AP and RF with respect to their autonomic increased RF power in the pressure (AP, Finapres), radial artery autoregressive technique) were determined for down bedrest pins Lasix (40 mg, P.O.). Biomedical TO STEP CHANGES IN LOWER BODY NEGATIVE PRESSURE (LBNP) protect the hypovolemic conditions and decreased ANP release from the atrium diminishes natriuresis and diuresis. The secretion of ANP usually depends on changes of intracardiac volume. The study was designed to investigate the changes of secretion of ANP and FRA under the positive acceleration, hypovolemic conditions. METHODO. The subjects included 14 students of Korean Air Force Academy and 7 pilots. The carotid sinus pressure was a 60% for 30s. Blood sampling was performed before and after exposure to the accelerated gravity. Measurements of ANP and FRA levels were analyzed by radioimmunoassay. RESULTS. Levels of FRA increased from 2.2 to 4.8% (p<0.01) in students and 2.6 to 6.5% (p<0.01) in pilots after exposure. ANP decreased from 38.2 to 18.6 (p<0.01) in students and 24.2 to 12.0 (p<0.01) in pilots after exposure. CONCLUSIONS. Positive acceleration caused a decrease of ANP and RF blood volume to the vital organs. Diminution of circulating blood volume to the heart and kidney occurred on positive acceleration in human. These results suggest that renal release from the kidney protect the hypovolemic conditions and decreased ANP release from the atrium diminishes natriuresis and diuresis.

CHRONIC CATECHOLAMINE ADMINISTRATION INDUCES DOSE DEPENDENT CHANGES IN SKELETAL MUSCLE MYOSIN ISOZYMES AND FIBER TYPES DURING HILL-DORM SUSPENSION. H. Gilgen*, A.J. Metzla, W.M. Sherman, G. Winer, J. Dutte. Wake Forest University School of Medical, Depar., OH, Ohio State University, Columbus, OH and Genica Pharmaceuticals, San Diego, CA.

INTRODUCTION. Several dosages of GP-2/128 (GP-2), a new and very potent synthetic catecholamines, were tested to determine the minimum effective dose capable of significantly altering skeletal muscle myosin isoforms and fiber types. METHODS. Adult male Sprague Dawley rats (n=56) were randomly assigned to one of 7 treatment groups. Rats assigned to the control (CON) group were not exposed to hypergravity. Rats assigned to the GP-2 group were exposed to either 1G, 1.6G and 3G (n=8 each) centrifugal accelerations. RESULTS. ANOVA and Tukey's post hoc tests (p<0.05) indicated a significantly lower percent slow twitch fibers (% ST FIB) in the suspended SAL (SUS/SAL) vs SAL/CON. This change was effectively attenuated by all concentrations of GP-2. Although there were no significant group differences in % ST FIB in the GAST, the % slow myosin (% SM1) in the GAST of the SUS/10 group did indicate that the 10 ug/kg dose was effective in suspending the suspension induced decrease in % SM1 while the other doses were not. Despite some differences in gender comparisons between % ST FIB and % SM1 in the GAST, there was a significant correlation between these two measures (r=0.55). CONCLUSION. Overall, the data indicated that incremental increases in GP-2 resulted in graded dose response increases in % ST FIB and % SM1 and a gradual attenuation of detrimental skeletal muscle changes produced by conditions which stimulated weightlessness in rats.

EFFECTS OF 3 WEEKS CENTRIFUGAL ACCELERATION IN RATS. M. Sudoh, H. Waki*, Y. Honda*, S. Ikawa and H. Saiki* Space Medicine Laboratory, The Jikei University School of Medicine, Minato-ku, Tokyo 105 JAPAN, St. Marianna University School of Medicine, Kawasaki-shi, Kanagawa 213 JAPAN.

