



Aerospace Medicine
and Biology
A Continuing
Bibliography
with Indexes

NASA SP-7011 (183)
August 1978

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AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY
WITH INDEXES

(Supplement 183)

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 July 1978 in

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



Scientific and Technical Information Branch

1978

National Aeronautics and Space Administration

Washington, DC

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INTRODUCTION

This Supplement to *Aerospace Medicine and Biology* (NASA SP-7011) lists 273 reports, articles and other documents announced during July 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.

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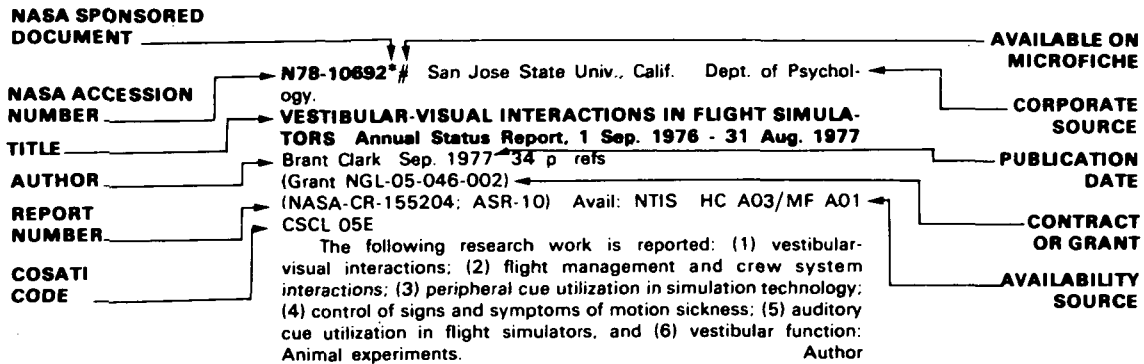
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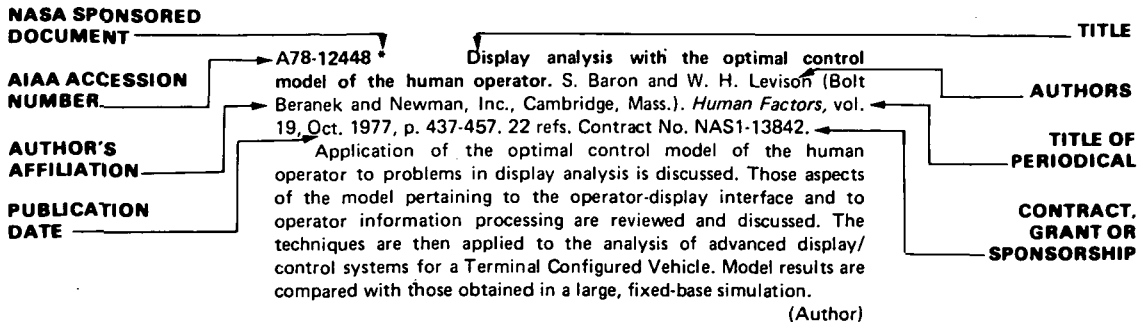
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TYPICAL CITATION AND ABSTRACT FROM STAR



TYPICAL CITATION AND ABSTRACT FROM IAA



AEROSPACE MEDICINE AND BIOLOGY

A Continuing Bibliography (Suppl. 183)

AUGUST 1978

IAA ENTRIES

A78-32673 * Human problem solving performance in a fault diagnosis task. W. B. Rouse (Illinois, University, Urbana, Ill.). *IEEE Transactions on Systems, Man, and Cybernetics*, vol. SMC-8, Apr. 1978, p. 258-271. 52 refs. Grant No. NsG-2119.

It is proposed that humans in automated systems will be asked to assume the role of troubleshooter or problem solver and that the problems which they will be asked to solve in such systems will not be amenable to rote solution. The design of visual displays for problem solving in such situations is considered, and the results of two experimental investigations of human problem solving performance in the diagnosis of faults in graphically displayed network problems are discussed. The effects of problem size, forced-pacing, computer aiding, and training are considered. Results indicate that human performance deviates from optimality as problem size increases. Forced-pacing appears to cause the human to adopt fairly brute force strategies, as compared to those adopted in self-paced situations. Computer aiding substantially lessens the number of mistaken diagnoses by performing the bookkeeping portions of the task. (Author)

A78-32676 A strategy for the development of training devices. B. W. Cream, F. T. Eggemeier, and G. A. Klein (USAF, Human Resources Laboratory, Wright-Patterson AFB, Ohio). *Human Factors*, vol. 20, Apr. 1978, p. 145-158. 23 refs.

This paper discusses the complex issues involved in the design of aircrew simulation training devices. It addresses methods for defining training requirements, fidelity, performance measurement, instructional features, and crew coordination. A research evaluation of a device using these methods is presented. (Author)

A78-32677 Critical variables in adaptive motor skills training. R. C. Williges and B. H. Williges (Virginia Polytechnic Institute and State University, Blacksburg, Va.). *Human Factors*, vol. 20, Apr. 1978, p. 201-213. 40 refs. Grant No. AF-AFOSR-77-3161.

Automatic adaptive training procedures for motor skills learning have been suggested for several years. Adaptive training is a closed-loop system in which some aspect of the student's performance is monitored and used in a computer algorithm to adjust the difficulty of the training task. Only limited research exists on the evaluation of these procedures both in basic laboratory motor learning tasks and in applications to flying training using synthetic flight trainers. In this paper critical variables dealing with the performance measurement procedure, the choice of the adaptive variable, and the appropriate adaptive logic are evaluated. The results of a series of laboratory studies are reviewed, and several suggestions for additional research as well as a general model of instruction are discussed. It was concluded that the most effective automated

adaptive motor skills training probably should use multivariate performance measurement schemes which manipulate stimulus-related adaptive variables in connection with a closed-loop adaptive logic model that is optimized for individual differences. (Author)

A78-32678 Simulation of operational equipment with a computer-based instructional system - A low cost training technology. A. M. Crawford and K. S. Crawford (U.S. Navy, Navy Personnel Research and Development Center, San Diego, Calif.). *Human Factors*, vol. 20, Apr. 1978, p. 215-223. 11 refs. ARPA-Navy-supported research.

The feasibility and effectiveness of teaching performance skills using a computer-based training (CBT) methodology were investigated. Graphic simulations of the appearance and functions of a system in an anti-submarine aircraft were presented to students within an instructional framework. Programmed logics controlled the dynamic representations of the equipment in response to student input made through a touch panel. The objective was to determine whether CBT could be used for low cost, part-task training. The performance of CBT students, as measured on a high fidelity simulator, was compared to that of students who had gone through conventional training consisting of workbook study and hands-on practice in the simulator. Results showed that CBT students performed the necessary skills as well before practice in the simulator as conventionally trained students could after this practice. The theoretical and cost implications are discussed. (Author)

A78-32781 Hand-arm vibration. III - A distributed parameter dynamic model of the human hand-arm system. L. A. Wood, C. W. Suggs, and C. F. Abrams, Jr. (North Carolina State University, Raleigh, N.C.). *Journal of Sound and Vibration*, vol. 57, Mar. 22, 1978, p. 157-169. 14 refs.

A78-32845 The adjacency principle in visual perception. W. C. Gogel (California, University, Santa Barbara, Calif.). *Scientific American*, vol. 238, May 1978, p. 126-128, 130 (4 ff.).

The adjacency principle in visual perception states, basically, that what one is able to perceive from one phenomenon is substantially influenced by phenomena occurring close by. An illustration of the principle is presented, whereby a line moving horizontally is perceived as moving diagonally if a vertically moving line is placed adjacent to it. Magnitudes of deviation from the line's true path are measured, taking size and distance of the test objects into consideration. Large size cues at close distances were found most effective in helping subjects perceive phenomena accurately. D.M.W.

A78-33253 Results of an investigation of the rotation of a man in space. G. G. Bebenin and Iu. N. Glazkov. (*Kosmicheskie Issledovaniia*, vol. 15, July-Aug. 1977, p. 533-539.) *Cosmic Research*, vol. 15, no. 4, Jan. 1978, p. 460-465. Translation.

A dynamic biomechanical model of the human body is proposed for studying the rotational motion of the human body about its

center of mass in free space, assuming that the human body is made to rotate solely by moving the arms and legs. In the model proposed, the human body is broken down into an 'immobile' torso (including the head) and mobile extremities (including cameras, tools, or other objects that might be carried at the time). Some results of a computer-aided analysis of the model are discussed. A general approach to the synthesis of the astronaut's system of motion control is outlined, where allowance is made for the influence of perturbing motions generated by the extremities. V.P.

A78-33467 # Changes in protein metabolism during prolonged hypokinesia (Izmeneniia belkovogo obmena pri dlitel'noi gipokinezii). V. A. Maksimov, P. O. Viazitskii, I. B. Sliusar, and S. L. Ivanov. *Voenna-Meditsinskii Zhurnal*, Feb. 1978, p. 73-75. In Russian.

Nitrogen excretion patterns of four groups of subjects (21-34 years old) were determined the 26th and 49th days of a 49-day period of hypokinesia when the subjects were in an antigravitational position as well as the tenth day after the end of the hypokinesia period and on a background day before the start of hypokinesia. The four groups were (1) control, (2) treated with drug or vitamin preparations, (3) given vibrational stimulation in the thigh region, and (4) exposed to negative pressure applied to the lower part of the body. Data for total nitrogen, amino acids, creatinine, and creatine excreted in the urine are reported and compared. In general, methods three and four reduced nitrogen excretion more than method two. M.L.

