



Aerospace Medicine
and Biology
A Continuing
Bibliography
with Indexes

NASA SP-7011 (181)
June 1978

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ACCESSION NUMBER RANGES

Accession numbers cited in this Supplement fall within the following ranges:

STAR (N-10000 Series) N78-17989—N78-20048

IAA (A-10000 Series) A78-24824—A78-28483

AEROSPACE MEDICINE AND BIOLOGY

**A CONTINUING BIBLIOGRAPHY
WITH INDEXES**

(Supplement 181)

A selection of annotated references to unclassified reports and journal articles that were introduced into the NASA scientific and technical information system and announced in May 1978 in

- *Scientific and Technical Aerospace Reports (STAR)*
- *International Aerospace Abstracts (IAA)*.



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INTRODUCTION

This Supplement to *Aerospace Medicine and Biology* (NASA SP-7011) lists 223 reports, articles and other documents announced during May 1978 in *Scientific and Technical Aerospace Reports (STAR)* or in *International Aerospace Abstracts (IAA)*. The first issue of the bibliography was published in July 1964; since that time, monthly supplements have been issued.

In its subject coverage, *Aerospace Medicine and Biology* concentrates on the biological, physiological, psychological, and environmental effects to which man is subjected during and following simulated or actual flight in the earth's atmosphere or in interplanetary space. References describing similar effects of biological organisms of lower order are also included. Such related topics as sanitary problems, pharmacology, toxicology, safety and survival, life support systems, exobiology, and personnel factors receive appropriate attention. In general, emphasis is placed on applied research, but references to fundamental studies and theoretical principles related to experimental development also qualify for inclusion.

Each entry in the bibliography consists of a bibliographic citation accompanied in most cases by an abstract. The listing of the entries is arranged in two major sections: *IAA Entries* and *STAR Entries*, in that order. The citations, and abstracts when available, are reproduced exactly as they appeared originally in *IAA* or *STAR*, including the original accession numbers from the respective announcement journals. This procedure, which saves time and money, accounts for the slight variation in citation appearances.

Two indexes -- subject and personal author -- are included.

An annual index will be prepared at the end of the calendar year covering all documents listed in the 1978 Supplements.

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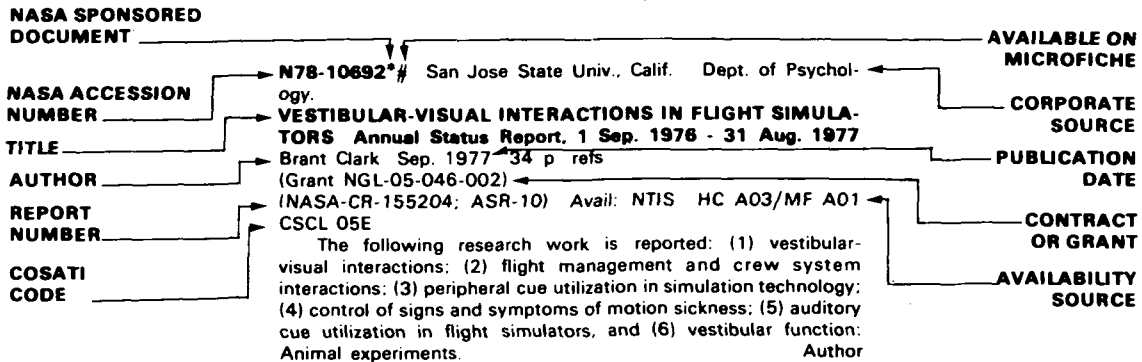
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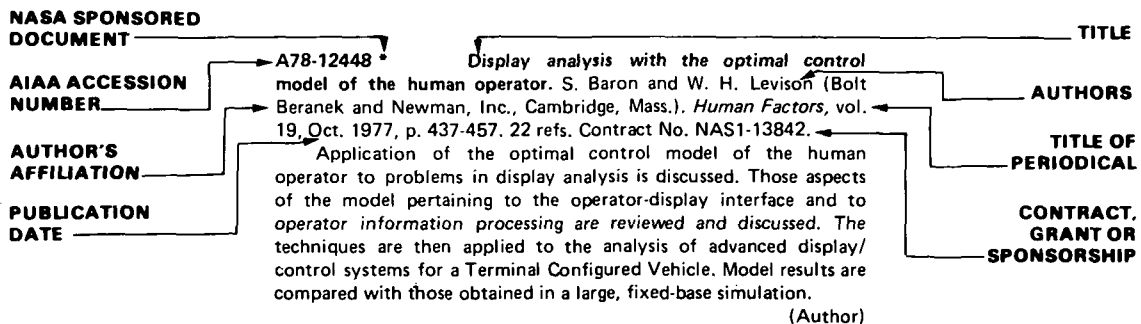
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TYPICAL CITATION AND ABSTRACT FROM IAA



AEROSPACE MEDICINE AND BIOLOGY

A Continuing Bibliography (Suppl. 181)

JUNE 1978

IAA ENTRIES

A78-24911 * # Ride quality criteria of multifactor environments. J. D. Leatherwood, T. K. Dempsey, and S. A. Clevenson (NASA, Langley Research Center, Hampton, Va.). *Transportation Research Board, Annual Meeting, Washington, D.C., Jan. 16-30, 1978, Paper. 32 p. 20 refs.*

The paper describes a comprehensive ride quality model that accounts for the effects of multifrequency and multitaxis vibration inputs as well as the interactive effects of noise and vibration upon passenger discomfort. The model is based on extensive experimental studies involving a realistic multi-degree-of-freedom laboratory simulator, and data relating to human discomfort response to vertical, lateral, and roll vibrations are presented. Results of studies involving vibration stimuli are expressed by sets of equal discomfort curves for each of three axes of vibration. A set of noise-vibration curves are obtained by an additive procedure, shown to be valid in the range under consideration, which combines the discomfort components due to noise and vibration. Other results from the study of human response to combined noise and vibration stimuli are reported. M.L.

A78-25234 Influence of plasma layer on steady blood flow in microvessels. N. Iida (Hokkaido University, Sapporo, Japan). *Japanese Journal of Applied Physics*, vol. 17, Jan. 1978, p. 203-214. 35 refs.

A semi-empirical new model for steady blood flow in microvessels is proposed. In the model, a peripheral layer devoid of blood cells (called the plasma layer) is taken into account and the central core of blood surrounded by the plasma layer is assumed to obey the Herschel-Bulkley equation. The velocity distribution and the pressure-flow relation have been derived for the model. To study the rheological condition of the blood flow in arterioles, the model is compared with the experimental data obtained by Einav et al., using the Laser Doppler anemometry. It is found that the experimental data for velocity profiles are explained fairly well by this model, if appropriate values are chosen for parameters. A careful investigation of these data reveals that the blood flow in microvessels can be regarded apparently as a Newtonian flow owing to the presence of the plasma layer. (Author)

A78-25560 * Chemical interpretation of Viking Lander 1 life detection experiment. E. V. Ballou, P. C. Wood (San Jose State University, San Jose, Calif.), T. Wydeven, M. E. Lehwalt, and R. E. Mack (NASA, Ames Research Center, Moffett Field, Calif.). *Nature*, vol. 271, Feb. 16, 1978, p. 644, 645. 9 refs.

An earth-based evaluation of the Viking Lander 1 life-detection experiments was conducted using a radiofrequency glow discharge in a simulated Martian atmosphere. The Gas Exchange Experiment conducted in the humid mode released substantial amounts of CO₂,

O₂, N₂, Ar, and CO into the atmosphere, indicating that these substances were adsorbed onto the Martian soil. An adsorption potential plot is given, graphing quantity of gas against time (d). For a model surface area of 17 squares meters per gram of measured substance, oxygen adsorption was found to be relatively high, a result which tends to confirm the hypothesis that Martian oxygen exists largely in chemisorbed states or in active oxygen compounds, e.g., peroxide, superoxide, hydroperoxide. D.M.W.

A78-25561 Cellular glutathione is a key to the oxygen effect in radiation damage. M. L. Morse and R. H. Dahl (Colorado, University, Medical Center, Denver, Colo.). *Nature*, vol. 271, Feb. 16, 1978, p. 660-662. 21 refs. NSF Grant No. BMS-7507343.

The presence of oxygen enhances biological mutation resulting from ionizing radiation by a factor of approximately three. A cellular sulphhydryl constituent, glutathione (GSH), is thought to be primarily responsible for facilitating the interaction of oxygen with the radiation. Thus, cells deficient in glutathione are not thought more likely to survive the effects of ionizing radiation when the oxygen is removed. Graphs are presented with gamma-ray dose time (min) plotted against the log fraction of surviving *E. coli*, both with and without oxygen. The survival rate of GSH deficient *E. coli* is not significantly greater when oxygen is bubbled away with argon, bearing out the hypothesis. D.M.W.

A78-25625 # Mathematical description of synapse behavior under conditions of rhythmic stimulation (Matematicheskoe opisaniye povedeniya sinapsa v usloviyakh ritmicheskoy stimulatsii). D. S. Melkonian, O. A. Mkrtchian, and N. S. Khondkarian (Akademiya Nauk Armiyskoy SSR, Institut Fiziologii, Yerevan, Armenian SSR). *Akademiya Nauk Armiyskoy SSR, Doklady*, vol. 65, no. 1, 1977, p. 59-64. 6 refs. In Russian.

The possibility of describing mathematically the laws governing changes in the efficiency of synaptic transmission under conditions of rhythmic presynaptic stimulation is investigated. The investigation is conducted on the basis of a mathematical model for the mechanisms of mobilization, consumption and resupply of the mediating agent. This procedure is used to compute the frequency characteristics of synaptic transmission, which are then compared with experimental curves. B.J.

A78-26247 A review of the effects of vibration on visual acuity and continuous manual control. I - Visual acuity. II - Continuous manual control. M. J. Griffin and C. H. Lewis (Southampton, University, Southampton, England). *Journal of Sound and Vibration*, vol. 56, Feb. 8, 1978, p. 383-413, 415-457. 156 refs. Research supported by the Ministry of Defence (Procurement Executive).

The article presents a two-part review of the effects of vibration on visual acuity and continuous manual control. Consideration is given to the influence of object vibration (vibration frequency and amplitude; object illumination, size, and style; object viewing distance) and whole-body vibration (vibration frequency; viewing distance; object size and illumination) on human vision. Attention is

also given to the effects of vibration on human performance as associated with continuous manual control or tracking. Vibration and visual task variables are considered separately. Procedures for evaluating tracking performance in vibration environments are outlined along with general mechanisms of the effects of vibration on tracking. General predictive models are suggested on the basis of these results. For each section a detailed guide to previous work and literature is presented. C.S.C.

A78-26268 # The biomechanics of work (Biomekhanika rabochikh protsessov). I. I. Artobolevskii, A. E. Kobrinskii, and K. V. Frolov. *Akademiia Nauk SSSR, Vestnik*, no. 11, 1977, p. 75-85. 9 refs. In Russian.

The biomechanics of work as a scientific discipline means the study of the geometry, kinematics and dynamics of the interaction of man with the tools and objects of work. In the present paper, a brief survey is given of the development of the biomechanics of work, and attention is directed at the elaboration of methods, criteria and technical means for the quantitative evaluation of the characteristics of bioengineering systems. As a special example, a robot manipulator used for copying is examined. B.J.

A78-26375 Functional equivalence of masking and cue reduction in perception of shape at a slant. W. Epstein and G. Hatfield (Wisconsin, University, Madison, Wis.). *Perception and Psychophysics*, vol. 23, no. 2, Feb. 1978, p. 137-144. 18 refs.

In a backward masking paradigm Epstein, Hatfield, and Muise (1977) found that presentation of a frontoparallel pattern mask caused the perceived shape of elliptical figures which were rotated in depth to conform to a projective shape function. The current study extended the masking function by examining the effect of a mask which was partially or wholly cotemporal with the target. The study also assessed the functional equivalence of the masking treatment and the conventional treatment for minimizing depth information. Reports of perceived shape and perceived orientation were obtained under three conditions: binocular without mask, binocular with mask, monocular without mask. Under the first condition, perceived shape conformed to objective shape and perceived orientation was proportional to objective orientation. Under the latter two conditions, perceived shape was in very close agreement to projective shape and the two functions did not differ. Orientation was underestimated greatly under both conditions. We concluded that the effect of the mask on perceived shape is mediated by its effect on encoding of orientation information, although an additional effect on the subsequent stage of shape-slant integration cannot be excluded. (Author)

A78-26608 # Factor analysis of changes in sleep in the cat following emotional stress (Faktornyi analiz izmenenii sna u koshek posle emotsional'nogo stressa). M. M. Bogoslovskii and L. L. Gogolitsyn (Akademiia Meditsinskikh Nauk SSSR, Leningrad; USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 63, Nov. 1977, p. 1518-1523. 11 refs. In Russian.

A78-26609 # Quantitative evaluation of thyroid secretion in the white rat during cold adaptation (O kolichestvennoi otsenke tireoidnoi sekretsii u belykh kryis pri akklimatsii k kholodu). V. I. Sobolev (Donetskii Gosudarstvennyi Universitet, Donetsk, Ukrainian SSR). *Fiziologicheskii Zhurnal SSSR*, vol. 63, Nov. 1977, p. 1589-1597. 12 refs. In Russian.

A thorough evaluation of thyroid secretion rates was performed on 96 white rats (160-200 g) by determining the dose of administered triiodothyronine necessary to normalize a number of thermoregulatory responses in chemically thyroidectomized animals held for 40 days at 12 and 24 C. It is found that the cold-adapted rats exhibit a thyroid secretion level that is equivalent to a daily administration of 6.23 + or - 0.72 micrograms/kg triiodothyronine; however, for animals not exposed to cold, this index is 1.21 + or - 0.36 micrograms/kg. It is concluded that a prolonged exposure to moderate cold gives rise to a fivefold increase in the quantity of hormones secreted by the thyroid in the white rat. L.D.

A78-26610 # Influence of adaptation to hypoxia on the dependence of internal respiration on temperature and oxygen tension in vitro (Vliianie adaptatsii k gipoksii na zavisimost' tkanevogo dykhaniiia ot temperatury i napriazheniia kisloroda in vitro). T. A. Bagdasarova and V. V. Khaskin (Akademiia Meditsinskikh Nauk SSSR, Novosibirsk, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 63, Nov. 1977, p. 1598-1604. 18 refs. In Russian.

An experimental study was conducted to evaluate the effect of hypoxic adaptation of rats on the initial rate of oxygen uptake by tissues of various organs (brain, heart, liver, kidney, lung, femoral muscle, diaphragm) under conditions of different temperatures and oxygen partial pressures in vitro. The data obtained are used to calculate the thermal coefficient (Q10) of internal (cellular) respiration and the Michaelis constant (Km) for oxygen. It is shown that for animals adapted to hypoxia, the in-vitro sensitivity of the tissues to a reduction in temperature and pO2 is decreased, whereas tissular affinity to oxygen and the proportionate temperature dependence of Km are increased. A functional relationship is revealed between the adaptive changes in Q10 and Km for the various organic tissues. The results point to the participation of kinetic variations of cellular respiration in the adaptive enhancement of tissular affinity to oxygen. S.D.

A78-26611 # Responses of the frog's cerebellar neurons to caloric vestibular stimuli of different intensity (Reaktsii neuronov mozghechka liagushki na kaloricheskie vestibuliarnye razdrzhiteli razlichnoi intensivnosti). L. A. Semenov (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 63, Nov. 1977, p. 1608-1611. 5 refs. In Russian.

A78-26726 Relationship between CO2 levels and decompression sickness - Implications for disease prevention. Y. Mano (Hawaii, University, Honolulu, Hawaii; Tokyo Medical and Dental University, Tokyo, Japan) and J. S. D'Arrigo (Hawaii, University, Honolulu, Hawaii). *Aviation, Space, and Environmental Medicine*, vol. 49, Feb. 1978, p. 349-355. 21 refs. NSF Grant No. BNS-76-02647; Grant No. NOAA-R-DP-02.

A78-26727 Effects of high altitude on plasma concentrations of testosterone and pituitary gonadotropins in man. A. J. Vander, L. G. Moore, G. Brewer, K. M. J. Menon, and B. G. England (Michigan, University, Ann Arbor, Mich.; Colorado, University, Denver, Colo.). *Aviation, Space, and Environmental Medicine*, vol. 49, Feb. 1978, p. 356, 357. 10 refs. Grant No. DADA17-69-C-9303.

A78-26729 * Incremental exposure facilitates adaptation to sensory rearrangement. J. R. Lackner (Brandeis University, Waltham; MIT, Cambridge, Mass.) and D. N. Lobovits (Brandeis University, Waltham, Mass.). *Aviation, Space, and Environmental Medicine*, vol. 49, Feb. 1978, p. 362-364. 10 refs. Research supported by the Rosenstiel Biomedical Sciences Foundation and Spencer Foundation; Grant No. NGL-22-009-308.

Visual-target pointing experiments were performed on 24 adult volunteers in order to compare the relative effectiveness of incremental (stepwise) and single-step exposure conditions on adaptation to visual rearrangement. The differences between the preexposure and postexposure scores served as an index of the adaptation elicited during the exposure period. It is found that both single-step and stepwise exposure to visual rearrangement elicit compensatory changes in sensorimotor coordination. However, stepwise exposure, when compared to single-step exposure in terms of the average magnitude of visual displacement over the exposure period, clearly enhances the rate of adaptation. It seems possible that the enhancement of adaptation to unusual patterns of sensory stimulation produced by incremental exposure reflects a general principle of sensorimotor function. S.D.

A78-26730 Effects of using long breathing hoses upon mask pressure. J. P. Cooke, R. M. Olson, and T. M. Maloney (USAF, School of Aerospace Medicine, Brooks AFB, Tex.). *Aviation, Space, and Environmental Medicine*, vol. 49, Feb. 1978, p. 365-370. 22 refs.

Effects of breathing-mask fit and use of oxygen-breathing hoses 0.9 to 8.2 m long upon mask pressure are analyzed during 0.75 to 12 sec decompressions from 2438 m to 6096, 10,668, or 15,240 m. It is shown that rapid decompressions from 2438 m to altitudes above 6096 m with 0.9-8.2 m breathing hoses may produce peak mask pressure above 80 mm Hg, which is considered large enough to cause pulmonary damage unless counter chest pressure such as provided by a pressure suit is used. In this case, 100% oxygen should be breathed to minimize hypoxia. Long breathing hoses should not be employed in an aircraft smaller than the cargo type, since a small cabin volume will result in rapid decompression rates and high mask pressure. Decompression with the mask adjusted to a tight or very tight fit and without the use of silicon sealing-grease resulted in lesser pressures. S.D.

A78-26731 **Effects of long-hose breathing.** R. M. Olson and J. P. Cooke (USAF, School of Aerospace Medicine, Brooks AFB, Tex.). *Aviation, Space, and Environmental Medicine*, vol. 49, Feb. 1978, p. 371-374. 8 refs.

The need for aircrew members to use long breathing hoses between regulator and mask arises in the design of new transport aircraft and in several cargo operations requiring an open rear door. In this study, induced work of breathing through long hoses, the resulting changes in oxygen consumption, and comfort were studied in relation to altitude, hose length, and exercise level. Conclusions were that, above 18,000 ft (5.5 km), a 30-ft (9.1-m) hose is acceptable for all reasonable work levels; for altitudes between 13,000 and 18,000 ft (4.0 and 5.5 km), the hose length should preferably be 18 ft (5.5 m), and at altitudes below 13,000 ft (4.0 km), hose length should be limited to 12 ft (3.6). Moreover, at ground level, the hose length should be limited to 6 ft (1.8 m) for all but sedentary activity. Should the potential for rapid decompression exist, at any altitude, volume considerations limit hose length to 18 ft (5.5 m) since larger hoses possess excessive regulator-to-mask dead space. (Author)

A78-26732 **Comparison of several G-tolerance measuring methods at various seatback angles.** V. M. Voge (U.S. Naval Material Command, Naval Air Development Center, Warminster, Pa.). *Aviation, Space, and Environmental Medicine*, vol. 49, Feb. 1978, p. 377-383. 36 refs.

The most commonly accepted endpoint indicative of impending blackout for subjects exposed to +Gz on a centrifuge is peripheral light loss (PLL). A comparison was made using PLL and cessation of bloodflow in the temporal artery, as measured in eight subjects with an externally mounted ultrasonic flowmeter using the Doppler effect. Each relaxed S was exposed to increasing G (onset rates of 0.1 and 0.3 G/s), while positioned at seatback angles of 15, 60, and 75 deg. In addition to the flowmeter, arterial oxygen saturation was monitored with an ear oximeter, and respiration and ECG were recorded. Tolerance to G loads was slightly greater with the more rapid rate of G onset. While use of the flowmeter resulted in obtaining reliable G tolerance endpoints in all cases, in only about 75% of these cases was the same true for PLL. Responses obtained from the ear oximeter were variable and delayed, showing only slight decreases in arterial saturation, which became more pronounced as the G-load exposure duration increased. (Author)

A78-26733 **Effects of rapidly rotating shifts on sleep patterns and sleep structure.** W. B. Webb and H. W. Agnew, Jr. (Florida, University, Gainesville, Fla.). *Aviation, Space, and Environmental Medicine*, vol. 49, Feb. 1978, p. 384-389. 21 refs.

The patterns and structure of sleep are analyzed on the basis of electroencephalograms and electrooculograms in six young adult males (18-25 yr), without sleep disorders, assigned to a rapidly rotating shift work schedule (6 am to 4 pm for 2 days, 4 pm to 10 pm for 2 days, and 10 pm to 6 am for 2 days). After a subject finished his work, he was free to occupy his time as he pleased provided he did not nap or leave the laboratory; the subjects were free to sleep anytime they wished but they had to wake up 1 hr before the beginning of their shift. Major conclusions are that shift

times systematically affect sleep patterns, that in changing to a new shift the new shift time tends to determine the sleep time, that sleep is substantially longer in transitions between shifts, and that sleep structure remains virtually unchanged. S.D.

A78-26734 **Survey of pilots' attitudes and opinions about drinking and flying.** D. K. Damkot and G. A. Osga (Vermont, University, Burlington, Vt.). *Aviation, Space, and Environmental Medicine*, vol. 49, Feb. 1978, p. 390-394. 8 refs. Grant No. PHS-R01-00697.

A78-26735 **Visual detection of commencement of aircraft takeoff runs.** B. L. Cole, A. W. Johnston, A. J. Gibson, and R. J. Jacobs (Melbourne, University; Victorian College of Optometry, Melbourne, Australia). *Aviation, Space, and Environmental Medicine*, vol. 49, Feb. 1978, p. 395-405. 14 refs. Research supported by the Department of Transport of Australia.

Among other things, airport control towers should be sited so that controllers can readily detect whether an aircraft cleared for takeoff has commenced its takeoff run. The detection of movement is not well enough understood to enable confident prediction that a particular site for a tower will enable commencement of takeoff run to be easily observed. A field study was undertaken to establish detection times for commencement of takeoff run by groups of trained and trainee air traffic controllers and untrained observers. It was found that the mean response of observers occurs when the aircraft is displaced about 5 deg of arc, a value essentially independent of observer experience, observation distance, aircraft velocity, and the clarity with which the aircraft can be seen. *Binoculars reduce the mean response time and response variability, although not as much as might be expected.* Domains within which control towers can be located to enable detection of takeoff runs within 2 s and 4 s are defined. (Author)

A78-26736 **Effects of ground trainer use on the anxiety of students in private pilot training.** R. C. Smith and C. E. Melton, Jr. (FAA, Civil Aeromedical Institute, Oklahoma City, Okla.). *Aviation, Space, and Environmental Medicine*, vol. 49, Feb. 1978, p. 406-408. 9 refs.

The self-reported anxiety levels of student pilots receiving private pilot instruction entirely in an aircraft were compared to the anxiety levels of students who received a portion of their training in a ground trainer. It was found that experience in the trainer had little effect on student pilot anxiety. It was determined, however, that reported anxiety levels did vary as a function of the type of flight (solo, dual, or evaluation) undertaken. (Author)

A78-26737 **Classification of sleep stage with period analysis features derived from the EEG.** A. J. Welch, P. C. Richardson, and J. N. Mockford (Texas, University, Austin, Tex.). *Aviation, Space, and Environmental Medicine*, vol. 49, Feb. 1978, p. 409-414. 15 refs. Grant No. DAMD17-74-C-4081.

An experimental study was carried out to evaluate the utility of the period analysis features (zero crossing count) derived in real time from a single channel of EEG for the classification of sleep stage. The features examined were the number of zero crossings; the number of zero crossings of the first derivative of the EEG; and the number of zero crossings of the second derivative and five additional 'histogram' measures, each histogram measure representing the number of occurrences of a zero crossing interval falling within an arbitrarily chosen range of values. Both computer-aided regression and discriminant analysis procedures are applied to the EEG from 12 nights of sleep that had been hand scored for comparison. *The results reveal a range of 57-90% accurate classification of sleep stage with the zero crossing measures alone.* A 0.63-0.94 cross-correlation between computer- and hand-scored nightly sleep patterns is established. S.D.

