-571-

EFFECTS OF NINE-DAY EXPOSURE TO MICROGRAVITY ON CARDIOPULMONARY FUNCTION. L.E. Farhi*, A.J. Olszowka, D.R. Pendergast, M.A Rokitka and B.E. Shykoff, State University of New York at Buffalo, Buffalo, NY 14214

Introduction. Prolonged exposure to microgravity has long been suspected to cause serious cardiovascular deconditioning, but has not been adequately documented, with one major exception (Buderer *et al (Aviat. Space Environ. Med.*,47:365-372, 1976). Our goal was to quantitate this deconditioning in subjects whose activities in space included near-daily periods of physical exercise on a bicycle ergometer. Methods. Three normal subjects (one female, two males) were studied repeatedly before a nine-day space mission (SLS1) and following reentry. In each case, the protocol consisted of three test periods (rest and two levels of exercise) during which steady state heart rate,blood pressure, gas exchange and cardiac output (by a rebreathing technique based on that of Farhi *et al., Respir. Physiol.*, 28:141-159,1976)) were determined. Subjects were studied in both the erect and supine positions. Each data point is the average of 4-5 successive measurements.Results. Significant ($P<.05$) changes were found in the erect subjects, both at rest and exercise on the day of reentry: at rest, heart rate increased to 133% of preflight value, while cardiac output dropped to 75%. Blood pressure was maintained. Calculated stroke volume decreased to 56%, while total peripheral resistance increased to 146%. These changes were also evident during exercise, although work did not cause further deterioration. Conclusions. 1) The subjects seemed able to vasoconstrict sufficiently to maintain blood pressure in the face of the decreased cardiac output; 2) many other trends, which cannot be proven now because of the limited number of subjects, may become statistically significant after the number of subjects is increased by repeating the studies on the SLS2 mission.

-572-

CARDIOVASCULAR ADAPTATION TO 0-G: RESULTS FROM SPACELAB LIFE SCIENCES ONE. F.A. Gaffney*, J.C. Buckey*, L.D. Lane, B.D. Levine, D.E. Watenpaugh, C.G. Blomqvist. University of Texas Southwestern Medical Center, Dallas, Texas 75235-9034.

Experiment 294 on the SLS-1 mission (5-14 June 91) examined the crew's adaptation to microgravity with a complex set of measurements including heart rate (ECG), blood pressure (Karotkoff and Finapres), cardiac output (rebreathing), leg volume, venous compliance (venous occlusion plethysmography), and cardiac dimensions (quantitative 2-dimensional echocardiography). Testing occurred inflight, and on the ground during a variety of interventions including lower body negative pressure tests, autonomic function tests using isoproterenol and phenylephrine infusions, supine and standing tests, upright maximal exercise, and a 24-hour head down tilt study. Central venous pressure, a critical parameter for quantitating the fluid shifts in microgravity, was also obtained for the first time before, during and after flight with a specially-designed fluid-filled catheter system. Results show that entry into microgravity was not associated with a detectable rise in CVP. Postflight maximal exercise was decreased on landing day, yet had returned to preflight levels by 7 days postflight. Significant degrees of orthostatic intolerance was seen postflight in all crewmembers. Excessive venous pooling did not appear to explain the observed deterioration in aerobic capacity and orthostatic intolerance. The cardiovascular changes associated with microgravity appear much more complex than previously believed.