A78-33522 * Extent of utilization of the Frank-Starling mechanism in conscious dogs. D. H. Boettcher (Harvard University, Harvard Medical School, Boston, Mass.), S. F. Vatner (Peter Bent Brigham Hospital, Boston, Mass.), G. R. Heyndrickx (Children's Hospital Medical Center, Boston, Mass.), and E. Braunwald (New England Regional Primate Research Center, Southborough, Mass.). *American Journal of Physiology*, vol. 234, Apr. 1978, p. H338-H345. 36 refs. Research supported by the American Heart Association; Grants No. PHS-HL-15416; No. PHS-HL-17459; No. PHS-HL-17665; No. NSG-2136.

The left ventricular end-diastolic pressure-dimension relationships in conscious dogs were studied; the ventricle was stressed to its limit in terms of myocardial preload in order to assess the extent of use of the Frank-Starling mechanism under these conditions. The preload was increased through volume loading with saline infusions, the provocation of global myocardial ischemia by constriction of the left main coronary artery, and infusion of methoxamine. While left ventricular end-diastolic pressure increased substantially in the reclining conscious animals, the left ventricular end-diastolic diameter did not increase, suggesting a minimum role for the Frank-Starling mechanism in this case. J.M.B.

A78-33523 Myocardial PO₂ distribution - Relationship to coronary autoregulation. R. W. Schubert, W. J. Whalen, and P. Nair (St. Vincent Charity Hospital, Cleveland, Ohio). *American Journal of Physiology*, vol. 234, Apr. 1978, p. H361-H370. 37 refs. Grant No. NIH-HL-11906.

Stable isovolumic cat heart preparations were employed to study autoregulatory phenomena, oxygen mass balance and left ventricular function. It was found that during good autoregulation, excellent regulation of flow, oxygen extraction, rate of oxygen consumption, isovolumic left ventricular function and especially tissue oxygen perfusion pressure distribution were maintained. Locally hypoxic areas may serve as a feedback signal for microvascular adjustment (arteriolar tone and capillary density). J.M.B.

A78-33524 Increased contractile potential of papillary muscles from exercise-trained rat hearts. P. A. Mole (Louisiana State University, New Orleans, La.). *American Journal of Physiology*, vol. 234, Apr. 1978, p. H421-H425. 29 refs. Research supported by the Louisiana Tech University; Grant No. NIH-1-T32-HL-07098.

A78-33525 Effect of exercise on pre- and postcapillary resistance in the spontaneously hypertensive rat. M. T. Edwards and J. N. Diana (Iowa, University, Iowa City, Iowa). *American Journal of Physiology*, vol. 234, Apr. 1978, p. H439-H446. 23 refs. Grants No. NIH-HL-16697; No. NIH-HL-14388.

A78-33817 # Theoretical limit to the contrast sensitivity of the human visual analyzer (Teoreticheskii predel kontrastnoi chuvstvitel'nosti zritel'nogo analizatora cheloveka). V. D. Ivanenko. *Optika i Spektroskopiiia*, vol. 44, Feb. 1978, p. 340-344. 14 refs. In Russian.

An information threshold criterion is used to calculate the contrast sensitivity of the human visual analyzer for known pupil, medium, and neuron parameters. Neuron blocking is taken into account, and numerical results are presented for two angular sizes of the stimulus. A theoretical model is considered which provides satisfactory agreement between the threshold contrasts and experimental values obtained in the daytime visual range. F.G.M.

A78-33887 # Compliance of a manipulator (Podatlivost' manipulatora). A. A. Kobrinskii (Gosudarstvennyi Nauchno-Issledovatel'skii Institut Mashinovedeniia, Moscow, USSR). *Akademiia Nauk SSSR, Doklady*, vol. 238, Feb. 11, 1978, p. 1071-1074. In Russian.

A compliance matrix approach is used to study the distribution of kinetostatic errors associated with the motion of a manipulator. It is assumed that these errors are small compared to the dimensions of manipulator links and that it is possible to linearize the sensitivity function in every configuration of the manipulator. It is also considered that, for all configurations, the elastic properties of the drives are linear within the limits of deformations that arise. B.J.

A78-33895 # Abiogenic synthesis of molecular complexes from amino acids and porphyrins discussed in reference to the problem of prebiological evolution (Abiogennyi sintez molekularnykh kompleksov iz aminokislot i porfirinov v sviazi s problemoi dobiologicheskoi evoliutsii). M. P. Kolesnikov and I. A. Egorov (Akademiia Nauk SSSR, Institut Biokhimii, Moscow, USSR). *Akademiia Nauk SSSR, Doklady*, vol. 238, Feb. 21, 1978, p. 1483-1486. 12 refs. In Russian.

An experiment was set up to determine the role of porphyrins in abiogenic synthesis. The effects of temperature on porphyrins and amino acids adsorbed into volcanic ash were studied. Two basic results were noted: (1) protoporphyrin-9 is considerably stable and degrades only 5% from the initial pigment-content in the ash, resulting in the formation of protoporphyrin-amino acid complexes, and (2) the formation of metalloporphyrins with characteristic phosphorescence spectra is noted. A second series of experiments was conducted to study the effects of temperature on chlorophylls also adsorbed into volcanic ash, with emphasis on conditions of porphyrin formation. B.J.

A78-34081 Effects of atropine and beta-blockade on temperature regulation and performance during prolonged exercise. C. T. M. Davies, J. R. Brotherhood, and E. ZeidiFard (Medical Research Council, Environmental Physiology Unit; London, University, London, England). *European Journal of Applied Physiology*, vol. 38, no. 3, 1978, p. 225-232. 13 refs.

A78-34082 Electrical impedance cardiogram in derivation of systolic time intervals. V. Balasubramanian, O. P. Pathew, A. Behl, S. C. Tewari, and R. S. Hoon (Army Hospital, New Delhi, India). *British Heart Journal*, vol. 40, Mar. 1978, p. 268-275. 35 refs. Research supported by the Armed Forces Medical Research Committee.

A three-phase experimental study was conducted on 185 human subjects under various conditions to evaluate the scope and limitations of the impedance cardiogram in measuring systolic time intervals (left ventricular ejection time, pre-ejection period). Phase I

concerned simultaneous recordings of the carotid pulse, impedance cardiogram, PCG, and ECG under controlled conditions. Phase II dealt with recording the impedance cardiogram, ECG, and PCG, during end-expiration followed by recording the carotid pulse, ECG, and PCG in healthy subjects at sea level and serially at high altitude. Phase III consisted of exploring the possibility of recording the impedance cardiogram during and after static and dynamic exercise in normal subjects and patients with ischemic heart disease. It is found that the impedance cardiogram is a suitable and versatile technique for obtaining various systolic time intervals under resting conditions. It does not yield satisfactory results during dynamic exercise, especially treadmill walking. A limitation of this technique is the necessity of holding the breath in expiration to get acceptable tracings. S.D.

A78-34083 **Alterations in left ventricular function in normal man on exposure to high altitude /3658 m/.** V. Balasubramanian, O. P. Mathew, S. C. Tiwari, A. Behl, S. C. Sharma, and R. S. Hoon (Army Hospital, New Delhi, India). *British Heart Journal*, vol. 40, Mar. 1978, p. 276-285. 51 refs.

A78-34084 **Assessment of correction formula for echocardiographic estimations of left ventricular volumes.** M. A. Martin (Royal Infirmary, Sheffield, England). *British Heart Journal*, vol. 40, Mar. 1978, p. 294-296. 15 refs. Research supported by May and Baker, Ltd.

The validity of a correction formula for echo ventricular volume is examined by using it to recalculate the results in four original studies comparing echocardiographic and angiographic volumes. The correction formula is $V = (7.0 / (2.4 + D)) \times D^3$, where V = echo ventricular volume and D = echo internal diameter. It is found that the correction formula produces only moderate changes in correlation coefficients and associated errors in the original studies. Both degradation and improvement are observed in the corrected correlations, with no consistent improvement in general. The variability of the major-to-minor axis and the presence of dyskinesia indicate that the general use of the correction formula is not helpful in correcting echo volume estimations. S.D.

A78-34085 **The predictive control of behaviour - Appropriate and inappropriate actions beyond the input in a tracking task.** K. A. Flowers (Bristol, University, Bristol, England). *Ergonomics*, vol. 21, Feb. 1978, p. 109-122. 20 refs. Research supported by the Medical Research Council.

A78-34086 **An equal sensation study of seated subjects in three translational modes.** B. K. N. Rao and B. Jones (Birmingham, University, Birmingham, England). *Ergonomics*, vol. 21, Feb. 1978, p. 123-134. 17 refs. Research supported by the Science Research Council.

Broad-band random vibrations are produced by most transport vehicles, though sinusoidal vibrations have generally been adopted to evaluate human response to vehicle motion. Accordingly, subjects were exposed to various levels of sinusoidal and random vibrations and asked to compare the sensations induced during the tests. Significant differences were noted in the perceived level of discomfort associated with the random and the sinusoidal vibrations. Of the three modes of vibration examined (vertical, right-to-left and back-to-chest), the vertical mode caused the most discomfort. J.M.B.