A78-26738 Comparison of exercise responses of males and females during acute exposure to hypobaric. P. R. Elliott and H. A. Atterbom (New Mexico, University, Albuquerque, N. Mex.). *Aviation, Space, and Environmental Medicine*, vol. 49, Feb. 1978, p. 415-418. 23 refs.

Bicycle ergometer tests in a hypobaric chamber were performed on 17 male and 20 female adult subjects to determine whether both sexes exhibit similar physiological responses while exercising at altitude under submaximal and maximal effort conditions. The variables measured were blood pressure, heart rate, respiration rate, minute ventilation, minute oxygen consumption, oxygen pulse (ml O₂/beat), and the ratio of minute ventilation to minute oxygen consumption. The results indicate that there are few differences between males and females in response to exercise at altitude. During both submaximal and maximal work, the female subjects exhibited smaller increases in minute ventilation than the male subjects. During maximal work at altitude, oxygen pulse was less affected in women than men. Altitude rise had a smaller effect on the submaximal-work heart rate of women. S.D.

A78-26740 1975 accident experience of civilian pilots with static physical defects. J. R. Dille and C. F. Booze (FAA, Civil Aeromedical Institute, Oklahoma City, Okla.). *Aviation, Space, and Environmental Medicine*, vol. 49, Feb. 1978, p. 422-425. 5 refs.

The 1975 aircraft accident experience of an active airman population of 763,793 with eight selected static physical defects are examined. The eight categories are blindness or absence of either eye, contact lenses, deficient color vision without restriction, deficient color vision with restriction, deficient distant vision, paraplegia, deafness, and amputations. Accident rates per 100,000 hr of cumulative and recent flight time are computed for three static defect categories (blindness or absence of either eye, deficient distant vision, and deficient color vision) identified as significant by a previous analysis of 1974 accidents. It is shown that the increased accident experience of monocular pilots, which was observed in 1974 and again in 1975, appears to be real after analysis of accident rates and examination of accident reports. Blindness or absence of either eye, use of contact lenses, and color vision defects with no restriction deserve special attention in analyzing the 1976 aircraft accident data. S.D.

A78-26741 Workload and operational fatigue in helicopter pilots. G. Rotondo (Aeronautica Militare, Servizio Medicafe, Rome, Italy). *Aviation, Space, and Environmental Medicine*, vol. 49, Feb. 1978, p. 430-436. 27 refs.

Stressing factors that induce physical and psychological fatigue in helicopter pilots during flight are examined. Possible causes of operational fatigue are discussed in terms of vibration, noise, and sensory and emotional factors pertaining to operational variety and hazards of helicopter piloting. The discussion is in accord with the hypothesis that helicopter piloting involves psychophysical workload and fatigue comparable to those experienced by pilots of other types of aircraft. The necessity of constant medical examination of helicopter pilots to ensure high flight performance and continuous flight safety is stressed. S.D.

A78-26742 Recuperation after muscular fatigue by 'diverting activities'. E. Asmussen and B. Mazin (Copenhagen, University, Copenhagen, Denmark). *European Journal of Applied Physiology*, vol. 38, no. 1, 1978, p. 1-7. 14 refs.

Experiments were conducted on 19 human subjects (22-37 yr) who performed an exhaustive rhythmic dynamic work of lifting weights for 2-3 min with the elbow or middle-finger flexors, and then engaged in a diverting activity consisting of static, dynamic, or mental activity during 2-min pauses between exercises. During pauses, the physical activity was performed by small or large muscle groups not involved in the exercise, while the mental activity was to solve mathematical problems. About 20 exhaustive exercises with alternating active and passive pauses were completed by each subject. It is shown that the amount of work done after a pause involving a

diverting activity is larger than the amount of work performed after a passive pause. A similar beneficial effect is observed when the blood flow to the exhausted muscles is interrupted by an air cuff. It is suggested that recuperation after local muscle fatigue is influenced by a central nervous factor which is largely independent of the local blood flow. S.D.

A78-26743 A central nervous component in local muscular fatigue. E. Asmussen and B. Mazin (Copenhagen, University, Copenhagen, Denmark). *European Journal of Applied Physiology*, vol. 38, no. 1, 1978, p. 9-15. 9 refs.

Following a previous study by the authors (1978) on recuperation after muscular fatigue by diverting activities, an experimental investigation was performed in which five subjects worked on the arm-ergograph and/or on the finger ergograph with alternating rest and active pauses and work bouts to exhaustion. Every second work period (even numbers) was performed with closed eyes, whereas during pauses and other work periods (uneven numbers) the subject had open eyes. The patellar reflex was taken as a sign of enhanced cerebral excitatory state, and hence the effect of the various diverting activities during the pauses on the patellar reflex was assessed. A hypothesis is advanced that muscular fatigue may be caused partly by local disturbances of the internal environment, but also partly by a central inhibition of the output of motor impulses. Fatigue caused by central inhibition can be greatly decreased by diverting activities which, presumably via the reticular formation in the brain, change the balance between the outflow of inhibitory and facilitatory impulses from the CNS. The beneficial effect of active pauses seems to be independent of changes in the local blood flow of the exercised muscles. S.D.

A78-26744 Adaptive modifications of cold pain. II - Long-term experiments with 24-hour intervals (Adaptive Modifikationen des Kälteschmerzes. II - Langzeitversuche mit 24stündigen Intervallen). H. Stempel (Marburg, Universität, Marburg, West Germany). *European Journal of Applied Physiology*, vol. 38, no. 1, 1978, p. 17-24. 33 refs. In German.

A cold pain stimulus was applied to one hand of ten healthy subjects at the same time of day on 21 successive days, and the subjective adaptation was followed up every other day through use of the McGill-Pain-Questionnaire. As adaptation proceeded, protopathic irradiation of the cold pain sensation decreased to a clearly local region, until at the end it was limited to just the area exposed to the cold pain stimulus. While the number of chosen pain adjectives with more affective-protopathic character diminished, the number of sensory-epicritic adjective remained constant. The trend of the objective adaptation parallels that of the subjective adaptation. P.T.H.

A78-26745 The lack of influence of reactive hyperemia on exhausting rhythmic or static exercise. H. Barcroft, A. R. Lind, and J. S. Petrofsky (St. Louis University, St. Louis, Mo.). *European Journal of Applied Physiology*, vol. 38, no. 1, 1978, p. 49-54. 7 refs. Grant No. AF-AFOSR-72-2362.

Dynamic and static endurance tests were conducted on five young male and female volunteer subjects in order to reexamine the hypothesis advanced by Nukada (1955) and Müller (1958) that fatiguing exercise performed in the presence of an initially increased blood flow due to prior circulatory occlusion could continue for a longer period of time. The dynamic work was an exhausting rhythmic exercise on a bicycle ergometer, whereas the static effort was exerted on a hand grip dynamometer. It is shown that no functional benefit is obtained by the subjects performing either dynamic or static exercise during reactive hyperemia, even when the preceding circulatory arrest is extended to 10 min., conditions in which Müller's subject extended his endurance by 250-650% depending on his degree of training. The endurance test results presented support the findings of Collier and Percival (1959) who found no increase in the working capacity of nine adults when the work was done in the presence of hyperemia following arterial occlusion for 5 min. S.D.

A78-26746 Effects of simulated altitude training on aerobic and anaerobic power. E. W. Banister and W. Woo (Simon Fraser University, Burnaby, British Columbia, Canada). *European Journal of Applied Physiology*, vol. 38, no. 1, 1978, p. 55-69. 33 refs.

Exhaustive stepwise exercise tests on a bicycle ergometer were conducted on five trained male subjects (20-23 yr) in order to evaluate the relative importance of training and hypoxia in producing changes in aerobic and anaerobic power. Increments of work occurred each minute through a range from unloaded pedaling to 600, 900, and 1500 kgm/min at a pedal rate of 100 rpm respectively, and finally to a work rate of 1800 kgm/min at 100 rpm which was continued until the subject volitionally ceased in spite of encouragement. The training period was 19 weeks divided into six periods of different durations with alternating normoxic and hypoxic exercise periods plus a normoxic detraining in the last period. It is shown that bradycardia takes place during the first minute of exhaustive work at 1800 kgm/min in all subjects and that aerobic power is substantially enhanced both in normoxia and in hypoxia by the end of the first phase of hypoxic training. Exhaustive exercise in both environments resulted in increased endurance, aerobic power, and anaerobic power. S.D.

A78-26747 Study of sleep in shift workers with alternating schedules - Adaptation and recovery in the case of rapid shift rotation /3-4 days/ (Etude du sommeil de travailleurs à horaires alternants - Adaptation et récupération dans le cas de rotation rapide de poste /3-4 jours/). J. Foret (CNRS, Laboratoire de Physiologie du Travail, Paris, France) and O. Benoit (Institut National de la Santé et de la Recherche Médicale, Paris, France). *European Journal of Applied Physiology*, vol. 38, no. 1, 1978, p. 71-82. 20 refs. In French.

An EEG study of day and night sleep is conducted on four healthy male oil-refinery shift workers (aged 22, 24, 25, and 29 yr, respectively) having at least 18 months of service in work shift (3 x 8). It is shown that EEG recordings of day sleep exhibit a disorganized behavior of the first-day sleep and a tendency to improvement of sleep characteristics in the course of day sleeps. Recovery night sleep is found to be different when following a curtailed night sleep or when following a curtailed day sleep. However, a night sleep right after a day sleep manifests only partly the features of a real recovery. It seems that an initial adaptation to schedule reversal has taken place. This finding supports the adoption of a rapid shift rotation, e.g., 3-4 days. S.D.

A78-26778 Local perfusion of noradrenaline maintains visual cortical plasticity. J. D. Pettigrew and T. Kasamatsu (California Institute of Technology, Pasadena, Calif.). *Nature*, vol. 271, Feb. 23, 1978, p. 761-763. 9 refs. Research supported by the Spencer Foundation and PHS.

It is hypothesized that the widespread system of monoaminergic fibers plays a role in regulating the plasticity observed in the visual cortex during the critical development period. In particular, catecholamines may be the agents responsible for maintaining a high degree of plasticity. An experimental program involving administrations of 6-hydroxydopamine to produce depletion of catecholamines bilaterally in the visual cortex of developing kittens indicates that the dosages cause a decline in the usual cortical plasticity, as evidenced by a change in the ocular dominance of binocular neurons following monocular conclusion. J.M.B.

A78-26923 Regulation of CSF /HCO₃⁻/ during long-term hypoxic hypocapnia in man. J. A. Dempsey, H. V. Forster, L. W. Chosy, P. G. Hanson, and W. G. Reddan (Wisconsin, University, Madison, Wis.). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 44, Feb. 1978, p. 175-182. 33 refs. Grant No. NIH-15469.

It has been hypothesized that compensatory reductions of cerebrospinal fluid (CSF) as a reaction to hypoxic hypocapnia are dependent upon reduced concentrations of plasma HCO₃⁻. To test

this hypothesis, 10 normal subjects were taken to an altitude of 3,200 m for 5-6 days, where mild alkalosis or K⁺ depletion was induced by ingestion of NaHCO₃ or thiazide diuretics, respectively. The NaHCO₃ served to maintain HCO₃⁻ concentration at a sea-level value. The thiazide group, however, still experienced somewhat reduced HCO₃⁻ values, although they were higher than the values recorded in the control group. The experimenters concluded that the observed reduction in CSF/HCO₃⁻ (conc) is partially, but not totally dependent on the concentration of plasma HCO₃⁻, and that local mechanisms may also be operating. In addition, it is pointed out that plasma and CSF/H⁺ (conc) changes in an increasingly alkaline direction, and arterial PO₂ rises, as acclimatization to altitude proceeds. D.M.W.

A78-26924 * Effect of force environment on regional pulmonary displacements and volumes in dogs. J. F. Greenleaf, H. C. Smith, P. A. Chevalier, D. J. Sass, A. A. Bove, and E. H. Wood (Mayo Clinic and Mayo Foundation, Rochester, Minn.). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 44, Feb. 1978, p. 216-224. 42 refs. Research supported by the American Heart Association; Grants No. NIH-HL-04664; No. NIH-RR-7; Contract No. F49620-76-C-0001; Grant No. NGR-24-003-001.

A78-27098 # Effect of high-intensity impulse noise on the hearing organ (Deistvie impul'suogo shuma bol'shoi sily na organ slukha). N. I. Ivanov. *Voенно-Meditsinskii Zhurnal*, Dec. 1977, p. 44-46. 15 refs. In Russian.

Available literature data show that an impulse sound or noise of sufficiently high intensity produces relatively pronounced changes in the cochlea with subsequent atrophy. No data are found on the external and middle ear subjected to intense impulse noise. In this paper, morphological tests on the macroscopic and microscopic levels are conducted on young rabbits in order to evaluate the influence of intense single-acting jet-engine impulse noise, with an intensity varying from 120-130 dB to 160 dB and more at an impulse length of 0.7-1 sec to 2.8 sec., on the external, middle, and inner ears. The results indicate that high-intensity impulse noise causes substantial functional changes in the hearing organ, whereas at a noise level of 135-140 dB organic changes do occur. At a noise level of 150 dB and more, well-pronounced changes in the cochlea take place, up to deterioration of the spiral organ. S.D.

A78-27099 # Influence of optical defects on the cockpit canopy glass on the spatial orientation of a pilot during flight (Vliianie opticheskikh defektov ostekleniya fonarei kabin samoletov na prostranstvennuu orientirovku letchika v polete). A. V. Lekarev. *Voенно-Meditsinskii Zhurnal*, Dec. 1977, p. 54, 55. 9 refs. In Russian.

A78-27100 # Ventilation and ergometric indices in young individuals afflicted with hypogonadism (Ventiliatsionnye i ergometricheskie pokazateli pri gipogonadizme u lits molodogo vozrasta). L. Nanchev, T. Tomov, V. Chaushev, and D. Dimitrov (Vissh Voенно-Meditsinski Institut, Sofia, Bulgaria). *Voенно-Meditsinskii Zhurnal*, Dec. 1977, p. 66-68. 7 refs. In Russian.

An experimental study is conducted on 61 male patients with hypogonadism and 43 healthy male subjects (controls) in order to evaluate pulmonary ventilation and the functional state of the cardiovascular system in the resting state and during moderate (submaximal) work, as well as the quantity of nonfatty body mass and the PWC(170) working capacity. The results indicate that hypogonadism-afflicted males exhibit a specific degradation of the function of the lung-heart system and that the ratio of nonfatty to fatty masses is reduced. Bicycle ergometer exercise data show that the patients have a lower PWC(170) than the controls. S.D.

A78-27123 Heart rate response to isocapnic hypoxia in conscious man. A. S. Slutsky and A. S. Rebeck (Toronto General Hospital, Toronto, Canada). *American Journal of Physiology*, vol. 234, Feb. 1978, p. H129-H132. 27 refs.

The effect of acute progressive hypoxia on heart rate in conscious healthy subjects is discussed. The PCO₂ was held constant (plus or minus 1.5 mmHg) midway between the resting end-tidal and mixed-venous levels. Hypoxia was induced by having the subject rebreathe from a small bag so that the PO₂ fell at a rate related to the subject's oxygen consumption. Arterial oxygen saturation O₂(Sa) was measured continuously during the procedure with an ear oximeter. We found that heart rate (HR) was best fitted to an inverse linear relation to arterial oxygen saturation and a power relation to PO₂. The range of HR change to O₂(Sa) change was 0.62-1.46 beats/min per 1% fall in O₂(Sa), (mean SE = 0.98 plus or minus 0.06). There was no relationship between heart rate and ventilatory responses to hypoxia. (Author)

A78-27124 * Effects of exercise and excitement on mesenteric and renal dynamics in conscious, unrestrained baboons. S. F. Vatner (Harvard University; Peter Bent Brigham Hospital; Children's Hospital Medical Center, Boston; New England Regional Primate Research Center, Southboro, Mass.). *American Journal of Physiology*, vol. 234, Feb. 1978, p. H210-H214. 24 refs. Research supported by the American Heart Association; Grants No. PHS-HL-15416; No. NSG-2136.

Radiotelemetry was used to measure arterial pressure and mesenteric and renal blood flows from nine unrestrained, conscious baboons during periods of rest, moderate exercise, and extreme excitement. A description of the experiments hardware is presented, including artificial depressants phenylcyclidine hydrochloride, 0.5-1.0 mg/kg, and pentobarbital sodium, 15 mg/kg, and an ultrasonic telemetry flow meter. Results showed rising heart rate and arterial pressure coupled with a reduction of mesenteric and renal flows as the level of exercise was increased. These findings are compared with mesenteric and renal flows somewhat above control level, but relatively stable heart rate and arterial pressure, postprandially. Attention is given to a quantitative analysis of the experimental results. D.M.W.

A78-27154 # Continuous and pulse control of the horizontal motion of a biped walking apparatus (O nepriyvnom i impul'snom upravlenii gorizontaln'ym dvizheniem dvunogogo shagushchego apparata). V. B. Larin. *Akademiia Nauk SSSR, Izvestiia, Mekhanika Tverdogo Tela*, Nov.-Dec. 1977, p. 54-64. In Russian.

In the present paper, the synthesis of a system that controls the motion of a walking apparatus is formulated as a periodic-optimization problem, neglecting the inertia of the legs. A control algorithm is derived in explicit form, and a version of a two-level (hierarchical) structure of the control system is discussed. The results of the analysis are illustrated by synthesizing (as an example) the control system of a biped apparatus, treating the latter as an inverted mathematical pendulum, provided with a foot. V.P.

A78-27155 # Linear problem of stabilizing biped walk (Lineinaia zadacha stabilizatsii dvunogoi khod'by). V. V. Beletskii and P. S. Chudinov. *Akademiia Nauk SSSR, Izvestiia, Mekhanika Tverdogo Tela*, Nov.-Dec. 1977, p. 65-74. In Russian.

In the present paper, the results obtained by Beletskii (1975, 1976, 1977) for unperturbed periodic biped walking modes are extended to the stabilization of biped walk in the presence of disturbances. A linear problem of stabilizing horizontal biped walk is solved within the framework of a model developed for a biped walking apparatus consisting of a ponderable torso and two imponderable two-link legs suspended at a point on the torso. V.P.

A78-27440 # Dynamics of the relation between cell mediators of adrenergic and cholinergic systems (cAMP-cGMP) in the mechanisms of adaptation to hypoxia (Dinamika sootnosheniia kletocnykh mediatorov adren- i kholinergicheskikh sistem /tsAMF-tsGMF) v mekhanizmakh adaptatsii k gipoksii). L. A. Kozhemiakin and D. S. Korostovtsev (Leningradskii Pediatricheskii Meditsinskii Institut, Leningrad, USSR). *Akademiia Nauk SSSR, Doklady*, vol. 237, Dec. 21, 1977, p. 1519-1521. 15 refs. In Russian.

White rats and mice were subjected to high-altitude simulation in a pressure chamber in an effort to induce hypoxia. The objective of the study was to probe the antihypoxic effect of several intracellular mediators which produce changes in the cAMP/cGMP ratio (cyclic adenosine monophosphate/cyclic guanosine monophosphate). An analysis of the dynamics of the cAMP/cGMP ratio discloses a phasing of the relations of adrenergic and cholinergic activities in the adaptation of cells and the organism as a whole to hypoxia. The cAMP/cGMP ratio can serve as a biochemical indicator of the transition from an adrenergic to a cholinergic phase. B.J.

A78-27572 # Hierarchic multilevel system for the control of some physiological functions (Ierarkhicheskaia mnogourovnevaia sistema regulirovaniia nekotorykh fiziologicheskikh funktsii). V. S. Em (Tashkentskii Gosudarstvennyi Meditsinskii Institut, Tashkent, Uzbek SSR) and A. A. Gafurov (Akademiia Nauk Uzbekskoi SSR, Institut Kibernetiki and Vychislitel'nyi Tsentr, Tashkent, Uzbek SSR). *Akademiia Nauk Uzbekskoi SSR, Izvestiia, Seriia Tekhnicheskikh Nauk*, no. 5, 1977, p. 36-41. 16 refs. In Russian.

The following multilevel scheme (with each level self-regulating) for the control of the human organs is presented (the hierarchy is given here from left to right in ascending order): (1) input-internal medium of the organism-output, (2) epidermis and connective tissues, and the organs sequenced from left to right as units, (3) the parasympathetic nervous system, the sympathetic nervous system, and the neuroendocrine system, (4) subcortical-brain structures and (5) the brain cortex. Consideration is given to interneuron interactions in the sympathetic ganglia, and a control scheme for the function of a single organ is presented. Attention is then given to how the functions of pathologically altered organs can be controlled on the basis of this hierarchic scheme. B.J.

A78-27668 # Formation mechanism for rhythmic extended action potentials of peripheral nerves and muscles (Mekhanizm proiskhozhdeniia ritmicheskikh prodlenykh potentsialov deistviia perifericheskikh nervov i myshts). D. M. Gedevanishvili, G. L. Vepkhvadze, and G. S. Sanadiradze (Tbilisskii Gosudarstvennyi Meditsinskii Institut, Tiflis, Georgian SSR). *Akademiia Nauk Gruzinskoi SSR, Soobshcheniia*, vol. 88, Oct. 1977, p. 165-168. 8 refs. In Russian.

A78-27669 # Cardiac, EEG, and motor components of the unconditioned reaction to acoustic stimulus during wakefulness and slow-wave sleep (Serdechnyi EEG i dvigatel'nyi komponenty bezuslovnoi reaktzii na zvukovoi razdrzhitel' pri bodrstvovanii i medlenovolnovoi faze SNA). G. V. Abuladze and N. A. Chuchulashvili (Ministerstvo Zdravookhraneniia SSSR, Gosudarstvennyi Institut Usovshenstrovaniia Vrachei, Tiflis, Georgian SSR). *Akademiia Nauk Gruzinskoi SSR, Soobshcheniia*, vol. 88, Oct. 1977, p. 169-172. 7 refs. In Russian.

A78-27670 # Experimentally observed magnetic-field effect on electrocardiographic indices (Vliianie magnitnogo polia na elektrokardiograficheskie pokazateli v eksperimente). D. D. Tvidiani (Tbilisskii Gosudarstvennyi Meditsinskii Institut, Tiflis, Georgian SSR) and T. I. Chlaidze (Akademiia Nauk Gruzinskoi SSR, Institut Geofiziki, Tiflis, Georgian SSR). *Akademiia Nauk Gruzinskoi SSR, Soobshcheniia*, vol. 88, Oct. 1977, p. 221-224. 9 refs. In Russian.

A78-27696 # Algorithm for separating bursts on physiological curves (Algoritm vydeleniia vspleskov na fiziologicheskikh krivkakh). V. G. Iakovlev. *Avtomatika i Telemekhanika*, Dec. 1977, p. 94-105. 6 refs. In Russian.

The problem of isolating the information parts (bursts) on physiological curves is examined, and a real-time algorithm for solving the problem is proposed. Rules for choosing the free parameters in the algorithm are formulated, and the effectiveness of the algorithm is illustrated on the example of detecting bursts on electromyograms. P.T.H.

A78-27712 # On the possibility of predicting the frequency of electrical stimulation which would cause the onset of the regular rhythm of extended action potentials (O vozmozhnosti prognozirovaniia chastoty elektricheskogo razdrzheniia, obuslovlivaiushchei vozniknovenie reguliarnogo ritma PPD). D. M. Gedevanishvili and G. S. Sanadiradze (Tbilisskii Gosudarstvennyi Meditsinskii Institut, Tiflis, Georgian SSR). *Akademiia Nauk Gruzinskoi SSR, Soobshcheniia*, vol. 88, Nov. 1977, p. 429-432. 5 refs. In Russian.

A78-27713 # A mathematical model of anaerobic energy metabolism for evaluating the mechanisms of oxygen debt formation (Matematicheskaiia model' anaerobnogo energeticheskogo obmena dlia otsenki mekhanizmov obrazovaniia kislorodnogo dolga). E. Sh. Shtengol'd, G. P. Itkin, E. A. Shirkovets, R. D. Magalashvili, R. A. Stepanishcheva, and O. P. Berdysheva (Ministerstvo Zdravookhraneniia SSSR, Institut Transplantatsii Organov i Tkanei, USSR). *Akademiia Nauk Gruzinskoi SSR, Soobshcheniia*, vol. 88, Nov. 1977, p. 465-468. 7 refs. In Russian.

A78-27728 * Multispectral photographic analysis - A new quantitative tool to assist in the early diagnosis of thermal burn depth. V. J. Anselmo (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, Calif.) and B. E. Zawacki (Los Angeles County/Southern California, University, Medical Center, Los Angeles, Calif.). *Annals of Biomedical Engineering*, vol. 5, 1977, p. 179-193. 13 refs. Contract No. NAS7-100.

A78-27748 * The division of attention and the human auditory evoked potential. R. F. Hink, S. T. Van Voorhis, S. A. Hillyard, and T. S. Smith (California, University, La Jolla, Calif.). *Neuropsychologia*, vol. 15, 1977, p. 597-605. 26 refs. Grants No. PHS-MH-25594-01; No. NGR-05-009-198.