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-573-

EFFECTS OF WEIGHTLESSNESS ON HUMAN BAROREFLEX FUNCTION Janice M. Fritsch and Dwain L. Eckberg* NASA-JSC, Houston, Texas 77058 and VA Medical Center, Richmond, VA, 23249

Impaired cardiovascular function, characterized by orthostatic intolerance and reduced exercise capacity, is a result of space travel. We hypothesized that postflight baroreflex dysfunction may contribute. We studied the vagally mediated carotid baroreceptor-cardiac reflex responses of 6 astronauts before, during, and after the ten day SLS-1 mission. A series of R-wave triggered pressure and suction steps (from 40 to -65 mmHg) were delivered to a neck chamber during held expirtation. Resulting R-R interval changes were plotted against carotid distending pressure (systolic - neck pressure), and curve parameters calculated. After an initial rise, the operational point declined consistently during the flight and reached a nadir on landing day, but had recovered to preflight levels by L+4. Slope and range of the response declined throughout the flight, were slightly recovered by the time measurements were made on landing day, but still were reduced on L+4. These data indicate that space flight results in a significant impairment of the carotid baroreceptor cardiac reflex response.

-574-

LUNG FUNCTION TESTS ON SLS-1 CREWMEMBERS. Harold J. B. Guy*, G.K. Prisk*, and J.B. West, Univ. of California, San Diego 92092-0931.

INTRODUCTION. A headward fluid shift and reduction of topographic gradients should alter lung function at 0-G. METHODS. We tested resting lung function on the SLS-1 crew repeatedly before, during (4 payload crew: days 2,4,5,9. 3 orbiter crew: day 4), and after flight. RESULTS AND CONCLUSIONS. CO diffusing capacities (DlCO) and pulmonary capillary blood volumes (Vc) were elevated and almost constant throughout the mission (~125% pre-flight standing control), and were higher than the control supine values. Membrane diffusing capacity (Dm) was increased, allaying any fears of interstitial pulmonary edema at 0-G, at least at rest. Cardiac stroke volumes (N2O rebreathing) were ~150% of the pre-flight standing values on flight day 2, and fell slowly but were still ~125% control on day 9. This fall was slower than that seen in head-down tilt studies. Vital capacities were only decreased on FD2 (~95% control, similar to KC-135 0-G data). Resting lung volumes (FRC) were intermediate between standing and supine FRCs, consistent with the absence of gravitational depression and elevation of the diaphragm. Single breath N2 washout/ argon bolus tests showed Phase IV rises (argon +, N2 +/-) at volumes near those seen pre-flight. Cardiogenic oscillations of N2 and CO2 were still ~50% of pre-flight. The slope of the N2 alveolar plateau (phase III) was reduced ~25%. Thus lung function is still far from uniform, and airways closure can still occur, at 0-G. Ongoing analyses of SLS-1, SLS-2 and D-2 data will allow further definition of the sources of this inhomogeneity.

-575-

HYPERBARIC OXYGEN THERAPY: NO LONGER WITCHCRAFT. R.W. Hamilton* Hamilton Research Ltd., Tarrytown, NY 10591-4138. Garrett R. Tucker. USAF Medical Center, Wright-Patterson AFB, OH 45433-5300.

Hyperbaric oxygen therapy is becoming a mature medical entity. As adjunctive therapy for a variety of conditions and the primary indication for a few, HBO as a field is experiencing healthy growth. Once over-promoted and poorly substantiated, HBO is slowly beginning to establish a much-needed base of controlled clinical trials; the changing attitude recognizes that HBO is adjunctive care in most cases. The American Board of Preventive Medicine has accepted HBO as a subspecialty. HBO equipment includes large steel, air-filled, 6-atmosphere "multiplace" chambers with multiple locks, compressors, a control panel, water deluge system for fire safety, and mask breathing system, as well as smaller, 3-atm, portable acrylic plastic single-lock "monoplace" chambers filled with 100% oxygen. A new hybrid "single-attended-patient" type is filled with air instead of O_2, allows the higher pressures, and has a small lock for an attendant. Hyperbarics is increasing in DOD installations, with a major new Naval facility planned to supplement existing USAF and Army installations. Major HBO preparations were made—but fortunately were not needed—for *Desert Storm*. HBO is primary care for gas lesion diseases (decompression sickness and embolism) and certain CO poisonings, and is well accepted in gangrene. New advances focus on wound care, including convincing results in the use of HBO to reduce the need for leg amputations of diabetics; HBO can reduce by more than half the need for subsequent amputations. The use of HBO as adjunctive therapy for osteoradionecrosis, especially of the mandible, is now accepted. Thermal burns heal faster and at considerably less cost when HBO is used adjunctively.