A78-34156 # **Acute and long-duration hypoxia (Ostraiia i khronicheskaiia gipoksiia).** V. B. Malkin and E. B. Gippenreiter. Moscow, Izdatel'stvo Nauka (Problemy Kosmicheskoi Biologii. Volume 35), 1977. 320 p. 605 refs. In Russian.

The book is concerned with experimental and literature data characterizing the physiological responses in man during acute and long-duration (chronic) hypoxia. An analysis is presented of the physiological mechanism underlying the action of hypoxia on the basic functional systems of the human organism. Attention is given

to the adaptation of the organism to oxygen deficiency as well as to the genesis of pathological conditions responsible for elevated- and high-altitude diseases. Also shown are the possibility and suitability of using hypoxic effects for training athletes engaged in different types of athletic activity. S.D.

A78-34157 # **Theoretical foundations for the design of life support systems (Teoreticheskie osnovy proektirovaniia sistem zhizneobespecheniia).** G. I. Morozov. Moscow, Izdatel'stvo Nauka (Problemy Kosmicheskoi Biologii. Volume 36), 1977. 255 p. 185 refs. In Russian.

Theoretical problems for designing life support systems for space flight are examined from the standpoint of systems analysis. A classification of life support systems according to the type of manned spacecraft is given. Life support systems for transportation and interplanetary vehicles are analyzed to determine the structure of life support systems, their interrelationships and relations with other onboard systems. Basic techniques for mathematical modeling of life support systems are outlined. Particular attention is given to comparison and reliability criteria. S.D.

A78-34334 **Pattern and movement detection in man and rabbit - Separation and comparison of occipital potentials.** J. J. Kulikowski (University of Manchester Institute of Science and Technology, Manchester, England). *Vision Research*, vol. 18, no. 2, 1978, p. 183-189. 37 refs. Science Research Council Grant No. B/RG/1511.

A78-34335 **Interaction between sustained and transient channels - Form inhibits motion in the human visual system.** M. W. von Grünau (Max-Planck-Institut für Psychiatrie, Munich, West Germany). *Vision Research*, vol. 18, no. 2, 1978, p. 197-201. 23 refs. Deutsche Forschungsgemeinschaft Contract No. SFB-50.

The effect of changing spatial frequency content of the inducing flashes on the likelihood of seeing apparent motion was investigated. The results suggest that the sustained channel inhibits the transient channel. This inhibitory effect is largest in the fovea and decreases sharply towards the periphery. Conditions that weaken the sustained channel lead to a decrease of the inhibitory effect and a corresponding increase in the response of the transient channel. (Author)

A78-34336 **Illusory motion in depth - Aftereffect or adaptation to changing size.** D. Regan and K. I. Beverley (Dalhousie University, Halifax, Nova Scotia, Canada). (*Association for Research in Vision and Ophthalmology, Spring Meeting, Sarasota, Fla., Apr. 25-29, 1977.*) *Vision Research*, vol. 18, no. 2, 1978, p. 209-212. 15 refs. Research supported by the National Research Council of Canada.

After adapting to changing size by viewing a square whose dimensions increased with a ramp waveform, a subsequently-viewed test square appeared to move continuously away in depth. Adapting to decreasing size produced the opposite aftereffect. This depth movement aftereffect could be measured by cancelling it by some unique rate of change of size. The direction of the aftereffect and the direction of the cancelling stimulus were independent of whether the adapting square or test square was of positive or negative contrast. The aftereffect built up over 10 min adaptation and decayed exponentially (decay time constant = 52 sec). It cannot be explained in terms of the classical movement aftereffect. It is proposed that neural filters sensitive to unidirectionally changing size drive the neural mechanism that underlies the perception of motion in depth. (Author)

A78-34337 **Measurement of human vertical fusional response.** A. L. Perlmutter and A. E. Kertesz (Northwestern University, Evanston, Ill.). *Vision Research*, vol. 18, no. 2, 1978, p. 219-223. 12 refs. Grants No. NIH-EY-1055; No. NIH-EY-70887.

Objective measurement of human vertical fusional response was carried out using a binocular eye movement monitoring device. The dichoptic stimulus consisted of a single horizontal line subtending 8.5 deg. The maximum fusible vertical disparity that could be introduced in a single step was 53.2 arc min. The results indicate the presence of a predominant motor component and a small but significant central component in vertical fusional response. Approximately 8 sec were required for the completion of the motor response to a step disparity. Thus, the observed vertical disjunctive movements were roughly 8 times slower than horizontal disjunctive movements. Furthermore, while horizontal disjunctive movements were found to be symmetrical and in accordance with Hering's law of equal innervation, vertical disjunctive movements were found to be unsymmetrical, both in their time course and in their final contributions to the overall motor response. (Author)

A78-34679 * Repeated observation of an uncertain signal. J. A. Swets (Bolt Beranek and Newman, Inc., Cambridge, Mass.) and T. G. Birdsall (Michigan, University, Ann Arbor, Mich.). *Perception and Psychophysics*, vol. 23, no. 4, Apr. 1978, p. 269-274. 6 refs. NASA-supported research.

The focus here is on sensory adaptation, or progressively more appropriate attention, as repeated observations yield more information about a signal with an uncertain parameter. The signal was a brief sinusoid; its uncertain parameter was frequency. Detection performance is predicted from data on a signal of known and constant frequency, as a function of the number of frequencies the uncertain signal could assume. A comparison condition presented a signal that varied in a manner not permitting adaptation. Models derived from signal detection theory describe the ideal observation processes for the three signal conditions, and supply quantitative predictions of relative performances. The models are generally supported by the data. (Author)

A78-34680 Signal detection and identification at successive stages of observation. J. A. Swets, D. M. Green, D. J. Getty, and J. B. Swets (Bolt Beranek and Newman, Inc., Cambridge, Mass.). *Perception and Psychophysics*, vol. 23, no. 4, Apr. 1978, p. 275-289. 10 refs. Navy-supported research.

The relationship of signal identification to signal detection was examined in a series of experiments. The signals were idealized lines and patterns of lines in a spectrographic display. On each trial, progressively more of the complete spectrogram was exposed in successive observation intervals, and after each interval the observer made both detection and identification responses that were based on the accumulating evidence. One model we employed conceives of detection and identification as proceeding together over time as parts of a unified process. A second model used shows how the joint detection-and-identification ROC - a relative operating characteristic that relates the joint probability of correct detection and correct identification to the probability of a false detection - may be predicted from the simple detection ROC. Both models were supported by the data. (Author)

A78-34681 * State reversals of optically induced tilt and torsional eye movements. R. A. Finke and R. Held (MIT, Cambridge, Mass.). *Perception and Psychophysics*, vol. 23, no. 4, Apr. 1978, p. 337-340. 20 refs. Grants No. NGL-22-009-308; No. NIH-5-R01-EY-01191.

Alternations of the state of apparent self-motion during observation of a large visual display rotating about the line of sight are associated with alternations in the magnitude of induced tilt and torsional eye rotation. In one experiment, shifts in visually induced tilt during these state alternations are found to be in the opposite direction to corresponding shifts in induced ocular torsion. In a second experiment, the reversals of self-motion perception are shown to be an intravisual phenomenon, independent of competing inputs provided by the vestibular system. These results emphasize the importance of distinguishing between visual and vestibular processes in tilt perception and ocular rotation during human orientation to gravitational vertical. (Author)

A78-34784 # Response of neurons of associative nuclei in the thalamus during thermal action on the anterior hypothalamus and the skin (Reaktsiia neuronov assotsiativnykh iader talamusa pri temperaturnom vozdeistvii na perednii gipotalamus i kozhu). E. M. Beliauskii and E. L. Abramova (Akademiia Meditsinskikh Nauk SSSR, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 64, Feb. 1978, p. 136-142. 19 refs. In Russian.

A78-34785 # Interrelationship of catecholamines and corticosteroids during muscle fatigue (Vzaimosviiaz' katekholaminov i kortikosteroidov v protsesse myshechnogo utomleniia). E. Sh. Matlina, G. L. Shreiberg, M. Kh. Voinova, and L. P. Dunaeva (Vsesoiuznyi Nauchno-Issledovatel'skii Institut Fizicheskoi Kul'tury; Tsentral'nyi Institut Uovershenstvovaniia Vrachei, Moscow, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 64, Feb. 1978, p. 171-176. 20 refs. In Russian.

A78-34786 # Temperature sensitivity of man to cold (K voprosu o temperaturnoi chuvstvitel'nosti cheloveka k kholodu). T. V. Kozyreva and M. A. Iakimenko (Akademiia Meditsinskikh Nauk SSSR, Novosibirsk, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 64, Feb. 1978, p. 220-225. 15 refs. In Russian.

An attempt is made to investigate the functional changes in the temperature analyzer in man as a result of the action of temperature on the human organism. An examination of the population of a specified city revealed that the number of operating cold receptors in the skin is dependent on the local skin temperature. In particular, when the temperature decreases from 35 to 25 C, the decrease in the number of active cold receptors obeys an almost linear law. Prolonged continuous cold action affects the temperature analyzer in man, reflected by a reduction in the number of cold receptors, i.e. in the number of active thermoreceptors in the entire range of skin temperatures. Possible mechanisms responsible for reduction in the sensitivity of the temperature analyzer to prolonged exposure to cold are discussed in terms of interneuronal connections and influence of the sympathetic branch of the autonomic nervous system. S.D.