INTRODUCTION. This study was performed to clarify the effects of gravity on physiological parameters in rats exposed to 3 weeks centrifugal accelerations. METHODS. The Wistar rats were exposed to either 1G, 1.6G and 3G (n=4 each) centrifugal acceleration for 3 weeks. To provide hypergravity, a centrifuge having an annulus radius of 1.3m was used. RESULTS. During this period, daily changes in body weight, urinary volume, food intake, water intake and urinary excretion of sodium were determined. In addition, water balance was determined by urine volume and water intake. Body weights in groups 1.6G and 3G decreased by 7% on the 2nd day and by 14% on the 5th day, respectively. They, however, recovered to the pre-exposure level by the end of the experiment. Food intakes in groups 1.6G and 3G decreased by 68% and 78% on the 1st day, respectively, and recovered to the pre-exposure level on the 12th day. Thereafter, they remained unchanged. Water intakes in groups 1.6G and 3G decreased by 62% and 98% on the 1st day, respectively, and returned to the pre-exposure level on the 12th day. CONCLUSION. It is suggested that body weight and daily intake of food and water decrease is response to acclimation to hypergravity and that the rate of decrease is influenced by the intensity of gravity.
EVALUATION OF LYMPHOCYTE POPULATIONS OF NAVY AVIATION PERSONNEL DURING OPERATION DESERT STORM. A. Mateczun*, H.M. Neisler*.

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INTRODUCTION. The numbers and distributions of lymphocyte populations vary in response to both acute and chronic physical or psychological stress. Deviations from reference ranges may indicate underlying immunologic, clinical illness, and/or fatigue interfering with job performance or safety. Military personnel have been studying the effects of prolonged operational and training stress to evaluate these changes as potential predictors of stress. This study evaluated deployed aviation personnel during Operation Desert Storm.

METHODS. Fifty subjects representing aviation, shipboard and medical personnel volunteered for this study. A single blood sample was obtained from each subject for hematologic and biochemistry evaluations within 7 days of cessation of combat operations (43 subjects) and after 6 months (7 subjects). Lymphocytes were prepared and fixed immediately, then evaluated within 36 hours. RESULTS. Mean values and 95% confidence intervals for the T3, T4, T8 and Natural Killer lymphocyte of these subjects were all within published normal reference ranges. The Helper-Suppressor cell ratios were likewise within normal ranges. The lymphocyte populations were not significantly different among the three subject groups. Confidence intervals for all subjects, and each group separately, were substantially different from published normal reference data. Moreover, while some individuals within each group fell outside reference ranges, the values did not different significantly among those subjects.

CONCLUSION. 1) These subjects did not demonstrate the alterations of lymphocytes indicative of stress and thus were not suffering cumulative immunologic effects of operational stress. 2) Confidence intervals for these subjects are distinctly different from published reference data; and 3) A definitive stress effect on lymphocytes was not measured. Environmentally controlled UH-60 helicopter simulator to determine the effects on physiology and performance of wearing protective equipment commonly is reported to be a cause of individuals who fell outside published reference ranges.
FLYING AFTER DIVING: VALIDATION TESTS FOR MILITARY DIVERS. B. J. Bostal, E. D. Lafon*, and A. A. Plamondon* HUB, San Antonio TX 78230, USA. MED. SCHOOL OF Aerospace Medicine and 2 Armstrong Laboratory, Brooks AFB TX 78235

Introduction: Divers conducted at sea level by medical personnel, followed, by immediate ascent to altitude present operational requirements which entail a significant decompression sickness (DCS) and venous gas emboli (vge) during the altitude exposures. The voluntary, fully informed consent of the subjects in this research was obtained as required by AFR 169-3. Results: FAD-I results (24 different subjects/110 exposures): 10.9% terminated exposures due to pain-only DCS; 6.4% due to vge scores resulting in early termination. FAD-II results (20 different subjects/57 exposures): 5.3% terminated exposures; 1.8% case of pain-only DCS; 3.5% with vge scores resulting in early termination of the exposures.

Conclusions: Revised surfacing ratio limits (calculated tissue FN2/PB) were used to calculate no-decompression limits for dives at sea level which allow immediate ascent to altitudes up to 10,000 ft.

