CHRONIC CATECHOLAMINE ADMINISTRATION INDUCES DOSE DEPENDENT CHANGES IN SKELETAL MUSCLE MYOSIN ISOGENES AND FIBER TYPES DURING HINDLIMB SUSPENSION. J. Girgten*, A.J. Merlo, W.M. Sherman, G. Winer, R. Darte. Wright State University School of Medicine, Dayton, OH, Ohio State University, Columbus, OH and Genica Pharmaceuticals, San Diego, CA.

INTRODUCTION. Several dosages of GP-2 (128, 512 and 2048), a new and very potent synthetic catecholamine, 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 seven treatment groups. Rats assigned to the control (CON) group were not suspended and received saline injections. All other rats were suspended using the Morrey-Hilton tail suspension method and were given injections of either saline (SAL) or one of five dosages of GP-2 (0.02, 0.04, 0.08, 0.16, 10 ng/kg/g). Each animal received two intraperitoneal injections per day, at 12 hours apart, for 14 days. Fiber types of the soleus (SOL) and gastrocnemius (GAST) muscles and myosin isoforms profiles of the GAST were determined by biochemical techniques and by gel electrophoresis, respectively. 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 (1% SM1) in the GAST of the SUS/10 group did indicate that the 10 ng/kg/g dose was effective in suppressing the suspension induced decrease in the % SM1 while the other doses were not. Despite some differences in group comparisons between % ST FIB and % SM1 in the GAST, there was a significant correlation between these two measures (r=0.53). CONCLUSION. Overall, the data indicated that incremental increases in GP-2 resulted in graded dose response increases in % ST FIB and % SM1, and graded attenuation of detrimental skeletal muscle changes produced by conditions which simulated weightlessness in rats.

EFFECTS OF 3 WEEKS CENTRIFUGAL ACCELERATION IN RATS. M. Sudoh, H. Waki*, Y. Honda*, S. Ikawa and H. Sakit. 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 5 weeks. To provide hypergravity, a centrifuge having an angular radius of 1.3m was used. RESULTS. During this period, daily changes in body weight, urine volume, food intake and 2-day interval BP monitoring system (Finapres) was used. The data indicated that incremental increases in GP-2 resulted in graded dose response increases in % ST FIB and % SM1, and graded attenuation of detrimental skeletal muscle changes produced by conditions which simulated weightlessness in rats.

EFFICIENCY OF CONTINUOUS BLOOD PRESSURE MONITORING DURING LBNP TEST. S. Yumukura*1, C. Sekiguchi*1, A. Miyamoto*1, K. Enomoto2, R. Maruy2, N. Yamaguchi2, and K. Yajima2. 1) NASA; 2) Nihon University School of Med. Tokyo, Japan. PURPOSE and METHOD: To evaluate the efficiency of continuous blood pressure (BP) monitoring during the LBNP test, the continuous BP monitoring system (Finapres) was used during 30 mmHg LBNP tests. The cases of presyncopeal episodes in which ECG, BP, HR (Finapres) and 2-minute interval BP monitoring (BM) were intermittent (1-minute interval) hemodynamic impedance cardiography monitoring and 2-minute interval BP monitoring. RESULTS: Neither 1-minute nor 2-minute interval BP monitoring resulted in an episode. CONCLUSION: The data indicated that incremental increases in GP-2 resulted in graded dose response increases in % ST FIB and % SM1, and graded attenuation of detrimental skeletal muscle changes produced by conditions which simulated weightlessness in rats.

