was available. The calculated Soyuz deceleration histories are compared with those expected for Mars aerobrakes.

CONCLUSIONS. Previous spaceflights performed the initial and last in the sequence of several short decelerations which were longer than the deceleration period of Soyuz spacecraft. The results confirm the peak load of 5 to 6 g’s for all flights. However, the duration of the lower g’s is not only expected to have a significant advantage? METHODS. A review of all centrifuge injuries in the 1975-1983 period was conducted with emphasis on the injury that would not have been avoided by use of current screening criteria. Experimental subjects may be over screened, with resulting unnecessary expense of selection and exclusion of many subjects. Careful review of screening requirements and selection criteria for high-G exposure should be explored along with a careful expansion of the g envelope.

THE RATE OF SYNEKIA IN FUNCTION. S. N. O’Connell, A.S. Markovits, Naval Aerospace Medical Institute, Pensacola, FL 32508.

INTRODUCTION. Ejection from jet aircraft is an area that has been exhaustively studied from many perspectives, e.g., causes of ejection, types and causes of ejection injuries, etc. Curiously, no study was found concerning the rate of eye injuries. Injections. Many pilots are required to wear corrective lenses during flight ops and many wear sunglasses. What happens to these during ejection? What injuries are caused? What factors can be identified that influence retention rate and severity of related injury? Do contact lenses provide significant advantages? METHODS. All ejections from 1977 to 1980 involving corrective or sun lens use were retrospectively examined. 5 were contact lens users. Most information was obtained from Naval Safety Center records and some from personal questionnaires. Injury and retention rates were examined as functions of several variables. RESULTS. Though 84% lost all lenses every single instance of retention occurred with visor down, 02 mask on, helmet properly secured, and at lower ejection speeds. Related injuries were minor and occurred in only 20%.

CONCLUSION. The utility of this finding cannot be neglected, however, intensive supervision by us seems to be effective to ameliorate their glycolic control.

FLAT RATE OF THE FEMORAL NECK SUSTAINED DURING ROUTINE CENTRIFUGE TRAINING M.E. Reid, N.D., Mall, J.S. Hahn, Ph.D. William Beaumont Army Medical Center, Orthopedics, El Paso, TX 79903.

INTRODUCTION. In efforts to enhance a high performance fighter pilot’s tolerance of high sustained G’s (HSG), centrifuge training in which the subject undergoes a series of runs attaining a maximum of 70 for 15s are commonly employed with minor if any complications. This paper, however, describes just such a routine centrifuge session resulting in the fracture of the subject’s femoral neck. Search of the literature revealed no similar mechanism of injury. CASE REPORT. A 30-year-old Air National Guard pilot in good health (no history of lower extremity trauma or pathology or change in activity) was approved for centrifuge training at a military training facility. In a rapid onset run (10K) of high Gx, he was accelerated from 1.20 to 7.0 G at a rate of +2.0 G/s, sustaining 7.0 G’s for an additional 15s while performing the +M- maneuver. At the completion of this run, the patient reported marked pain in his right hip. Examination revealed a complete fracture of the right femoral neck with no concurrent pathology. Initial biomechanical assessment of possible causative factors suggests that a minor shift in seating during the rapid onset of G’s may have channeled enough force through the hip to exceed bone strength. IMPLICATIONS. With thorough biomechanical analysis, the possible etiologic factors of this unique case will be debated, furthering our understanding of human function under high-G stress, and hopefully preventing future occurrence of such injury.
INVESTIGATION OF A WINDBLAST DEFLECTOR CONCEPT FOR IMPROVED WINDBLAST PROTECTION DURING EMERGENCY ESCAPE.

INTRODUCTION. Aircrew has reported that exposure to +Gz acceleration on the human centrifuge caused a greater loss in peripheral vision during the first run than subsequent runs at the same acceleration. Initial trials showed that six out of eight subjects exhibited a "first run" effect based upon visual loss criteria. It was therefore decided to study this phenomenon in greater detail and to assess the possible cause.

METHODS. Seven subjects were exposed to five successive runs on the human centrifuge at +15 g for time intervals determined based on previous +13 g data. All subjects were matched for age, sex, height, weight, and visual acuity.

RESULTS. No significant difference were found in STI parameters between the first and subsequent runs (30/sec, mean loss). Eye level blood pressure was similar between the first and subsequent runs (788 mmHg/sec mean loss). The time between runs was standardized at approximately three minutes. Peripheral blood pressure, heart rate, lower body blood volume, and peripheral vision were consistently monitored during exposure to +15 g.

CONCLUSION. Lower body blood volume and heart rate showed no significant difference between runs. A significant difference was clearly evident with peripheral vision and eye level blood pressure. Peripheral vision showed a 44% greater loss overall [p < 0.001] during the first run (430 sec, mean loss) compared with subsequent runs (200 sec, mean loss). Eye level blood pressure showed a greater overall loss of 25% [p < 0.001] during the first run (788 mmHg/sec mean loss) compared with subsequent runs (641 mmHg/sec mean loss).

CONCLUSION. This study has established that a high proportion of centrifuge subjects experience a "first run" effect. This phenomenon manifests itself as a significantly greater loss in peripheral vision and eye level blood pressure under +Gz acceleration during the first run compared to those recorded in subsequent runs at the same acceleration. Both parameters appear to be independent of changes in lower body blood volume. The results from this study suggest that it is essential to be aware of this phenomenon when assessing related G tolerance if gross errors are to be avoided. Further investigations will be necessary to determine the underlying cause.
CARCINOID IMPA ONCE DIFFERENTIAL LOOP IN AIRCRAFT G. ZULLI, B. XING, L. GUO, J. YANG - General Hospital of Air Force, Beijing 100036 China.

