INTRODUCTION. The present study was conducted to evaluate the prevalence of NIDDM among jet aircraft pilots and to analyze the present status of individuals with NIDDM and impaired glucose tolerance (IGT). METHODS. A review of all flight records was made for every 6 month since employment and those who showed urine glucose > trace and/or fasting plasma glucose (FPG) > 100 mg/dl took 75 gOGTT. All IGT and NIDDM's were identified from 39-31-91, laboratory variables were measured to determine their control status. RESULTS. Of 1263, 43 were diagnosed as NIDDM, 192 as IGT, 10 as renal glucoseuria and the remaining 1018 were normal. Prevalence rate of NIDDM was 3.4%. A cross sectional study demonstrated that present age (52.8, 49.2 vs 46.8 yrs), FPG (107, 104 vs 92 mg/dl), HbA1c (6.1, 5.8 vs 5.5%) were higher in NIDDM and IGT than in normals, however, BMI, T.chol and uric acid levels were identical among three groups. None of them were grounded due to poor control of diabetes. CONCLUSION. The occurrence of NIDDM among cockpit crew was approximately 1/3 of general population despite the high physical demands. Health care cannot be neglected, however, intensive supervision by us seems to be effective to ameliorate their glycemic control.

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. Thorough 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 injury or pathology or change in activity) was approved for centrifuge training at a military training facility. In a rapid onset run (ROM) of high Gs, he was accelerated from 1.20 to 7.0G at a rate of +2.0 G's-1, sustaining 7.0Gds for an additional 1.5s while performing the M-1 maneuver. At the completion of this run, the patient reported groin pain in his right hip. Examination revealed a complete fracture of the right femoral neck with no concomitant 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 demarked, furthering our understanding of human function under high-G stress, and hopefully preventing future occurrence of such injury.

INTRODUCTION. A review of acceleration injuries on human centrifuges in the United States and Canada since 1905. R. McDougal, J. Whinney, ACME Labs, Naval Air Development Center, Warminster, PA 19097-9000; R. Yablon, Aerospace Lab, Brooks AFB, TX 78235-5301; F.J. Muggley, G.W. Gray, Defense and Civil Institute of Environmental Medicine, North York, Ontario, Canada, M3M 3B6; D. Greent, R.D. Vanderheek, William Beaumont Army Medical Center, Orthopaedics, El Paso, TX 79905. The present study was conducted to evaluate the prevalence of NIDDM among jet aircraft pilots and to analyze the present status of individuals with NIDDM and impaired glucose tolerance (IGT). METHODS. A review of all flight records was made for every 6 month since employment and those who showed urine glucose > trace and/or fasting plasma glucose (FPG) > 100 mg/dl took 75 gOGTT. All IGT and NIDDM's were identified from 39-31-91, laboratory variables were measured to determine their control status. RESULTS. Of 1263, 43 were diagnosed as NIDDM, 192 as IGT, 10 as renal glucoseuria and the remaining 1018 were normal. Prevalence rate of NIDDM was 3.4%. A cross sectional study demonstrated that present age (52.8, 49.2 vs 46.8 yrs), FPG (107, 104 vs 92 mg/dl), HbA1c (6.1, 5.8 vs 5.5%) were higher in NIDDM and IGT than in normals, however, BMI, T.chol and uric acid levels were identical among three groups. None of them were grounded due to poor control of diabetes. CONCLUSION. The occurrence of NIDDM among cockpit crew was approximately 1/3 of general population despite the high physical demands. Health care cannot be neglected, however, intensive supervision by us seems to be effective to ameliorate their glycemic control.

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F-16 PILOT EXPERIENCE WITH COMBAT EJECTIONS DURING THE PERSIAN GULF WAR. M. Williams, J. Armstrong, Wright-Patterson Air Force Base, Ohio 45433-6553.

INTRODUCTION. Most experience with ejections from modern fighter aircraft has occurred in mishaps outside of true combat operations. During the Persian Gulf War, the 601st Tactical Fighter Wing lost 4 F-16C aircraft while on combat missions. All 4 pilots ejected safely, but under varying and different parameters.