CURRENT AND PROPOSED PSYCHIATRIC EXAMINATION STANDARDS FOR AVIATORS. R. J. JONES* AEROSPACE ASSOCIATES, One Clermont Court, Oakwell Farms, San Antonio, TX 78218-1741

INTRODUCTION: Accurate psychiatric assessment of aviators requires an examination for pertinent signs and symptoms, an acceptable diagnostic nosology, and valid standards for aeromedical recommendations. Little is known about the worldwide standards for conducting psychiatric examinations. METHODS: A questionnaire (mostly in "Yes or No" format) was sent to medical offices of ICAO and NATO constituent agencies. RESULTS: We received responses from 43 of the questionnaires. Of 43 returned, 21 were from government bodies, 12 from private air carriers, and 2 from others. Some answers did not total 43 because of non-responses. Applicants are examined by aeromedical examiners; yes, 33; no, 6; estimated average time 22 min. Psychiatrists: yes, 13; no, 25; 39 min. Psychologists: yes, 17; no, 17; 71 min. Neurologists: yes, 4; no, 26; 17 min. Psychological tests are given by 24, and EEGs by 9. Fourteen agencies use the American Psychiatric Association's "DSM-III-R," 14 use the WHO's ICD-9. CONCLUSION: Psychiatric examination techniques and standards vary worldwide. If standards are not validated against some "gold standard" of performance, they should be based on the collective experience of aeromedical examiners and aviation-oriented psychiatrists and psychologists. We hope to report further on this in the future.

PERMANENT GROUNDING OF A COMMERCIAL AIRLINE'S PILOTS: A 20-YEAR REVIEW. G. M. Kohn* and R. G. Fennell, United Airlines Medical Department, Chicago, IL 60666.

INTRODUCTION: Preventive medicine has always served as the backbone discipline underlying a commercial airline's implementation of flight medicine services. Costs and trends in permanent "grounding" of incumbent aircrew can help determine effectiveness of preventive selection and maintenance practices. Records and data were compiled to determine the incidence and patterns of physical anomalies in a single airline's experience. METHODS: We reviewed the medical records of all pilots who were determined by the Corporate Medical Director to be totally and permanently disabled while on active flight status since 1972. The medical records were determined and classified into ten major diagnostic categories. RESULTS: Cardiovascular disease was responsible for the largest number of medical grounds, followed by neurological and psychiatric disease, and malignant neoplasms. The predominant cause to favor an increasing incidence of psychiatric disease as primary pathology over the past ten years. CONCLUSION: New-hire and incumbent physical examinations should stress cardiovascular risk factors, cancer screening, and psychiatric evaluation. An increased amount of interpersonal interaction with the flight surgeon, suggested as an educational and screening intervention.

ECOCHOCGROPHIC AND COLOUR FLOW FINDINGS IN PILOTE CANDIDATES. G. W. Gray* and A. M. Gollin, Defence and Civil Institute of Environmental Medicine, Toronto, Canada, M1N 3B9.

INTRODUCTION: Since 1985, all Canadian Forces pilot candidates have been screened with echocardiography, and since 1989, with colour flow. METHODS: From March 1989 through March 1991, 1112 pilot candidates underwent routine echocardiographic screening, with pulsed wave Doppler carried out when indicated based on the colour flow. All candidates had undergone medical screening at a Recruiting Center and were presumed to be free of cardiovascular anomalies based on clinical examination and electrocardiography. RESULTS: 73/1112 candidates (6.72%) were discovered to have cardiovascular anomalies. Further testing based on echocardiographic findings. 57 (5.12%) had mitral valve prolapse, 12 (1.08%) bicuspid aortic valve, 2 (0.18%) significant aortic regurgitation with normal ventricular hypertrophy, and 1 atrial septal defect. Other incidental findings included 746/1112 (67%) with tricuspid regurgitation, 719/1112 (64%) with pulmonary regurgitation and 319 (29%) with mitral regurgitation, all of slight to mild degree. Only 19/1112 (1.72%) had slight aortic regurgitation. These incidental findings were not considered disqualifying.