EFFICIENCY OF CONTINUOUS BLOOD PRESSURE MONITORING DURING LBNP TEST. S. Yumukura*1, C. Sekiguchi*1, A. Miyamoto*1, K. Enomoto2, R. Maruy2, N. Yamaguchi2, and K. Yajima2. 1) NASA; 2) Nihon University School of Med. Tokyo, Japan. PURPOSE and METHOD: To evaluate the efficiency of continuous blood pressure (BP) monitoring during the LBNP test, the continuous BP monitoring system (Finapres) was used during 30 mmHg LBNP tests. The cases of presyncopeal episodes in which ECG, BP, HR (Finapres) and 2-minute interval BP monitoring (BM) were intermittent (1-minute interval) hemodynamic impedance cardiography monitoring and 2-minute interval BP monitoring. RESULTS: Neither 1-minute nor 2-minute interval BP monitoring resulted in an episode. CONCLUSION: The data indicated that incremental increases in GP-2 resulted in graded dose response increases in % ST FIB and % SM1, and graded attenuation of detrimental skeletal muscle changes produced by conditions which simulated weightlessness in rats.

SPECTRAL COMPONENTS OF HUMAN CARDIOVASCULAR RESPONSES TO STEPS CHANGES IN LOWER BODY NEGATIVE PRESSURE (LBNP) BEFORE AND AFTER 22 HR OF HEAD DOWN REST. C.F. Knap*, J.M. Evans, K.J. Gravle, C.D. Murphy, A.R. Patwardhan, Center for Biomedical Engineering, University of Kentucky. Lexington, KY 40506.

Changes in autonomic outflow to peripheral organs during the development of bedrest induced, orthostatic stress were determined. Recent studies have indicated that spectral analysis provides an indirect assessment of these changes. Eight male rats were studied before and after 22 hours of head down bedrest plus LBNP (40 mmHg, 60 min). Cardiovacular function (autoregulation technique) were determined for heart rate (HR), cardiac output (CO), arterial pressure (BP), and peripheral resistance (PR) in the absence of LBNP. Spectra were obtained from 2.5 minute segments during control, LBNP (100, 200, 300, 400, 500, 600 and 1000 mmHg), and recovery. Redundant HR spectral power in the low (0.01 to 0.1 Hz), mid (0.1 to 0.8 Hz), and high (0.8 to 4.0 Hz) frequency ranges and increased AP power in the high frequency range. Both HR and AR were observed to be increased AP power in the high frequency range. Since spectral power of HR in the high frequency range was shown to be associated with sympathetically mediated regulation and power in the low and mid frequency ranges indicate a sympathetically driven response, then both bedrest and LBNP appear to be associated with increased sympathetic sympathetic regulation of the heart. Analysis of the spectral content of AP and HR with respect to their autonomic regulation of HR. The interpretation of the spectral content of both bedrest and LBNP appeared to shift sympathetic and mid frequency ranges indicate a sympathetic frequency range.
EVALUATION OF LYMPHOCYTE POPULATIONS OF NAVY AVIATION PERSONNEL DURING OPERATION DESERT STORM. A. Mateer*, H.M. Nelder*, A.W. Schonherr*, N. El Ghorab. Naval Aerospace Medical Research Laboratory, Pensacola, FL 32508-2700 and Naval Medical Research Unit 3, Cairo, Egypt.

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 result from the state of cellularity, cellular lines, and/or fatigue interfering with job performance or safety. Military personnel have been studied during 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 lymphocyte and blood chemistry 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. CONCLUSION. These data do not demonstrate the alterations of lymphocytes indicative of stress and thus were not suffering cumulative immunologic effects of operational stress. However, further research is required to determine if individuals who fall outside published reference ranges. The Helper-Suppressor cell ratios were significantly different from published normal reference data; and 3) A definite stress response was noted as evidenced by the increase in T lymphocytes.


INTRODUCTION. The threat of chemical warfare with organophosphate poisons has resulted in fielding the anticholinergic atropine sulfate to soldiers. Atropine is a key to survivability once poisoning has occurred, there have been concerns that the drug might be injected after an aviator manifests symptoms, be ineffective or be improperly injected. An in-flight investigation was conducted to evaluate the operational impact of this scenario. METHODS. Twelve Army helicopter pilots were given placebo, 2 mg, and 4 mg atropine and evaluated for cognitive, psychomotor, and flight performance. RESULTS. Effects were seen most often with the 4 mg dose. Flight performance revealed decrements in straight and level, standard-rate turns, a climbing turn, an instrument landing system (ILS) approach, turn, and coordinated area operations. Vision tests showed increases in pupil diameter and double vision with decreases in accommodation. Cognitive tests revealed decrements in logical reasoning, quantitative ability, short-term memory, and choice reaction time. There were also increases in psychomotor tracking errors, and EOGs revealed evidence of decreased accommodation at high altitudes. All physical parameters were found to be normal. Conclusions. Atropine dosages with up to 4 mg of atropine did not appear to be critically impacted, but were contrary to the ground revealed problems. Aviators should avoid flying for a minimum of 12 hours after an injection of atropine.