-576-

ECONOMIC AND ADMINISTRATIVE CHARACTERISTICS OF THE CLINICALLY BASED HYPERBARIC MEDICINE PROGRAM.
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No longer limited to regional referral centers, hyperbaric medicine facilities are now in place across the continuum of health care institutions. The increasing acceptance of hyperbaric medicine as a useful adjunctive therapeutic modality in carefully selected patients is based upon sound mechanistic rationale, limited but continuing clinical experience, and a requirement to reduce total health care costs. The free standing clinic concept has largely disappeared, primarily as a result of reimbursement policies. Hospital based hyperbaric programs are evenly divided as either divisions of existing departments (most commonly Respiratory, Emergency, and Surgical services) or full fledged departments. There are advantages to each, but, the successful program is unlikely to be limited to professional case management by a single specialty group. Many early programs relied upon physicians with experience in undersea and aviation medicine. Now, clinical hyperbaric training programs and many surgical and primary care specialties are being developed. Chamber operations are undertaken by nurses, respiratory therapists and specifically trained technicians. A recent certification program has introduced minimum standards of training for the "Hyperbaric Technologist." HBO capital requirements are based upon a careful institutional analysis of clinical and financial factors. Referral expectations, present and potential competition, and payor class can be matched to a variety of delivery systems and their respective operating costs. The choice of a monopatient vs. multipatient approach is dictated more by economics than clinical case management; new equipment developments allow critically ill patients to be treated effectively in single place chambers.

-577-

CLINICAL HYPERBARIC MEDICINE IN THE DEPARTMENT OF DEFENSE. W.T. Workman, LtCol, USAF, BSC*; Hyperbaric Medicine Division, Aerospace Medicine Directorate, Armstrong Laboratory, Brooks AFB TX 78235-5000.

The Department of Defense (DOD) has witnessed tremendous growth in the clinical application of hyperbaric oxygen (HBO) since its early beginnings in the 1960s. Initially inspired by successes in the Air Force program, clinical hyperbaric oxygen therapy is now expanding in both the US Army and US Navy. In 1986, the Air Force was designated as Lead Agent by the DOD to guide development of a comprehensive tri-service program. This leadership has directly contributed to clinical HBO capabilities at Brooks AFB TX; Wright-Patterson AFB OH, Travis AFB CA, Ft Rucker AL, and Portsmouth Naval Base VA (under design). The direct application of HBO to military medicine results from potential uses in support of combat casualty care. Research is being aggressively pursued to validate its use in conditions such as burn and crush injuries, other soft tissue injuries, microbial infections, and environmental injuries. During Desert Storm, the potential for the use of HBO in the theater of operations was carefully evaluated. Even though access to hyperbaric treatment facilities was extremely restricted, triage time, evacuation limitations and few casualties prevented a full test of HBO capabilities.

-578-

USE OF HYPERBARIC OXYGEN IN MANAGING RADIATION NECROSIS. Robert E. Marx. University of Miami School of Medicine, Miami, FL 33101.