A questionnaire was developed to recall and evaluate their ejection situation, any problems or injuries they encountered, and their present condition. RESULTS. A total of 4 pilots were given the questionnaire that allowed them to provide answers to 12 questions pertaining to their ejection. Questions ranged from recalling the parameters of their ejection to conscious recollections of the event and their assessment of how well the system worked. RESULTS. All 4 ejections occurred under different parameters. Two were at high altitudes. All 4 pilots were able to vividly recall their egress experience and recount some part of the event that was a surprise. None suffered any significant injury and one was wearing contact lenses which remained in during the ejection. All felt the seat and survival gear performed flawlessly. CONCLUSION. This was one of the first times that experience was obtained in the F-16 ejection system under combat operations in which the reason for emergency egress might be different, e.g., frag damage, than in peacetime.

AERODYNAMIC SEAT MAN COEFFICIENTS DURING WINDBLAST EJECTION SEATS. D. Patterson, M. Williams, Wright-Patterson Air Force Base, Ohio 45433-6553.

INTRODUCTION. Seating configuration is a critical design parameter in the F-16 ejection mechanism. Under combat operations in which the reason for emergency egress might be different, e.g., frag damage, than in peacetime, the windblast forces acting on the ejection seat and survival gear performed flawlessly.

CONCLUSION. All 4 ejections occurred under different parameters. Two were at high altitudes. All 4 pilots were able to vividly recall their egress experience and recount some part of the event that was a surprise. None suffered any significant injury and one was wearing contact lenses which remained in during the ejection. All felt the seat and survival gear performed flawlessly. CONCLUSION. This was one of the first times that experience was obtained in the F-16 ejection system under combat operations in which the reason for emergency egress might be different, e.g., frag damage, than in peacetime.
**HYPERTENSION MANAGEMENT IN AVIATORS OF A COMMERCIAL AIRLINE. L.T. HUSSAIN, C.V. MASTRACCHI, STATHOGIA, HELLENIC AIR FORCE AEROSPACE MEDICAL CENTRE, ATHENS GREECE.**

**INTRODUCTION.** Effective control of arterial hypertension in aviators still remains a problem. Diuretics and β-blockers adequately tested so far, are known to cause unfavourable effects on lipid and glucose metabolism. Yet diuretics cause electrolyte disturbances and β-blockers may restrain exercise capability and have sedative effects. Newer classes of antihypertensive agents such as Ca-antagonists and ACE inhibitors have been proved clinically safe and effective. They present no adverse metabolic effect, they do not cause orthostatic hypotension or sedative effects. On the contrary ACE inhibitors may increase alertness. Based on these considerations, these classes of drugs have been introduced in recent years. Whenever hypertension is detected the aviator is grounded. After clinical and laboratory investigation, a stepped care treatment of hypertension is started. Out of 450 aviators, 10 were found hypertensive (BP>150/95). 17 of them succeeded adequate control of BP only by salt restriction and life style modification. The remaining 26 received successfully drug therapy: 5-blockers, Ca-antagonists, ACE inhibitors or diuretics as monotherapy or in combination. During the last five years, 5 pilots were permanently disqualified because of uncontrolled hypertension. CONCLUSION. New classes of antihypertensive drugs such as ACE inhibitors and Ca-antagonists have been effectively and safely used in civilian aviators.

The studies carried out within this programme suggest that angiotensin converting enzyme inhibitors are likely to have the least deleterious effect on central function in man.
BLOOD VOLUME AND ORTHOSTATIC RESPONSES OF MEN AND WOMEN TO A 13-DAY BEDREST. *S. Forney*, T. Driscoll, L. Umansky, and C. Todd, NASA/Johnson Space Center, KRUG Life Sciences, and the Baylor College of Medicine.