The sensitivity of the scalp-recorded, auditory evoked potential to selective attention was examined while subjects responded to stimuli presented to one ear (focused attention) and to both ears (divided attention). The amplitude of the N1 component was found to be largest to stimuli in the ear upon which attention was to be focused, smallest to stimuli in the ear to be ignored, and intermediate to stimuli in both ears when attention was divided. The results are interpreted as supporting a capacity model of attention. (Author)

A78-27749 * Long-latency evoked potentials to irrelevant, deviant stimuli. E. Snyder and S. A. Hillyard (California, University, La Jolla, Calif.). *Behavioral Biology*, vol. 16, 1976, p. 319-331. 21 refs. Grants No. NIH-MH-25594-01; No. NGR-05-009-198.

Occasional shifts of loudness in a repetitive train of clicks elicited a late-positive wave (P3a) in nonattending subjects which peaked at a mean latency of 258 msec and had a frontocentral scalp distribution; P3a was typically preceded by an 'N2' component at 196 msec. The P3a wave was distinguishable from the longer-latency (378 msec) parietocentrally distributed 'P3b' wave that was evoked by the same stimulus in an actively attending subject, thus confirming the findings of Squires et al. (1975). Infrequently presented single sounds did not produce large or consistent N2-P3a components; the critical condition for the generation of an N2-P3a wave seemed to be that the infrequent sounds represent a deviation (intensity increment or decrement) from a repetitive background.

Furthermore, increasing the repetition rate of the background clicks drastically reduced N1-P2 amplitude but had little effect on the amplitude of N2-P3a. This suggests that N2-P3a is not simply a delayed N1-P2 'vertex potential', but rather reflects the operation of a 'mismatch' detector, which registers deviations from an ongoing auditory background. (Author)

A78-27897 * Dry-heat resistance of selected psychrophiles. L. Winans (Hardin-Simmons University, Abilene, Tex.), I. J. Pflug, and T. L. Foster (Minnesota, University, Minneapolis, Minn.). *Applied and Environmental Microbiology*, vol. 34, Aug. 1977, p. 150-154. 20 refs. Grants No. NGR-44-095-001; No. NGL-24-005-160.

The dry-heat resistance characteristics of spores of psychrophilic organisms isolated from soil samples from the Viking spacecraft assembly areas at Cape Kennedy Space Flight Center, Cape Canaveral, Fla., were studied. Spore suspensions were produced, and dry-heat D values were determined for the microorganisms that demonstrated growth or survival under a simulated Martian environment. The dry-heat tests were carried out by using the planchet-boat-hot plate system at 110 and 125 C with an ambient relative humidity of 50% at 22 C. The spores evaluated had a relatively low resistance to dry heat. D (110 C) values ranged from 7.5 to 122 min, whereas the D (125 C) values ranged from less than 1.0 to 9.8 min. (Author)

A78-27949 # Effect of certain space-flight factors on the vestibular system in man /based on data from domestic and foreign literature/ (Vliianie nekotorykh faktorov kosmicheskogo poleta na vestibuliarnyi analizator cheloveka /po dannym otechestvennoi i zarubezhnoi pechati/). E. V. Lapaev and G. I. Pavlov. *Akademiia Nauk SSSR, Izvestiia, Serii Biologicheskaiia*, Dec. 1977, p. 805-812. 45 refs. In Russian.

Data from domestic and foreign investigations are presented, showing that the effect of the most prevailing space-flight factors - such as acceleration, weightlessness, noise, and vibration - lead to the alteration of the functional state of the vestibular system. A few theories are outlined which account for the etiological pathogenesis of deleterious responses, predominantly of vestibular origin, occurring in astronauts during flight. S.D.

A78-27950 # Role of biochemical processes in the response of biosystems to magnetic fields (Rol' biokhimicheskikh protsessov v otvetnykh reaktsiakh biosistem na deistvie magnitnykh poloi). V. M. Aristarkhov and L. A. Piruzian (Akademiia Nauk SSSR, Institut Khimicheskoi Fiziki, Moscow, USSR). *Akademiia Nauk SSSR, Izvestiia, Serii Biologicheskaiia*, Dec. 1977, p. 915-918. 8 refs. In Russian.

The effect of a magnetic field (MF) on the rate and direction of chemical reactions in the human organism may be accounted for within the framework of the theory of chemical polarization of nuclei and electrons. Based on this theory, the effect of MF on biochemical reactions is considered a primary mechanism explaining the interaction between MF and a living system. The biomagnetic effect on the human organism, determined by changes during biochemical reactions in any part of the metabolic system, is the result of transformation of molecular changes through adaptive defensive barriers on the levels of cell, organ, and organism. S.D.

A78-28049 * Ultraviolet-photoproduced organic solids synthesized under simulated Jovian conditions - Molecular analysis. B. N. Khare, C. Sagan (Cornell University, Ithaca, N.Y.), E. L. Bandurski, and B. Nagy (Arizona, University, Tucson, Ariz.). *Science*, vol. 199, Mar. 17, 1978, p. 1199-1201. 24 refs. Grants No. NGR-33-010-101; No. NGR-03-002-171.

In an earlier paper, Khare and Sagan reported the production of a brownish polymeric material from the near-ultraviolet irradiation of simulated jovian atmospheres with a low hydrogen abundance. Examination of this product indicates that hydrogen sulfide is the

initial photon acceptor; the powder resulting after extraction with benzene is 84 percent sulfur, largely S8. In results reported here, the remaining 16 percent was pyrolyzed and then examined by gas chromatography-mass spectrometry. Pyrolysis at 450 C yielded a series of alkanes, alkenes, C3-alkylbenzenes, aromatics, thiophenes, alkylthiophenes, alkylmercaptans, alkyldisulfides, together with the nitrogenous compounds hydrogen cyanide, methyl cyanide, alkylisothiocyanates, acrylonitrile, and allylthiocyanates. Some of these compounds might be sought on Jupiter and Saturn and their satellites by remote infrared and ultraviolet spectroscopy and directly by entry probes. (Author)

A78-28096 # Synaptic transmission in muscles and mechanisms of mediator action (Sinaptichna peredacha v m'iazakh i mekhanizmi dii mediatoriv). M. F. Shuba. *Akademiia Nauk Ukrain-s'koi RSR, Visnik*, vol. 41, Dec. 1977, p. 44-56. 41 refs. In Ukrainian.

Experimental data are presented on neuromuscular transmission of excitatory and inhibitory commands; synaptic transmission is studied with reference to the investigation of miniature and elementary end-plate potentials and exciting postsynaptic potentials. Ion-electrolyte mechanisms of the action of various mediating agents are elaborated. In particular, the inhibitory action of mediators is discussed with respect to effect of K(+) mobility on the action of adrenaline and noradrenaline and the excitatory action of mediators is discussed with respect to the action of Na(+), Ca(++) and Cl(-) mobility on the action of noradrenaline and acetylcholine. B.J.

A78-28122 # Possibility of existence of an auditory-feedback mechanism at the periphery of hearing (O vozmozhnosti sushchestvovaniia mekhanizma slukhovoii obratnoi svyazi na periferii slukha). A. P. Molchanov and L. N. Babkina (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). *Akademiia Nauk SSSR, Doklady*, vol. 237, Dec. 1, 1977, p. 958-961. 14 refs. In Russian.

The auditory-feedback mechanism is responsible for forming - at the input of the inner ear - oscillations proportional to the alternating component of the impulse-activity envelope in neuron groups of the frequency selection system at the periphery of the ear. In the present paper, a qualitative model is developed for processes in the auditory-feedback mechanism during the action of signals consisting of several harmonic components on the input to the inner ear; a functional scheme of these processes is presented. The nonuniform line, modeling the frequency-selection characteristics of the ear periphery, is replaced by a system of filters with a rectangular frequency characteristic and a linear phase characteristic. An expression is obtained showing that the action of auditory feedback leads to the occurrence of an oscillation envelope in the form of an independent signal transmitted to the inner-ear input. The discussion is conducted with reference to the oscillatory-system of the cochlea. B.J.

A78-28123 # Heart damage during emotional stress and prophylaxis of this effect with the aid of preliminary adaptation to high-altitude hypoxia (Povrezhdenie serdtsa pri emotsional'nom stresse i profilaktika etogo iavleniia s pomoshch'iu predvaritel'noi adaptatsii k vysokoi gipoksii). F. Z. Meerson, S. A. Radzievskii, L. M. Giber, A. Kh. Kogan, I. I. Rozhitskaia, O. I. Volovinskaia, and M. G. Pshennikova (Akademiia Meditsinskikh Nauk SSSR; I Moskovskii Meditsinskii Institut, Moscow, USSR). *Akademiia Nauk SSR, Doklady*, vol. 237, Dec. 1, 1977, p. 977-980. 13 refs. In Russian.

A78-28124 # Dynamics of conditioned-reflex realignments of human visual recognition and detection (Dinamika uslovno-reflektornykh perestroek zritel'nogo opoznaniia i obnaruzheniia u cheloveka). V. P. Meshcheriakov (Akademiia Nauk SSSR, Institut Vyshei Nervnoi Deiatel'nosti i Neurofiziologii, Moscow, USSR). *Akademiia Nauk SSSR, Doklady*, vol. 237, Dec. 1, 1977, p. 981-983. In Russian.

It was shown by Meshcheriakov (1977) that, after the combination of the image of some alphabetical letter with electrocutaneous

reinforcement, the brightness threshold of the recognition of this letter changes relative to the threshold of uncombined (control) letters in a two-phase manner: the first phase lasts 3-3.5 hours and is manifested in lowering of the threshold and the second phase follows, lasting more than 25 days and manifested in raising of the threshold. In the present paper, the dynamics of recognition thresholds for letters is correlated with the dynamics of detection thresholds; consideration is also given to the latency periods of motor response after reinforcement of letter by electrical stimulation of the index finger. Feedback that results in response to the isolated application of pain stimulation is also examined along with the reciprocal development of complex two-phase plastic realignments in the functional state of the recognizing and detecting structures in the visual system. B.J.

A78-28319 # Histological studies of eyeballs of experimental animals subjected to accelerations (Badania histologiczne galek ocznych zwierzat doswiadczalnych poddanych dzialaniu przyspieszen). M. Wojtkowiak (Wojskowy Instytut Medycyny Lotniczej, Warsaw, Poland). *Postepy Astronautyki*, vol. 10, no. 2, 1977, p. 71-81. 8 refs. In Polish.

Histological examination of the eyeballs of guinea pigs subjected to accelerations to the limits of organism tolerance showed changes in the permeability of the vasculoventricular barrier to blood proteins. Numerous small extravasations and damage of vascular epithelium were found. Transudatal changes between the retina and choroid were observed in animals examined several hours after termination of centrifugation. The character of the change depends on the direction of acceleration. When this direction is toward the head, marked hyperaemia and stasis effects are noted, but when acceleration is in the opposite direction, local ahemia and ischemic changes appear. P.T.H.

A78-28320 # Behavior of certain biochemical indices of the blood of rats subjected to +Gz accelerations according to different programs in tests to the tolerance limit (Zachowanie sie niektorzych wskaźnikow biochemicznych we krwi szczurow podczas badania tolerancji przyspieszen +Gz według roznych programow). J. Domaszuk, M. Wojtkowiak, and M. Janusevic (Wojskowy Instytut Medycyny Lotniczej, Warsaw, Poland). *Postepy Astronautyki*, vol. 10, no. 2, 1977, p. 83-91. 10 refs. In Polish.

Rats were placed in a centrifuge for a program of linear acceleration increase of 0.2 g/sec (first group) and a program of constant acceleration of 10 g until breakdown of the circulatory system (second group). In both groups the high +Gz accelerations caused increases in levels of glucose, lactic acid, pyruvic acid, and fatty acids, and also a drop in pH and sodium level. The blood plasma of rats of the second group showed a significantly higher level of lactic acid, glucose, and fatty acids and a lower sodium and carbon dioxide level in comparison with that of animals of the first group. P.T.H.

A78-28321 # Influence of specific and nonspecific training on +Gz acceleration tolerance of rats (Wplyw treningu fizycznego specyficznego i niespecyficznego na poziom tolerancji przyspieszen +Gz szczurow). M. Wojtkowiak, J. Domaszuk, and M. Janusevic (Wojskowy Instytut Medycyny Lotniczej, Warsaw, Poland). *Postepy Astronautyki*, vol. 10, no. 2, 1977, p. 93-97. In Polish.

The +Gz acceleration tolerance of rats who received specific training in an animal centrifuge and rats who received nonspecific training in the form of swimming was investigated. After four weeks of training the difference in the acceleration tolerance between the two groups was insignificant. P.T.H.

A78-28325 # The possibility of studying ageusia during weightlessness by the electrogustometric method (O mozliwosci badania ageusji w stanie niewazkosci metoda elektrogustometrii). J. Jatczak and P. Kordasz (Akademia Medyczna, Lodz, Poland). *Postepy Astronautyki*, vol. 10, no. 3, 1977, p. 69-87. 43 refs. In Polish.

An experiment involving examination of threshold changes in an astronaut's gustatory sensitivity during weightlessness is proposed. An electrogustometric method of examination is used. Problems related to estimation of measurement error, deviation of threshold of gustatory activity, and determination of receptive areas of gustatory sensitivity are discussed. P.T.H.

A78-28449 # Characteristics of the local temperature of isolated cortex during wakefulness and alternation of sleep stages (Kharakteristika lokal'noi temperatury izolirovannoi kory pri bodrstvovanii i smene stadii sna). M. M. Bogoslovskii, V. G. Krasil'nikov (Akademiia Meditsinskikh Nauk SSSR, Leningrad, USSR), G. Zeschke (Deutsche Akademie der Wissenschaften, Zentralinstitut für Herz- und Kreislauf-Regulationsforschung, Berlin, East Germany), and S. V. Al'bertin (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 63, Dec. 1977, p. 1631-1637. 19 refs. In Russian.

A78-28450 # Aftereffects of short-term cooling and their significance in cold adaptation (Sledovye efekty kratkovremennykh okhlazhdenii i ikh znachenie v adaptatsii k kholodu). E. I. Shvetsova (Akademiia Meditsinskikh Nauk SSSR, Novosibirsk, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 63, Dec. 1977, p. 1715-1720. 20 refs. In Russian.

Cold-adaptation experiments were conducted on 12 white rats (200-300 g) in order to evaluate the duration and characteristics of cooling at -20 C with rectal temperature decreased to 30 C (single-step and two-step), and of intermittent cooling without temperature drop (15 times for 2 min each, with 5-min warmup between coolings). The results were compared to those for long-term cold adaptation (4-5 weeks at 2-4 C). The thermoregulatory state (oxygen consumption, electrical activity of neck muscles, rectal and subcutaneous temperatures) was tested at 22-24 C and 6-7 C one, five, ten, and thirty days after cessation of cold exposure. It is shown that the aftereffects are dependent on the cold-inducing conditions. In particular, the aftereffects of short-term cooling are enhanced 5-10 days after cessation of cold exposure, and are similar to changes during long-term cold adaptation. S.D.

STAR ENTRIES

N78-18672*# Case Western Reserve Univ., Cleveland, Ohio. Dept. of Biomedical Engineering.

EFFECT OF SURFACE TEXTURE BY ION BEAM SPUTTERING ON IMPLANT BIOCOMPATIBILITY AND SOFT TISSUE ATTACHMENT Annual Report

Donald F. Gibbons Dec. 1977 15 p refs.
(Grant NsG-3126)

(NASA-CR-135311; AR-1) Avail: NTIS HC A02/MF A01 CSCL 06C

The objectives in this report were to use the ion beam sputtering technique to produce surface textures on polymers, metals, and ceramics. The morphology of the texture was altered by varying both the width and depth of the square pits which were formed by ion beam erosion. The width of the ribs separating the pits were defined by the mask used to produce the texture. The area of the surface containing pits varies as the width was changed. The biological parameters used to evaluate the biological response to the texture were: (1) fibrous capsule and inflammatory response in subcutaneous soft tissue; (2) strength of the mechanical attachment of the textured surface by the soft tissue; and (3) morphology of the epidermal layer interfacing the textured surface of percutaneous connectors. Because the sputter yield on teflon ribs was approximately an order of magnitude larger than any other material the majority of the measurements presented in the report were obtained with teflon.

Author

N78-18673*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.

DESIGN OF A BLOOD-FREEZING SYSTEM FOR LEUKEMIA RESEARCH

Thomas E. Williams and Thomas A. Cygnarowicz Feb. 1978 43 p refs

(NASA-TP-1165; G7702-F-9) Avail: NTIS HC A03/MF A01 CSCL 06E

Leukemia research involves the use of cryogenic freezing and storage equipment. In a program being carried out at the National Cancer Institute (NCI), bone marrow (white blood cells) was frozen using a standard cryogenic biological freezer. With this system, it is difficult to maintain the desired rate of freezing and repeatability from sample to sample. A freezing system was developed that satisfies the requirements for a repeatable, constant freezing rate. The system was delivered to NCI and is now operational. This report describes the design of the major subsystems, the analyses, the operating procedure, and final system test results.

Author

N78-18674*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.

METHOD AND APPARATUS FOR ELIMINATING LUMINOL INTERFERENCE MATERIAL Patent Application

Eldon Jeffers (Boeing Aerospace Co., Houston, Tex.) and R. R. Thomas, inventors (to NASA) (Boeing Aerospace Co., Houston, Tex.) Filed 9 Feb. 1978 27 p Sponsored by NASA

(NASA-Case-MS-C-16260-1; US-Patent-Appl-SN-876440) Avail: NTIS HC A02/MF A01 CSCL 06M

A method was developed for automatically and rapidly making determinations of the total number of bacteria, alive and dead, present in a fluid sample, by using the iron porphyrin assay method. The method provides for eliminating luminescent interference caused by the reaction of luminol with common inorganic interfering agents such as metallic ions and organic

interfering agents such as extracellular porphyrin. The reliability of the iron porphyrin is thereby increased by inactivating soluble iron porphyrins in the sample which are unrelated to the bacteria in the sample, but which would luminescently react with luminol to interfere with the assay.

NASA

N78-18675# Florida State Univ., Tallahassee. Dept. of Chemistry.

HIGH SENSITIVITY FOURIER TRANSFORM NMR. INTERMOLECULAR INTERACTIONS BETWEEN ENVIRONMENTAL TOXIC SUBSTANCES AND BIOLOGICAL MACROMOLECULES Technical Report, 2 Oct. 1974 - 1 Oct. 1976

George C. Levy Sep. 1977 96 p refs
(Grant EPA-803095)

(PB-274011/6; EPA-600/1-77-045)

Avail: NTIS

HC A05/MF A01 CSCL 06A

The feasibility of developing techniques for evaluation of the effects of environmental toxic materials on complex biopolymer systems using high sensitivity Fourier Transform Nuclear Magnetic Resonance (NMR) spectroscopy was explored. Spectral sensitivity was to be increased especially for the ^{13}C and other nuclides having low magnetogyric ratios. Initially, modifications to an existing Bruker HX-270 spectrometer provided moderate improvement in sensitivity for ^{13}C and substantial sensitivity increase for ^{15}N observation.

Author

N78-18676 California Univ., Los Angeles.

A NEW MODEL OF NERVE ACTION POTENTIAL AND THE EXISTENCE OF A PULSE SOLUTION Ph.D. Thesis

Jonathan George Bell 1977 113 p

Avail: Univ. Microfilms Order No. 77-25325

A mathematical model was developed which describes the propagation of electrical impulses down the axon of a nerve cell. The dynamics of sodium and potassium processes are described in the model by two linear, ordinary differential equations of third order for sodium and second order for potassium. These equations have coefficients that depend nonlinearly on voltage, which is governed by a parabolic partial differential equation. A mechanical spring-mass-dashpot system is presented which generates the initial conditions for the ordinary differential equations.

Dissert. Abstr.

N78-18678*# Iowa Univ., Iowa City. Dept. of Medicine

INFLUENCE OF CENTRAL VENOUS PRESSURE UPON SINUS NODE RESPONSES TO ARTERIAL BAROREFLEX STIMULATION IN MAN

Allyn L. Mark, Akira Takeshita, Dwain L. Eckberg, and Francois M. Abboud 1978 25 p refs

(Grants NsG-9060; HL-14388; HL-18083)

(NASA-CR-155783) Avail: NTIS HC A02/MF A01 CSCL 06P

Measurements were made of sinus node responses to arterial baroreceptor stimulation with phenylephrine injection or neck suction, before and during changes of central venous pressure provoked by lower body negative pressure or leg and lower trunk elevation. Variations of central venous pressure between 1.1 and 9.0 mm Hg did not influence arterial baroreflex mediated bradycardia. Baroreflex sinus node responses were augmented by intravenous propranolol, but the level of responses after propranolol was comparable during the control state, lower body negative pressure, and leg and trunk elevation. Sinus node responses to very brief baroreceptor stimuli applied during the transitions of central venous pressure also were comparable in the three states. The authors conclude that physiological variations of central venous pressure do not influence sinus node responses to arterial baroreceptor stimulation in man.

Author

N78-18679# Joint Publications Research Service, Arlington, Va.

SPACE BIOLOGY AND AEROSPACE MEDICINE, NO. 5, 1977

O. G. Gazenko, ed. 10 Nov. 1977 127 p refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), no. 5, 1977 92 p

(JPRS-70135) Copyright. Avail: Issuing Activity

Articles concerning aerospace biology and medicine are presented. Topics discussed include metabolism, stresses, gravitation, visual and auditory perception during flight.

N78-18680# Joint Publications Research Service, Arlington, Va.

MAIN STAGES AND PROSPECTS OF DEVELOPMENT OF SPACE BIOLOGY AND MEDICINE

A. I. Burnazyan, Ye. I. Vorobyev, O. G. Gzenko, N. N. Gurovskiy, Yu. G. Nefedov, B. A. Adamovich, B. B. Yegorov, Ye. Ye. Kovalev, and A. D. Yegorov *In its Space Biol. and Aerospace Med.*, No. 5, 1977 (JPRS-70135) 10 Nov. 1977 p 1-9 Transl. into ENGLISH from *Kosm. Biol. Aviakosm. Med. (Moscow)*, no. 5, 1977 p 3-12

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Developments in space biology and medicine are reviewed in terms of preparation for manned space flight in the USSR. Life support systems for extravehicular activity, biological effects of artificial gravity, and radiation safety on long-term space flights are among the topics discussed. Application of technology developed during the space program to medical science is covered. J.M.S.

N78-18681# Joint Publications Research Service, Arlington, Va.

AVIATION MEDICINE ON THE SIXTIETH ANNIVERSARY OF THE GREAT OCTOBER REVOLUTION

N. M. Rudnyy *In its Space Biol. and Aerospace Med.*, No. 5, 1977 (JPRS-70135) 10 Nov. 1977 p 10-17 Transl. into ENGLISH from *Kosm. Biol. Aviakosm. Med. (Moscow)*, no. 5, 1977 p 12-18

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Aerospace medicine as it developed in the USSR is discussed. Medical support of flight personnel, the psychophysiological factors involved in flight training, and life support equipment are among the topics considered. The effects of high altitude, high pressure, weightlessness, acceleration, and vibration on man are included. J.M.S.

N78-18682# Joint Publications Research Service, Arlington, Va.

BIOMECHANICAL CRITERIA OF ARTIFICIAL GRAVITY

I. Yu. Sarkisov and A. A. Shipov *In its Space Biol. and Aerospace Med.*, No. 5, 1977 (JPRS-70135) 10 Nov. 1977 p 18-27 refs Transl. into ENGLISH from *Kosm. Biol. Aviakosm. Med. (Moscow)*, no. 5, 1977 p 18-25

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The creation of artificial gravity in a rotating environment is considered in terms of the limitations imposed on the system by the physical and physiological effects on man. J.M.S.

N78-18683# Joint Publications Research Service, Arlington, Va.

CHANGE IN GRAVITATION LEVEL AS A STRESS FACTOR

L. V. Serova *In its Space Biol. and Aerospace Med.*, No. 5, 1977 (JPRS-70135) 10 Nov. 1977 p 28-36 refs Transl. into ENGLISH from *Kosm. Biol. Aviakosm. Med. (Moscow)*, no. 5, 1977 p 25-32

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The results of experimental studies of the effects of weightlessness and hypergravitation on structural and functional characteristics of mammals are discussed. Emphasis is placed on growth and embryonic development and the extent of stress changes arising in the organism with prolonged and continuous exposure to altered gravitation conditions. J.M.S.

N78-18684# Joint Publications Research Service, Arlington, Va.

MAIN RESULTS OF MEDICAL RESEARCH CONDUCTED DURING THE FLIGHT OF TWO CREWS ON THE SALYUT-5 ORBITAL STATION

N. M. Rudnyy, O. G. Gzenko, S. A. Gzuzlov, I. D. Pestov, P. V. Vasilyev, A. V. Yerebin, V. A. Degtyarev, I. S. Balakhovskiy, R. M. Bayevskiy, and G. D. Strykh *In its Space Biol. and Aerospace Med.*, No. 5, 1977 (JPRS-70135) 10 Nov. 1977 p 37-46 refs Transl. into ENGLISH from *Kosm. Biol. Aviakosm. Med. (Moscow)*, no. 5, 1977 p 33-41

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The effect of weightlessness on man was studied on Salyut-5 orbital station. Test equipment included a space simulator for physical exercises, a weighted suit to be worn at all times, a vacuum container for the lower half of the body, a postflight preventive suit, and an onboard kit with a set of drugs. Telemetry methods as well as radio communications and television observations were used for routine medical monitoring of the cosmonauts. The physiological parameters were recorded and relayed over the telemetry communication channel by means of onboard equipment, both at rest and with measured loads. Results of the tests are discussed and tabulated. J.M.S.