Radiation induced problems, especially those occurring in head and neck surgery, are the nightmare of the reconstructive surgeon. Once developed, they lead to bone and tissue necrosis, failure to revascularize and granulate, and secondary infection, not to mention pain and disability. Surgery or trauma to the area increases the risk of infection, fracture, and wound dehiscence, and chances of resolution are slim. The wound healing defect appears to be related to chronic local tissue hypoxia and its consequences. Hyperbaric oxygenation has been shown to cause an apparently paradoxical neovascularization, capillary proliferation, and fibroplasia in irradiated tissue. Transcutaneous oxygen measurements suggest that this may be due to the intermittent raising of tissue oxygen, combatting local hypoxia around the center of the wound and creating a steep oxygen gradient. This provides release of angiogenesis factor by macrophages, a stimulus to capillary budding, and growth of an intercellular collagen framework. Based on these principles we developed a three-phase treatment regimen using traditional surgical therapy supplemented by HBO, and applied it to a cohort of 278 patients with exposed mandibular bone for 6 months following radiation. The first step is to treat with HBO for 30 treatments without bone removal, then to use local debridement and labial and lingual flap closure over bleeding bone and additional HBO, followed if necessary by bony reconstruction and more HBO. Results showed virtually complete resolution in all patients. In another study on 74 highly irradiated and high-risk patients HBO was used to prevent or ameliorate radionecrosis; 30% of the penicillin control group developed the condition, but only 5.4% of those treated. Costs of these procedures is less than one-third that of non-HBO patients.

-579-

RESULTS OF COMBINED THERAPY INCLUDING HBO IN SALVAGING DIABETIC LIMBS. Salimi A. Wirjosemito.* Hyperbaric Medicine Dept., USAF Medical Center/SGPH, Wright-Patterson AFB, OH 45433-5300.

INTRODUCTION. A major complication of diabetes is foot infection, which often leads to successive amputations due to failure of the wound to heal. Adjunctive hyperbaric oxygen, HBO, is used in treatment of diabetic problem wounds. We surveyed its efficiency in a retrospective study of recovery from local foot amputation, with a five-year followup. METHODS. HBO patients received traditional daily wound care, antibiotics, and therapy for diabetes, plus once or twice daily HBO treatment for 140 minutes at 2.4 atm abs for 35-40 treatments. RESULTS. Of 45 initial patients (45-75 years) two died of unrelated causes and one was lost to followup. Of the remaining 42, 35 or 83% were healed and did not require further amputation. Of these, 21 received skin grafts and 14 healed secondarily. Of 5 failures requiring subsequent amputations, 3 were below the knee and two above. DISCUSSION. This study suggests a beneficial effect of HBO. To relate it to similar care but without HBO we matched our results with those of Britton (Ann Royal Coll Surg England 69(3):127-129, 1987), who reviewed 64 similar patients, ages 45-75. Of Britton's patients 45% healed and the remainder required a subsequent major amputation (versus 83% healed with adjunctive HBO). In another study Baroni (Diabetes Care 10(1):81-86, 1987 Jan-Feb) found only 2 of 18 HBO patients required amputation while 4 of 10 without HBO had to have amputations. CONCLUSIONS. Adjunctive HBO can reduce by more than half the number of subsequent major amputations of diabetics after local foot surgery.

-580-

ROLE OF HYPERBARIC OXYGEN IN THERMAL BURNS. Charles Petit, HealthSouth Rehabilitation, Columbia, SC, and Paul Cianci, Department of Hyperbaric Medicine, Brookside Hospital, San Pablo, CA 94806.

In 1965 Wada *et al* observed accelerated healing of burns in patients receiving HBO therapy for treatment of carbon monoxide poisoning. Those observations subsequently led to a plethora of investigations using animal burn models to explore the mechanisms by which this ameliorative effect was derived. Current understanding of those mechanisms by which HBO therapy spares adjacent and subjacent tissues, reduces edema formation, decreases average fluid resuscitation requirements, enhances cellular immune responses, and supports revascularization and re-epithelialization allows for the confident prescription of HBO therapy as an adjunct to standard burn care. Safety and efficacy having been established, it remained for cost effectiveness to be demonstrated in order for the modality to gain widespread acceptance. That issue has now been well established in the care of both moderately and severely burned patients. A reduction in the number of surgical procedures, length of hospital stay, and overall cost of care is now certain. It is therefore essential that all medical personnel working with burn patients understand and effectively apply this valuable therapy in their care.