**INTRODUCTION.** Changes in blood volume during space flight are thought to contribute to decrements in mission planning and orthostatic function. The purpose of this study was to determine whether gender affects red cell mass and plasma volume during a short exposure to simulated microgravity, and whether gender differences in orthostatic disturbances were affected by menstrual phase.

**METHODS:** Twenty-four normal men and women (19±2.4 years, 1.7±0.06 m, 70±8 kg, 21±3 days of bedrest) underwent 13 days of −6° head-down bedrest. Plasma volume (PV) and red cell mass (RCM) were measured before bedrest and on bedrest day 13. On the same day, orthostatic tolerance (OT) was determined as the maximal pressure during a presyncopal-limited lower body negative pressure test. RESULTS. Plasma volume (PV) and red cell mass (RCM) decreased (P < 0.01) during bedrest in both groups, with a greater PV decrease (P < 0.05) in men (6.3 ± 0.6 ml/kg) than in women (4.1 ± 0.6 ml/kg). Decreases in red cell mass were similar (1.7 ± 0.2 ml/kg in men and 1.7 ± 0.2 ml/kg in women). OT was similar for men and women before bedrest (−78.6 ± 22.4 mmHg in men vs. −70.4 ± 21.6 mmHg in women) and decreased by a similar degree (by an average of 11 mmHg in both groups) after bedrest. The changes in OT did not correlate with changes in plasma volume during bedrest (P = 0.02). **CONCLUSION.** Thus, although female hormones may protect PV during bedrest, they do not appear to offer an advantage in terms of loss of orthostatic function.


**INTRODUCTION.** The combined effect of postural changes, fluid shifts, and diuresis associated with the absence of the gravity vector may decrease GIM during space flight. GIM can be estimated from the mouth-to-cecum transit time (MCTT) of orally administered lactulose (LAC); this test is used to assess changes in GIM in normal subjects and in patients with GIM dysfunction and gas trointestinal (GI) symptoms. Since BR mimics some of the physiological changes that occur during space flight, the effect of ten days of BR on GIM was evaluated from the MCTT of LAC.

**METHODS.** Subjects were 12 non-smoking males between the ages of 35 and 50. After an 8-h fast, four subjects ingested Cephaline® (20g solution) with a low-titer breakfast on four different days (45, 30, 25, and 20) before BR and on three separate days (4, 7, and 10) during BR. Breath-H₂ concentrations were measured before and at 10-min intervals for 4 h after breakfast using a Quintron breathalyzer. RESULTS. MCTT ranged between 50 and 100 min during anthabulation and 80 and 210 min during BR with means of 79 min and 122 min, respectively. **CONCLUSIONS.** Mean MCTT during BR was 54% longer than during ambulation, suggesting that absorption and availability of orally administered medications and nutrients may be delayed or impaired as a result of decreased GIM during bedrest.

**THE EFFECTS OF LYPRESSIN ON HEMODYNAMIC RESPONSES TO HEAD-DOWN TILT AND ORTHOSTATIC STRESS.** D. Ware* and R.W. Goradia*, Wright State University School of Medicine, Dayton, OH 45401.

**INTRODUCTION.** This study was conducted to examine the effects of the synthetic drug lysine-8-vasopressin (lypressin) on specific hemodynamic variables during nascent (4 hours) head-down tilt (HDT) and subsequent orthostatic stress. **METHODS.** Seven healthy male subjects, ages 23-59, were blinded, cross-over subjects in a study of 8-vasopressin (lypressin) on specific hemodynamic variables during nascent (4 hours) head-down tilt (HDT) and subsequent orthostatic stress. Nascent (4 hours) head-down tilt (HDT) and subsequent orthostatic stress. **RESULTS.** Mean systolic and diastolic blood pressures were not different between standard HDT and HDT with 8-vasopressin (lypressin) infusion. **CONCLUSIONS.** The effects of 8-vasopressin (lypressin) on specific hemodynamic variables during nascent (4 hours) head-down tilt (HDT) and subsequent orthostatic stress were not different.