RECONNAISSANCE INCIDENCE OF DECOMPRESSION SICKNESS (DCS) IN HIGH ALTITUDE RECONNAISSANCE PILOTS. A.A. Pilmis*, R.U. Binson. Armstrong Laboratory, Brooks AFB TX 78235.

INTRODUCTION. USAF pilots flying U-2/TR-1 reconnaissance aircraft are routinely exposed to cabin altitudes between 25,000 and 30,000 ft for 9 or more hours. One hour of ground level prebreathing with 100% O2 is used to reduce DCS risk, and 100% O2 is breathed during flight. Formal reports of DCS are not made for non-pulmonary DCS, and DCS is primarily disqualification of a mission. The threat of chemical warfare with organophosphate poisons has resulted in fielding the anticholinergic atropine sulfate to soldiers. Atropine is a key to survivability once poisoning has occurred, there have been concerns that the drug might be injected after an aviator manifests symptoms, be ineffective or be improperly injected. An in-flight investigation was conducted to evaluate the operational impact of this scenario. METHODS. Twelve Army helicopter pilots were given placebo, 2 mg, and 4 mg atropine and evaluated for cognitive, psychomotor, and flight performance. RESULTS. Effects were seen most often with the 4 mg dose. Flight performance revealed decrements in straight and level, standard-rate turns, a climbing turn, an instrument landing system (ILS) approach, turn, and coordinated area operations. Vision tests showed increases in pupil diameter and double vision with decreases in accommodation. Cognitive tests revealed decrements in logical reasoning, quantitative ability, short-term memory, and choice reaction time. There were also increases in psychomotor tracking errors, and EOGs revealed evidence of decreased accommodation at high altitudes. All physical parameters were found to be normal. Conclusions. Atropine dosages with up to 4 mg of atropine did not appear to be critically impacted, but were contrary to the ground revealed problems. Aviators should avoid flying for a minimum of 12 hours after an injection of atropine.

INCONSISTENT CLASSIFICATION AND TREATMENT OF TYPE 1/TYPE II DECOMPRESSION SICKNESS (DCS) IN HIGH ALTITUDE RECONNAISSANCE PILOTS. A.A. Pilmis*, R.U. Binson. Armstrong Laboratory, Brooks AFB TX 78235.

INTRODUCTION. USAF pilots flying U-2/TR-1 reconnaissance aircraft are routinely exposed to cabin altitudes between 25,000 and 30,000 ft for 9 or more hours. One hour of ground level prebreathing with 100% O2 is used to reduce DCS risk, and 100% O2 is breathed during flight. Formal reports of DCS are not made for non-pulmonary DCS, and DCS is primarily disqualification of a mission. The threat of chemical warfare with organophosphate poisons has resulted in fielding the anticholinergic atropine sulfate to soldiers. Atropine is a key to survivability once poisoning has occurred, there have been concerns that the drug might be injected after an aviator manifests symptoms, be ineffective or be improperly injected. An in-flight investigation was conducted to evaluate the operational impact of this scenario. METHODS. Twelve Army helicopter pilots were given placebo, 2 mg, and 4 mg atropine and evaluated for cognitive, psychomotor, and flight performance. RESULTS. Effects were seen most often with the 4 mg dose. Flight performance revealed decrements in straight and level, standard-rate turns, a climbing turn, an instrument landing system (ILS) approach, turn, and coordinated area operations. Vision tests showed increases in pupil diameter and double vision with decreases in accommodation. Cognitive tests revealed decrements in logical reasoning, quantitative ability, short-term memory, and choice reaction time. There were also increases in psychomotor tracking errors, and EOGs revealed evidence of decreased accommodation at high altitudes. All physical parameters were found to be normal. Conclusions. Atropine dosages with up to 4 mg of atropine did not appear to be critically impacted, but were contrary to the ground revealed problems. Aviators should avoid flying for a minimum of 12 hours after an injection of atropine.
FLYING AFTER DIVING: VALIDATION TESTS FOR MILITARY AVIATORS DIVERS. R.E. Rose et al., E.D. LaFont, and A.A. Pilmanis. HUB, United Airlines Medical Department, Chicago, IL 60666.