N78-18685# Joint Publications Research Service, Arlington, Va.

DISTINCTIONS OF FLUID AND ELECTROLYTE METABOLISM AND RENAL FUNCTION IN CREW MEMBERS OF THE FIRST SALYUT-4 EXPEDITION

A. I. Grigoryev, G. I. Kozyrevskaia, B. R. Dorokhova, V. I. Lebedev, and B. V. Morukov *In its Space Biol. and Aerospace Med.*, No. 5, 1977 (JPRS-70135) 10 Nov. 1977 p 47-54 refs Transl. into ENGLISH from *Kosm. Biol. Aviakosm. Med. (Moscow)*, no. 5, 1977 p 41-47

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The fluid-electrolyte metabolism, osmoregulatory and ionoregulatory functions of the kidneys were examined before and after a 30 day orbital flight on the Salyut-4 station. Results indicate that the effect of weightlessness on kidney function is related to the duration of the space mission. J.M.S.

N78-18686# Joint Publications Research Service, Arlington, Va.

TECHNIQUE FOR SELECTIVE CATHETERIZATION OF THE HEART AND GREAT VESSELS USED IN BIOMEDICAL STUDIES OF HEALTHY INDIVIDUALS

O. G. Gzenko, V. I. Shumakov, Yu. M. Volynkin, B. I. Shalnev, L. I. Kakurin, V. M. Mikhaylov, V. Ye. Katkov, and V. V. Chestukhin *In its Space Biol. and Aerospace Med.*, No. 5, 1977 (JPRS-70135) 10 Nov. 1977 p 55-60 refs Transl. into ENGLISH from *Kosm. Biol. Aviakosm. Med. (Moscow)*, no. 5, 1977 p 47-51

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The benefits realized by applying selective catheterization of the brain, heart, liver, and kidney to the study of the effects of weightlessness are discussed. Factors considered include: monitoring metabolic changes not reflected in venous blood, monitoring pulmonary function, and monitoring changes in various parts of the cardiovascular system during space flight. J.M.S.

N78-18687# Joint Publications Research Service, Arlington, Va.

PARAMETERS OF ACID-BASE EQUILIBRIUM AND ENZYMIC ACTIVITY OF BLOOD IN MAN DURING BRIEF ANTIORTHOSTATIC HYPOKINESIA

V. Ye. Katkov, N. I. Kauricheva, V. V. Chestukhin, O. Kh. Zybin, R. D. Seyfulla, and V. N. Utkin *In its Space Biol. and Aerospace Med.*, No. 5, 1977 (JPRS-70135) 10 Nov. 1977 p 61-69 refs Transl. into ENGLISH from *Kosm. Biol. Aviakosm. Med. (Moscow)*, no. 5, 1977 p 51-58

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The effect of brief antiorthostatic hypokinesia on parameters of acid-base equilibrium and aminotransferase and alkaline phosphatase activity in blood flowing from various organs was studied by performing selective catheterization before and after 5 days of bed rest in antiorthostatic position. A decrease in standard bicarbonate, excess of bases and buffer bases, as well

as some drop of pH were noted. Results are discussed and are applicable to the study of the effects of weightlessness on brain metabolism. J.M.S.

N78-18688# Joint Publications Research Service, Arlington, Va.

MAIN OBJECTIVES AND RESULTS OF THE RADIOBIOLOGICAL EXPERIMENT CONDUCTED ON THE KOSMOS-690 BIOSATELLITE

Yu. G. Grigoryev, Yu. P. Druzhinin, V. V. Verigo, and Ye. A. Ilin *In its Space Biol. and Aerospace Med.*, No. 5, 1977 (JPRS-70135) 10 Nov. 1977 p 70-79 Transl. into ENGLISH from *Kosm. Biol. Aviakosm. Med. (Moscow)*, no. 5, 1977 p 58-66

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The biological effect of ionizing cosmic radiation and weightlessness were studied onboard the biosatellite Cosmos-690. Artificial sources of radiation were used to investigate the modifying effect of weightlessness on the radiobiological effect. Changes in radiosensitivity of animals and distinctions of formation of radiation lesions and characteristics of biological effects of heavy ions of galactic cosmic radiation on nervous tissue of mammals were emphasized. Results are compared with ground based control experiments. J.M.S.

N78-18689# Joint Publications Research Service, Arlington, Va.

LACTATE DEHYDROGENASE ISOZYMES OF RAT SKELETAL MUSCLES FOLLOWING A SPACE FLIGHT AND WITH HYPOKINESIA

N. V. Petrova and V. V. Portugalov *In its Space Biol. and Aerospace Med.*, No. 5, 1977 (JPRS-70135) 19 Nov. 1977 p 80-87 refs Transl. into ENGLISH from *Kosm. Biol. Aviakosm. Med. (Moscow)*, no. 5, 1977 p 66-72

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The soleus and plantaris muscles of the hind limbs of male rats were studied to determine the influence of weightlessness and hypokinesia on carbohydrate metabolism. Changes in isozyme spectrum of the enzyme lactate dehydrogenase were measured. Results indicate that disturbances in carbohydrate metabolism resulting from hypokinesia lead to the development of atrophic and dystrophic changes in skeletal muscles. J.M.S.

N78-18690# Joint Publications Research Service, Arlington, Va.

MORPHOLOGICAL MANIFESTATIONS OF FUNCTIONAL CHANGES IN THE HYPOTHALAMO-HYPOPHYSEAL NEUROSECRETORY SYSTEM AND RAT KIDNEYS UNDER THE INFLUENCE OF SPACE FLIGHT FACTORS

Ye. A. Savina, A. S. Pankova, and Ye. I. Alekseyev *In its Space Biol. and Aerospace Med.*, No. 5, 1977 (JPRS-70135) 10 Nov. 1977 p 88-93 refs Transl. into ENGLISH from *Kosm. Biol. Aviakosm. Med. (Moscow)*, no. 5, 1977 p 72-76

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The hypophyseal neurosecretory system and kidneys of rats that spent 22 days in flight on Cosmos-605 biosatellite were morphologically examined. Emphasis was placed on changes in hormone balance and fluid-electrolyte metabolism during space flight and upon return to earth, and diminished diuresis, decreased excretion of electrolytes and increased antidiuretic activity observed upon return to earth's gravity. J.M.S.

N78-18691# Joint Publications Research Service, Arlington, Va.

EFFECT OF HEAD ORIENTATION IN THE GRAVITY FIELD ON SEVERITY OF CALORIC NYSTAGMUS

V. N. Krutko, B. I. Polyakov, and M. I. Serebrennikov *In its Space Biol. and Aerospace Med.*, No. 5, 1977 (JPRS-70135) 10 Nov. 1977 p 94-99 refs Transl. into ENGLISH from *Kosm. Biol. Aviakosm. Med. (Moscow)*, no. 5, 1977 p 76-80

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The intensity of vertical and horizontal caloric nystagmus was experimentally studied as a function of head orientation in a gravity field. Nystagmus was recorded as an electronstagnogram and vertical and horizontal eye movement recordings are compared. Results are presented. J.M.S.

N78-18692# Joint Publications Research Service, Arlington, Va.

A STUDY OF THE PULSED METHOD OF LAUNDERING
B. A. Adamovich, V. V. Borshchenko, Ya. N. Vernikov, A. G. Prishchep, and A. P. Rogatovskaya *In its Space Biol. and Aerospace Med.*, No. 5, 1977 (JPRS-70135) 10 Nov. 1977 p 100-106 refs Transl. into ENGLISH from *Kosm. Biol. Aviakosm. Med. (Moscow)*, no. 5, 1977 p 80-85

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The design parameters of a washing and spinning device to be used for sanitary and housekeeping tasks on long-term manned space flight were experimentally studied. Results of these studies are presented. Temperature of the wash water and maximum removal of soil are correlated. J.M.S.

N78-18693# Joint Publications Research Service, Arlington, Va.

SIGNIFICANCE OF THE PERCUSSION SYMPTOM IN DETECTION OF PEPTIC ULCERS IN FLIGHT PERSONNEL

Ye. A. Fedorov and V. D. Vlasov *In its Space Biol. and Aerospace Med.*, No. 5, 1977 (JPRS-70135) 10 Nov. 1977 p 107-110 refs Transl. into ENGLISH from *Kosm. Biol. Aviakosm. Med. (Moscow)*, no. 5, 1977 p 85-87

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The significance of local percussory tenderness and muscle tension during percussion with the index finger of the abdominal wall in diagnosis of a peptic ulcer was studied. The difference in incidence of markedly positive percussion symptoms in flight personnel with peptic ulcer at the stage of exacerbation or remission, as compared to the control group, is shown to be statistically reliable. J.M.S.

N78-18694# Joint Publications Research Service, Arlington, Va.

AUTOGENIC TRAINING USED FOR SELF-REGULATION OF CARDIOVASCULAR FUNCTION AND PREVENTION OF NEUROCIRCULATORY DYSTONIA IN PILOT CANDIDATES

V. S. Lozinskiy *In its Space Biol. and Aerospace Med.*, No. 5, 1977 (JPRS-70135) 10 Nov. 1977 p 111-115 refs Transl. into ENGLISH from *Kosm. Biol. Aviakosm. Med. (Moscow)*, no. 5, 1977 p 88-90

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The use of autogenic training to control arterial pressure and pulse rate was investigated in pilot candidates. Results indicate that there was stable normalization of the arterial pressure, but no decrease of pulse rate. F.O.S.

N78-18695# Joint Publications Research Service, Arlington, Va.

INVESTIGATION OF SPACE PERCEPTION BY THE CREW OF THE EXPERIMENTAL SOYUZ-APOLLO MISSION

L. N. Kornilova, G. D. Strykh, I. K. Tarasov, and I. Ya. Yakovleva *In its Space Biol. and Aerospace Med.*, No. 5, 1977 (JPRS-70135) 10 Nov. 1977 p 116-117 refs Transl. into ENGLISH from *Kosm. Biol. Aviakosm. Med. (Moscow)*, no. 5, 1977 p 90-91

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The perception of spatial coordinates was studied to obtain objective, quantitative information about perception before and after space flights. The correlation between indices of accuracy and the intensity of subjective reactions were investigated. Author

N78-18696# Joint Publications Research Service, Arlington, Va.

EFFECTS OF HIGH CONCENTRATIONS OF CARBON DIOXIDE ON FUNCTION OF THE HUMAN ACOUSTIC ANALYZER

Yu. V. Krylov *In its* Space Biol. and Aerospace Med., No. 5, 1977 (JPRS-70135) 10 Nov. 1977 p 118-120 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), no. 5, 1977 p 91-92

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The distinctions of the human acoustic analyzer in the presence of a high concentration of carbon dioxide in inhaled air (from 1 to 8%) were analyzed. The thresholds of auditory sensibility for airborne conduction were tested at frequencies of 125-10,000 Hz on 15 healthy males ranging in age from 19 to 30 years. Audiometry was performed before, during and 5-30 min after the experiment. It was shown that exposure of man to an atmosphere with CO₂ concentration of 1 to 2% for many days does not lead to a statistically reliable change in hearing thresholds. The same findings were obtained with exposure of man to an atmosphere with up to 3% CO₂. The first changes in auditory thresholds were obtained when the subjects were exposed for a long period of time to a respiratory gas mixture with 4 to 4.5% CO₂.

Author

N78-18697 Indiana Univ., Bloomington.

PACEMAKER RELATED CONDUCTANCE CHANGES IN CARDIAC PURKINJE FIBERS Ph.D. Thesis

Joseph Reiser 1977 214 p

Avail: Univ. Microfilms Order No. 77-30314

The relationship of input resistance (R_{in}), during spontaneous diastolic depolarization, to the steady state current-voltage profile (V/I_{ss}) in cardiac Purkinje fibers was studied. Values of R_{in} during diastolic depolarization ranged from 1.26 x 10 to the 5th power Omega at the most negative potential to 2.35 + or - .22 x 10 to the 5th power Omega at the most positive. Variations in slope conductance obtained from V/I_{ss} over a similar voltage excursion, ranged from 1.21 + or - .25 x 10 to the 5th power Omega to 2.28 + or - .13 x 10 to the 5th power Omega. Results suggest that changes in membrane conductance occurring in spontaneous Purkinje fibers may not be the primary mechanism involved in initiation of spontaneous diastolic depolarization.

Dissert. Abstr.

N78-18698 Duke Univ., Durham, N. C.

NERVE FORM AND FUNCTION: SOME CELLULAR ASPECTS OF ACTION POTENTIAL INITIATION AND PROPAGATION Ph.D. Thesis

Richard Mont Westerfield, Jr. 1977 175 p

Avail: Univ. Microfilms Order No. 77-31704

A method was developed to separate clearly the effects of geometry from the effects of membrane properties on the initiation and propagation of impulses in nerve cells. The electrical properties of squid giant axons with regional inhomogeneities were studied. Inhomogeneities were induced by lowering the internal resistance with an axial wire, by shifting the voltage dependence of the membrane conductances with lanthanum and by decreasing the current density with tetrodotoxin. Many of the experiments were simulated with a computer model of the axon and the electrodes.

Dissert. Abstr.

N78-18699# National Aeronautics and Space Administration, Washington, D. C.

CERTAIN PECULIARITIES OF THE FUNCTIONING OF THE CARDIOVASCULAR SYSTEM IN BEDREST CONDITIONS DURING HORIZONTAL AND ANTIORTHOSTATIC BODY POSITIONS

Jan. 1978 27 p refs Transl. into ENGLISH of "Nekotoryye osobennosti funktsionirovaniya serdechno-sosydistoy sistemy v usloviyakh postel'nogo rezhima pri gorizontally i antiortostaticheskom polozeniyakh tela" Acad. Sci. USSR, Moscow, 1977 p 1-33 Transl. by Scientific Translation Service, Santa Barbara, Calif. Orig. Doc. prep. by Academy of Sciences USSR, Moscow

(Contract NASw-2791)

(NASA-TM-75075) Avail: NTIS HC A03/MF A01 CSCL 06S

The adequate modeling of physiological reactions inherent to the state of weightlessness has become a matter of particular urgency in space medicine. This modeling is necessary for studying the phenomenology and degree of disorders, prognostication of the crew's health, and developing the various preventive measures employed in space flights. A comparison is made of the physiological effects brought about by bed rest in a horizontal and antiorthostatic body position. A study is done of the influence of brief antiorthostatic hypokinesia, simulating the acute period of adaptation to weightlessness, on circulation and on a number of involved analytical systems. The basic model accepted is antiorthostatic hypokinesia with a body position declination angle of 4 deg (head lower than feet). The experiment's duration is dictated by the objectives of the research.

Author

N78-18700# Michigan Univ., Ann Arbor. Kresge Hearing Research Inst.

EVALUATION OF POSTURAL MECHANISMS UNDER DYNAMIC CONDITIONS Final Report, First Year

David J. Anderson Jan. 1978 25 p

(Contract NAS9-15244)

(NASA-CR-151638) Avail: NTIS HC A02/MF A01 CSCL 06P

A stimulus delivery and data acquisition system for assessment of human posture was developed based on a digital computer and a translating platform. The movement of the platform acts to displace the subject's base of support while the computer tracks the corrections which are made by the subject to maintain balance. Various stimuli are used ranging from fast transients to sine waves.

Author

N78-18701# Iowa Univ., Iowa City. Cardiovascular and Clinical Research Centers.

INFLUENCE OF LOW AND HIGH PRESSURE BARORECEPTORS ON PLASMA RENIN ACTIVITY IN HUMANS

Allyn L. Mark, Francois M. Abboud, and Annette E. Fitz [1977] 27 p refs

(Grants NsG-9060; MIRS-5462; HL-14388; HL-16149; RR-59)

(NASA-CR-155307) Avail: NTIS HC A03/MF A01 CSCL 06P

The effects of low and high pressure baroreceptors on plasma renin activity (immunoassay) were evaluated using graded lower body suction (LBS) in six healthy men. LBS at -10 and -20 mmHg for 10 min decreased central venous pressure without changing arterial pressure and thereby presumably reduced low but not high pressure baroreceptor inhibition of renin release. LBS at these levels produced forearm vasoconstriction, but did not increase renin. LBS at -40 mmHG decreased central venous and arterial pulse pressure and thus reduced both low and high pressure baroreceptor inhibition. LBS at this level produced forearm vasoconstriction and tachycardia and increased renin. In summary, reduction in low pressure baroreceptor inhibition in humans did not increase renin in the presence of physiological tonic inhibition from high pressure baroreceptors. Increases in renin did not occur until there was combined reduction of high and low pressure baroreceptor inhibition on plasma renin activity.

Author

N78-18702# Jet Propulsion Lab., Calif. Inst. of Tech., Pasadena.

SYNTHESIS AND BIOLOGICAL SCREENING OF NOVEL HYBRID FLUOROCARBON HYDROCARBON COMPOUNDS FOR USE AS ARTIFICIAL BLOOD SUBSTITUTES Annual Report, Jul. 1976 - Jul. 1977

J. Moacanin, K. Scherer, A. Toronto, D. Lawson, T. Terranova, L. Astle, and S. Harvey 3 Mar. 1978 198 p refs Sponsored in part by Natl. Heart, Lung and Blood Inst.

(Contracts NAS7-100)

(NASA-CR-155781; JPL-Pub-77-80)

Avail: NTIS

HC A09/MF A01 CSCL 06A

The goal of this project is to prepare a series of hybrid fluorochemicals of general structure R1R2R3CR4, where the R_i's are saturated fluoroalkyl groups of formula C_nF_{2n+1}' and R₄ is an alkyl group C_nH_{2n+1} or related moiety containing amino, ether or ester functions but no C-F bonds. Results of the initial

year's work include: (1) successful syntheses of several candidate compounds with acceptable physical properties; (2) preliminary toxicity results indicating that at least one of these is non-toxic, contrary to the previous belief that significant hydrogen content necessitates toxicity; and (3) the development of a method for predicting vapor pressure and oxygen solubility from chemical structure alone, to guide the synthetic efforts in the most fruitful direction.

Author

N78-18703# Texas Univ., Austin.

SLEEP WAKEFULNESS DETERMINATIONS FROM HEART RATE DATA, VOLUME 3 Annual Report, 1 Jun. 1976 - 15 Mar. 1977

P. C. Richardson, A. J. Welch, T. P. Daubek, and L. E. Taylor
31 May 1977 112 p refs
(Contract DAMD17-74-C-4081)

(AD-A045817) Avail: NTIS HC A06/MF A01 CSCL 06/16

During the past years several projects have been conducted at the University of Texas at Austin by members of the Bio-Medical Engineering Program investigating the automated classification of levels of wakefulness. The primary design and goal of these projects was rapid, inexpensive determination of levels of wakefulness performed accurately using easily derived physiologic parameters. It was felt that by combining some of the procedures and results of previous studies with the procedures developed from the last two years of this research, a conglomerate algorithm which had the capabilities desired could be developed. During the third year of this research, an altered algorithm has been developed from previous algorithms to classify REM(+) - NREM sleep stages from minute-by-minute heart rate. The reclassification of the two training nights yielded accuracies of 51.30% and 63.68% for night one of LES and night one of FER, respectively. Accuracies from the remaining data of subject LES yielded 60.11% to 66.50%, of subject FER 45.99% to 63.68%. Subject OWN, whose data were not used in any training, yielded accuracies from 52.27% to 58.60%.

GRA

N78-18704# Air Force Human Resources Lab., Brooks AFB, Tex.

AUDIO-VISUAL PROFICIENCY TESTING: ANNOTATED BIBLIOGRAPHY Interim Report, Oct. 1976 - Jun. 1977

Dale J. Wissman Oct. 1977 17 p refs

(AD-A048122; AFHRL-TR-77-54) Avail: NTIS
HC A02/MF A01 CSCL 05/9

This report contains an annotation of published reports dealing with the use of audio-visual media for proficiency testing. Reports included discuss investigation of audio-visual administrations of standardized printed tests as well as motion picture filmed tests assessing job knowledge and skill. Reports dealing with the use of audio-visual media in teaching were not included, though references to several bibliographies dealing with the use of motion pictures in education are listed. The majority of the investigations of motion picture filmed tests were done between 1945 and 1958. Most of the more recent research is limited to the audio-visual display of printed tests during test administration. Although the published results of the reviewed reports vary from extremely positive to quite negative, the general finding of this review stresses the paucity of thorough investigations using the audio-visual medium in proficiency testing.

GRA

N78-18705# Franklin Inst. Research Labs., Philadelphia, Pa.
BIOLOGICAL EFFECTS OF NONIONIZING ELECTROMAGNETIC RADIATION VOLUME 2: NUMBER 2, DECEMBER 1977 Quarterly Report, Sep. - Dec. 1977

Bruce H. Kleinstein and Elena P. Saboe Dec. 1977 41 p
(Contract TP-7AC024)

(AD-A047647; FIRL-C-4735-01-Vol-2; TP-7AC024) Avail:
NTIS HC A03/MF A01 CSCL 06/18

This quarterly digest presents current awareness information on the biological effects of nonionizing electromagnetic radiation (microwave and radiofrequency) in the range of 0 Hz to 100 GHz. The effects of magnetic and electric fields (static and alternating) are also covered. Each issue contains abstracts of English and foreign current literature, summaries of ongoing research

investigations, news items, and a directory of meetings and conferences.

Author (GRA)

N78-18706# Istituto Superiore di Sanita, Rome (Italy). Lab. di Fisica.

TECHNICAL AND SCIENTIFIC ASPECTS OF SANITARY AND SAFETY PROBLEMS IN NUCLEAR ENERGY PRODUCTION

G. CamposVenuti, S. Frullani, L. Maiani, S. Risica, A. Rogani, and E. Tabet 3 Jun. 1976 83 p refs In ITALIAN; ENGLISH summary Presented at the Soc. Ital. di Fis. Conf. 'Problemi Sanit. e di Sicurezza Connessi con l'Energia Elettronucl.', Bologna, 23-24 Apr. 1976 Submitted for publication
(ISS-P-76/9) Avail: NTIS HC A05/MF A01

Some safety and health problems of the nuclear fuel cycle are discussed. Attention is given essentially to topics related to reprocessing plants and to reactor safety. A critical examination of some items in the radiological protection methodology is presented together with a possible scheme for the selection of nuclear sites.

Author (ESA)

N78-18707# Technische Hogeschool Twente, Enschede (Netherlands). Afdel. der Elektrotechniek.

DESIGN OF A PYRO-ELECTRIC VIDICON CAMERA FOR MEDICAL THERMOGRAPHY Final Report

G. S. Hoeksma 11 May 1977 105 p refs

(THT-TM-77-009) Avail: NTIS HC A06/MF A01

The technical feasibility and design parameters of a pyroelectric vidicon (PEV) camera for medical purposes were surveyed. It was found that synchronous chopping is the best operating method for a PEV camera. A 25 Hz chopper frequency yields the best spatial resolution using standard TV readout (50 Hz raster frequency). Camera MTF is then determined mainly by thermal diffusivity in the PEV target which is about equal for current tube types. Important errors are introduced in the signal by pedestal non-uniformities, which can be processed out but degrade picture quality heavily. A method to remedy the disturbances is proposed. Conclusions of the experimental work are that it is advisable to bring part of the video circuits out of the camera to prevent parasitic oscillations due to the high gain needed and that ion pedestal generation during forward scan is not very well suited for the synchronous chopper mode.

ESA

N78-18708# European Space Agency, Paris (France).

THE INFLUENCE OF THE JOURNEY'S TIME OF DAY ON THE DE- AND RESYNCHRONIZATION OF THE 24-HOUR RHYTHM OF BODY AND TEMPERATURE AFTER TRANSATLANTIC FLIGHTS

Arnold Theodor Sonderfeld Jan. 1978 60 p refs Transl. into ENGLISH of 'Der Einfluss der Tageszeit der Reise auf die De- u. Resynchronisation der Tagesrhythmik der Koerpertemp. nach Transatlantikfluegen', DFVLR, Bonn Report DLR-FB-77-10, 24 Mar. 1977 Original report in GERMAN previously announced as N77-30740 Original German report available from DFVLR, Cologne DM 22.80

(ESA-TT-420; DLR-FB-77-10) Avail: NTIS HC A04/MF A01

The influence of a time-shift of 6 hrs on the 24-hr rhythm of body temperature was investigated in a group of eight students in Germany and the U.S. by measuring their rectal temperatures after transatlantic flights. The temperatures were taken continuously over the first 6 days and on days 8 and 13 after an east-west flight and after a west-east flight. In contrast to previous studies in which the west flight was a day flight, the east flight a night flight, both flights in this case were day flights. The time of resynchronisation after the east-west flight ran up to 7 days, the time after a flight in the opposite direction up to 10 days. This result squares with the results gained from previous experiments on day and night flights insofar as an influence of the hour of the day at which the flight is carried out is not supposed.