-581-

PANEL: SPATIAL DISORIENTATION
CHAIRS: *W.B. Albery, Armstrong Laboratory, Wright-Patterson AFB OH; *W. Ercoline, Krug International, Brooks AFB TX

This panel had been an AsMA workshop for the past two years but will become a panel from now on. Various researchers in spatial orientation including those from the Armstrong Laboratory, the Naval Aerospace Medical Research Laboratory, the Royal Air Force's Institute of Aviation Medicine, as well as universities and the private sector will present their research on spatial disorientation.

-582-

SPATIAL ORIENTATION RESEARCH IN THE U.S. NAVY. A. H. Rupert*. Naval Aerospace Medical Research Laboratory, Naval Air Station, Pensacola, FL 32508-5700.

Spatial Disorientation (SD) is the leading physiological human factors cause of aviation mishaps in the U.S. Navy. The Naval Aerospace Medical Research Laboratory (NAMRL) has a fourfold approach to reduce the incidence of SD mishaps: 1) basic research to elucidate the mechanisms of SD, 2) improved training techniques, 3) development of neurological tests to aid mishap investigation and pilot selection, and 4) improved man-machine interfaces. Basic science programs utilize psychophysical and neurophysiological techniques to examine perceptual and reflex motor responses of pilots to linear and angular accelerations in the presence or absence of whole-field visual motion. The ultimate goal is to develop conceptual and mathematical models that will predict the pilot's perceptions given the visual field motion and aircraft acceleration profile. Training paradigms on the closed-loop vertifuge simulator are being prepared for the more common illusions. A battery of neurovestibular tests is being refined to provide flight surgeons with tools to ascertain whether survivors of SD mishaps have predisposing physiological attributes that render them particularly susceptible to experiencing SD. Such tests have strong potential for selection/screening. The NAMRL thrust to improve the man-machine interface is to supplement traditional central vision displays with a combination of veridical, proprioceptive, and peripheral vision attitude displays. The efficacy of novel displays is tested on the unique man-rated acceleration devices of NAMRL.

-583-

FLIGHT EVALUATION OF AN ACOUSTIC ORIENTATION INSTRUMENT (AOI). K.K. Gillingham* and D.C. Teas. Armstrong Laboratory, Brooks AFB TX 78235-5000 and KRUG Life Sciences, San Antonio, TX 78279-0644.

INTRODUCTION. An AOI provides an auditory display of primary flight parameters, in theory allowing the pilot to maintain spatial orientation while visually occupied with other tasks. A flight simulator-tested AOI, which displays airspeed and vertical velocity as variable auditory images, and bank angle as lateralization of those images, was evaluated in flight in a Beech Queen Air aircraft. METHODS. The performance of 8 instrument-rated pilots during five experimental maneuvers (straight and level, 30° banked turn, steep turn, level-off from descent, and recovery from a disorienting maneuver) under four conditions (instrument hood, hood + AOI, blind, and blind + AOI) was measured with respect to absolute vertical velocity and bank angle deviations (mean, RMS, and variance). ANOVA and post-hoc statistical comparisons of the four conditions were accomplished. RESULTS. In all maneuvers the blind + AOI condition resulted in significantly better ($p<0.05$) bank angle control than was obtained in the blind-only condition, and bank angle control in the blind + AOI condition was not significantly different from that obtained under either hood condition. Although vertical velocity control tended to be better in the blind + AOI than in the blind-only condition in most maneuvers, statistical significance was reached only in straight and level flight. CONCLUSION. The AOI enables a pilot to maintain bank angle control in the absence of vision. Its potential to aid in vertical velocity control is also evident, but the vertical velocity display needs to be improved.