INTRODUCTION: Dives conducted at sea level by military personnel, followed by an immediate ascent to altitudes up to 10,000 feet for 1 hour, and then returned to sea level. In FAD-I, the subjects were exposed to 3 different dive profiles followed by altitude exposures as described except that altitudes were reached in 2 1/2 minutes. Subjects were monitored for decompression sickness (DCS) and for venous gas emboli (VGE) during the altitude exposures. The voluntary, fully informed consent of the subjects in this research was obtained as required by the U.S. Public Health Service. Results: FAD-I results (20 different subjects/110 exposures): 7/20 experienced DCS and 2/20 had VGE. FAD-II results (20 different subjects/105 exposures): 5/20 experienced DCS and 1/20 had VGE. Conclusions: Revisions of the0 screening procedures are recommended in flight medicine standards for military divers.


INTRODUCTION: Accurate psychiatric assessment of aviators requires a screening examination for persistent signs and symptoms, an acceptable diagnostic nosology, and valid standards for aeromedical recommanations. Little is known about the worldwide prevalence of non-blind psychiatric diagnoses. METHODS: A questionnaire (mostly in "Yes or No" format) was sent to medical offices of ICAO and IATA constituent agencies. RESULTS: We received 97 questionnaires. Of 43 returned, 21 were from government bodies, 7 from patrol s cariers, and 2 from others. Some answers did not total 43 because of non-responses. Applicants are examined: by aeromedical examiners: yes, 63; no, 26; yes, 26; 17 min. Psychiatrists: yes, 17; no, 26; 17 min. Psycholog-ists: yes, 17; 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 diagnostic techniques, tests 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.

ASTHMA AND SELECTION OF AVIATORS: ASSESSMENT OF BRONCHIAL REACTIVITY. R. Berti, L. Urbani, C. De Angelis, P. Matricardi, R. Nisini, G. Petrelli; Dept. of Aerospace Medicine, D-W-80200 Fuerstenfeldbruck, Germany.

INTRODUCTION: Accurate psychiatric assessment of aviators requires a screening examination for persistent signs and symptoms, an acceptable diagnostic nosology, and valid standards for aeromedical рекомандацій. Little is known about the prevalence of non-blind psychiatric diagnoses. METHODS: A questionnaire (mostly in "Yes or No" format) was sent to medical offices of ICAO and IATA constituent agencies. RESULTS: We received 97 questionnaires. Of 43 returned, 21 were from government bodies, 7 from patrol s cariers, and 2 from others. Some answers did not total 43 because of non-responses. Applicants are examined: by aeromedical examiners: yes, 63; no, 26; yes, 26; 17 min. Psychiatrists: yes, 17; no, 26; 17 min. Psychologists: yes, 17; 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 diagnostic techniques, tests 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.

ECHOGRAPHIC AND COLOUR FLOW FINDINGS IN PILOT CANDIDATES. G.W. Gray and A.M. Gulino. Defence and Civil Institute of Environmental Medicine, Toronto, Canada, M3H 3H9.