A78-34787 # Enhancement factor in the thermoregulatory system at varying ambient temperature (Koeffitsient usileniia v sisteme termoregulatsii pri razlichnoi okruzhaiushchei temperature). N. A. Slepchuk, G. V. Rumiantsev, and B. Kruk (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR*, vol. 64, Feb. 1978, p. 226-230. 15 refs. In Russian.

The enhancement factor in the thermoregulatory system is defined as the ratio between the amount of heat released during vascular thermoregulatory reaction and the amount of heat input during the heating of the hypothalamus. A combined thermocouple/electric heater implanted in the hypothalamus is used to increase the temperature of the medial preoptic region of the hypothalamus in rabbits weighing 3000-3500 g. Heating this area resulted in vasodilation of the auricular floors and nose-ridge skin. A biocalorimeter is employed to measure the heat released by the auricular floors and nose-ridge skin in response to vascular thermoregulatory reactions in them. It is found that when the temperature in the biocalorimeter chamber is 20 C the enhancement factor is 3.9 + or - 0.8, whereas at 24 C it becomes 13.6 + or - 1.0. S.D.

A78-34962 # Thematic filtering algorithms and their use in recognition of complex images (Algoritmy tematicheskoi fil'tratsii i ikh primeneniie v zadache raspoznavaniia slozhnykh izobrazhenii). A. A. Shmidt and V. A. Iakubovich. *Avtomatika i Telemekhanika*, Feb. 1978, p. 161-176. 9 refs. In Russian.

The problem of separating images of individual objects from a set of complex images is studied. In constructing the algorithm for solving the problem it is noted that the variability of the images of real objects has a twofold nature: first of all, it is generated by the natural variability of the objects themselves, and secondly, it is due to the different positions a given object can take in space. Variability of the second kind is treated as the result of the action of a certain group of image transformations. P.T.H.

A78-35101 Experiments on the detection of roll motion. A. J. Gundry (RAF, Institute of Aviation Medicine, Farnborough, Hants, England). *Aviation, Space, and Environmental Medicine*, vol. 49, May 1978, p. 657-664. 12 refs.

Four experiments investigated the detection of whole-body roll motion by normal adult males. Experiments 1, 3, and 4 employed an earth-horizontal rotation axis, and Experiment 2 an earth-vertical rotation axis. Comparison of Experiments 1 and 2 showed that the presence of gravireceptor stimuli increased the range of detectable angular accelerations and reduced the time required for detection. In Experiment 3, stimuli were presented from a side-down orientation and this increased detection times when compared to roll from the upright. Experiments 1, 2, and 3 used blindfolded subjects; however, Experiment 4 found no effect on detection times of viewing a head-stabilized visual target. The overall data show detection of angular position and velocity and suggest synergistic action of the semicircular canals and gravireceptors. The influence of somatosensory stimuli is considered. Finally, implications of the findings for flight simulators are discussed. (Author)

A78-35102 Lack of protection against oxygen toxicity by in vivo protective agents in the isolated toad bladder. J. H. Miller and S. A. Mendoza (California, University, La Jolla, Calif.). *Aviation, Space, and Environmental Medicine*, vol. 49, May 1978, p. 665-670. 25 refs. Contract No. N00014-69-A-0200-6050.

Agents which protect against the development of oxygen toxicity in vivo were tested in an in vitro system, the isolated urinary bladder of the toad *Bufo marinus*. None of the agents protected against the inhibition of sodium transport across the bladder by hyperbaric oxygen exposure. Two protective agents, disulfiram and diethyldithiocarbamic acid, significantly increased the rate and extent of sodium transport inhibition by 5 ATA of oxygen, either when added in vitro or given in vivo. It was concluded that oxygen toxicity protective agents may have a nonspecific action in vivo. (Author)

A78-35103 Thresholds of perception for periodic linear motion. A. J. Gundry (RAF, Institute of Aviation Medicine, Farnborough, Hants., England). *Aviation, Space, and Environmental Medicine*, vol. 49, May 1978, p. 679-686. 28 refs.

This paper reviews 18 reports which have investigated the absolute threshold of perception of periodic linear motion. The roles of the otolith, somatosensory, and visual detection mechanisms in determining threshold are discussed. Most threshold data for oscillation at frequencies below 1 Hz reflect otolith and somatosensory detection, and show a falling threshold as the frequency rises. This is in accord with neurophysiological data of otolith and somatosensory function. The data for frequencies above 1 Hz reflect an unknown mix of visual, otolith, and somatosensory influences. These data are too heterogenous to indicate whether threshold rises or falls as the frequency of stimulation increases. (Author)

A78-35104 Embryonic implantation, dietary intake, and plasma GH concentration in pregnant mice exposed to hypoxia. B. A. Rattner, H. J. Brinkley (Maryland, University, College Park, Md.), and S. D. Michael (New York, State University, Binghamton, N.Y.). *Aviation, Space, and Environmental Medicine*, vol. 49, May 1978, p. 687-691. 34 refs. Research supported by the University of Maryland; Grants No. PHS-RR-07042-11; No. PHS-MH-28286.

A78-35105 Laboratory comparison of techniques for rewarming hypothermic casualties. P. Marcus (RAF, Institute of Aviation Medicine, Farnborough, Hants., England). *Aviation, Space, and Environmental Medicine*, vol. 49, May 1978, p. 692-697. 31 refs.

The efficacy of inhalation, hot bath, piped suit and spontaneous rewarming have been directly compared under controlled conditions. Hot bath rewarming was significantly more effective at raising deep body temperature than the piped suit technique and both were more effective than the other two methods. The effect of inhalation rewarming was not significantly different from that of spontaneous

rewarming. All techniques gave rise to afterdrops of core temperature of widely varying degrees and durations. It is concluded that inhalation rewarming should not be employed if it entails a delay in transporting a patient to a facility for rapid external rewarming. Piped suit rewarming is a convenient field alternative to the use of a hot bath and a simple apparatus for carrying this out is described. The sluggish response of rectal temperature to cooling and rewarming in this study suggests that it should not be relied upon as the sole indicator of a patient's thermal state during treatment. Auditory canal temperature is a more valid substitute. (Author)

A78-35106 Monocular peripheral vision as a factor in flight safety. D. S. Kochhar and T. M. Fraser (Waterloo, University, Waterloo, Ontario, Canada). *Aviation, Space, and Environmental Medicine*, vol. 49, May 1978, p. 698-706. 9 refs. Research supported by the Department of Transport.

The performance of static visual identification tasks and simulated operational flying tasks, by nine binocular pilots and nine adapted monocular pilots, was measured in a unique operational visual simulator. It was hypothesized that, with head free to move, an adapted monocular pilot would perform as well as a binocular pilot, while an unadapted monocular (simulated by covering an eye) would perform less well. Other hypotheses were advanced. The static primary central task required sequential identification of dial readings. The dynamic primary central task involved simulated aircraft landing operations. During each set of primary tasks, a set of secondary peripheral visual tasks was performed. Results of the primary tasks and times of execution of the secondary tasks were subjected to analysis of variance. Factors included head position (fixed or free), stimulus location in peripheral field, eye state (seeing eye, blind eye), and type of central task (static, dynamic). All hypotheses were validated. (Author)

A78-35107 Effect of altitude acclimatization on thermoregulation efficiency of man. R. M. Rai, W. Selvamurthy, S. D. Purkayastha, and M. S. Malhotra (Defence Institute of Physiology and Allied Sciences, Delhi, India). *Aviation, Space, and Environmental Medicine*, vol. 49, May 1978, p. 707-709. 13 refs.

The paper considers the effect of altitude acclimatization on human thermoregulation efficiency. Twenty subjects at an altitude of 3500 m were tested for palm skin temperature after dipping the hand in 10 C water for two minutes. The results were compared to those of 10 native low-altitude subjects and 10 native high-altitude subjects. The seasonal variation and ambient temperature were also monitored. It was found that all subjects showed a prolonged rewarming time when confined to a particular altitude. The rewarming improved at higher ambient temperatures and in the spring months. It is concluded that thermoregulation efficiency deteriorates at higher altitudes and that the peripheral vascular responses to local cold stress do not reach the level of native inhabitants even after a year of acclimatization. S.C.S.

A78-35108 Sexual variations in thermoregulation during heat stress. A. M. Paolone, C. L. Wells, and G. T. Kelly (Temple University, Philadelphia, Pa.). *Aviation, Space, and Environmental Medicine*, vol. 49, May 1978, p. 715-719. 12 refs.

In an investigation of sexual variation in thermoregulation, physically fit male and female subjects performed a treadmill walking task in normal (25 C), warm (32 C) and hot (40 C) environments. Rectal and skin temperature responses during the exercises showed no significant differences for males and females; however, the males were found to experience higher heart rates and greater evaporative weight losses than the females under all three temperature conditions. The findings suggested that physically fit females are as capable of working in the heat as males, if work loads are determined relative to maximum aerobic capacity. J.M.B.

A78-35109 Survivorship of *Drosophila* in nitrogen reduced hypobaric atmospheres. G. P. Kloek (Kentucky State University, Frankfort, Ky.). *Aviation, Space, and Environmental Medicine*, vol. 49, May 1978, p. 720, 721. 8 refs.