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-584-

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DYNAMICS OF THE G-EXCESS ILLUSION. **K. A. Baylor*[1], M. Reschke*[2], F. E. Guedry*[3], B. J. McGrath*[1] and A. H. Rupert*[1]. 1. Naval Aerospace Medical Research Laboratory, Pensacola, FL 32508-5700. 2. NASA, Johnson Space Center, Houston, TX 77058. 3. University of West Florida, Pensacola, FL 32514.**

INTRODUCTION. The G-excess illusion is increasingly recognized as a cause of aviation mishaps especially when pilots perform high-speed, steeply banked turns at low altitudes. Centrifuge studies of this illusion have examined the perception of subject orientation and/or target displacement during maintained hypergravity with the subject's head held stationary. The transient illusory perceptions produced by moving the head in hypergravity are difficult to study onboard centrifuges because the high angular velocity ensures the presence of strong Coriolis cross-coupled semicircular canal effects that mask immediate transient otolith-organ effects. The present study reports perceptions following head movements in hypergravity produced by high-speed aircraft maintaining a banked attitude with low angular velocity to minimize cross-coupled effects. METHODS. Fourteen subjects flew on the NASA KC-135 were exposed to resultant gravity forces of 1.3, 1.5, and 1.8 G for 3-min periods. On command, seated subjects made controlled head movements in roll, pitch, and yaw at 30-s intervals both in the dark and with faint targets at a distance of 5 ft. RESULTS. Head movements produced transient perception of target displacement and velocity at levels as low as 1.3 G. Reports of target velocity without appropriate corresponding displacement were common. At 1.8 G when yaw head movements were made from a face down position, 4 subjects reported oscillatory rotational target displacement with fast and slow alternating components suggestive of torsional nystagmus. Head movements evoked symptoms of nausea in most subjects with 2 subjects and 1 observer vomiting. CONCLUSIONS. The transient percepts present conflicting signals, which introduce confusion in target and subject orientation. Repeated head movements in hypergravity generate nausea by mechanisms distinct from cross-coupled Coriolis effects.

-585-

NATURE OF THE G EXCESS ILLUSION AS PRODUCED ON A RESEARCH CENTRIFUGE
T. L. Chelette*, E. J. Martin, R. L. Esken. Armstrong Laboratory, Wright-Patterson Air Force Base, OH

INTRODUCTION: The G excess illusion is described as an exaggerated sensation of self-tilt due to the increased shear forces placed on the otolith organs when the head is tilted under sustained G_z. The experiments described herein were designed to clarify the perceptual confounds of measuring such an illusion and to quantify the extent of the illusion on the Dynamic Environment Simulator, a human centrifuge. METHODS: Twelve subjects reported perceived location of the horizon through a gimbaled mechanism surrounding their right hand while performing a head aiming task using a helmet mounted display. Phase I placed the subject at a variety of attitudes. Phase II placed the torso at a variety of angles while maintaining the head at horizontal. Phase III repeated the positions of Phase II while at 3 G_z. Phase IV varied the head position and the G level while maintaining the torso aligned with the G_z vector. RESULTS: In the first three phases the following comparisons of mean errors showed no statistically significant differences; Phase I - pitch vs roll axis, head at 0° vs 45° (both axes), pre vs post training (both axes, both head angles); Phase II - torso at 0° and head at 45° vs reverse condition, torso and head at 0° vs torso at -45° and head at 0°; torso at -45°, -30° or +30° and head at 0° vs torso and head at 0°; Phase III - 3 G_z vs 1 G_z for torso at 0°, or +30° and head at 0° (both axes). Statistically significant increases in error at 3 G_z vs 1 G_z were observed when the body was pitched backward in the -30° and -45° positions and head at 0°. CONCLUSIONS: In this experimental paradigm, the following confounds have been shown to have no independent effect on the mean error in reported attitude: disparate sensitivity to roll axis vs pitch axis, repeated training with digital feedback, and haptic sensation of the gravity vector at 1 or 3 G_z. G_z level has been shown to have an error inducing effect when the neck is extended while keeping the head level.