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 echocardiographic and colour flow 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 electrocardiology. RESULTS: 73/1112 candidates (6.7%) were discovered to have cardiac anomalies during the screening based on echocardiographic findings. 57 (5.1%) had mitral valve prolapse, 12 (1.1%) bicuspid aortic valve, 2 (0.2%) significant aortic regurgitation, 2 left ventricular hypertrophy, and 1 atrial septal defect. Other incidental findings included 746/1112 (67%) with tricuspid regurgitation, 719/1112 (65%) with pulmonary regurgitation and 319 (29%) with mitral regurgitation, all of slight to mild degree. Only 19/1112 (1.7%) had slight aortic regurgitation. These incidental findings were not considered disqualifying.

CONCLUSION: Echocardiographic and colour flow screening of candidates for pilot training detects a significant prevalence of cardiac anomalies missed on routine examination screening which if discovered after training could lead to medical grounding. It is considered safe and cost-effective.
APOPROTIN B AS A USEFUL TOOL TO FORETELL CARDIO-VASCULAR RISK IN NORMAL OR HYPERCHOLESTEROLEMIC SUBJECTS. P. Blanco Rojo, J.M. Pérez * Sastre, Occupational Medicine Service of IBERTA airline company of Spain, Madrid

INTRODUCTION. It is generally accepted high apo B levels as a reliable predictor of cardio-vascular risk disregarding pathologic 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 sample. METHODS: Total cholesterol was determined by Abbott's enzymatic method (cholesterol oxidase and cholesterol esterase) and apo A and B by Schölmerich's nephelometric method in 390 random workers sample. RESULTS: 35.40% males and 13.48% females were hypercholesterolemic, being 75% and 68% respectively considered high cardio-vascular risk. 15% males and 4% females with normal cholesterol were also considered high risk, due to both to high apo B and low apo A levels. CONCLUSIONS: Apo B should be determined in Hyper and/or Normocholesterolemic workers when there are other associated factors (smoking, hypertension, diabetes) and/or safety related jobs (aircrew) in order to comply or not washer therapies to prevent cardio-vascular disease.

REGULATION AND ADAPTION PROCESSES OF HUMAN BODY IN LONG-TERM MICROGRAVITY. A.I. Gripposev and A.D. Egerov, Institute of Biomedical Problems, Moscow 123007, USSR

INTRODUCTION. Mechanisms of regulation and adaptation of cardiovascular, respiratory, muscular-skeletal, hematologic and immune systems in microgravity were discussed in this paper. METHODS: Space flight medical investigation results are analyzed and summarized in terms of general physiological mechanisms. RESULTS: Microgravity induced elimination of gravity-related dependence of the physiological parameters. The mechanisms underlying the human body structures changes affect input and removes weight-load and hydrostatic blood pressure. As a result, regulation processes are changed and short- and long-term adaptation responses are developed. It was observed that the healthy ground and flight workers sample. METHODS: Total cholesterol, Ca++, Mg++, P and PTH levels in otherwise healthy ground and flight workers sample. RESULTS: 15.6% males and 4.6% females were hypercholesterolemic, being 75% and 68% respectively considered high cardio-vascular risk. 15% males and 4% females with normal cholesterol were also considered high risk, due to both to high apo B and low apo A levels. CONCLUSIONS: Apo B should be determined in Hyper and/or Normocholesterolemic workers when there are other associated factors (smoking, hypertension, diabetes) and/or safety related jobs (aircrew) in order to comply or not washer therapies to prevent cardio-vascular disease.

INTRODUCTION. Bone loss following spaceflight is well documented, and if left untreated may lead to loss of bone to occur over long periods, months to years, but the relationship between bone and blood calcium homeostasis appears to be a crucial problem of spaceflight. We hypothesized that the initial response of bone to unloading will be a release of calcium, through increased bone resorption, but this is not proved. Antiresorptive drugs such as those in research trials in osteoporosis and metastatic bone disease may be useful in preventing bone loss in spaceflight.