INTRODUCTION. Carcinoid impedance differential loop (ILD) is a plot of impedance AT versus impedance differential d/df (Zalk 1982). It is more informative and accurate than impedance cardiotography. The ILD parameters of the aircrew and the groundcrew were recorded. RESULTS. The important and age-related parameters are tabulated in the Table. It can be seen that the ITmax of aircrew are much higher than those of groundcrew. CONCLUSION. The ILD parameters of the aircrew & the groundcrew are different.

PHE III PARAMETERS OF THE AIRCREW & THE GROUNDCREW

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Aircrew (%)</th>
<th>Groundcrew (%)</th>
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<tbody>
<tr>
<td>ITmax (ms)</td>
<td>76.9 ± 7.1</td>
<td>84.8 ± 5.7</td>
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IIIA/IA(%) 2.7 ± 1.04 2.5 ± 0.76

The ILD of 50 Chinese pilots is the same as impedance cardiography. Subjects were divided into 2 age groups. RESULTS. The Impedance and age-related parameters are tabulated in the Table. It can be seen that the ITmax of aircrew are much higher than those of groundcrew. CONCLUSION. The ILD parameters of the aircrew & the groundcrew are different.

USING TOTAL QUALITY CONTROL (TQC) TO ASSESS FLIGHT SURGEON'S WORK QUALITY. S. S. Sen, K. Z. Quan, W. Tan, Z. Li, Z. An, Institute of Aviation Medicine, Air Force, Beijing 100016, P. R. CHINA.

INTRODUCTION. The assessment of work in health maintenance is almost traditionally qualitative because of the difficulty involved in its quantification. In order to improve the work quality of Flight Surgeon, this study is to work out a practical quality maintenance procedure of Flight Surgeon quantitatively. METHODS. According to concepts of management, Total Quality Control and investigation in basic units, we first work out a comprehensive index system on work quality. The second step was to attach each index with a weight factor through Delphi method and Analytic Hierarchy Process method. The third step was to establish the grade demand of each index on the basis of basic results. RESULTS: solving the three problems mentioned above, we arrived at a qualitative evaluation procedure of Flight Surgeon's work composed of 30 items, grouped into 4 categories (Flight Surgeon's quality, Flight Surgeon's work application and management of equipments, the health condition of pilots). CONCLUSIONS. This quantitative evaluation procedure of Flight Surgeon's work is practicable and reliable in actual application.

HYPERTENSION MANAGEMENT IN AVIATORS OF A COMMERCIAL AIRLINE. L. T. NNADIER, G. V. MAZAKIA, STHIAOGRAPHTI, Hellenic Air Force Aerospace Medical Centre, Athens GREECE.

INTRODUCTION. Effective control of arterial hypertension in aviation still remains a problem. Diuretics and B-blockers may have some adverse effects. Newer classes of antihypertensive agents such as Ca-antagonists and ACE inhibitors have been proved clinicly safe and effective. The present paper describes the results obtained in the treatment of hypertension in commercial aviators in Greece. The experience gained is presented in this paper. METHODS. By law, all commercial aviators in Greece are examined every six months in the Hellenic Aerospace Medical Centre. Athens GREECE.

The studies carried out within this program suggest that angiotensin converting enzyme inhibitors are likely to have the least deleterious effect on central function in man.
MTRIAL REGURGITATION AS A COFACTOR IN MTRHAL VALVE PROLAPSE WHITE, R.M. Medicine, H. Marcus, Forearm, R.M., Amrional Medical Consultation Service, Brooks AFB, Texas 78686.

OBJECTIVE: To evaluate the role of mitral regurgitation in the setting of mitral valve prolapse identifies a subset of individuals with a high risk for peripheral blood thromboembolism.

MATERIALS AND METHODS: History, physical examination, echocardiography, Holter monitor, and other testing (including subspecialty u- ltrasound and magnetic resonance imaging) were performed appropriately during hospitalization. Mitral regurgitation was considered present if there was a late systolic deceleration of the mitral velocity by measurement of nasal secretions. A methacholine NPT, by measurement of nasal secretions. A methacholine bronchial provocation test (8PT) was also determined.

RESULTS: The 198 aviators underwent 320 evaluations averaging 1.5 visits per subject. MR was noted on physical exam and/or echocardiography in 53 of these aviators. Some degree of MR (mild to severe/severe) was noted on Doppler study in 31 aviators; 25 of these 31 aviators had an antibody to MR well. Antibody titers significantly more common in individuals with MVP and MR were significantly more common in individuals with MR vs. MVP without MR. (p = 0.01). Ventricular pairing, ventricular or atrial fibrillation/flutter, etc. did not show a significant association with the MVP group.

CONCLUSION: In this group of MVP aviators, MVP only GAC was present significantly more common in the subjects with MR as compared to the MVP group. MR for identifying aviators with MVP who are at risk for tachyarrhythmias.

ASPECIFIC NASAL HYPERREACTIVITY IN AN AIR FORCE POPULATION AND ITS RELATIONSHIP WITH BRONCHIAL HYPERREACTIVITY. M. Urbanski, R. Bertil, C. De Angelis, G. Petrelli, S. Farrace, P.M. Matricardi, R. Misini and F. Ficacci. I.AF, DASR, Dept. of aerospace Medicine and ENT Clinic, University of Rome.

INTRODUCTION. Nasal function is of paramount importance for aircrew. Aspecific nasal hyperreactivity (ANH) prevalence in a young IAF population was investigated and compared to the prevalence of aspecific bronchial hyperreactivity (ABH) association with cold methacholine NPT, by measurement of nasal secretions. A methacholine NPT, by measurement of nasal secretions. A methacholine bronchial provocation test (BPT) was also determined.