Author (ESA)

N78-18709# Interuniversitair Reactor Instituut, Delft (Netherlands).

PATIENT DOSES RESULTING FROM AN X-RAY RECORDING (BELLY SURVEY PICTURE). INFLUENCE OF TECHNICAL PARAMETERS ON THE DOSAGE [PATIENTDOSIS TENGEVOLGE VAN EEN ROENTGENOPNAME (BUIKVERZICHTSFOTO). INVLOED VAN TECHNISCHE PARAMETERS OP DE DOSIS]

A. VantRiet Sep. 1977 80 p refs In DUTCH (IRI-190-77-01) Avail: NTIS HC A05/MF A01

The influence of technical parameters on the patient dosage in X-ray diagnostics was investigated. In 46 Dutch hospitals for 650 adult female patients skin exposure measurements were made during the recording of the belly photograph as part of the intravenous pyelography investigation from March 1976 to 1977. The halve thickness of the radiation was also determined and in 15 hospitals measurements on a Rando phantom were made. Results show an appreciable spread in the entrance and exit exposure; however, it is shown that it is possible, in daily X-ray diagnosis, to index relatively high exposures for the belly survey picture. Some possibilities for reducing the dosage are indicated. ESA

N78-18710# Office of Radiation Programs, Washington, D. C. **RADIOLOGICAL QUALITY OF THE ENVIRONMENT IN THE UNITED STATES, 1977 Final Report**

Kurt L. Feldman Sep. 1977 307 p refs (PB-274229/4; EPA-520/1-77-009) Avail: NTIS HC A14/MF A01 CSCL 06R

The report is part of Office of Radiation Programs (ORP's) dose assessment program for evaluating the radiological quality of the environment. Special emphasis was placed on acquiring and summarizing the most recent dose data available. For some source categories, dose information was available for calendar year 1976, for others the most recent data go back to the early 1970's. The concern was for the availability of data and what the existing data provided for individual and population dose information. However, gaps in data coverage and areas of inadequate data coverage are identified when found. Author

N78-18711# Georgia Inst. of Tech., Atlanta. Electromagnetic Effectiveness Div.

RF DIELECTRIC PROPERTIES MEASUREMENT SYSTEM: HUMAN AND ANIMAL DATA

J. Toler and J. Seals Jul. 1977 89 p refs (Contract PHS-CDC-210-76-0136) (PB-274776/4; DHEW/PUB/NIOSH-77/176) Avail: NTIS HC A05/MF A01 CSCL 06R

Research efforts are described that led to the development of an instrumentation system for accurately measuring relative dielectric constant and conductivity of materials used in phantom modeling research, over a 10 to 100 MHz range. The system is based on an antenna modeling theorem which relates the impedance of a short monopole antenna in air to its impedance in dielectric media with a high radiofrequency power absorption such as phantom modeling materials and biological tissues. Accuracy and repeatability of the system were demonstrated by comparing measured electrical property data with corresponding reference data published in the literature. GRA

N78-18712# Washington Univ., Seattle. Bioelectromagnetics Research Lab.

RF CELL CULTURE IRRADIATION SYSTEM WITH CONTROLLED TEMPERATURE AND FIELD STRENGTH

Arthur W. Guy Jun. 1977 55 p refs Prepared for School of Aerospace Med. (Contract NIOSH-IA-75-30) (PB-274793/9; DHEW/PUB/NIOSH-77/182) Avail: NTIS HC A04/MF A01 CSCL 06R

The system produced electric field strengths up to 100 V/cm from D.C. to 1000 MHz in a 5 ml sample of culture medium. The culture medium temperature was controlled and measured up to 100 MHz by monitoring the feedline impedance, which was dependent on culture medium temperature. Constant temperatures below 37C can be maintained at field strengths in

excess of 25 V/cm. The information that was obtained with the use of this system was needed to fill information gaps for standards criteria development. GRA

N78-18713# National Academy of Sciences - National Research Council, Washington, D. C. Committee on Medical and Biologic Effects of Environmental Pollutants.

CARBON MONOXIDE

Sep. 1977 354 p refs (Contract EPA-68-02-1226) (PB-274965/3; EPA-600/1-77-034) Avail: NTIS HC A16/MF A01 CSCL 06T

Carbon monoxide literature related to effects on man and his environment is summarized. Recent major advances in our knowledge of carbon monoxide are emphasized, including chemical reactions in air; biologic effects on man; problems in monitoring urban concentrations and relating such data to the exposure of populations; data concerning the identification of susceptible populations; and evidence implicating carbon monoxide as a causal factor of disease. GRA

N78-18714# National Bureau of Standards, Boulder, Colo. Electromagnetics Div.

MEASUREMENT OF RF POWER-ABSORPTION IN BIOLOGICAL SPECIMENS, 10 TO 100 MHz

Frank M. Greene Feb. 1977 31 p refs (Contract NIOSH-IA-75-16) (PB-274218/7; DHEW/PUB/NIOSH-77/146) Avail: NTIS HC A03/MF A01 CSCL 06R

This method was based on measuring the forward and reflected power on the transmission line feeding the synthesizer. Commercially available rf wattmeters were used, and an automatic data acquisition system employed 'read' the meters and rapidly calculated, displayed, and recorded the rf power flow. The advantage was that the exact measuring point on the feed line was not critical, as it was with methods employing direct impedance measurements, and that the required measurements were made without interfering with the exposure tests. GRA

N78-18715# Joint Publications Research Service, Arlington, Va.

SPACE BIOLOGY AND AEROSPACE MEDICINE, NO. 3, 1977

7 Jul. 1977 139 p refs Transl. into ENGLISH from Kosm. Biol. Aviakosmich. Med. (USSR), no. 3, 1977 p 1-87 (JPRS-69380) Avail: NTIS HC A07/MF A01

Articles are presented concerning the selection and training of cosmonauts; evaluation and analysis of accumulated data to facilitate the on-going transition from orbital to interplanetary flights; research aimed at guaranteeing safety on long flights and reliability of the human component of the 'man-spaceship' system; space psychology and physiology; environmental problems and control and telemetry.

N78-18716# Joint Publications Research Service, Arlington, Va.

PSYCHOPHARMACOLOGY IN AVIATION AND ASTRONAUTICS

P. V. Vasilyev and G. D. Glod *In its* Space Biol. and Aerospace Med., No. 3, 1977 (JPRS-69380) 7 Jul. 1977 p 1-14 Transl. into ENGLISH from Kosm. Biol. Aviakosmich. Med. (USSR), no. 3, 1977 p 3-11 Avail: NTIS HC A07/MF A01

Pharmacological agents with psychotropic action were investigated as a means of maintaining a high degree of efficiency and professional reliability in spacecrews. Theoretical and applied aspects of using psychopharmacological agents (PPA) in aerospace medicine were each considered. The pathogenesis of impaired efficiency of pilots and astronauts in flight and the capabilities of current PPA, provide grounds for two basic directions of PPA application at the present time: for the prevention or correction of functional disturbances in the central nervous system that are related to fatigue, and for controlled regulation of emotions. Author

N78-18717# Joint Publications Research Service, Arlington, Va.

EXPERIMENTAL AND GENERAL THEORETICAL RESEARCH

O. G. Gizenko, A. A. Prokhochukov, V. V. Panikarovskiy, R. A. Tigranya, A. G. Kolesnik, G. N. Pakhomov, A. S. Grigoryan, Z. P. Antipova, S. M. Remezov, and N. A. Komissarova *In its Space Biol. and Aerospace Med.*, No. 3, 1977 (JPRS-69380) 7 Jul. 1977 p 15-24 refs Transl. into ENGLISH from Kosm. Biol. Aviakosmich. Med. (USSR), no. 3, 1977 p 11-20

Avail: NTIS HC A07/MF A01

The influences of space flight factors on calcium metabolism were investigated since elevation of blood calcium, increased excretion of calcium in urine and feces, and decreased mineralization of some skeletal bones have been observed in astronauts after prolonged space flight. Tissue of different skeletal bones were comprehensively investigated using autopsy material from the crew of Salyut-1. Pathohistological, crystallographic, biophysical, and biochemical techniques were used during an in-depth examination of the material. Author

N78-18718# Joint Publications Research Service, Arlington, Va.

DISTINCTIVE FEATURES OF REGIONAL CIRCULATION AND VASOMOTOR REGULATION FOLLOWING A TWO-MONTH SPACE FLIGHT

Kh. Kh. Yarullin and T. D. Vasilyeva *In its Space Biol. and Aerospace Med.*, No. 3, 1977 (JPRS-69380) 7 Jul. 1977 p 25-32 refs Transl. into ENGLISH from Kosm. Biol. Aviakosmich. Med. (USSR), no. 3, 1977 p 20-26

Avail: NTIS HC A07/MF A01

Vasomotor regulation and regional hemodynamics of astronauts during and after space flights were studied in view of the significant redistribution of blood in the body under the influence of weightlessness. Rheoencephalograms in the fronto-mastoidal and bimastroidal leads, as well as rheograms of the right lung and crus, photoplethysmogram of the third finger and EKG in the second standard lead were recorded synchronously for the crews of Soyuz-18 and Salyut-4 after extended time in space. Marked changes in regional hemodynamics were detected from these rheographic studies. Author

N78-18719# Joint Publications Research Service, Arlington, Va.

STUDIES OF CIRCULATION DURING LBNP TEST ABOARD SALYUT-4 ORBITAL STATIONS

V. A. Degtyarev, V. G. Doroshev, T. V. Batenchuk-Tusko, Z. A. Kirillova, N. A. Lapshina, S. I. Ponamarev, and V. N. Ragozin *In its Space Biol. and Aerospace Med.*, No. 3, 1977 (JPRS-69380) 7 Jul. 1977 p 33-38 refs Transl. into ENGLISH from Kosm. Biol. Aviakosmich. Med. (USSR), no. 3, 1977 p 26-31

Avail: NTIS HC A07/MF A01

The functional test utilizing lower body negative pressure was used on the Salyut-4 orbital station as part of cosmonaut medical monitoring. This test was confirmed during preflight preparations as informative for the prediction and evaluation of orthostatic endurance. The tachyoscillogram and distal perimetric oscillogram of the brachial artery, kinetocardiogram in the region of the apex beat and sphygmogram of the femoral artery were recorded. Results show that heart rate increased by 30 to 36%, minute volume decreased by 20 to 37% and stroke volume by 33 to 45%. Diastolic arterial pressure rose by a maximum of 14 to 18% while pulse pressure rose by 20 to 26%. Author

N78-18720# Joint Publications Research Service, Arlington, Va.

DYNAMICS OF ORTHOSTATIC STABILITY OF COSMONAUTS FOLLOWING 2 TO 63 DAY MISSIONS

V. V. Kalinichenko *In its Space Biol. and Aerospace Med.*, No. 3, 1977 (JPRS-69380) 7 Jul. 1977 p 39-45 refs Transl. into ENGLISH from Kosm. Biol. Aviakosmich. Med. (USSR), no. 3, 1977 p 31-37

Avail: NTIS HC A07/MF A01

Orthostatic stability of Soyuz spacecraft crew members was studied, since it is known that cosmonauts experience difficulties in readaptation to earth's gravitation chiefly due to deconditioning of the circulatory system. Indices calculated, include heart rate per minute, left ventricular expulsion time, arterial pressure, end systolic pressure, mean dynamic pressure, diastolic pressure, arm/leg lateral systolic pressure, pulse wave velocity and stroke. The integral index of orthostatic stability was calculated from mean values of the aforementioned indices. Author

N78-18721# Joint Publications Research Service, Arlington, Va.

SOME PSYCHONEUROLOGICAL REQUIREMENTS IN ASSESSING INFLIGHT FUNCTIONAL STATE OF COSMONAUTS

V. I. Myasnikov, O. V. Konkova, and F. N. Uskov *In its Space Biol. and Aerospace Med.*, No. 3, 1977 (JPRS-69380) 7 Jul. 1977 p 46-49 ref Transl. into ENGLISH from Kosm. Biol. Aviakosmich. Med. (USSR), no. 3, 1977 p 37-39

Avail: NTIS HC A07/MF A01

Word tests were developed to demonstrate the distinctive features of similarity assessment on the basis of incomplete information. Tests consisted of a series of synonyms, and were utilized as aids to the neuropsychiatrist in his evaluation of the current state of cosmonauts. Results were used to calculate the index of stability of judgment based on the number of times a given subject changed his mind. Author

N78-18722# Joint Publications Research Service, Arlington, Va.

HISTOCHEMICAL STUDY OF DIGESTIVE ORGANS OF RATS FOLLOWING FLIGHT ON KOSMOS-605

M. G. Shubich, L. L. Goryacheva, V. I. Dudetskiy, N. M. Lutsenko, and G. M. Mogilnaya *In its Space Biol. and Aerospace Med.*, No. 3, 1977 (JPRS-69380) 7 Jul. 1977 p 50-55 refs Transl. into ENGLISH from Kosm. Biol. Aviakosmich. Med. (USSR), no. 3, 1977 p 40-46

Avail: NTIS HC A07/MF A01

A comparative study was made of the stomach, small and large intestine, and pancreas of rats that had spent 22.5 days onboard Kosmos-605 satellite. Rats from a ground-based model experiment and intact rats maintained on the same diet in a vivarium were also examined. Results are discussed. Author

N78-18723# Joint Publications Research Service, Arlington, Va.

MUCOPOLYSACCHARIDES AND COLLAGEN OF TISSUES IN HYPOKINETIC RATS

P. P. Potapov *In its Space Biol. and Aerospace Med.*, No. 3, 1977 (JPRS-69380) 7 Jul. 1977 p 56-61 refs Transl. into ENGLISH from Kosm. Biol. Aviakosmich. Med. (USSR), no. 3, 1977 p 44-48

Avail: NTIS HC A07/MF A01

Hypokinetic rats were used to investigate changes demonstrated in fluid-electrolyte metabolism of cosmonauts in weightlessness and in subjects kept on strict bed rest. Content levels of collagens and mucopolysaccharides in animal tissue were studied at different stages of hypokinesia and in the recovery period. Blood serum, tissues of the liver, heart, kidneys, brain and skeletal muscles from the posterior group of the thigh served as the material to be studied. Results indicate restricted mobility led to a significant increase in hydroxyproline content of skeletal muscle. Author

N78-18724# Joint Publications Research Service, Arlington, Va.

CARDIOVASCULAR REACTIONS TO ORTHOSTATIC TESTS AND HUMAN RESISTANCE TO VESTIBULAR STIMULI

B. I. Polyakov, B. Ye. Petrenko, A. B. Savvin, I. G. Tazetdinov, and A. M. Tarko *In its Space Biol. and Aerospace Med.*, No. 3, 1977 (JPRS-69380) 7 Jul. 1977 p 62-67 refs Transl. into ENGLISH from Kosm. Biol. Aviakosmich. Med. (USSR), no. 3, 1977 p 48-52

Avail: NTIS HC A07/MF A01

The correlation between the level of vestibular stability (LVS) and nature of transient processes in the cardiovascular system during passive orthostatic testing (OTP) was studied, as well as the analogous correlation to the active orthostatic test, in an attempt to better understand motion sickness. Mathematical analysis was employed to test multiple correlation between different groups of parameters from the initial set for OTP and LVS, to single out groups of parameters that would yield the maximum confidence coefficient of difference. A special program was prepared to express the method of gradient decline in the space of groups of parameters. Equations of linear multiple regression were devised to express the link between LVS and parameters contained in the group. Author

N78-18725# Joint Publications Research Service, Arlington, Va.

DYNAMIC CONTROL OF PARAMETERS OF SPACECRAFT ATMOSPHERE

I. S. Breslav and V. N. Salazkin *In its Space Biol. and Aerospace Med.*, No. 3, 1977 (JPRS-69380) 7 Jul. 1977 p 68-75 refs Transl. into ENGLISH from *Kosm. Biol. Aviakosmich. Med. (USSR)*, no. 3, 1977 p 68-75

Avail: NTIS HC A07/MF A01

Nonstationary atmospheres in spacecraft were proposed in light of long duration space flights and the range of work performed by cosmonauts. A 'rapid' control of environment parameters was considered as an approach to the problem. This approach was based on operational monitoring of body functions with the objective of providing a high level of cosmonaut efficiency with different load levels and counteracting disturbances of physiological conditions in the case of abrupt changes in state and conditions of vital functions. The patterns of control of partial pressures of oxygen and carbon dioxide in the spacecraft atmosphere were determined. Author

N78-18726# Joint Publications Research Service, Arlington, Va.

MECHANICS OF SPEECH-RELATED RESPIRATION WHILE PERFORMING STATIC PHYSICAL EXERCISE

M. A. Tikhonov and A. S. Belan *In its Space Biol. and Aerospace Med.*, No. 3, 1977 (JPRS-69380) 7 Jul. 1977 p 76-82 refs Transl. into ENGLISH from *Kosm. Biol. Aviakosmich. Med. (USSR)*, no. 3, 1977 p 58-63

Avail: NTIS HC A07/MF A01

The biomechanical aspects of speech formation, specifically the correlation between speech and mechanical and aerodynamic processes in the lungs and vocal tract, were comprehensively investigated. Studies of respiration mechanics were made while subjects performed physical exercise. Volumetric air flow velocity and the integrated curve of respiratory volumes were recorded. Transpulmonary intrathoracic pressure was measured in the middle third of the esophagus. Results of quantitative analysis of volume and rate indices of pulmonary ventilation during ordinary breathing and speech associated with a progressively increasing physical load are given in tabular form. Author

N78-18727# Joint Publications Research Service, Arlington, Va.

ELECTROLYTE CONTENT OF BLOOD AND POTASSIUM ION TRANSPORT IN ERYTHROCYTES OF ANIMALS EXPOSED TO A STEADY MAGNETIC FIELD

G. K. Gerasimova and Z. N. Nakhilnitskaya *In its Space Biol. and Aerospace Med.*, No. 3, 1977 (JPRS-69380) 7 Jul. 1977 p 83-24 refs Transl. into ENGLISH from *Kosm. Biol. Aviakosmich. Med. (USSR)*, no. 3, 1977 p 63-67

Avail: NTIS HC A07/MF A01

The nature and extent of steady magnetic field influence on concentration of potassium and sodium ions in blood was shown. Distribution thereof in plasma and erythrocytes, blood pH and erythrocyte volume in animal blood, as well as transfer of potassium ions through the erythrocyte membrane in *in vitro* experiments was determined. Author

N78-18728# Joint Publications Research Service, Arlington, Va.

HEMOPOIESIS IN DOGS EXPOSED TO LETHAL DOSES OF PROTONS WITH SHIELDED BONE MARROW

G. F. Nevskaya, G. M. Abramova, Ye. V. Ginsburg, D. N. Ishmukhametova, and A. S. Skorik *In its Space Biol. and Aerospace Med.*, No. 3, 1977 (JPRS-69380) 7 Jul. 1977

p 88-92 refs Transl. into ENGLISH from *Kosm. Biol. Aviakosmich. Med. (USSR)*, no. 3, 1977 p 67-70

Avail: NTIS HC A07/MF A01

The long term effects of nonuniform irradiation by protons were investigated, in order to assure radiation safety of space missions. Studies were referable to the results of 6 year observation of 18 dogs exposed twice to minimum absolutely lethal doses (350 rad) of protons at a 45 day interval. Author

N78-18729# Joint Publications Research Service, Arlington, Va.

INVESTIGATION OF CONCOMITANT MICROFLORA IN PROLONGED SUBSTRATE-FREE CULTIVATION OF BEET PLANTS

L. S. Yunusova and N. A. Drugova *In its Space Biol. and Aerospace Med.*, No. 3, 1977 (JPRS-69380) 7 Jul. 1977 p 93-96 refs Transl. into ENGLISH from *Kosm. Biol. Aviakosmich. Med. (USSR)*, no. 3, 1977 p 71-74

Avail: NTIS HC A07/MF A01

The dynamics of microorganism population size in the case of long-term substrate-free cultivation of beet plants, as well as their qualitative and quantitative composition, were investigated. The dominant forms of microorganisms isolated in the course of prolonged cultivation of beets were also identified. Author

N78-18730# Joint Publications Research Service, Arlington, Va.

PHYSIOLOGY OF ANTIORTHOSTATISM

K. L. Geykhman and M. R. Mogendovich *In its Space Biol. and Aerospace Med.*, No. 3, 1977 (JPRS-69380) 7 Jul. 1977 p 97-101 refs Transl. into ENGLISH from *Kosm. Biol. Aviakosmich. Med. (USSR)*, no. 3, 1977 p 75-76

Avail: NTIS HC A07/MF A01

The physiology of antiorthostatics was investigated, and accelerations and weightlessness in man were simulated. The concept of antiorthostatism was introduced and a distinction between passive and active antiorthostatics was made. The distinctions of kinesthesia, changes in skin and internal temperature, oxygenation of blood and sensibility of the acoustic analyzer were investigated. The question of using antiorthostatic experiment data for the screening of cosmonauts and development of preventive measures was also studied. Author

N78-18731# Joint Publications Research Service, Arlington, Va.

HETEROPHILIC ANTIBODIES AND COMPLEMENT ACTIVITY OF RAT BLOOD SERUM AFTER FLIGHT IN KOSMOS-605 SATELLITE

V. V. Portugalov, A. A. Ivanov, and V. N. Shvets *In its Space Biol. and Aerospace Med.*, No. 3, 1977 (JPRS-69380) 7 Jul. 1977 p 102-105 refs Transl. into ENGLISH from *Kosm. Biol. Aviakosmich. Med. (USSR)*, no. 3, 1977 p 76-78

Avail: NTIS HC A07/MF A01

Prolonged stays of animals and man in a sealed space were associated with reduction of automicroflora, leading to reduction of the immunocompetent system and impairment of natural immunity. Hypodynamia was another factor of space flights that lowered immunological reactivity. Immunological reactions were usually mediated in the organism through humoral factors: specific (antibodies) and nonspecific (blood serum complement). The levels of heterophilic antibodies in peripheral blood were consistent with the capacity of lymphoid tissue cells to produce antibodies. Author

N78-18732# Joint Publications Research Service, Arlington, Va.

MEASUREMENT OF RADIATION DOSES IN THE SOYUZ-16 SPACECRAFT

Yu. A. Akatov, Ye. Ye. Kovalev, V. M. Petrov, M. V. Teltsov, and V. I. Shumshurov *In its Space Biol. and Aerospace Med.*, No. 3, 1977 (JPRS-69380) 7 Jul. 1977 p 106-107 refs Transl. into ENGLISH from *Kosm. Biol. Aviakosmich. Med. (USSR)*, no. 3, 1977 p 78-79

Avail: NTIS HC A07/MF A01

Orbital parameters determined the characteristics of the radiation conditions on the path and in the craft, as well as the specifications with regard to the system of monitoring them. An R-15 dosimeter was installed to measure the integral dose of cosmic radiation; it provided the necessary information for the ground-based radiation safety service. The instrument was equipped with an ionization chamber of plexiglas that was filled with argon. During operation, the ionization current in the chamber was converted into pulses. Data on galactic cosmic radiation during the period of minimal solar activity and the map of distribution of proton and electron flows at different altitudes were used. The effect of solar cosmic rays on radiation dose rate was not determined, since the forecast covering several days showed a very low level of solar activity and lack of bursts causing radiation. Author

N78-18733# Joint Publications Research Service, Arlington, Va.

BLOOD CLOTTING FUNCTION DURING 12-DAY IMMERSION IN WATER, AND THE PREVENTIVE ROLE OF REVOLVING ON A CENTRIFUGE

M. A. Khudyakova and Ye. B. Shulzhenko *In its Space Biol. and Aerospace Med.*, No. 3, 1977 (JPRS-69380) 7 Jul. 1977 p 108-112 refs Transl. into ENGLISH from *Kosm. Biol. Aviakosmich. Med. (USSR)*, no. 3, 1977 p 79-81

Avail: NTIS HC A07/MF A01

The changes in various indices of homeostasis, hypodynamia, and coagulation were studied. It was determined whether it was possible to use increased gravitation for prevention of decondition of the organism during immersion. Author

N78-18734# Joint Publications Research Service, Arlington, Va.

DEFENSE REACTIONS OF THE ORGANISM WHILE BREATHING HIGH CONCENTRATIONS OF CARBON DIOXIDE

O. Yu. Sidorov and Z. K. Sulimo-Samuylo *In its Space Biol. and Aerospace Med.*, No. 3, 1977 (JPRS-69380) 7 Jul. 1977 p 113-116 Transl. into ENGLISH from *Kosm. Biol. Aviakosmich. Med. (USSR)*, no. 3, 1977 p 81-83

Avail: NTIS HC A07/MF A01

The effects of increasing and stationary concentrations of CO₂ were studied in people. The features of development of defense reactions of the organism under the influence of high concentrations of carbon dioxide were established, especially their effectiveness in controlling developing hypercapnia. The subjects' pulmonary ventilation, composition of alveolar air, pulse rate, blood pressure and EKG were recorded. In addition, in the long-term experiments, the reserve alkalinity of blood, erythrocyte count, hemoglobin, potassium, proteins, amino acids, and blood pH were estimated. Author

N78-18735# Joint Publications Research Service, Arlington, Va.

