INTRAMUSCULAR PRESSURE: A BETTER TOOL THAN EMG TO OPTIMIZE EXERCISE FOR LONG-DURATION SPACE FLIGHT.

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INTRODUCTION. A serious problem experienced by astronauts during long-duration space missions, in particular those spending a longer time in space, is muscle loss which occurs due to disuse or inactivity. A simple method for monitoring in vivo function of specific muscles is needed. Previous studies have shown that intramuscular pressure (IMP) and electromyography (EMG) provide valuable indications of muscle condition and function. While IMP is on average a more powerful tool than EMG for developing an understanding of muscular changes, there are certain situations were muscle strain must be quantified concurrently. However, at present there are no data available concerning the usefulness of IMP versus EMG for quantifying muscular strain. METHODS. IMP (Myopress catheter) and surface EMG activity (Caddwell, Inc.) were measured concurrently in the anterior (TA) and soleus (SOL) muscles of 9 normal male volunteers (28-54 years). These parameters were recorded during both concentric and eccentric exercises which consisted of plantarflexion and dorsiflexion of the ankle joint. A Lido Active Isokinetic Dynamometer concurrently recorded ankle joint torque and position. RESULTS. Intramuscular pressure correlated linearly with contraction force for both SOL (r=0.837) and TA (r=0.946) during concentric exercise. SOL and TA EMG did not correlate as well with force during concentric exercise (r=0.716 and r=0.670, respectively). During eccentric exercise, SOL and TA IMP also correlated linearly with contraction force (r=0.892 and r=0.913, respectively), but SOL and TA EMG correlated poorly with force (r=0.496 and r=0.702, respectively).

CONCLUSIONS. IMP measurement provides a better index of muscle contraction force than EMG during concentric and eccentric exercise. IMP reflects possible biological properties of individual muscles, such as length-tension relationships. Although invasive, IMP provides ideal candidates for evaluating exercise habits and protocols for astronauts exposed to long-duration flight. (Supported by NASA)

GROUND REACTION FORCES DURING RUNNING ON ACTIVE AND PASSIVE TREADMILLS IN SIMULATED ZERO-CRAVITY. B.L. Davids, F. P. Cavanagh.
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INTRODUCTION. The effects of seating and escape configurations in subject groups on the efficiency of egress to the life support system has not yet been addressed. In this study, a series of seating and escape configurations in the life support system were evaluated using two methods. First, the design of the egress system was based on the requirements of the life support system, and the effects of seating on the egress system were evaluated. Second, the effects of seating on the egress system were evaluated using the results of the design study. The results of this study will provide a better understanding of the effects of seating on the egress system and the design of the life support system.

RESULTS. The results of this study showed that seating and escape configurations in the life support system had a significant effect on the efficiency of egress. The results also showed that seating and escape configurations in the life support system had a significant effect on the efficiency of egress. The results also showed that seating and escape configurations in the life support system had a significant effect on the efficiency of egress. The results also showed that seating and escape configurations in the life support system had a significant effect on the efficiency of egress. The results also showed that seating and escape configurations in the life support system had a significant effect on the efficiency of egress.

CONCLUSION. This study showed that seating and escape configurations in the life support system had a significant effect on the efficiency of egress. The results of this study will provide a better understanding of the effects of seating on the egress system and the design of the life support system.

SENSORY ILLUSIONS REPORTED WHILE USING NIGHT VISION DEVICES IN SOUTHWEST ASIA.


INTRODUCTION. Degraded visual cues associated with the use of night vision devices (NVDs) combined with the adverse environmental conditions of Southwest Asia often produce unexpected visual effects and illusions. This study identified the variety of sensory illusions experienced by U.S. Army aviators in SW Asia while using NVDs. METHODS. An open-ended questionnaire was distributed to aviation units while deployed. Aircrew were asked to report any episodes of disorientation, sensory problems, or illusions noted while flying with NVDs. RESULTS. Eighty-nine questionnaires were collected. The sensory events occurred during good weather, over open terrain, during low levels of illumination, and in all phases of flight. Degraded visual cues accounted for over half of all reports, with loss of visual horizon and degraded resolution most frequently mentioned. CONCLUSIONS. Familiarity with sensory illusions is critical for safe NVD-flight. These findings can be used to better prepare aviators to fly at night in a desert environment.

Effects of Seating Configuration and Number of Type III Exits on Simulated Emergency Egress from a Narrow Body Transpacific Category Aircraft. G C Mohan, S. C. B. Megan,
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INTRODUCTION. An increase in the required pathway width from aircraft center aisles to Type III overwing exits is being weighed by the FAA. To augment the analysis, an evaluation of seat/eight configuration effects on simulated emergency egress was conducted in the CAMI Evacuation Research Facility. METHODS. Four subject groups were tested in the Evacuation Research Facility: different seat configurations in a counter-balanced, repeated-measures design. Pathway width was modified by altering seat configuration. RESULTS. The highest flow-rates occurred with a 20° pathway between triple seats or a 10° pathway between double seats. At the same time, the egress occurred in less than 35% of the time required for a straight line (p<0.007), although flow-rates declined 11% and exit plug removal increased 32%, compared to single exits. CONCLUSION. Efficient egress requires optimization of the space around the exit. Generally, wider pathways and fewer seat configurations enhance this process; however, when pathway size is too great, conflicts among passengers may be produced which inhibit egress.

INTRODUCTION. Lychak and Frohnhoffer suggested that motion sickness develops in man and animals when rhythmic changes in body displacement centering around 12/sec synergize brain waves occurring in the 10-15 Hz range (10.17-0.25 Hz for zeta rhythm). The resonance hypothesis is based on some selected factors associated with MS but is inconsistent with other evidence.

METHODS. Squirrel monkeys, cynomolgus monkeys and cats were exposed to continuous linear vertical and horizontal displacement on a ship with a steady velocity horizontal rotation. Neural centers for vomiting (CTZ) were surgically ablated in some subjects. RESULTS. Squirrel monkeys of Bolivian phenotype developed MS syndrome readily during rotation but never during vertical linear oscillation. A different phenotype was highly resistant to all motion. Neither vertical displacement nor horizontal rotation created signs of MS in cynomolgus monkeys or cats. Based on data from CTZ-ablated animals, the postulated link between zeta rhythm, poisoning and MS is questionable. CONCLUSION. Contradictory findings from animal studies and the resonance hypothesis of MS as it is currently formulated.