-586-

THE EFFECT OF VISUAL SCENE INFORMATION ON THE SOMATOGRAVIC ILLUSION. F.H. PREVIC, D.C. VARNER, AND K.K. GILLINGHAM*. Armstrong Laboratory, Brooks AFB, TX 78235-5000; Southwest Research Institute, San Antonio, TX 78298-2224

INTRODUCTION. The somatogravic illusion (SGI) occurs when a shift in the resultant gravitoinertial force vector created by a sustained linear acceleration is misinterpreted as a change in pitch or bank attitude. Since the SGI typically occurs under degraded visual conditions, this study attempted to determine which visual scene cues are most effective in overcoming the SGI. METHODS. Nine subjects (seven pilots) were exposed to 5.67 m/s^2 acceleration (+30 deg pitch SGI) for 30 s in the Armstrong Laboratory's Vertifuge. They experienced the SGI both with their eyes closed and while viewing visual scenes depicting acceleration over a shoreline through a wide field-of-view (90 x 60 deg) head-mounted display. The scenes contained horizon, perspective, texture, and color cues in both isolation and various combinations. Subjects indicated the direction of "down" during the final 7 s of each trial, and also rated the amount of linear vection produced by the scenes. RESULTS. None of the scenes significantly reduced the magnitude of the SGI relative to the eyes-closed pitch illusion (+26.6 deg). Significant vection was induced by some scenes, but it did not correlate with the ability of the scenes to reduce the SGI, even in the most visually dependent subjects. CONCLUSION. The ability of low-cost head-mounted visual displays to reliably reduce the magnitude of the SGI and other disorientation illusions remains uncertain. The capability to elicit vection may not be sufficient for overcoming the SGI.

-587-

SOMATOGYRAL ILLUSION IN THE PITCH, ROLL AND YAW PLANE. H. Onus*, C. R. Wilpizeski* and G. Li. Environmental Tectonics Corporation, Southampton, PA and Jefferson Medical College, Philadelphia, PA

INTRODUCTION. After termination of constant velocity rotation, Jones and Kowalsky found differences in the persistence of the somatogyral illusion for pitch, roll and yaw. These differences may have been a consequence of the interaction between neck proprioceptors and the semicircular canals. We controlled neck tension by using whole-body rotation around the subject's X and Y axis. METHODS. With heads fixed and eyes closed, male volunteers were exposed to 6 deg/sec constant velocity rotation for a period of 60 seconds. They were asked to respond as soon as they perceived the onset and termination of rotation. RESULTS. With neck tension controlled, the median durations of the per- and postrotational somatogyral illusion were progressively greater for pitch, roll and yaw. Persistence of perceived rotation was longer in all three planes during rotation than after. Only 61% of the subjects could accurately identify the direction of roll. CONCLUSIONS. The duration of the somatogyral illusion differs for roll, pitch and yaw. This difference cannot be explained completely by physiological interaction between neck proprioception and semicircular canals.

-588-

RESEARCH AND DEVELOPMENT : THE INTEGRATION OF COMPUTER BASED MEDICAL TECHNOLOGY INTO THE AEROMEDICAL EVACUATION SYSTEM OF THE 21 CENTURY MSgt L.D. Tripp Jr.* , 356th Tactical Airlift Squadron, Rickenbacker ANGB, 43217

INTRODUCTION: Aeromedical evacuation is on the brink of some extraordinary advances in patient care technology. With the explosion of biomedical technology over the past 15 years, a plethora of computer based patient assessment technologies have emerged. These new technologies present the flight nurse corps with endless research opportunities in the area of advanced medical equipment applications in the aircraft environment. **METHODS:** Some of the current off-the-shelf items which may apply to in flight patient care include: 1) pulse oximetry, for non-invasive arterial oxygen saturation measurement, 2) automated blood pressure monitoring , 3) infrared digital thermometers, and 4) transcrainal Doppler, for measuring cerebral blood flow. Research in to the application of these devices will require the development of experimental protocols, in flight test and evaluation, data collection and analysis, and plans for incorporating these devices into the future equipment and training requirements. **RESULTS:** An increase in the quality of in flight patient care will be the major benefit derived from this process. **CONCLUSION:** The result of these efforts will culminate in the transformation of aeromedical patient care into the 21st century.