EFFECT OF GAMMA RADIATION ON INTENSITY OF AMMONIA EXCRETION IN ALBINO RATS

K. P. Bugar, V. V. Kustov, B. I. Abidin, and L. T. Poddubnaya *In its Space Biol. and Aerospace Med.*, No. 3, 1977 (JPRS-69380) 7 Jul. 1977 p 117-120 refs Transl. into ENGLISH from *Kosm. Biol. Aviakosmich. Med. (USSR)*, no. 3, 1977 p 83-84

Avail: NTIS HC A07/MF A01

Experimental results revealed that gamma radiation had no effect on excretion of ammonia by irradiated animals with a dosage of 100 rad, whereas in doses of 300 rad and 650 rad it lowered excretion. The lower intensity of elimination after exposure to ionizing radiation was due to the impaired functional state of the gastrointestinal system, the main supplier of ammonia. Author

N78-18736# Joint Publications Research Service, Arlington, Va.

OTOLITH SYSTEM FUNCTION IN COSMONAUTS FOLLOWING SPACE MISSIONS

F. A. Solodovnik *In its Space Biol. and Aerospace Med.*, No. 3, 1977 (JPRS-69380) 7 Jul. 1977 p 121-123 refs Transl. into ENGLISH from *Kosm. Biol. Aviakosmich. Med. (USSR)*, no. 3, 1977 p 85-86

Avail: NTIS HC A07/MF A01

Swinging at low amplitude stimulates the otolithic system in man. All of the cosmonauts perceived accurately the start of swinging under the influence of low linear accelerations, and they determined the direction of movement of the swing after increases in swinging amplitude. A comparison of the results of testing threshold levels of linear accelerations before and after space flights failed to demonstrate appreciable differences. Author

N78-18737# Joint Publications Research Service, Arlington, Va.

SUDDEN LOSS OF CONSCIOUSNESS IN PILOTS WITH LOW INTRAOCULAR PRESSURE DURING EXPOSURE TO G FORCES

Yu. Domashuk and M. Voytkovyak *In its Space Biol. and Aerospace Med.*, No. 3, 1977 (JPRS-69380) 7 Jul. 1977 p 124-125 refs Transl. into ENGLISH from *Kosm. Biol. Aviakosmich. Med. (USSR)*, no. 3, 1977 p 86-87

Avail: NTIS HC A07/MF A01

During linear increment of G forces at the rate of 0.1 units/s, marked impairment of peripheral vision occurred at 8 to 12 s prior to loss of consciousness. However, mass screening of pilots on a centrifuge (determination of range of endurance with intact vision with linear increment of G forces) revealed instances when loss of consciousness was not preceded by disturbances referable to vision. Experimental results revealed that low intraocular pressure during exposure to G forces may be the cause. Author

N78-18738# Joint Publications Research Service, Arlington, Va.

SPACE BIOLOGY AND AEROSPACE MEDICINE, NO. 4, 1977

14 Oct. 1977 129 p refs Transl. into ENGLISH from *Kos. Biol. Aviakos. Med. (Moscow)*, no. 4, 1977 p 1-87 (JPRS-69964) Avail: NTIS HC A07/MF A01

Space flight stresses were investigated in regard to protein biosynthesis, vestibulotonic reflexes, aseptic inflammation, blood chemistry, blood circulation, personality traits, autonomic disorders, altitude-decompression disorders, and hypertension in cosmonauts. Aspects of space flight considered included weightlessness, cyclic and acyclic locomotion, hypokinesia, super intensity constant magnetic fields, and gamma radiation.

N78-18739# Joint Publications Research Service, Arlington, Va.

PRINCIPAL METHODS OF SIMULATING BIOLOGICAL EFFECTS OF WEIGHTLESSNESS

Ye. A. Kovalenko *In its Space Biol. and Aerospace Med.*, No. 4, 1977 (JPRS-69964) 14 Oct. 1977 p 1-9 refs Transl. into ENGLISH from *Kos. Biol. Aviakos. Med. (Moscow)*, no. 4, 1977 p 3-9

Avail: NTIS HC A07/MF A01

Methods of simulating and modeling the effects of weightlessness on the living organism under ground-based conditions were systematized. Methods of partial simulation of the effects of weightlessness were based on the feasibility of reproducing some

elements of the mechanism of effects of weightlessness on the organism. Three main categories of modeling were distinguished: (1) decreasing the effect of gravity on the organism; (2) creating a variable effect of gravity on the organism and (3) simulation of different effects of pathogenesis of weightlessness on the organism by means of biological procedures. Each of these categories was divided into groups of specific methods of modeling weightlessness. Author

N78-18740# Joint Publications Research Service, Arlington, Va.

DYNAMICS OF CYCLIC AND ACYCLIC LOCOMOTION OF THE SOYUZ-18 CREW AFTER A 63-DAY SPACE MISSION
I. F. Chekirda and A. V. Yerebin *In its Space Biol. and Aerospace Med.*, No. 4, 1977 (JPRS-69964) 14 Oct. 1977 p 10-15 refs Transl. into ENGLISH from Kos. Biol. Aviakos. Med. (Moscow), no. 4, 1977 p 9-13

Avail: NTIS HC A07/MF A01

The dynamics of locomotor activity of cosmonauts during the readaptation period were investigated through the use of electromyography and photocyclography. Tests were done to aid in the selection of optimal rehabilitation measures, motor activity and physical exercise. Evaluations of the effects of long flights on the motor system were also made possible. Author

N78-18741# Joint Publications Research Service, Arlington, Va.

MEDICAL SUPPORT OF THE IMMEDIATE POSTFLIGHT PERIOD FOLLOWING LONG SPACE MISSIONS
L. L. Stazhadze, V. V. Bogomolov, and I. R. Goncharov *In its Space Biol. and Aerospace Med.*, No. 4, 1977 (JPRS-69964) 14 Oct. 1977 p 16-19 refs Transl. into ENGLISH from Kos. Biol. Aviakos. Med. (Moscow), no. 4, 1977 p 14-16

Avail: NTIS HC A07/MF A01

The scientific methodological aspects of organizing resuscitation and anesthesiological care of acute, emergency states in the early readaptation period following lengthy, manned space flights are discussed. Author

N78-18742# Joint Publications Research Service, Arlington, Va.

DNA STATUS IN RAT LIVER AND SPLEEN FOLLOWING FLIGHT ON KOSMOS-605 SATELLITE
G. S. Komolova, F. T. Guseynov, V. F. Makeyeva, I. A. Yegorov, R. A. Tigranyan, and L. V. Sarova *In its Space Biol. and Aerospace Med.*, No. 4, 1977 (JPRS-69964) 14 Oct. 1977 p 20-23 refs Transl. into ENGLISH from Kos. Biol. Aviakos. Med. (Moscow), no. 4, 1977 p 17-19

Avail: NTIS HC A07/MF A01

The effect of space flight factors on nucleic acid metabolism and structure was investigated. Liver and spleen tissues of rats carried in Kosmos-605 were analyzed for nucleic acid content and DNA structure. Total nucleic acids and DNA were assayed by the two-wave method, using spectrophotometry. Results showed no change in DNA content of the liver following the space flight, whereas RNA level dropped by 14%. RNA content in the spleen dropped by 19%. Author

N78-18743# Joint Publications Research Service, Arlington, Va.

EFFECT OF PROLONGED SPACE FLIGHT ON PROTEIN BIOSYNTHESIS IN VARIOUS RAT ORGANS AND TISSUES
E. A. Rapoport, L. A. Goncharova, S. A. Morenkova, and V. A. Kazaryan *In its Space Biol. and Aerospace Med.*, No. 4, 1977 (JPRS-69964) 14 Oct. 1977 p 24-29 refs Transl. into ENGLISH from Kos. Biol. Aviakos. Med. (Moscow), no. 4, 1977 p 20-24

Avail: NTIS HC A07/MF A01

In view of the correlation between the physiological status of cells and tissues and the course of protein biosynthesis in them, protein biosynthesis was studied using the method of isotope tracers. Materials studied included parenchymous organs, the myocardium and some skeletal muscles of rats. Experiments were

done on the 2nd and 26th days following a 22 day space flight aboard Kosmos-605. Results indicate that a 22 day space flight does not elicit any specific changes in the biosynthesis of proteins in most of the organs studied. Author

N78-18744# Joint Publications Research Service, Arlington, Va.

CYTOCHEMICAL STUDIES OF PROTEINS AND RNA IN INDIVIDUAL SPINAL CORD MOTONEURONS AND SPINAL GANGLIA NEURONS OF RATS FOLLOWING A SPACE FLIGHT

A. V. Gorbundova and V. V. Portugalov *In its Space Biol. and Aerospace Med.*, No. 4, 1977 (JPRS-69964) 14 Oct. 1977 p 30-35 refs Transl. into ENGLISH from Kos. Biol. Aviakos. Med. (Moscow), no. 4, 1977 p 24-28

Avail: NTIS HC A07/MF A01

Changes in RNA and protein content of motoneurons of the anterior cornua of the spinal cord and sensory neurons of spinal ganglia of rats, used in a 22-day space flight were examined. Rats kept in the vivarium and used in a groundbased model experiment, in which most of the factors of space flights were simulated, served as controls. Several categories of neurons were distinguished, which differed in size and other parameters. Separate studies of small medium and large neurons were made. It was established that different groups of neurons react differently. Tables show that a 22-day space flight was not associated with changes in RNA content of medium and small neurons of the spinal ganglia. Author

N78-18745# Joint Publications Research Service, Arlington, Va.

VESTIBULOTONIC REFLEXES IN MUSCLES OF THE RAT HIND LIMB FOLLOWING A FLIGHT ON KOSMOS-605

Z. I. Apanasenko *In its Space Biol. and Aerospace Med.*, No. 4, 1977 (JPRS-69964) 14 Oct. 1977 p 36-42 refs Transl. into ENGLISH from Kos. Biol. Aviakos. Med. (Moscow), no. 4, 1977 p 28-34

Avail: NTIS HC A07/MF A01

The changes in characteristics of vestibulotonic reflexes in skeletal muscles of animals under the influence of space flight conditions were studied. According to classical experiments, such a reflex originates in the sensory utricular maculae when there is a change in spatial position of the body. Thus, the changes in parameters of the reflex should reflect, to some extent, the functional state of the vestibular analyzer, and mainly of its otoliths. Electromyograms were recorded using silver plate electrodes on the group of femoral extensor muscles. The electrodes, mounted in a thin plastic plate, were attached to the limbs with adhesive tape. A special device was used to integrate action currents of muscles concurrently with the ink tracing on paper; total electric activity was expressed in relative units on electronic counters. Results indicate increased periods of electric activity as an aftereffect to adequate vestibular stimulation. Author

N78-18746# Joint Publications Research Service, Arlington, Va.

CLINICAL AND BIOCHEMICAL ASPECTS OF HUMAN ADAPTATION TO CENTRAL ANTARCTICA AS APPLIED TO PROBLEMS OF SPACE BIOLOGY AND MEDICINE

V. V. Kurbanov, V. P. Khmelkov, T. N. Krupina, A. G. Kuznetsov, M. P. Kuzmin, Yu. N. Purakhin, N. I. Tsyganova, and N. N. Mukhina *In its Space Biol. and Aerospace Med.*, No. 4, 1977 (JPRS-69964) 14 Oct. 1977 p 43-50 refs Transl. into ENGLISH from Kos. Biol. Aviakos. Med. (Moscow), no. 4, 1977 p 34-41

Avail: NTIS HC A07/MF A01

Human adaptation to extreme environmental conditions was studied using prevailing conditions in central Antarctica. Biological rhythms and effects of extreme factors were monitored in a group of individuals after prolonged isolation at a station in Vostok. Results are given on psychological and physiological changes caused by deleterious environmental factors. Author

N78-18747# Joint Publications Research Service, Arlington, Va.

EFFECT OF PROLONGED HYPOKINESIA ON THE COURSE OF ACUTE ASEPTIC INFLAMMATION

P. V. Vasilyev, V. Ye. Belay, N. A. Gaydakin, G. D. Glod, V. E. Lysak, Ye. P. Melnikova, S. V. Petrukhin, and N. N. Uglova *In its Space Biol. and Aerospace Med.*, No. 4, 1977 (JPRS-69964) 14 Oct. 1977 p 51-57 refs Transl. into ENGLISH from Kos. Biol. Aviakos. Med. (Moscow), no. 4, 1977 p 41-46

Avail: NTIS HC A07/MF A01

Studies, conducted on rats, investigated the effect of different periods of hypokinesia on the course of inflammation; the effect of the duration of readaptation; and the distinctions of development of an inflammatory process against the background of continued restricted mobility. Inflammation was produced by administration of 3% formalin under the planter aponeurosis of hind limb under aseptic conditions. The dynamics of the inflammatory reaction were assessed according to local changes and some systemic changes. Hyperemia and edema developed within minutes after the injection, but gradually diminished starting on the 3rd through 5th days, and by the 7th through 10th days all outward signs of aseptic inflammation disappeared. Author

N78-18748# Joint Publications Research Service, Arlington, Va.

EFFECTS OF CHRONIC EXPOSURE TO CARBON MONOXIDE ON BIOCHEMISTRY OF HUMAN BLOOD

M. V. Markaryan, T. A. Smirnova, and O. S. Khokhlova *In its Space Biol. and Aerospace Med.*, No. 4, 1977 (JPRS-69964) 14 Oct. 1977 p 58-63 refs Transl. into ENGLISH from Kos. Biol. Aviakos. Med. (Moscow), no. 4, 1977 p 46-50

Avail: NTIS HC A07/MF A01

Some aspects of protein, carbohydrate and lipid metabolism in man were studied as related to prolonged and continuous exposure to different concentrations of carbon monoxide. Work was done in order to set the maximum permissible concentrations of carbon monoxide in the atmosphere of pressurized areas. Experiments were conducted on human subjects in pressurized chambers which held various concentrations of carbon monoxide. Total protein in blood serum was assayed by refractometry, protein fractions by means of electrophoresis, and total lipids by the turbidimetric method. Cholesterol, lipoproteins, and blood sugar were also monitored. It was found that the continuous 30-day exposure of man to carbon monoxide in a concentration of 20 to 15 mg/cu m led to impairment of metabolic processes, manifested by an increase in albumins, globulins, total lipids, cholesterol, and lipoproteins and a decrease in blood sugar concentration. Author

N78-18749# Joint Publications Research Service, Arlington, Va.

EFFECT OF SUPERHIGH INTENSITY CONSTANT MAGNETIC FIELDS ON MORPHOLOGICAL COMPOSITION OF PERIPHERAL BLOOD

A. G. Borodkina and Z. N. Nakhilnitskaya *In its Space Biol. and Aerospace Med.*, No. 4, 1977 (JPRS-69964) 14 Oct. 1977 p 64-68 refs Transl. into ENGLISH from Kos. Biol. Aviakos. Med. (Moscow), no. 4, 1977 p 50-55

Avail: NTIS HC A07/MF A01

Experimental mice were exposed to horizontal constant magnetic force, CMF, and hemoglobin levels and erythrocytes were assayed. Exposure of mice to CMF of 9.9, 25.4 and 39.4 kOe elicited changes in reticulocyte and leukocyte content of peripheral blood. A persistent and prolonged decrease in number of reticulocytes with concurrent decrease in leukocytes was observed, which was apparently related to depression of erythropoiesis and leukopoiesis. Author

N78-18750# Joint Publications Research Service, Arlington, Va.

ORGANISM REACTIONS TO HYPOXIA FOLLOWING EXPOSURE TO GAMMA RADIATION

B. I. Davydov and V. V. Antipov *In its Space Biol. and Aerospace Med.*, No. 4, 1977 (JPRS-69964) 14 Oct. 1977 p 69-74 refs Transl. into ENGLISH from Kos. Biol. Aviakos. Med. (Moscow), no. 4, 1977 p 55-59

Avail: NTIS HC A07/MF A01

The correlation between time of exposure to hypoxia and mortality can be described as a cumulative function (performance curve). For this reason, the method of probit analysis was used to calculate both the mean effective time of animal death and animal death in the case of a fixed time of exposure to hypoxia. In addition, the median time was calculated. In the latter case, radiation death without hypoxia was evaluated as zero time. The arithmetic mean time was determined only for mice that died within 30 minute exposure to hypoxia. Author

N78-18751# Joint Publications Research Service, Arlington, Va.

CATARACTOGENIC EFFECT OF 25 AND 50 MeV PROTONS

A. N. Kabachenko and B. S. Fedorenko *In its Space Biol. and Aerospace Med.*, No. 4, 1977 (JPRS-69964) 14 Oct. 1977 p 75-79 refs Transl. into ENGLISH from Kos. Biol. Aviakos. Med. (Moscow), no. 4, 1977 p 59-62

Avail: NTIS HC A07/MF A01

It was established that 25 and 50 MeV protons had definite cataractogenic activity. The incidence of lenticular opacities occurring under the influence of protons was a function of dosage and postradiation time. The linear nature of incidence of opacities as function of dose and postradiation time was indicative of absence of correlation between or vulnerability to radiation. Distinctions of formations of different grades of opacities were studied, and revealed consistent development of radiation cataract under the influence of protons and X rays. Author

N78-18752# Joint Publications Research Service, Arlington, Va.

ACUTE LEUKOCYTIC REACTIONS TO IMPACT ACCELERATIONS

Ye. Ye. Simonov *In its Space Biol. and Aerospace Med.*, No. 4, 1977 (JPRS-69964) 14 Oct. 1977 p 80-85 refs Transl. into ENGLISH from Kos. Biol. Aviakos. Med. (Moscow), no. 4, 1977 p 62-67

Avail: NTIS HC A07/MF A01

Data indicated that the blood leukocyte level did not remain unchanged in the experimental animals. An increase in leukocytes was observed under the influence of mild stimuli, related to transportation, immobilization of the animals and nondeleterious landing-related accelerations. Reactions were a special manifestation of the organisms' general defense reactions. Only changes observed in experiments with intolerable accelerations were classified as the pathological type of acute leukocytic reaction. Author

N78-18753# Joint Publications Research Service, Arlington, Va.

INVESTIGATION OF PERSONALITY TRAITS OF PILOTS AND NAVIGATORS

N. F. Lukyanova, V. I. Polyanskiy, and Ye. N. Lokshina *In its Space Biol. and Aerospace Med.*, No. 4, 1977 (JPRS-69964) 14 Oct. 1977 p 86-91 refs Transl. into ENGLISH from Kos. Biol. Aviakos. Med. (Moscow), no. 4, 1977 p 67-70

Avail: NTIS HC A07/MF A01

Results showed that achievement of high results in the professional activities of pilots and navigators was related to personality distinctions and correct choice of flying as a specialty. The data had a direct bearing on improvements of occupational psychological screening for flight schools. Examination of candidate's personality traits made it possible to evaluate more fully and accurately, fitness for flight training. It also provided a more substantiated individual approach to the educational and training process, as well as psychological training of flight personnel. Author

N78-18754# Joint Publications Research Service, Arlington, Va.

TETRAPOLAR RHEOGRAPHY USED TO EVALUATE THE CIRCULATORY SYSTEM

I. B. Tikhomirov, V. F. Turchaninova, V. T. Selivanenko, and V. A. Staferov *In its Space Biol. and Aerospace Med.*, No. 4, 1977 (JPRS-69964) 14 Oct. 1977 p 92-96 refs Transl. into ENGLISH from *Kos. Biol. Aviakov. Med. (Moscow)*, no. 4, 1977 p 70-74.

Avail: NTIS HC A07/MF A01

The rheographic method was based on the existence of a close link between cardiac function and pulsed fluctuations of tissular resistance. The results obtained were indicative of the feasibility of using tetrapolar rheography; it permitted qualitative and quantitative evaluation of pulsed delivery of blood to the region examined. A comparison of cardiac output obtained by rheography and the dye dilution method revealed a high degree of correlation. Author

N78-18755# Joint Publications Research Service, Arlington, Va.

CARBOHYDRATE AND LIPID CONTENT OF RAT LIVER TISSUE FOLLOWING A 22-DAY SPACE FLIGHT

R. A. Belitskaya *In its Space Biol. and Aerospace Med.*, No. 4, 1977 (JPRS-69964) 14 Oct. 1977 p 97-99 refs Transl. into ENGLISH from *Kos. Biol. Aviakov. Med. (Moscow)*, no. 4, 1977 p 75-76

Avail: NTIS HC A07/MF A01

Space flight did not affect total carbohydrate content of the liver, but it led to an increase in lipids and phospholipids, which reverted to normal in the postflight period. However, the weightlessness factor could have elicited only an increase in phospholipids. Author

N78-18756# Joint Publications Research Service, Arlington, Va.

CHANGES IN CIRCULATING BLOOD VOLUME AND FILLING OF THE BRAIN AND INTERNAL ORGANS OF RATS FOLLOWING ACUTE AND CHRONIC HYPOXIA

M. A. Kolesov and M. N. Shcherbakova *In its Space Biol. and Aerospace Med.*, No. 4, 1977 (JPRS-69964) 14 Oct. 1977 p 100-105 refs Transl. into ENGLISH from *Kos. Biol. Aviakov. Med. (Moscow)*, no. 4, 1977 p 76-80

Avail: NTIS HC A07/MF A01

Results showed that acute hypoxia induced redistribution of blood flow in the direction of predominant delivery of blood to the heart, brain and liver at the expense of decreased delivery to other organs. These changes were transient and functional in nature. As a result of multiple exposure of animals to a hypoxic environment, the changes in the vascular bed became structurally fixed and were demonstrable for a period of time. There was correlation between the change in circulating blood volume and filling of organs in the presence of hypoxia. Author

N78-18757# Joint Publications Research Service, Arlington, Va.

THE HEMATIC SYSTEM IN THE SET OF SYMPTOMS OF AUTONOMIC DISORDERS IN MONKEYS ON THE LOW GRAVITATION STAND

G. S. Belkaniya and M. I. Kuksova *In its Space Biol. and Aerospace Med.*, No. 4, 1977 (JPRS-69964) 14 Oct. 1977 p 106-111 refs Transl. into ENGLISH from *Kos. Biol. Aviakov. Med. (Moscow)*, no. 4, 1977 p 80-83

Avail: NTIS HC A07/MF A01

Signs of stimulation of hemopoiesis, as reflected by increased erythroblast activity of medullary hemopoiesis: an increase in erythroid cells on the myelogram, and an increase in amount of erythrocytes, reticulocytes and hemoglobin in blood were observed. Erythroblastosis was particularly marked after restoration of the usual characteristics of the static reaction and motor activity of the monkeys. In addition, the poststand period was characterized by marked lability with regard to composition of peripheral blood, and this corresponded to instability of automatic regulation of

other physiological systems of the organism and persistence of marked orthostatic insufficiency. Author

N78-18758# Joint Publications Research Service, Arlington, Va.

RELATIONSHIP BETWEEN ONSET OF ALTITUDE-DECOMPRESSION DISORDERS IN MAN AND BAROMETRIC PRESSURE LEVEL DURING INTENSIVE PHYSICAL EXERCISE

M. I. Vakar, A. N. Mazin, A. S. Tsvilashvili, and V. V. Malchikov *In its Space Biol. and Aerospace Med.*, No. 4, 1977 (JPRS-69964) 14 Oct. 1977 p 112-115 refs Transl. into ENGLISH from *Kos. Biol. Aviakov. Med. (Moscow)*, no. 4, 1977 p 83-85

Avail: NTIS HC A07/MF A01

With onset of altitude-decompression disorders, an increase in time required to write letters and words was observed. A decrease in capacity of the visual analyzer was also shown. This was indicative of intensification of the inhibitory process in the cerebral cortex. Concurrently, an elevation of rectal and weighted mean body temperature was noted, which was interpreted as a distinctive nervous reflex reaction accompanying decompression disorders. Author

N78-18759# Joint Publications Research Service, Arlington, Va.

PREVENTION OF HYPERTENSIVE STATES IN SHIP CREWS OUT AT SEA

V. N. Barnatskiy, A. G. Kuznetsov, V. A. Kotenko, B. I. Goryayev, M. V. Pimenova, and Yu. S. Slobodchuk *In its Space Biol. and Aerospace Med.*, No. 4, 1977 (JPRS-69964) 14 Oct. 1977 p 116-119 Transl. into ENGLISH from *Kos. Biol. Aviakov. Med.*, (Moscow), no. 4, 1977 p 85-87

Avail: NTIS HC A07/MF A01

Pathology of the cardiovascular system, and particularly essential hypertension, was one of the causes of diminished fitness of seamen and subsequent grounding for health reasons. Studies conducted on ships in the course of long-term cruises established that no arterial pressure drop was observed during storms among seamen susceptible to seasickness after intravenous and rectal administration of sodium hydrocarbonate (NaHCO₃), whereas it did drop significantly in a control group. Concurrently, it was observed that NaHCO₃ had a hypotensive effect on seamen with high arterial pressure. Studies were conducted at different latitudes in the ocean to test the hypotensive effect of NaHCO₃ on ship crews. It was planned to develop methods of using NaHCO₃ to prevent hypertensive states in seamen. Author

N78-18760# City Univ. of New York. School of Liberal Arts and Science.