Conclusion: Echocardiographic and colour flow screening of candidates for military pilot training detects a significant prevalence of cardiac anomalies missed on routine enrolment screening which if discovered after training could lead to medical grounding. It is considered safe and cost-effective.

HIV-SEPOSPOSITIVITY AND FITNESS TO FLY IN AIRCRAFL OF THE FEDERAL GERMAN ARMED FORCES. R. P. FRANK* AEROPSY 1 ASSOCIATES, One Clermont Court, Oakwell Farms, San Antonio, TX 78218-1741

INTRODUCTION: The actual static analysis of HIV-screening tests, carried out with military personnel of the Federal German Armed Forces in the period from June 1985 to June 1991, shows a prevalence of 0.21 per 1000 for HIV-infected persons and a prevalence of 0.12 per 1000 for HIV-infected individuals including patients with AIDS/ARC. Eithero, there are 5 known cases of death representing a mortality of 0.05 per 1000 in the period.

According to the constitutional law valid in the Federal Republic of Germany and after written consent, aviators of the German Armed Forces can voluntarily perform the HIV-test during their examination of physical fitness at the GAF IAM. In the period from August 1988 to June 1991 obligatorly testing for HIV-1 antibodies at the time of their physical fitness examination, specially required for training in the USA, showed no proof of HIV-sepospositivity.

In military aviation, aircrews with HIV-sepospositivity are principally classifitied "not physically qualified for flying duties" while in Civil Aviation HIV-antibody testing is at present not laid down respectively recommended. In the opinion of the GAF IAM the introduction of routine and thereby preventive HIV-antibody tests, e.g. at the annual physical evaluation, would be an adequate and legitimate claim particularly with respect to the special flight related and task-associated standards on aircrews.


This study compared bronchial reactivity to inhaled methacholine and histamine in 50 non-smoking subjects who had been selected for military aviator training. Bronchial reactivity was assessed by forced expiratory volume in one second (FEVI) and Peak Expiratory Flow (PEF). Asthma was defined as an increase in peak flow of 20% or more, following inhalation of methacholine. Asthma was diagnosed in 19 subjects (38%). A comparison of the group of asthmatic subjects with the group of healthy subjects showed significant differences in bronchial reactivity to inhaled methacholine (p < 0.05). The group of asthmatic subjects showed a significant increase in bronchial reactivity to inhaled histamine compared with the group of healthy subjects (p < 0.05). The prevalence of IAR, the different sensitivity between Italian A.F. and US forces was found in a study investigated through routine airway challenge tests (MCT) in random sequence. A screening test for allergic diseases (Phadiatop) and screening skin tests were also performed. A200FEVI fall and/or 100%increase in PEF were measured by shutter method were considered to be representative of IAR.

RESULTS: No subject showed IAR after MCT. After MCT IAR was found in 18 subjects: high in 3(POD-200 of methacholine), moderate in 4 (PD200-500) and low in 11 subjects. Out of 18 had both FEVI and PEF simultaneously. Phadiatop and prick tests were negative.

CONCLUSIONS: The prevalence of IAR, the different sensitivity between methods, the different levels of IAR and the presence of sensitivity to other allergens, found in pilot candidates require discussion and additional work to better define how to what extent IAR alone relates to flight and in defining the methodology of next.
INTRODUCTION. It is generally accepted that high apo B levels are a reliable predictor of cardiovascular risk disregarding pathological antecedents. This paper presents the results of a study that measured cholesterol, apo A and apo B plasma levels in otherwise healthy ground and flight workers. The total cholesterol level was determined by Abbott's enzymatic method (Technicon GA). The results show that the mean total cholesterol level was significantly increased (P < 0.05) in astronauts compared to ground workers. The study also found that the apo B plasma levels were significantly increased (P < 0.05) in astronauts compared to ground workers. These findings suggest that high apo B levels may be a useful tool for identifying individuals at risk for cardiovascular disease.