Populations of *Drosophila melanogaster* were maintained from enclosure to death in 150 torr oxygen/150 torr nitrogen (300 torr total pressure). Survivorship was identical to siblings maintained in normal atmospheric pressures. The study demonstrates that a significant reduction in atmospheric nitrogen does not affect the toxicity of oxygen at normal partial pressures. The study provides the basis for future studies concerning hypobaric, oxygen-enriched atmospheres. (Author)

A78-35110 **Disseminated intravascular coagulation developed in hyperbaric oxygen.** L. A. Palos (Orvostovabbkepzo Intezet, Budapest, Hungary) and N. A. Agadjanjan (Ministerstvo Zdravokhraneniia SSSR, Institut Mediko-Biologicheskikh Problem, Moscow, USSR). *Aviation, Space, and Environmental Medicine*, vol. 49, May 1978, p. 722, 723. 12 refs.

A78-35111 **Stress in air traffic personnel - Low-density towers and flight service stations.** C. E. Melton, R. C. Smith, J. M. McKenzie, S. M. Wicks, and J. T. Saldivar (FAA, Civil Aeromedical Institute, Oklahoma City, Okla.). *Aviation, Space, and Environmental Medicine*, vol. 49, May 1978, p. 724-728. 19 refs.

Ten air-traffic control specialists at low traffic-density towers were monitored for stress and anxiety levels. The subjects ranged in age from 23 to 60 years old and included two female participants. The subjects were instrumented for ambulatory electrocardiography. Urine specimens representing both day and night periods were collected and analyzed for 17-ketogenic steroids, epinephrine, norepinephrine, and creatinine. Subjects were evaluated for psychological arousal states before and after each workday. Results are presented for mean heart rates, the stress indices at various facilities, mean A-trait and A-state raw scores, and facility rank as obtained by urinary-metabolite indications of on-duty arousal. (Author)

S.C.S.

A78-35112 **Ten-year experience with abnormal EEGs in asymptomatic adult males.** J. J. Robin, G. D. Tolan, and J. W. Arnold (USAF, School of Aerospace Medicine, Brooks AFB, Tex.). *Aviation, Space, and Environmental Medicine*, vol. 49, May 1978, p. 732-736. 15 refs.

This study reports a 10-year experience of the USAF School of Aerospace Medicine with spike waves or focal spikes on a screening electroencephalogram in aviators who did not have a history of seizure, unexplained loss of consciousness, or significant neurologic abnormality at the time of the first abnormal electroencephalogram. Only one of 20 patients went on to develop a seizure disorder 4 years after his first abnormal electroencephalogram. (Author)

A78-35113 **Heterophoria - Its influence on stereopsis and the importance of cycloplegia in refraction testing of pilot applicants.** J. Castren, J. Stjernschantz, and J. Aho (Central Military Hospital I, Helsinki, Finland). *Aviation, Space, and Environmental Medicine*, vol. 49, May 1978, p. 737-741. 10 refs.

Based on visual examinations of pilot applicants, consideration is given to the influence of heterophoria on stereopsis. The role of cycloplegia in refraction testing is also investigated. The visual examinations consisted of: (1) tests for visual acuity, heterophoria, stereopsis, color vision, and refraction testing without cycloplegia, and (2) refraction testing under cycloplegia, ophthalmoscopy, and adaptation to darkness. It is found that there is no significant correlation between distant heterophoria and the degree of stereopsis to at least six prism diopters. Cycloplegia is noted to induce a mean difference of plus 0.75 diopter in refraction both before and during cycloplegia. (Author)

S.C.S.

A78-35193 **A spatial-temporal filtering procedure for cardiac potential mapping (Un procedimento di filtraggio spazio temporale per le elettromappe cardiache).** I. Galligani (Torino, Università, Turin; CNR, Istituto per le Applicazioni del Calcolo, Rome, Italy). *Milano, Seminario Matematico e Fisico, Rendiconti*, vol. 46, 1976, p. 101-109. 9 refs. In Italian.

A spatial-temporal filtering procedure has been developed for an automatic cardiac potential mapping system based on a mini-computer. The filtering procedure is designed to retain in the mapping the details relevant for diagnosis of acute myocardial infarct, while eliminating measurement errors. The filtering technique relies on a regularization operator easily implemented with the minicomputer. (Author)

J.M.B.

A78-35419 **Subjective Lorentz transformations and the perception of motion.** T. Caelli (Melbourne, University, Melbourne, Australia), W. Hoffman, and H. Lindman. *Optical Society of America, Journal*, vol. 68, Mar. 1978, p. 402-411. 26 refs.

It has been known for some 40 years that the perceived velocity of a moving object does not correspond to its physical velocity. It is also known that the perceived length and temporal duration of a moving object is affected by its physical velocity. In this paper it is argued that such phenomenal distortions can be embedded in a model for motion perception that involves the concepts of moving frames, Lorentz transformations, perceived length contractions, and time dilations. Experimental results support this model and indicate that the maximum perceivable velocity of movement plays a crucial role in determining motion effects. (Author)

A78-35622 * # **Jet pump assisted arterial heat pipe.** W. B. Bienert, A. S. Ducao, and D. S. Trimmer (Dynatherm Corp., Cockeysville, Md.). In: International Heat Pipe Conference, 3rd, Palo Alto, Calif., May 22-24, 1978, Technical Papers. New York, American Institute of Aeronautics and Astronautics, Inc., 1978, p. 335-345. 12 refs. Contract No. NAS2-9233. (AIAA 78-443)

This paper discusses the concept of an arterial heat pipe with a capillary driven jet pump. The jet pump generates a suction which pumps vapor and noncondensable gas from the artery. The suction also forces liquid into the artery and maintains it in a primed condition. A theoretical model was developed which predicts the existence of two stable ranges. Up to a certain tilt the artery will prime by itself once a heat load is applied to the heat pipe. At higher tilts, the jet pump can maintain the artery in a primed condition but self-priming is not possible. A prototype heat pipe was tested which self-primed up to a tilt of 1.9 cm, with a heat load of 500 watts. The heat pipe continued to prime reliably when operated as a VCHP, i.e., after a large amount of noncondensable gas was introduced. (Author)

A78-35649 **The role of exercise in internal medicine.** Edited by D. Brunner (Tel Aviv University, Jaffa, Israel) and E. Jokl (Kentucky, University, Lexington, Ky.). Basel, S. Karger AG (Medicine and Sport. Volume 10), 1977. 186 p. \$37.75.

The influence of exercise on ischemic heart disease, the endocrine and immunological systems, and metabolic bone disease is discussed. Topics of the papers include the relationship between hypertension, body weight and exercise, maximal heart rate adjusted according to the age and fitness of the subject, exercise and diabetes mellitus, and the role of exercise in the rehabilitation of coronary heart patients. (Author)

J.M.B.

A78-35664 * **Ride quality criteria.** D. G. Stephens (NASA, Langley Research Center, Hampton, Va.). In: NOISE-CON 77; Proceedings of the National Conference on Noise Control Engineering, Hampton, Va., October 17-19, 1977. New York, Noise Control Foundation, 1977, p. 463-482. 21 refs.

Ride quality refers to the interior or passenger environment of a transportation system as well as the passenger response to the environment. Ride quality factors are illustrated with the aid of a diagram presenting inputs to vehicle, the vehicle transfer function, the ride environment, the passenger response function, and the passenger ride response. The reported investigation considers the ride environment as measured on a variety of air and surface vehicles, the passenger response to the environment as determined from laboratory and field surveys, and criteria/standards for vibration, noise, and combined stimuli. Attention is given to the vertical vibration

characteristics in cruise for aircraft and automobile, the aircraft vibration levels for various operating regimes, comparative noise levels during cruise, the discomfort level for a 9 Hz sinusoidal vibration, equal discomfort contours for vertical vibration, subjective response to noise in a speech situation, and noise and vibration levels for constant discomfort contours. G.R.

A78-35801 **Ocular hazard from UV laser exhibiting self-mode-locking.** J. A. Zuclich (Technology, Inc., Life Sciences Div., San Antonio, Tex.) and J. Taboada (USAF, School of Aerospace Medicine, Brooks AFB, Tex.). *Applied Optics*, vol. 17, May 15, 1978, p. 1482-1484. 10 refs. Contract No. F33615-77-C-0615.

Consideration is given to retinal damage produced by 325-nm He-Cd laser radiation at lower energy doses than necessary to cause corneal or lenticular damage. Beam diagnostic testing of the He-Cd laser indicated self-mode-locking of the laser output at 325 nm. Experiments were performed with a helium cadmium laser having a single isotope tube. Laser output at 325 nm was about 30 mW. Laser mirrors were adjusted to yield maximum output in the TEM(00) mode. Incident power at the corneal plate was about 20 mW for most exposures, yielding a corneal irradiance of 0.96 W/sq cm. The experimental rhesus monkeys were tranquilized and anesthetized. Exposure sites were selected in the eye macular region. Ophthalmoscopic examinations were made at 1, 18, and 24-hour periods post exposure. Threshold retinal lesion was taken to be the appearance of a minimal (about 50 microns) pigmented spot at 24 hours post exposure. The retinal threshold found in this way was 7.6 mJ, corresponding to a corneal energy density of 0.36 J/sq cm. S.C.S.