EVOKED CORTICAL POTENTIALS AND INFORMATION PROCESSING Annual Report, 1 Jan. - 31 Dec. 1977

John L. Andreassi, Joseph A. Gallichio, and Nancy E. Young 31 Dec. 1977 79 p refs

(Contract N00014-77-C-0114)

(AD-A048647) Avail: NTIS HC A05/MF A01 CSCL 06/4

The present report details the results of five separate experiments. Experiment I examines the visual evoked potential (VEP) to a target stimulus when it is perceptually masked by a second stimulus, and again when it is disinhibited. In experiment II, the effects of contiguity of target (initial) and mask (later) visual stimuli on backward masking and the VEP was examined. Significant VEP amplitude decreases occurred when the target was followed closely in time by either of the masks. Experiment III tested the effects of differing numbers of corner masks on perception of, and VEP to, the target stimuli. In experiment IV we asked whether corner masking stimuli would be more effective than non-corner masks with respect to effects on perception and the VEP. Both corner and non-corner masks occupied less area than the target stimuli (57%). The fifth experiment examined the effects of a randomly generated noise pattern on a target. The target was a letter T and the mask overlapped and crisscrossed the T at many points along its contour. The random visual pattern proved to be a very effective mask

perceptually and also led to sharp decreases in VEP amplitude. The general finding of VEP attenuation with backward masking was interpreted in terms of excitatory-inhibitory interactions at the visual cortex which occur when later presented stimuli bound, or spatially overlap, earlier presented target stimuli. GRA

N78-18761* National Aeronautics and Space Administration, Lyndon B. Johnson Space Center, Houston, Tex.
EMERGENCY SPACE-SUIT HELMET Patent
Harvey A. Smith, inventor (to NASA) (United Aircraft Corp., East Hartford, Conn.) Issued 2 Jun. 1970 7 p Filed 24 Feb. 1966 Sponsored by NASA
(NASA-Case-MS-C-10954-1; US-Patent-3,514,785;
US-Patent-App-SN-529884; US-Patent-Class-2-2.1) Avail: US Patent Office CSCL 06K

A frusto-conically shaped distensible component is described which inflates to encircle a portion of the wearer's head and carries a collapsible member which automatically extends over the remaining portion of the head. A pulley arrangement secured between the walls of the distensible component automatically extends and retracts the collapsible member. When deflated, the unit is carried on the back of the wearer so as to provide an automatic emergency space suit helmet.

Official Gazette of the U.S. Patent Office

N78-18762*# National Aeronautics and Space Administration, Langley Research Center, Langley Station, Va.
DROP FOOT CORRECTIVE DEVICE Patent Application
Bert C. Deis, inventor (to NASA) Filed 9 Feb. 1978 11 p
(NASA-Case-LAR-12259-1; US-Patent-App-SN-876298) Avail: NTIS HC A02/MF A01 CSCL 06B

A drop foot corrective device to alleviate a plurality of difficulties encountered in walking by a victim suffering from a drop foot condition is presented. The invention consists essentially of an apparatus including a legband positionable to girdle the afflicted leg of the victim above the calf and below the knee, retaining and supporting the joint with a flexible ligament affixed to and extending from a toe of the foot or the toe of a shoe worn on the foot to the legband where it is anchored. The novel feature of the device appears to lie in its unique structure which alleviates the problem of drop foot by providing the support needed and the flexibility required, and furthermore is inexpensive, lightweight, inconspicuous, easily transferable from shoe to shoe, and may be worn with bare feet. NASA

N78-18763*# National Aeronautics and Space Administration, Ames Research Center, Moffett Field, Calif.
SPACESUIT MOBILITY JOINTS Patent Application
Hubert C. Vykukal, inventor (to NASA) Filed 3 Mar. 1978 45 p
(NASA-Case-ARC-11058-2; US-Patent-App-SN-883094) Avail: NTIS HC A03/MF A01 CSCL 05H

A spacesuit is presented having a waist joint, shoulder joints, elbow joints, hip joints, and ankle joints. Each of the joints includes at least one pair of annuli supported for pivotal displacement about paralleling axes and a flexible, substantially impermeable diaphragm of a tubular configuration spanning the distance between the annuli and connected thereto in a hermetically sealed relationship. The diaphragm includes at least one rolling convolution having a crown disposed in a fixed relation with an axis about which one of the annuli pivots. The knee joint is constructed slightly different from the other joints. A curved tubular shell is disposed between two circular bellows. Cables are secured to the rings, shell, and bellows. The cables limit the motion of the bellows when the suit is pressurized. NASA

N78-18764# Army Tropic Test Center, APO New York 09827.
A NEW APPROACH TOWARD OBTAINING QUANTIFIED SUBJECTIVE TEST DATA Final Report
R. L. Williamson and D. A. Dobbins May 1977 24 p refs
(AD-A047838; USATTC-7705001) Avail: NTIS HC A02/MF A01 CSCL 05/5

This report proposes a method for obtaining ratio-scaled response data during subjective questioning of soldiers whose opinions are solicited during Army materiel tests. The approach

is an adaptation of psychophysical measurement methods developed in recent years. Types of measurement scales are reviewed; a tentative taxonomy of psychophysical terminology is proposed. Methods and instrumentation for selecting and validating response modes are outlined. Plans for using resultant subjective measures of effectiveness in parametric models for statistical inference are suggested. Author (GRA)

N78-18765# Systems Technology, Inc., Hawthorne, Calif.
AN INTRODUCTION TO V/STOL TECHNOLOGY AFFECTING THE PILOT'S ROLE
Robert F. Ringland Dec. 1977 46 p refs
(Contract N60530-77-M-H604)
(AD-A048214; NWC-TP-5996) Avail: NTIS HC A03/MF A01 CSCL 01/3

This report provides introductory material on the aerodynamics, propulsion, and flight control for V/STOL aircraft. Certain basic aspects of V/STOL technology and hardware are outlined, and deficiencies in past V/STOL aircraft which adversely impact the pilot's performance are discussed. The report is intended to provide background material on the human factors aspects of future V/STOL aircraft development. GRA

N78-18766# Army Aeromedical Research Unit, Fort Rucker, Ala.
THE HELMET PROTECTS THE AVIATOR'S HEAD - OR DOES IT

Gerald L. Johnson and John J. Treanor Oct. 1977 5 p
(AD-A048574) Avail: NTIS HC A02/MF A01 CSCL 06/17

This paper examines the need for trained life support equipment specialists to maintain the protective capability of Army aviator's helmets (SPH-4). One-hundred helmets selected at random from the user population were evaluated for ability to attenuate impact forces, attenuate noise, and afford eye protection to the Army aviator. The evaluation revealed that protection was compromised in the majority of helmets in all three functional areas. The individual airman is responsible for maintaining his own equipment, no trained equipment personnel are available to inspect or maintain the helmets. The applicability of such a survey is suggested in the case of motorcycle and construction helmets. GRA

N78-18767# Naval Air Development Center, Warminster, Pa.
A PERSONAL COOLING SYSTEM FOR HELICOPTER PILOTS Phase Reports, 1 Oct. 1976 - 30 Sep. 1977
Suzanne M. Reeps 21 Nov. 1977 14 p refs
(AD-A047649; NADC-77289-60) Avail: NTIS HC A02/MF A01 CSCL 06/17

The NAVAIRDEVCCEN (Naval Air Development Center) is developing a personal cooling system for helicopter pilots to alleviate the heat stress encountered during exposure to high ambient temperatures. The major components of this system are a lightweight, constant-wear, liquid circulating garment (LCG) outfitted with skin temperature sensors, a cooling generator, and an automatic controller. The liquid circulation garment is designed for wear under a standard flight coverall and is connected, upon aircraft entry, to the generator and automatic controller. During flight, the system automatically maintains the pilot and copilot in thermal comfort thereby enabling more effective performance of flight duties. The system is currently under a development contract. Author (GRA)

N78-18768# Human Engineering Labs., Aberdeen Proving Ground, Md.
HUMAN ENGINEERING LABORATORY IDENTIFICATION FRIEND OR FOE TEST (HELIF) Final Report
John A. Barnes Oct. 1977 53 p refs
(AD-A048784; HEL-TM-30-77) Avail: NTIS HC A04/MF A01 CSCL 05/4

This study tested the ability of qualified helicopter gunners to detect and to identify moving tactical vehicles of the United States and its allies and the Warsaw Pact countries as either friend or foe. The gunners observed the vehicles from a tower which simulated a gunship in the hover position. The data shows the mean time and mean range differences between the

detection and the identification of the moving tactical vehicles both with the use of 10-power optics and with unaided vision. The percentage of correct identifications is also given.

Author (GRA)

N78-18769# Texas Technological Univ., Lubbock. Dept. of Industrial Engineering.

SELECTED DESIGN PARAMETERS FOR RECLINING SEATS BASED ON ENGINEERING ANTHROPOMETRY

Final Report

M. M. Ayoub, S. Deivanayagam, and Kenneth W. Kennedy Sep. 1977 162 p refs

(Contract F33615-75-C-5013)

(AD-A048458; AMRL-TR-77-44)

Avail: NTIS

HC A08/MF A01 CSCL 05/5

This report discusses selected engineering anthropometric design criteria for reclining cockpit seats. The reclining back-rest positions selected were 13, 27, 51 and 65 deg from the vertical line through the seat reference point (SRP). Two seat pan angles of 10 and 20 deg were utilized. Three seating components were considered in this report, these are: the head rest, arm rest, and foot rest. The specific engineering anthropometric design parameters addressed were: the head rest hinge point location, arm rest location and orientation in space as the seat reclines, location of foot rests and the synchronization of arm rest movement with back rest inclination.

Author (GRA)

N78-18770# Advisory Group for Aerospace Research and Development, Paris (France).

ASSESSING PILOT WORKLOAD

Feb. 1978 83 p refs

(AGARD-AG-233; ISBN-92-835-74-X)

Avail: NTIS

HC A05/MF A01

Pilot workload was defined and classified according to physical and mental stresses. The need for workload assessment was summarized while principles and methods of subjective assessment were discussed. Physiological tests used in the assessment of workload were presented. Tests recorded the functions of the respiratory, nervous, and cardiovascular systems.

B.L.P.

N78-18771*# National Aeronautics and Space Administration, Ames Research Center, Moffett Field, Calif.

THE SEARCH FOR EXTRATERRESTRIAL INTELLIGENCE (SETI)

Philip Morrison, ed. (MIT, Cambridge), John Billingham, ed., and John Wolfe, ed. 1977 289 p refs

(NASA-SP-419) Avail: NTIS MF A01; SOD HC \$4.50 CSCL 06C

A bibliography of reports concerning the Search for Extraterrestrial Intelligence is presented. Cosmic evolution, space communication, and technological advances are discussed along with search strategies and search systems.

J.C.S.

N78-19741 Agricultural and Technical Coll. of North Carolina, Greensboro.

REGULATION OF MAMMALIAN HIBERNATION
Ph.D. Thesis

John Thomas Burns 1977 83 p

Avail: Univ. Microfilms Order No. 77-28662

Neural and endocrine mechanisms were investigated with regard to the regulation of hibernation. Hibernation was inhibited with injections of alloxan, p-chlorophenylalanine, and two different temporal relationships of corticosterone and prolactin. Prolactin injections given 20 hours after daily injections of corticosterone for 11 days during the hibernation season prevented hibernation. Prolactin given 12 hours after corticosterone markedly reduced the occurrence of hibernation. This effect indicated that a temporal synergism of corticosterone and prolactin may be part of a circannual mechanism that regulates seasonal physiological and behavioral changes. The role of neurotransmitters in the neural control of hibernation was tested.

Dissert. Abstr.

N78-19742*# Texas A&M Univ., College Station.

[LOCOMOTOR BEHAVIOR OF FISH HATCHED FROM EMBRYOS EXPOSED TO FLIGHT CONDITIONS]

Final Report

H. Kleerekoper 13 Feb. 1978 3 p

(Contract NAS9-15175)

(NASA-CR-151633) Avail: NTIS HC A02/MF A01 CSCL 06C

Embryos of *Fundulus heteroclitus* in various stages of development were exposed to space flight conditions aboard Apollo spacecraft and Cosmos satellites. The objective of the study was to ascertain whether fish hatched from these embryos displayed locomotor behavior different from that of control fish of the same age. An electronic monitoring technique was used to record behavior. Results indicate no change in locomotor behavior in fish on Apollo Spacecraft, but inexplicable significant changes were noted in fish aboard Cosmos Satellites.

Author

N78-19743# Civil Aeromedical Inst., Oklahoma City, Okla.

FUNCTIONAL LOCALIZATION IN THE NUCLEUS ROTUNDUS

Alvin M. Revzin Oct. 1977 14 p refs

(AD-A047717/4; FAA-AM-77-22)

Avail: NTIS

HC A02/MF A01 CSCL 06/15

It was suggested that the effects of psychoactive drugs on visual performance may best be understood, and/or predicted, by studying differential effects of the drugs on functionally differentiated sets of neurons in visual projection systems in the brain. It was demonstrated that the nucleus rotundus, an avian posterior thalamic visual relay nucleus homologous to parts of the mammalian lateralis posterior/pulvinar complex, is divided into at least three functionally distinct neuron subsets. The posterior rotundal cells respond to any moving retinal image. Ventral rotundal cells respond preferentially to intensity modulation of moving or stationary stimuli. Anterior rotundal neurons respond preferentially to such abstract properties of moving stimuli as size, velocity, and direction of movement. All subnuclei may be further subdivided by function. The findings reinforce current theories which suggest that pattern vision results from cortical integration of the outputs of many classes of pattern selective visual projection system neurons.

Author

N78-19744# Oak Ridge National Lab., Tenn. Environmental Sciences Div.

TEMPERATURE INFLUENCES ON GROWTH OF AQUATIC ORGANISMS

C. C. Coutant and J. S. Suffern 1977 13 p refs Presented at the Conf. on Waste Heat Management and Util., Miami Beach, Fla., 9 May 1977

(Contract W-7405-eng-26)

(CONF-770516-9) Avail: NTIS HC A02/MF A01

Temperature profoundly affects the growth rates of aquatic organisms, and its control is essential for effective aquaculture. Characteristically, both low and high temperatures produce slow growth rates and inefficient food conversion, while intermediate temperature ranges provide rapid growth and efficient food conversion. Distinct, species-specific optimum temperatures and upper and lower temperatures of zero growth can often be defined. Thermal effects can be greatly modified by amounts and quality of food. These data not only provide the basis for criteria which maintain growth of wild organisms but also for effectively using waste heat to create optimal conditions of temperature and food ration for growing aquatic organisms commercially.

ERA

N78-19745# Johns Hopkins Univ., Baltimore, Md.

MOLECULAR BASIS FOR THE MUTAGENIC AND LETHAL EFFECTS OF ULTRAVIOLET IRRADIATION

1977 8 p refs

(Contract EY-76-S-02-2814)

(TID-27764) Avail: NTIS HC A02/MF A01

Pathways of DNA repair in bacteria and mammalian cells were examined. Progress is reported on the following studies: genetic control of incision and excision in *Escherichia coli*; effects of binding proteins on the repair process in vitro; location of endonuclease - UV-irradiated DNA complexes; identification of eukaryotic repair mechanisms; nuclear complementation in HeLa

cells; enzyme isolation from repair syndrome skin fibroblasts; and expression of the E. coli - SV40 hybrid DNA. ERA

N78-19746# Pennsylvania State Univ., University Park. Dept. of Biochemistry and Biophysics.

BASIC ASPECTS OF RADIATION ACTION ON MICRO-ORGANISMS Progress Report, 1 Apr. 1976 - 30 Jun. 1977

E. C. Pollard Jul. 1977 23 p

(Contract EY-76-S-02-2362)

(COO-2362-26) Avail: NTIS HC A02/MF A01

Ultraviolet mutagenesis follows a relation, part of which is an induction process, very similar to the induction process for induced radioresistance and induced inhibition of postirradiation DNA degradation. The repair of single-strand breaks produced by gamma rays takes place more rapidly than does postirradiation DNA degradation. Repaired DNA is degraded and there is good repair of single-strand breaks in lex cells followed by degradation of the repaired DNA. The signal for the start of radiation-induced DNA degradation is probably not single-strand breaks. The dose-response relation for the lambda induction requires more dose and has kinetics different from those for the induction of other phenomena. No evidence of induced radioresistance in two lambda lysogens of E. coli was found. There is induced radioresistance if the lysogens are of induction-minus phage.

ERA

N78-19747 Ohio State Univ., Columbus.

AN AUTOMATED SACCADE ANALYSIS SYSTEM Ph.D. Thesis

James Robert Brown 1977 221 p

Avail: Univ. Microfilms Order No. 77-31837

A computer based eyetracking system was developed to automatically analyze human saccadic eye movement responses to two dimensional step deflections of a visual target. Subject eye rotation was monitored with a modified Cornsweet-Crane eyetracker whose electrical outputs, representing horizontal and vertical eye rotations, were sampled, digitized, and stored by a PDP-8/E computer for later analysis. Software analysis of subject eye responses to step target deflections yields first saccade latency time and eye settling times to within various radii of the final target position. Nearly 400 responses from each of 4 subjects were recorded and analysed; stimuli consisted of target deflections generated at random angles and with both fixed and random magnitudes. Out of 4 subjects tested, 3 demonstrated heretofore unreported latency increases for downward target deflections.

Dissert. Abstr.

N78-19748 California Univ., Berkeley.

ROTATING DISC INDUCED HEMOLYSIS AS INFLUENCED BY DISC MATERIAL AND BLOOD CHEMISTRY Ph.D. Thesis

Richard Dulin Offeman 1977 359 p

Avail: Univ. Microfilms Order No. 77-31483

A rotating disc apparatus was employed to compare 22 materials to each other by means of the amount of hemolysis each generated during a standard shearing test. Since bloods from different donors vary in the shape and magnitude of their kinetic hemolysis curves, as does a single blood tested at different storage ages, it was necessary to provide a common reference material, polyethylene, to which materials run on different bloods could be compared. Time independent ranking of the hemolytic behavior of these materials relative to polyethylene was accomplished. The average relative magnitude of hemolysis generated by a polymeric material was found to correlate with its critical surface tension, with a low critical surface tension material generating low hemolysis.

Dissert. Abstr.

N78-19749 Yale Univ., New Haven, Conn.

BRAIN MONOAMINES AND TEMPERATURE REGULATION Ph.D. Thesis

Mao-Tsun Lin 1977 117 p

Avail: Univ. Microfilms Order No. 77-28148

Thermoregulatory responses to a variety of thermal stresses were examined in groups of rabbits treated by intracerebroventricular injections of either 6-hydroxydopamine (6-OHDA) or 5,7-dihydroxytryptamine (5,7-DHT). The thermal stresses chosen were: changes in ambient temperature, changes in hypothalamic temperature, and febrile responses to the pyrogenic agent prostaglandin E. It was found that both 6-OHDA treated and 5,7-DHT treated animals were capable of maintaining their internal body temperatures within normal limits over a wide range of ambient temperatures. Both groups of animals retained their preoptic anterior hypothalamic thermosensitivity and they both responded to pyrogenic challenges, although in an attenuated fashion. However, specific alterations in the thermo-effector outputs were noted in both groups of animals. Dissert. Abstr.

N78-19750# Virginia Univ., Charlottesville.

RETINAL ROD OUTER SEGMENT DISCS: A STUDY OF MEMBRANE STRUCTURE AND FUNCTION Ph.D. Thesis

Henry Gilbert Smith, Jr. 1977 138 p

Avail: Univ. Microfilms Order No. 77-28612

Osmotically intact discs were prepared from retinal rod outer segments by osmotic shock followed by flotation. The flotation effectively separated osmotically intact discs from protein contaminants, burst discs, and other membranous debris. The high purity of this preparation was further supported by polyacrylamide gel electrophoresis. The integrity of the discs was confirmed by electron microscopy and by their osmotic behavior. The lipid structure of discs was studied with the nonmembrane penetrating labeling reagent, trinitrobenzenesulfonate. When present outside of the discs this reagent reacted with all of the phosphatidylethanolamine and phosphatidylserine in the membrane. It was concluded that the disc had a markedly asymmetric membrane with these lipids distributed preferentially in the outer surface.

Dissert. Abstr.

N78-19751*# National Aeronautics and Space Administration, Washington, D. C.

THE RATE OF SYNTHESIS AND DECOMPOSITION OF TISSUE PROTEINS IN HYPOKINESIA AND INCREASED MUSCULAR ACTIVITY

I. V. Fedorov, A. V. Chernyy, and A. I. Fedorov Feb. 1978 10 p refs Transl. into ENGLISH from Fiziol. Zh. SSSR (USSR), v. 63, no. 8, 1977 p 1128-1133 Transl. by Kanner (Lao) Associates, Redwood City, Calif. Original doc. prep. by Med. Inst., Yaroslavl (USSR), v. 63, no. 8, 1977 p 1128-1133

(NASA-TM-75203) Avail: NTIS HC A02/MF A01 CSCL 06S

During hypokinesia and physical loading (swimming) of rats, the radioactivity of skeletal muscle, liver, kidney, heart, and blood proteins was determined after administration of radioactive amino acids. Tissue protein synthesis decreased during hypokinesia, and decomposition increased. Both synthesis and decomposition increased during physical loading, but anabolic processes predominated in the total tissue balance. The weights of the animals decreased in hypokinesia and increased during increased muscle activity.

Author

N78-19752*# National Aeronautics and Space Administration, Washington, D. C.

RESEARCH REPORT ON THE PHYSIOLOGICAL EFFECTS OF AIR IONS AND THEIR SIGNIFICANCE AS ENVIRONMENTAL FACTORS

Andras Varga Feb. 1978 37 p refs Transl. into ENGLISH from Forschungsbericht ueber die Physiol. Wirkung. von Luftionen und deren Bedeutung als Umweltfaktoren, 1972 p 1-28 Transl. by Scientific Translation Service, Santa Barbara, Calif. Original Doc. prep. by Heidelberg Univ., West Germany

(Contract NASw-2791)

(NASA-TM-75086) Avail: NTIS HC A03/MF A01 CSCL 08P

The series of experiments performed have shown that small air ions generated artificially using radioactive materials produced physiological effects in all test subjects, which are described. These results show that the air ions were important climatic factors in the production of comfortable and healthy room climates.

Author

N78-19753# Miami Univ., Oxford, Ohio. Dept. of Psychology.

RESEARCH ON VISUAL PERCEPTION OF COMPLEX AND DYNAMIC IMAGERY Final Technical Report, Sep. 1975 - Aug. 1977

Allan J. Pantle Wright-Patterson AFB, Ohio AMRL Nov. 1977 127 p refs

(Contract F33615-76-C-5006)

(AD-A049127; AMRL-TR-77-83)

Avail: NTIS

HC A07/MF A01 CSCL 06/4

This report discusses three main research topics, each of which is interpreted in terms of a spatial frequency analysis model of the human visual system. Parameters which affect the perception of clusters of line elements in dynamic, computer-generated displays are investigated. Transitions between perception of the moving cluster as a group and perception of the motion of the individual elements of the cluster are studied as a function of display frame rate, subject dark adaptation, image contrast, spatial orientation and various positional perturbations of elements in the cluster. The effect of spatial frequency components on eye movement in real-life scenes was studied by correlating eye movement patterns obtained from photographic scenes which were spatially high-pass filtered, low-pass filtered, or unfiltered. Results indicate that areas of scenes containing strong low spatial frequency components attract attention more than areas containing strong high spatial frequency components. Velocity coding in the human visual system was studied by means of moving sinusoidal gratings. Results with complex moving gratings indicate that velocity perception depends partially on the temporal variation of intensity at each point on the retina due to the moving pattern. A complex pattern containing a fundamental spatial frequency and higher harmonic components appear to be moving faster than a stimulus consisting of only the fundamental component and moving at the same velocity as the complex pattern. GRA

N78-19754# Massachusetts General Hospital, Boston.

NEW IMAGING SYSTEMS IN NUCLEAR MEDICINE

Technical Progress Report, 1 Oct. 1976 - 31 May 1977

G. L. Brownell 1977 43 p

(Contract EY-76-S-02-3333)

(COO-3333-30) Avail: NTIS HC A03/MF A01

Work carried out on the development of instrumentation and techniques for positron scintigraphy is discussed. Progress in positron imaging instrumentation and applications is detailed. The assembly and initial evaluation of the multicrystal positron camera, PC-2, was completed. Images were obtained in both two and three dimensions which demonstrate the basic physical properties of the instrument. Successful measurements using transverse section imaging were carried out on animals and human volunteers. Physiological investigation using PC-2 is proceeding. A flexible and accurate computer program was developed for transverse section reconstruction of data acquired by PC-2. This program makes it possible to reconstruct both the activity distribution and the distribution of absorption. The program was developed to handle variations in the data collection procedure. ERA

N78-19755# Washington Univ., Seattle. Bioelectromagnetics Research Lab.