INTRODUCTION. The USSR experience, having been accumulated in LDSF medical support, has shown the necessity of the definite correction and specification of methodology of MCS design. METHODS. By use of systemic analysis and the method of control estimation of the results of MCS in space has been performed. There have been analyzed the results of examination of 19 Soviet cosmonauts, who performed LDSF, lasting from 2 to 12 months, in 1980-90. The analogous estimation has been carried out in 565 experiments with volunteers during the modelling of zero-gravity environment. RESULTS. The systemic analysis has shown, that in addition to 3 well-known methodological principles (i.e. pathogenesis, "MC by stages" and successions of events), 4 new principles must be formulated and taken into account. They are the systemic-structural approach, the system of "MC with total "image" of MCS, the search of "organ-targets". CONCLUSION. The realization of the formulated methodological principles leads to the significant improvement of the informative and diagnostic possibilities of on-board MCS in LDSF.

RESULTS OF AN INTERNATIONAL SPACE CREW DEBRIEF. P.A. Santy*, A.K. Rolland*, D. Bacon5, P. Rosegger, and R. Barroden-North*. UHMS, Galveston, TX 77550; and Johnson Space Center & Behavioral Laboratory, Houston, TX 77058.

INTRODUCTION. In order to identify potential multicultural and multilingual problems for future International Space Station (ISS) crew, a crew debrief questionnaire (called an "International Crew Debrief") was developed for U.S. astronauts who flew on Shuttle missions with one or more crewmembers from other countries, METHODOLOGY. From 1981-90, a total of 20 U.S. astronauts flew on International space missions. Debriefs were collected through interview with instructions not to identify themselves or their specific mission. The debrief focused primarily on preflight training and postflight incidents, including miscommunication, misperceptions, and interpersonal friction among crewmembers. Astronauts were asked to rate the impact of the incident to the mission (low, medium or high). RESULTS: Most of the astronauts responded, but only nine responses were able to be scored; for a return rate of 45%. 42 incidents were reported; 9 in the preflight period; 26 inflight; and 7 in the postflight period. Most of these incidents were rated "low" or medium impact, but 5 of the inflight incidents were rated at a "high" mission impact. A number of causes for the problems were listed, and are discussed. CONCLUSIONS. The Debrief respondents provide useful and timely recommendations on preflight training which might help facilitate the integration of multinational crews and prevent multicultural or multilingual factors from interfering with mission operations.

MAGNETIC RESONANCE IMAGING (MRI) OF SKELETAL MUSCLES IN ASTRONAUTS AFTER 9 DAYS OF SPACE FLIGHT. M. Jawaid1, P. Narayanan2, J. Slupecki2, L. Butner3, V. Schneider1, A. LeBlanc3, L. Folster1, and D. Bacon3. NASA Johnson Space Center, 1Univ. of Texas Health Science Center, 2Baylor College of Medicine, 3Houston, TX.

INTRODUCTION. Skysy studies indicated that prolonged exposure of human subjects to a weightless environment of space flight may result in significant muscle atrophy accompanied by reduced muscle strength and fatigue resistance. The objective of this study was to determine decrements in muscle size, if any, in the soleus and gastrocnemius muscles of male and female astronauts after 9 days of space flights. METHODS. Eight astronauts, one female and seven male, between the ages of 31 and 59 years, 59.8-94 kg body weight were examined by MRI 2-3 times preflight within 16 days before launch; and 2 days (n=6) and seven days (n=6) after landing. The right leg muscles (gastrosoleus) were imaged with a lower extremity coil in magnets operating at 1.0 or 1.5 Telsa. The imaging protocol consisted of spin echo with a TR of 0.7-1.5 sec. Thirty to forty 3-5 mm thick slices were acquired in 256 x 128 or 256 x 256 matrices. Acquisition time lasted 20-40 minutes. Multiple slices were measured by computerized planimetry. RESULTS. Compared to the preflight, the cross-sectional areas (CSA) of the soleus, gastrocnemius and the leg, at 2 days after landing were reduced (at least P<0.05) 8.9 percent, 13.2 percent and 8.5 percent, respectively. The soleus and the leg of three astronauts evaluated at 7 days postflight, did show full recovery compared to the preflight values. CONCLUSIONS. It is concluded that 9 days of space flight may cause significant decrease in CSA of the leg muscles. The factors responsible for this loss need further delineation.