A78-35850 **The cardiovascular fitness of airline pilots - Report of a working party of the Cardiology Committee of the Royal College of Physicians of London.** C. Clarke, D. Black, J. F. Goodwin, R. W. Emanuel, K. P. Ball, F. S. Jackson, D. Jewitt, D. M. Krikler, E. L. McDonald, and K. Robson. *British Heart Journal*, vol. 40, Apr. 1978, p. 335-350. 36 refs.

The paper discusses the initial medical examination requirements before acceptance of candidate airline pilots for training in order to detect existing cardiovascular disease (including hypertension) and eliminate those who have an undue risk of developing cardiovascular disease before retirement at the usual age. Special attention should be given to the family history of hypertension, premature cardiovascular disease, or sudden death. The discussion focuses on coronary artery disease, arrhythmias, valvar heart disease, pericardial heart disease, cardiomyopathy, congenital heart disease, pulmonary heart disease, peripheral and cerebrovascular disease, and cardiac surgery. Cardiovascular reassessment of licensed pilots along the same lines in order to decide on license withdrawal is also discussed. Regular medical examination is considered imperative. S.D.

A78-35851 **International Congress of Psychology, 21st, Symposium on Mental Work Load, Paris, France, July 25, 1976, Proceedings.** Edited by J. Leplat and A. T. Welford (Adelaide, University, Adelaide, Australia). *Ergonomics*, vol. 21, Mar. 1978. 95 p.

Factors determining work-load are considered along with forgotten alternatives in skill and work-load, approaches and methods of assessment in the case of an internal representation of task structure and mental load of work, the regulation of working methods as a function of work-load among air traffic controllers, and dual task methods of assessing work-load. Attention is also given to the mapping of mental load in car driving, three characteristic patterns of subjective fatigue symptoms, subjective aspects of physical and mental load, an analytical tool for studying work-load in perceptual motor tasks, and mental work-load as a function of demand, capacity, strategy, and skill. G.R.

A78-35852 **Mental work-load as a function of demand, capacity, strategy and skill.** A. T. Welford (Adelaide, University, Adelaide, Australia). (*International Congress of Psychology, 21st, Symposium on Mental Work Load, Paris, France, July 25, 1976.*) *Ergonomics*, vol. 21, Mar. 1978, p. 151-167. 47 refs.

The basic idea of work-load in terms of muscular effort is examined. So long as capacity exceeds demand, performance is limited by demand, but when demand exceeds capacity, performance is limited by capacity. Work-load can be expressed as the ratio of demand to average maximum capacity. The question is considered whether the same principles can be applied to mental work. In the case of mental work the definition of satisfactory concepts corresponding to those used for work involving muscular effort appears difficult. Time has been considered as a measure of the amount of mental work required and short-term memory has been used as a mental analogy to instantaneous capacity. The application of information theory has serious difficulties. However, the only present alternative to its use is a series of ad hoc determinations of relationships between capacity and demand in particular tasks. Performance and work-load appear to depend upon the interaction of four factors, including the demands of the task, the capacities of the performer, the strategies used to relate demands to capacities, and, when a range of strategies is available, skill in choosing the most efficient. G.R.

A78-35853 **Forgotten alternatives in skill and work-load.** L. Bainbridge (Reading, University, Reading, Berks., England). (*International Congress of Psychology, 21st, Symposium on Mental Work Load, Paris, France, July 25, 1976.*) *Ergonomics*, vol. 21, Mar. 1978, p. 169-185. 28 refs.

It is pointed out that even in the most simple situation it is possible to do a task in different ways. Decisions between alternatives must involve some mental process, not necessarily conscious. To choose a strategy which matches not only the present external task requirements but also his own mental and physical state a person needs suitable knowledge concerning the external factors involved and his own capacities. An analysis is conducted regarding this knowledge and the decision-making process. It is suggested that with increased experience the number and complexity of task 'decisions' is reduced so that the amount of mental work needed to achieve a given task performance is reduced, and that the development of skill lies in this change in knowledge and decisions. It is also suggested that these decisions, which generate the sequence of behavior, are one locus of the breakdown of behavior under high task demands. Under normal circumstances a person tries to balance task demands and mental demands on his behavior. Increased task demands lead to changes in behavior priorities which the person is not necessarily experienced in reacting to. G.R.

A78-35854 **The regulation of working methods as a function of work-load among air traffic controllers.** J.-C. Sperandio (Paris VIII, Université, Paris, France). (*International Congress of Psychology, 21st, Symposium on Mental Work Load, Paris, France, July 25, 1976.*) *Ergonomics*, vol. 21, Mar. 1978, p. 195-202. 9 refs.

A series of field studies among air traffic controllers is reviewed. It largely concentrated on regulatory aspects of operational behavior, using a model based on the concept of 'economy' in the individual's selection of operating procedures. Attention is directed at processes involving reasoning, the receipt and transmission of information, and the division of tasks between controllers at the same station. The basic hypothesis, which is supported by numerous data, is that for a given task and a given controller certain operating procedures are less costly than others; that is, they generate lower levels of load. These procedures will therefore be more and more employed as work demand increases, together with the relaxation of certain, self-imposed, qualitative criteria. This regulatory feedback between work-load and operating methods is used by the controller to avoid the abrupt onset of overload conditions and to delay satiation. For the investigator, these progressive changes in operating procedure can provide indirect indices of load. Several ergonomic consequences of this approach for system design are discussed. (Author)

A78-35855 Dual task methods of assessing work-load. I. D. Brown (Medical Research Council, Applied Psychology Unit, Cambridge, England). (*International Congress of Psychology, 21st, Symposium on Mental Work Load, Paris, France, July 25, 1976.*) *Ergonomics*, vol. 21, Mar. 1978, p. 221-224. 12 refs.

The purpose of the dual task method is to produce measurable performance where operators are performing tasks with a relatively high cognitive component, requiring few overt responses. The method is based on the concept that human processing resources are limited. If an additional task can be made to compete for those limited resources, there will eventually be a measurable deterioration in performance. This deterioration usually occurs as a gradual change. Different applications of the method are critically evaluated, taking into account the study of performance as a function of work-load distribution over time and as a function of time-on-task. Different factors in the design of dual task situations are also evaluated. It is concluded that the dual task method should be used only for the study of individual difference in processing resources available to handle work-load. If it is so used, it should probably be in the form of an additional, secondary task, presenting discrete stimuli of constant load, on a forced-paced schedule, and competing for processing resources only. G.R.

A78-35899 # Modern electronystagmography for vestibulometry (Sovremennaiia elektronistagmografiia dlia praktiki vestibulometrii). I. A. Sidel'nikov. *Akademiia Nauk SSSR, Izvestiia, Serii Biologicheskaiia*, Mar.-Apr. 1978, p. 259-266. 39 refs. In Russian.

Several practical aspects of electronystagmography (ENG) are discussed. Topics include direct and indirect recording, amplifier types, limits in the linearity (with respect to amplification and time constant) of the relation between eye movement and recorded movement, calibration, and effect of light on the magnitude of corneal-retinal potential. Suggestions for more effective ENG are presented. M.L.

A78-35900 # Experimental study of some aspects of motion sickness pathology (Eksperimental'noe issledovanie nekotorykh storon etiopatogeneza bolezni dvizheniia). F. A. Solodovnik. *Akademiia Nauk SSSR, Izvestiia, Serii Biologicheskaiia*, Mar.-Apr. 1978, p. 267-277. 38 refs. In Russian.

The effect of acceleration direction and the rate of acceleration on the vestibular stability of human subjects was studied, and individual susceptibility to motion sickness caused by vestibular stimuli was detected. The data indicate that the development of motion sickness does not depend on the activity of the vestibular analyzer and that motion sickness is not simply a vestibular response. Instead, motion sickness is a response of the entire organism, and it occurs among people with a predisposition to motion sickness when they are subjected to prolonged vestibular stimulation. The occurrence of motion sickness depends on features of the limbic reticular system. M.L.

A78-35924 # On the predictive, precognitive and preview manual tracking systems. K. Ito and M. Ito (Nagoya University, Nagoya, Japan). *Nagoya University, Faculty of Engineering, Memoirs*, vol. 29, May 1977, p. 60-114. 41 refs.

Three tracking control modes, predictive, precognitive and preview, are studied from the point of view of control theory. Preview control involves knowledge of the future input, precognitive control involves recollection of a more or less regular input previously received, and predictive control involves no advance knowledge of the future input. The alterations in tracking behavior from precognitive to predictive control modes with changing input signal regularity are assessed. In addition, forced-pace and self-paced preview tracking are analyzed on the basis of experimental data and control theory. The feedback-feedforward nature of the preview control behavior of a human operator is discussed. J.M.B.

A78-36123 # State of energy metabolism in albino rats under the action of increased oxygen concentrations (Sostoianie energoobmena u belykh krysh pod vozeistviem povyshennykh kontsentratsii kisloroda). V. V. Matsynin (Akademiia Nauk Ukrain-

s'koi SSR, Institut Fiziologii, Kiev, Ukrainian SSR). *Fiziologicheskii Zhurnal*, vol. 24, Mar.-Apr. 1978, p. 234-242. 36 refs. In Russian.