RF RADIATION ABSORPTION PATTERNS: HUMAN AND ANIMAL MODELING DATA

Arthur W. Guy, Michael D. Webb, and John A. McDougall Sep. 1977 79 p refs Prepared for School of Aerospace Med., Brooks AFB, Tex.

(Contract NIOSH-IA-75-30)

(PB-274749/1; DHEW/PUB/NIOSH-77/183) Avail: NTIS HC A05/MF A01 CSCL 06R

Various models of animals and humans were exposed to radiofrequency fields and power absorption patterns and the rates of power absorption at specific anatomical locations within the models were thermographically recorded under simulated industrial exposure conditions. The results of the modeling research demonstrate the validity of this technique for predicting the magnitude and distribution of radiofrequency power absorption in humans and animals. The utility of the techniques for

extrapolation to human radiofrequency exposure thresholds from animal data was firmly established. GRA

N78-19756# Joint Publications Research Service, Arlington, Va.

SPACE BIOLOGY AND AEROSPACE MEDICINE, NO. 1, 1978

O. G. Gazonko, ed. 9 Mar. 1978 145 p refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), no. 1, 1978 145 p

(JPRS-70753) Copyright. Avail: Issuing Activity

Articles are presented concerning the selection and training of cosmonauts; evaluation and analysis of accumulated data to facilitate the on-going transition from orbital to interplanetary flights; research aimed at guaranteeing safety on long flights and reliability of the human component of the 'man-spacecraft' system; space psychology and physiology; environmental problems; control and telemetry.

N78-19757# Joint Publications Research Service, Arlington, Va.

METHODS OF STUDYING INFLIGHT PILOT PERFORMANCE

N. I. Frolov *In its* Space Biol. and Aerospace Med., No. 1, 1978 (JPRS-70753) 9 Mar. 1978 p 1-12 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), no. 1, 1978 p 3-11

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Aspects of pilot performance evaluation were generally discussed, with references to recent publications in which efforts were made to analyze human performance. A definition of pilot performance was offered as his capacity to perform flight assignments with a specified level of efficiency in the course of his flight shift, in the presence of sufficient motivation, training and adequate physical condition. Psychological and physiological responses of pilots were also discussed. B.L.P.

N78-19758# Joint Publications Research Service, Arlington, Va.

PROVISIONS FOR RADIATION SAFETY OF THE CREW OF THE SECOND EXPEDITION ON SALYUT-4

S. I. Avdyushin, Ye. Ye. Kovalov, V. M. Petrov, N. K. Pereyaslova, A. V. Sedov, L. G. Smolenskiy, A. P. Tibanov, and V. I. Shumshurov *In its* Space Biol. and Aerospace Med., No. 1, 1978 (JPRS-70753) 9 Mar. 1978 p 13-20 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), no. 1, 1978 p 11-17

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Aerospace radiation environments were considered in regard to spacecraft safety. The earth's radiation belts were examined and safety assessments for elliptically orbiting spacecraft were made. Individual radiation doses to crew members of Soyuz spacecraft and Salyut, as well as equipment for monitoring radiation situations in spacecraft, were provided in tabular form. B.L.P.

N78-19759# Joint Publications Research Service, Arlington, Va.

COMBINED EFFECT OF WEIGHTLESS AND IONIZING RADIATION OF RATS: RESULTS OF MORPHOLOGICAL STUDIES

V. V. Portugalov and Ye. A. Savina *In its* Space Biol. and Aerospace Med., No. 1, 1978 (JPRS-70753) 9 Mar. 1978 p 21-27 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), no. 1, 1978 p 17-22

Avail: Issuing Activity

Results of morphological studies conducted on rats exposed to radiation on Kosmos-690 satellite are discussed, in order to demonstrate the distinctions of the combined effect of weightlessness and penetrating radiation. Analysis of the changes demonstrated was made in three main directions: (1) how weightlessness affects the course of radiation lesions; (2) how radiation affects changes caused by weightlessness; (3) is there summation of

effects due to each of these factors when used in combination. It was found that changes were induced by weightlessness and the aggregate of all factors of space flight. All of the organs and systems of the organism did not react similarly to these factors. Morphologically discernable changes were found in the skeletomuscular system, lymphoid organs, hemopoietic system, as well as systems involved in adaptation reactions: hypothalamo-hypophyseoadrenal and reninangiotensin-juxtaglomerular system of the kidneys. In conclusion, there are target organs in the animal's body that react first to weightlessness. Author

N78-19760# Joint Publications Research Service, Arlington, Va.

ISOZYME COMPOSITION OF LACTATE DEHYDROGENASE OF RAT SKELETAL MUSCLES AFTER FLIGHT IN KOSMOS-690 BIOSATELLITE

N. V. Petrova *In its Space Biol. and Aerospace Med.*, No. 1, 1978 (JPRS-70753) 9 Mar. 1978 p 28-33 refs Transl. into ENGLISH from *Kosm. Biol. Aviakosm. Med. (Moscow)*, no. 1, 1978 p 23-27

Avail: Issuing Activity

Studies were made of isozyme composition of lactate dehydrogenase (LDH), one of the enzymes of carbohydrate metabolism, in the soleus and plantaris muscles of rats after a 20.5 day flight in the Kosmos-690 biosatellite. The effects of radiation and weightlessness were of major interest. Electrophoresis in polyacrylamide gel was used to study the isozyme spectrum of LDH of skeletal muscles. Reliability of the obtained results was determined by the method of variation statistics. Results indicate that the changes in proportion of isozyme fractions of LDH on the 2nd day after the flight, are due to the effects of weightlessness; subsequent changes in correlation between LDH fraction activity are related to the effects of radiation.

Author

N78-19761# Joint Publications Research Service, Arlington, Va.

EFFECTS OF SPACE FLIGHTS AND CONCOMITANT RADIATION ON AMINO ACID METABOLISM IN RAT SKELETAL MUSCLES

A. S. Ushakov, M. S. Gayevskaya, T. F. Vlasova, N. A. Veresotskaya, and Ye. B. Miroshnikova *In its Space Biol. and Aerospace Med.*, No. 1, 1978 (JPRS-70753) 9 Mar. 1978 p 34-38 refs Transl. into ENGLISH from *Kosm. Biol. Aviakosm. Med. (Moscow)*, no. 1, 1978 p 27-31

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The results of studying the amino acid pool and transaminase activity in the femoral quadriceps of rats exposed to radiation during a flight in the Kosmos-690 biosatellite are presented. The femoral quadriceps was taken from rats 1 and 26 days after completion of a 20.5-day flight in space and ground-based control experiments. In the flight and ground-based experiments, the animals were exposed to doses of 220, 670 and 955 rad radiation. Free amino acids of the rat femoral quadriceps were assayed on an automatic analyzer, using ion-exchange chromatography with prior deproteinization of specimens with sulfosalicylic acid. Activity of aspartate aminotransferase, and alanine aminotransferase, as well as protein content, were determined in the fraction of sarcoplasmic proteins. A comparison of all data led to the conclusion that irradiation of rats during space flight resulted in marked impairment of metabolism of aspartic acid, phenylamine, methionine, glutamic acid and serine in skeletal muscles. Author

N78-19762# Joint Publications Research Service, Arlington, Va.

SENSORY COMPONENTS OF OPTICOKINETIC NYSTAGMUS UNDER THE INFLUENCE OF ANGULAR ACCELERATIONS

V. I. Babiyak *In its Space Biol. and Aerospace Med.*, No. 1, 1978 (JPRS-70753) 9 Mar. 1978 p 87-92 refs Transl. into ENGLISH from *Kosm. Biol. Aviakosm. Med. (Moscow)*, no. 1, 1978 p 66-71

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Oculomotor reactions and their psychophysiological components, which are formed as mandatory and purposeful mechanisms of control in the case of exposure of the operator to a combination of visual and vestibular stimuli were investigated. Studies dealt with the patterns of perception of opticokinetic stimuli (OKS) and determination of the relationship between objective OKN indices and these stimuli under the combined effect of vestibular stimuli and angular accelerations. Analysis of angular rate of OKN slow components (SC) as a function of OKS revealed that the index of angular velocity of OKN SC is different in different individuals, with increase in angular velocity of OKS. In some, it remained relatively high with all gradations of OKS velocity, and in others it was significantly diminished. It was found that there was a number of individuals with an intermediate level for this index. Author

N78-19763# Joint Publications Research Service, Arlington, Va.

A DEVICE FOR MEASUREMENT OF RATE OF SLOW PHASE OF NYSTAGMUS ON THE NYSTAGMOGRAM

V. N. Krutko *In its Space Biol. and Aerospace Med.*, No. 1, 1978 (JPRS-70753) 9 Mar. 1978 p 93-95 refs Transl. into ENGLISH from *Kosm. Biol. Aviakosm. Med. (Moscow)*, no. 1, 1978 p 72-73

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A device was developed which permitted processing of nystagmograms recorded at any paper-feeding rate and calibrations encountered in nystagmographic practice in a single operation of superposition of the nystagmic curve over a path on the scale. Author

N78-19764# Joint Publications Research Service, Arlington, Va.

AN AUTOMATED SYSTEM FOR EVALUATION OF EYE FATIGUE

V. F. Ananin and V. A. Filin *In its Space Biol. and Aerospace Med.*, No. 1, 1978 (JPRS-70753) 9 Mar. 1978 p 96-99 refs Transl. into ENGLISH from *Kosm. Biol. Aviakosm. Med. (Moscow)*, no. 1, 1978 p 73-75

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The set of equipment developed for early detection of eye fatigue consisted of instruments for determining acuity of vision, recording eye movements, accommodation, pupillary reaction and blinking reflex, an attachment to record oculomotor coordination, instruments for recording intraocular pressure and calibrometry of vessels from films of the fundus and an electroencephalograph. The instrument for recording micromovements of the eyes was based on the photoelectron principle. Author

N78-19765# Joint Publications Research Service, Arlington, Va.

THE ROLE OF SKELETAL MUSCLE TONE IN REGULATION OF ORTHOSTATIC CIRCULATION

V. Ye. Katkov and L. I. Kakurin *In its Space Biol. and Aerospace Med.*, No. 1, 1978 (JPRS-70753) 9 Mar. 1978 p 100-105 refs Transl. into ENGLISH from *Kosm. Biol. Aviakosm. Med. (Moscow)*, no. 1, 1978 p 75-78

Copyright. Avail: Issuing Activity

Relaxation of muscles had a significant effect on the orthostatic reaction. This was manifested by an increase in extent of pressure drop in the aorta, decrease in and slowing of development of pressure reaction, elimination of increase in blood flow in the aorta and rise of pressure in the right atrium. This indicated that the changes in the orthostatic position during the experiment, caused changes in skeletal muscle tone which created conditions for improving venous influx of blood to the heart and restoration of aortic pressure. Author

N78-19766# Joint Publications Research Service, Arlington, Va.

OXYGEN CONTENT OF BLOOD DURING PROLONGED ROCKING

L. A. Radkevich *In its Space Biol. and Aerospace Med.*, No. 1, 1978 (JPRS-70753) 9 Mar. 1978 p 106-109 refs Transl.

into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), no. 1, 1978 p 78-80

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Results indicate that in the case of prolonged vestibular stimulation while breathing atmospheric air, rabbits, representative of the animal type that was resistant to vestibular stimuli, did not develop serious disturbances of oxygenation of blood. The observed changes were consistent and were compensated by psychological mechanisms. Author

N78-19767# Joint Publications Research Service, Arlington, Va.

RESISTANCE TO HYPERBARIC OXYGENATION AND FACTORS AFFECTING IT

V. P. Dudarev *In its Space and Aerospace Med.*, No. 1, 1978 (JPRS-70753) 9 Mar. 1978 p 113-117 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), no. 1, 1978 p 81-83

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Methods and modes of oxygen therapy and oxygen prophylaxis, and the physiological and biochemical processes that provide for relative stability of the internal environment of the organism in the presence of an altered gas environment were studied. The resistance of rats on the basis of survival of intact, thyroidectomized or adrenalectomized rats to high oxygen pressure. (HOP) of 3 and 5 atm(gage) and resistance of mice according to survival of intact and splenectomized animals was evaluated. The adrenal function of rats according to ascorbic acid level of the adrenals was assayed after exposure to HOP. Author

N78-19768# Civil Aeromedical Inst., Oklahoma City, Okla.

DISORIENTATION TRAINING IN FAA-CERTIFICATED FLIGHT AND GROUND SCHOOLS: A SURVEY

William E. Collins, A. Howard Hasbrook, Amelia O. Lennon, and Dorothy J. Gay Sep. 1977 15 p refs

(AD-A047718/2; FAA-AM-77-24) Avail: NTIS HC A02/MF A01 CSCL 05/9

A voluntary questionnaire answered by 674 flight and ground schools provided information on (1) the conduct of formal instruction about disorientation; (2) the occurrence and content of lectures on disorientation; (3) use of on-the-ground demonstrations of disorientation; (4) use of in-the-air demonstrations of disorientation; (5) use of films on pilot vertigo; (6) amount of instrument flying training students receive; (7) amount of instrument flying training required of flight instructors to maintain their proficiency; (8) adequacy of the school's program on disorientation training; (9) other comments, and (10) numerical data regarding the number of students beginning and completing various flight and/or ground school courses. More than one-third of the respondents evaluated their disorientation training program as inadequate and defined the inadequacy most often as a lack of appropriate materials, aids, and information. Author

N78-19769# National Aviation Facilities Experimental Center, Atlantic City, N. J.

SIMULATOR PILOT CONSOLES FOR NAS ENROUTE AND ARTS 3 FACILITIES Final Report, Jun. 1976 - May 1977

Kenneth House, Stephen Karovic, and Theodore Rundall Nov. 1977 101 p

(FAA Proj. 216-103-100)

(AD-A047567/3; FAA-NA-77-36; FAA-RD-77-136) Avail: NTIS HC A06/MF A01 CSCL 05/9

The work effort and results of a feasibility and desirability study of replacing simulator pilot consoles in the field with more cost effective, easier to learn and use devices are described. A touch panel input device using a menu list concept with target to map association, performed by an interface processor, was recommended. As an aid to deciding the desirability of proceeding with such a procurement, the costs of various alternatives were estimated. The costs of the preferred system was found to exceed the budget, unless a reduced number of consoles or sites were equipped, in which case the average cost per console was increased substantially. Author

N78-19770# Arizona State Univ., Tempe. Dept. of Psychology.

COGNITIVE PRETRAINING: AN AID IN THE TRANSITION FROM INSTRUMENT FLYING Final Report

John V. Crosby Williams AFB, Ariz. AFHRL Oct. 1977 45 p refs

(Contract F41609-75-C-0018)

(AD-A048816; AFHRL-TR-77-62)

Avail: NTIS

HC A03/MF A01 CSCL 05/9

This study was designed to investigate the role of cognitive pretraining relative to the early difficulties encountered by student pilots transitioning from ground-based instrument training to composite flying training. The cognitive pretraining consisted of: (a) an instrument reading review, (b) a vocabulary of relevant cockpit features, (c) the use of brief perceptual rules for pitch and bank attitudes, and (d) prototype representations of a variety of pitch and bank attitudes. Three groups of 12 pilots each participated in the study: student experimental, student control, and experienced instructor pilots (IP). The experimental group was exposed to cognitive pretraining and then compared to the student control and IP groups in a simulated composite flight laboratory task. Results of the laboratory task demonstrated superior discrimination performance of the student experimental group over both the student control and experienced pilot groups for the most difficult discrimination. As the discrimination difficulty decreased, the performance of the experimental and experienced pilot groups were equal and both were superior to the student control group. As a measure of the external validity of the laboratory task, both student groups were subjected to four discrete maneuvers in the Williams Air Force Base Human Resources Laboratory, Flying Training Division (AFHRL/FT) Advanced Simulator for Pilot Training (ASPT). Results of the ASPT task support the findings of the laboratory task. The laboratory and simulator results were discussed in the context of directed attention and schema theory. Author (GRA)

N78-19771* National Aeronautics and Space Administration, Washington, D. C.

NASA DEVELOPS TELEOPERATOR RETRIEVAL SYSTEM

31 Mar. 1978 8 p

(NASA-News-Release-78-49; P78-10047) Avail: NASA Scientific and Technical Information Facility, P.O. Box 8757, B.W.I. Airport, Md. 21240 CSCL 05H

The teleoperator retrieval system vehicle was designed to reboot and/or deorbit the Skylab; however, usefulness in survey, stabilization, retrieval and delivery was examined. Thrusters, designed for cold gas propulsion, were adapted to hydrazine propulsion. Design specifications and cost analysis are given. M.V.

N78-19772* Life Systems, Inc., Cleveland, Ohio.

TECHNOLOGY ADVANCEMENT OF THE STATIC FEED WATER ELECTROLYSIS PROCESS Final Report

F. H. Schubert and R. A. Wynveen Nov. 1977 89 p refs

(Contract NAS2-8682)

(NASA-CR-152073; LSI-ER-265-7)

Avail: NTIS

HC A05/MF A01 CSCL 06K

A program to advance the technology of oxygen- and hydrogen-generating subsystems based on water electrolysis was studied. Major emphasis was placed on static feed water electrolysis, a concept characterized by low power consumption and high intrinsic reliability. The static feed based oxygen generation subsystem consists basically of three subassemblies: (1) a combined water electrolysis and product gas dehumidifier module; (2) a product gas pressure controller and; (3) a cyclically filled water feed tank. Development activities were completed at the subsystem as well as at the component level. An extensive test program including single cell, subsystem and integrated system testing was completed with the required test support accessories designed, fabricated, and assembled. Mini-product assurance activities were included throughout all phases of program activities. An extensive number of supporting technology studies were conducted to advance the technology base of the static feed water electrolysis process and to resolve problems. Author

N78-19773# National Aeronautics and Space Administration, Marshall Space Flight Center, Huntsville, Ala.

END EFFECTOR DEVICE Patent Application

Keith H. Clark, inventors (to NASA) and James D. Johnston
Filed 9 Mar. 1978 11 p

(NASA-Case-MFS-23692-1; US-Patent-Appl-SN-885061) Avail:
NTIS HC A02/MF A01 CSCL 05H

A lightweight structure adapted for gripping objects of a variety of sizes and shapes with uniform tightness was designed for a mechanical manipulator arm of a space vehicle or other remote manipulator. The end effector device includes a pair of movable jaws in opposed relation for gripping an object. Each jaw has laterally spaced gripping fingers in the form of flat plates. Each finger has a gripping face in which a notch is formed. The gripping fingers of one of the jaws are carried alternately offset with respect to the fingers of the opposed jaw to permit the fingers to intermesh and provide a variably closed channel for gripping objects of various sizes and shapes. The jaws are connected to an adapter mechanism by couplings which include a pair of spaced pivots on which a pair of linkage bars are mounted. Each jaw is connected to its coupling through a flexible cartilage which prevents shearing of connecting rods and pins and provides for more effective gripping action. The adapter mechanism is in turn connected to a mechanical wrist joint of a manipulator arm.

NASA

N78-19774# Boeing Aerospace Co., Seattle, Wash.

WINDSHIELD QUALITY AND PILOT PERFORMANCE Technical Report, 1 Jul. 1978 - 1 Jul. 1977

Conrad L. Kraft, Charles D. Anderson, Charles L. Elworth, and Clarence Larry Wright-Patterson AFB, Ohio AMRL Oct. 1977

117 p refs

(Contract F33615-76-C-0516)

(AD-A048457; AMRL-TR-77-39)

Avail: NTIS

HC A06/MF A01 CSCL 01/3

Two experimental investigations were performed with C-141 pilots making aircraft landings with a 727-200 flight crew training simulator mounted on a three-degree-of-freedom motion base. The terrain image was computer-generated and the 1000 TV line, full color scene was displayed at optical infinity with a resolution of 2.9 arc minutes. All pilots were extensively tested for several skills. Optical distortion panels between the pilot and the visual scene simulated a range of windscreen image qualities from excellent to poor. One study used 8 pilots, 4 windscreen qualities, 2 times-of-day and 2 visibility conditions. A second study used 6 pilots, 3 windscreen qualities, 2 times-of-day, and 4 replications. In both studies, ten dependent measures were taken of pilot's performance. Decreased windscreen optical quality increased centerline deviations at touchdown point. Windscreen quality and time-of-day significantly interacted. Night approaches with poor windscreens were significantly above glide slope, but on glide slope with better windscreens. Approaches were low for all windscreens in daytime landings. Poor optical quality windscreens caused apparently more cautious night landings: higher faster approaches, more rapid descents and touchdowns that were harder and further down the runway. Recommendations are made for measuring windscreen optical quality effects on flight performance.

Author (GRA)

N78-19775# Electro-Voice, Inc., Buchanan, Mich. Military Engineering Dept.

LINEAR NOISE-ATTENUATING EARPHONE Final Report,

28 May 1976 - 21 Aug. 1977

R. Ramsey 4 Nov. 1977 99 p

(Contract DAAB07-76-C-0149)

(AD-A048846; ECOM-76-0149-F)

Avail: NTIS

HC A05/MF A01 CSCL 09/5

This document covers the technical details of work performed to improve the linearity and attenuation of the earphone and earcup respectively in Flying Type Helmet SPH-4. The results of the effort provide an immersible, salt resistant, rugged and low distortion earphone with a flat frequency response fitting an 8 db response envelope when placed in the newly designed earcup which is lighter in weight but more rugged than the present standard SPH-4. The new ear-cushion utilizes a low

permeability foam for improved attenuation in the low and mid-frequency range, which is covered with a urethane film for low temperature flexibility and body oil resistance. Author (GRA)

N78-19776# Aerojet Liquid Rocket Co., Sacramento, Calif. **STORABILITY INVESTIGATIONS OF WATER LONG-TERM STORAGE EVALUATION Annual Report, Nov. 1976 - Oct. 1977**

E. M. Vander Wall and G. R. Janser Edwards AFB, Calif. AFRPL Dec. 1977 69 p ref

(Contract F04611-72-C-0062; AF Proj. 3059)

(AD-A049189; AFRPL-TR-77-7423; AR-4) Avail: NTIS HC A04/MF A01 CSCL 13/2

The objective of this program is to gather data that will permit the Air Force to assess the long term storage characteristics of water, particularly with regard to formation of particulate matter, so that the feasibility of long-term storage of water for use as a transpiration coolant can be determined. Five metallic materials of construction are included in the program: 304 stainless steel, A-286 (aged) steel, 17-4 (aged) stainless steel, Inconel 718 (aged), 6Al-4V titanium (STA). Two types of water are used in the program; oxygen-saturated, deionized, filtered, and oxygen-free, deionized, filtered. Five-year storage tests have been initiated in 304 and 17-4 Ph stainless steels, A-286 steel, Inconel 718, and 6Al-4V titanium (STA) containers using the filtered, deionized waters. Evaluation of water and containers stored for forty-two months and forty-eight months has been completed. The data show that both oxygen-saturated and oxygen-free water can be stored in appropriate metal containers for the selected time periods without detrimental particulate matter formation or significant changes in the quality of the water. It is in excellent condition for transportation coolant purposes.

Author (GRA)

N78-19777# Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.

IDENTIFICATION OF ALPHABETIC SYMBOLS AS A FUNCTION OF THEIR LOCATION IN THE VISUAL PERIPHERY

Shelton MacLeod Oct. 1977 24 p refs

(AD-A049345; AMRL-TR-77-37)

Avail: NTIS

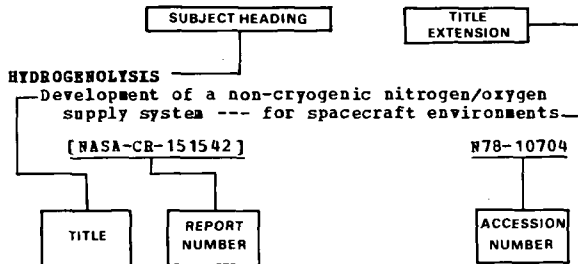
HC A02/MF A01 CSCL 06/16

A preliminary study in a proposed program of research to develop improved design criteria for peripheral vision displays was performed. Binocular peripheral identification of alphabetic symbols was measured for four subjects at four angular distances from a fixation point (3, 6, 12, and 24 degrees) and along eight equally spaced meridia in the visual field. Response measures were choice reaction time and accuracy scores. Results show: (1) a relatively constant and high level of peripheral identification along all meridia out to a 12-degree, angular distance from central fixation; (2) extension of this high identification performance out to 24 degrees along both right and left horizontal meridia; (3) significant differences in peripheral identifiability of the four alphabetic symbols used; (4) no significant bilateral performance differences related to dual cerebral control. An important display implication of the data concerns the potential advantage of placing letters to be identified in the periphery along the horizontal visual axis.

Author (GRA)

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Typical Subject Index Listing



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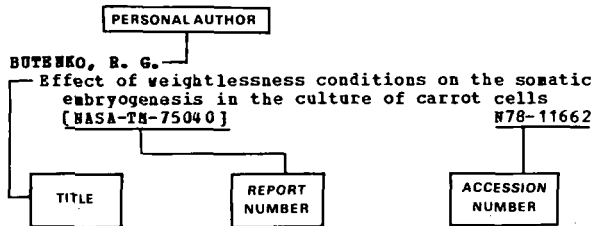
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