A78-36124 # Absorptive function of the small intestine during administration of the aerovit drug under motion-sickness conditions (Vsyavatel'naia deiatel'nost' kishechnika pri vvedenii preparata aerovit v usloviakh ukachivaniia). R. O. Faitel'berg, Iu. F. Udalov, L. I. Semik, T. V. Gladkii, V. M. Malakhovskaia, and N. N. Balan (Odesskii Gosudarstvennyi Universitet, Odessa, Ukrainiia SSR). *Fiziologicheskii Zhurnal*, vol. 24, Mar.-Apr. 1978, p. 252-257. 19 refs. In Russian.

Chronic experiments were performed on nine dogs with isolated jejunal loop about 20 cm long in order to study the absorptive function of this portion of the small intestine with respect to 7% glucose solution, 0.03 M glycine solution, and a solution of manganese chloride in the concentration 0.25 mg Mn per 1 ml solution. It is shown that the administration of the polyvitamin drug aerovit stimulates the absorption of glycine and manganese and does not affect glucose resorption. In particular, the absence of motion-sickness syndrome, the maintenance of a high level of absorption for the tested substances in the small intestine of dogs having received aerovit prior to exposure to motion sickness, bears evidence to the beneficial effect of aerovit on the organism. S.D.

A78-36151 Protection against the physiological effects of positive pressure breathing. K. N. Ackles, J. A. G. Porlier, D. E. Holness, G. R. Wright, J. M. Lambert, and W. J. McArthur (Defence and Civil Institute of Environmental Medicine, Downsview, Ontario, Canada). *Aviation, Space, and Environmental Medicine*, vol. 49, June 1978, p. 753-758. 6 refs.

The protection provided by three jerkin G-suit systems (British, Canadian, and Swedish) having different pressures against the physiological effects of positive pressure breathing was studied. Ten male volunteers at ground level were evaluated. Two systems were investigated with G-suit pressure equal to breathing pressure and 3.2 times breathing pressure. One system was studied with 3.2 times breathing pressure only. It was found that positive pressure breathing caused increases in heart rate, peripheral resistance, systolic, diastolic, and mean arterial blood pressures. Decreases were observed in cardiac output and stroke volume. The results indicate that the best protection against the effects of positive pressure breathing is provided by the British system having a G suit inflated to 3.2 times breathing pressure. S.C.S.

A78-36152 Preventive effect of a vasodilator on the occurrence of decompression sickness in rabbits. U. Balldin (Lund, Universitet, Lund, Sweden) and M. Liner (Institute of Aviation Medicine, Linkoping, Sweden). *Aviation, Space, and Environmental Medicine*, vol. 49, June 1978, p. 759-762. 16 refs.

A78-36153 Physiological and psychological effects of heat stress simulating cockpit conditions. S. A. Nunneley, P. J. Dowd, L. G. Myhre, and R. F. Stribley (USAF, School of Aerospace Medicine, Brooks AFB, Tex.). *Aviation, Space, and Environmental Medicine*, vol. 49, June 1978, p. 763-767. 18 refs.

The effects of thermal conditions similar to those occurring in aircraft cockpits when flying in warm climates were evaluated. The influence of both radiant heat and high air temperatures were considered. Subjects were exposed to a baseline period (30 min), heat exposure (120 min), recovery (30 min), heat exposure (120 min), and recovery (60 min). Measurements were made of esophageal, rectal, and skin temperatures, heart rate, weight, and hematocrit. Subjective fatigue estimates and repetitive psychometric measures were performed. It was found that although the conditions were physiologically tolerable, they caused marked fatigue and altered the learning curve in some subjects. S.C.S.

A78-36154 * Effect of gravitational and inertial forces on vertical distribution of pulmonary blood flow. P. A. Chevalier, J. H. Reed, Jr., R. A. Vandenberg, and E. H. Wood (Mayo Clinic; Mayo Foundation, Rochester, Minn.). *Aviation, Space, and Environmental Medicine*, vol. 49, June 1978, p. 768-778. 36 refs. Research supported by the American Heart Association; Contract No. F49620-76-C-0001; Grants No. NGR-24-003-001; No. NIH-HL-04664; No. NIH-RR-7.

Vertical distribution of pulmonary blood flow (VDPBF) was studied, using radioactive microsphere emboli, in dogs without thoracotomy in the right decubitus position during exposure to lateral accelerations of 1, 2, 4, and 6 G. At all levels of force environment studied, an inverse linear relationship was observed between vertical height in the thorax and pulmonary blood flow (ml/min/ml lung tissue) with a decrease in flow to the most dependent region of the lung despite large increases in intravascular pressures at this site. Changes in blood flow were smallest at the mid-lung level, the hydrostatic 'balance point' for vascular and pleural pressures. These force environment-dependent changes in VDPBF are not readily explainable by the Starling resistor analog. Gravity-dependent regional differences in pleural and associated interstitial pressures, plus possible changes in vascular tone resulting from inadequate aeration of blood in the most dependent regions of the lung, probably also affect VDPBF. (Author)

A78-36155 Hypoxia, smoking history, and exercise. J. A. Wagner, S. M. Horvath, J. F. Bedi (California, University, Santa Barbara, Calif.), G. M. Andrew, and W. H. Cottle. *Aviation, Space, and Environmental Medicine*, vol. 49, June 1978, p. 785-791. 28 refs. Grant No. AF-AFOSR-73-2455.

Male cigarette smokers and nonsmokers were studied to determine the connections between hypoxia, smoking history, and exercise. The subjects performed bicycle work for 30 minutes in an altitude chamber. Four conditions were simulated: sea level with 0.5% HbCO, sea level with 4.2% HbCO, altitude with 0.5% HbCO, and altitude with 4.2% HbCO. Heart rate, minute ventilation, and tidal volume were observed to increase while diastolic blood pressures were observed to decrease relative to sea level during work at altitude. For all conditions except altitude with 4.2% HbCO, all subjects showed similar cardiac output, stroke volume, and arterial-mixed venous oxygen difference. At altitudes with 4.2% HbCO, nonsmokers exhibited increased cardiac output and stroke volume, as well as decreased arterial-mixed venous oxygen difference. In all conditions except sea level with 0.5% HbCO, smokers showed increased heart rate. It is concluded that cigarette smokers are partially adapted to hypoxia and that nonsmokers are more sensitive to carbon monoxide contaminated air at altitude. S.C.S.

A78-36156 Time course of change in soleus muscle fibers of rats subjected to chronic centrifugation. W. D. Martin (Kentucky, University, Albert B. Chandler Medical Center, Lexington, Ky.). *Aviation, Space, and Environmental Medicine*, vol. 49, June 1978, p. 792-797. 18 refs. Grant No. NIH-RR-05374.

A78-36157 * Some influences of touch and pressure cues on human spatial orientation. J. R. Lackner (Brandeis University, Waltham, Mass.) and A. Graybiel (U.S. Navy, Naval Aerospace Medical Research Laboratory, Pensacola, Fla.). *Aviation, Space, and Environmental Medicine*, vol. 49, June 1978, p. 798-804. 24 refs. Contract No. NAS9-15147. NASA Order T-5904B; NASA Order T-590413.

In order to evaluate the influences of touch and pressure cues on human spatial orientation, blindfolded subjects were exposed to 30 rpm rotation about the Z-axis of their bodies while the axis was horizontal or near horizontal. It was found that the manipulation of pressure patterns to which the subjects are exposed significantly influences apparent orientation. When provided with visual information about actual orientation the subjects will eliminate the postural

illusions created by pressure-cue patterns. The localization of sounds is dependent of the apparent orientation and the actual pattern of auditory stimulation. The study provides a basis for investigating: (1) the postural illusions experienced by astronauts in orbital flight and subjects in the free-fall phase of parabolic flight, and (2) the spatial-constancy mechanisms distinguishing changes in sensory afflux conditioned by a subject's movements in relation to the environment, and those conditioned by movements of the environment. S.C.S.

A78-36158 Inflight measurement of pilot workload - A panel discussion. S. J. Gerathewohl, E. L. Brown, J. E. Burke, K. A. Kimball, W. F. Lowe, and S. P. Stackhouse (FAA, Office of Aviation Medicine, Washington, D.C.). *Aviation, Space, and Environmental Medicine*, vol. 49, June 1978, p. 810-822. 10 refs.

A panel discussion considering the inflight measurement of pilot workload is presented. Improvements to cockpit design through crew workload measurements are suggested. Methods for measuring flight crew workload are proposed, including pilot opinion, physiological measures, secondary task loading, and videotapes of cockpit activity. Determinations of pilot workload by a helicopter-vision-requirements program is discussed and an eye-mark recording technique for assessing pilot visual workload is described. Procedures for measuring the visual workload of helicopter pilots during low-altitude flight are outlined. Comments on an information processing workload and the physical and physiological aspects of operator workload are presented. S.C.S.

A78-36159 Permanent changes in the spines of military parachutists. P. Mustajoki, J. Nummi, and K. Meurman (Finnish Defence Forces; Military Central Hospital I, Helsinki, Finland). (*International Congress of Aviation and Space Medicine, 25th, Helsinki, Finland, Sept. 4-9, 1977.*) *Aviation, Space, and Environmental Medicine*, vol. 49, June 1978, p. 823-826. 6 refs. Research supported by the Scientific Committee of National Defence.

A78-36160 Investigation of arterial bloodgases at altitude using constant-flow oxygen masks. W. R. Hodgson, R. C. Wright, G. C. Nelson, and T. Letchford (St. Vincent Hospital, Sydney; 3 RAAF Hospital, Richmond AFB, Australia). *Aviation, Space, and Environmental Medicine*, vol. 49, June 1978, p. 829-836. 13 refs.

A study was made of arterial bloodgases at altitudes to 6700 m using subjects breathing from various constant-flow oxygen masks. Results are presented for arterial oxygen tensions at 4260 and 6705 m with various oxygen-flow levels, mean arterial oxygen tensions, mean carbon dioxide tensions, and the mean fractional inspired oxygen concentrations. The results indicate that: (1) the currently available masks and oxygen flows for passenger oxygenation during emergency descent are adequate, (2) the provisions that the arterial oxygen partial pressure of at least 90% of the passengers falls to 48 torr or less during return to base from 4260 m is inadvisable, (3) the Sierra, Aro; and Puritan 114019 masks are superior to the air ambulance masks, (4) arterial oxygen partial pressures, with the military MD-1 diluter demand system are sea level normal, and (5) for air ambulance service Hudson 1007 masks are suggested below 2800 m and face-shaped Puritan 114019 masks are suggested above 2800 m. S.C.S.

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Biosferu Zemli" Moscow, Nauka Press, 1971

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The characteristic features underlying the cyclicality of the epidemic process are discussed and compared with known indexes of solar cycles. Methods of autocorrelation-spectral analysis and periodogram analysis are used to analyze data concerning epidemic dynamics. Geographic and climatic conditions are among the factors considered. J.M.S.

STAR ENTRIES

N78-22561# Israeli Program for Scientific Translations Ltd., Jerusalem.

EFFECTS OF SOLAR ACTIVITY ON THE EARTH'S ATMOSPHERE AND BIOSPHERE

M. N. Gnevyshev, ed. and A. I. Ol, ed. 1977 304 p refs Transl. into ENGLISH of the book "Vliyaniye Solnechnoi Aktivnosti na Atmosferu i Biosferu Zemli" Moscow, Nauka Press, 1971 Sponsored by US-Israel Binatl. Sci. Found.

(TT-75-50015; ISBN-0-7065-1566-8) Copyright. Avail: NTIS HC A14/MF A01

Solar-biological relationships effected through weather and the direct action of solar activity on living organisms are considered. Solar activity cycles and geomagnetic disturbances are correlated with the growth of tree stands, population dynamics among rodents, chemical test results, cardiovascular diseases, and mortality rates.

N78-22566# Israeli Program for Scientific Translations Ltd., Jerusalem.

POPULATION DYNAMICS AND RHYTHMS OF EPIZOOTICS AMONG RODENTS CORRELATED WITH SOLAR CYCLES

A. A. Maksimov *In its Effects of Solar Activity on the Earth's Atmosphere and Biosphere* (TT-75-50015) 1977 58-73 refs Transl. into ENGLISH from the book "Vliyaniye Solnechnoi Aktivnosti na Atmosferu i Biosferu Zemli" Moscow, Nauka Press, 1971

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Periodic, or cyclic, fluctuations in the population of rodents are examined in relation to solar activity cycles. The influence of habitat and ecology is discussed along with anthropogenic factors. Long-term forecasting and preventing of the spread of epizootic disease and destruction of agriculture and forestry are considered. J.M.S.

N78-22567# Israeli Program for Scientific Translations Ltd., Jerusalem.

PERIODIC ACTIVITY OF NATURAL FOCI OF PLAGUE AND ITS CAUSES

A. A. Lavrovskii *In its Effects of Solar Activity on the Earth's Atmosphere and Biosphere* (TT-75-50015) 1977 74-81 refs Transl. into ENGLISH from the book "Vliyaniye Solnechnoi Aktivnosti na Atmosferu i Biosferu Zemli" Moscow, Nauka Press, 1971

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Long-term data on the shifts of plague epizootics in the desert-plain and low-mountain-desert foci of the Caspian region, Kazakhstan, and Soviet Central Asia are analyzed and phases of low and high activity indicated. Mechanisms are examined which under favorable conditions set systems of biocenoses in motion and determine the active life of foci. Indirect dependence between the occurrence of plague epizootics in foci and solar activity is outlined. Long-term forecasts of plague epizootics are considered on a regional basis. J.M.S.

N78-22568# Israeli Program for Scientific Translations Ltd., Jerusalem.

THE EPIDEMIC PROCESS AS A FUNCTION OF SOLAR ACTIVITY

V. N. Yagodinskii, Z. P. Konovalenko, and I. P. Druzhinin *In its Effects of Solar Activity on the Earth's Atmosphere and Biosphere* (TT-75-50015) 1977 p 82-103 refs Transl. into ENGLISH from the book "Vliyaniye Solnechnoi Aktivnosti na Atmosferu i

N78-22569# Israeli Program for Scientific Translations Ltd., Jerusalem.

EFFECT OF HELIOGEOGRAPHICAL FACTORS ON THE EVOLUTION OF INFECTIOUS DISEASES OF MAN

V. E. Stadolnik *In its Effects of Solar Activity on the Earth's Atmosphere and Biosphere* (TT-75-50015) 1977 p 104-110 refs Transl. into ENGLISH from the book "Vliyaniye Solnechnoi Aktivnosti na Atmosferu i Biosferu Zemli" Moscow, Nauka Press, 1971

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The effect of heliogeographical factors on the biosphere, specifically on man and the diseases to which he is prone is discussed. Periodic rises of mortality and gravity for individual diseases are correlated with solar cycles. J.M.S.

N78-22571# Israeli Program for Scientific Translations Ltd., Jerusalem.

THE BIOLOGICAL ACTIVITY OF THE DISTURBED GEOMAGNETIC FIELD

N. I. Muzalevskaya *In its Effects of Solar Activity on the Earth's Atmosphere and Biosphere* (TT-75-50015) 1977 p 128-137 refs Transl. into ENGLISH from the book "Vliyaniye Solnechnoi Aktivnosti na Atmosferu i Biosferu Zemli" Moscow, Nauka Press, 1971

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Specific features of the geomagnetic field (GMF) are described, as well as the peculiarities in the character of the response reactions at different levels of biological organization. It was shown that the energy density and the power flux density of the GMF at the time of a disturbance exceeds the sensitivity threshold of the human organism. On the basis of a comparison of the parameters of the threshold sensitivity and the disturbed GMF, proceeding from the general principles of reception, it is shown that an interaction between the human organism and the magnetic field of the earth is possible. The character of the reaction and the interaction of the GMF with the organism are investigated at the structural level. It is demonstrated that the first half of the phase of excitation of biological structures corresponds, on the indicated energy scale, to the position of the parameters of the disturbed GMF. The special features of the GMF are noted, from the point of view of a possible strengthening of the biological effect. Author

N78-22572# Israeli Program for Scientific Translations Ltd., Jerusalem.

POSSIBLE SOLAR-ACTIVITY FACTORS AFFECTING PROCESSES IN THE BIOSPHERE

B. M. Vladimirkii *In its Effects of Solar Activity on the Earth's Atmosphere and Biosphere* (TT-75-50015) 1977 p 138-154 refs Transl. into ENGLISH from the book "Vliyaniye Solnechnoi Aktivnosti na Atmosferu i Biosferu Zemli" Moscow, Nauka Press, 1971

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The manifestations of the effect of solar activity on biological processes are investigated. Topics discussed include: (1) phenomenological properties of signals connected with solar activity; (2) physical nature of the signal; (3) spectrum of natural alternating electromagnetic field of the earth and its variations; (4) biological effect of alternating electromagnetic field at frequencies below 200 Mc; and (5) nature of periodic correlations between solar activity and processes in the biosphere. It is concluded that the relationship between solar activity and processes in the biosphere is due to the alternating electromagnetic field, and that the effect of the field manifests itself in two frequency bands: acoustic frequencies and ultralow frequencies. The relevance of the results to space medicine is discussed. J.M.S.

N78-22574# Israeli Program for Scientific Translations Ltd., Jerusalem.

A POSSIBLE MOLECULAR MECHANISM BY WHICH SOLAR ACTIVITY AFFECTS BIOSPHERE PROCESSES

L. D. Kislovskii *In its Effects of Solar Activity on the Earth's Atmosphere and Biosphere* (TT-75-50015) 1977 p 164-183 refs Transl. into ENGLISH from the book "Vliyanie Solnechnoi Aktivnosti na Atmosferu i Biosferu Zemli" Moscow, Nauka Press, 1971

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The sensitivity of living organisms and of inorganic colloidal systems to the manifestations of solar activity, specifically to changes in low frequency electromagnetic fields, is associated with the nonequilibrium of these heterogeneous systems. Metastable states and their role in nature as discussed including the origin of metastable structures in water and the stabilization of metastable structures in water. Properties and use of activated water are briefly described with emphasis on the molecular mechanism of activation and effects of solar activity are outlined. Specific topics covered include: role of instantaneous changes in concentration of free calcium ions in biological systems; and effects of electromagnetic fields on biological systems.

J.M.S.

N78-22575# Israeli Program for Scientific Translations Ltd., Jerusalem.

SOLAR ACTIVITY AND CARDIOVASCULAR DISEASES

K. F. Novikova and B. A. Ryvkin *In its Effects of Solar Activity on the Earth's Atmosphere and Biosphere* (TT-75-50015) 1977 p 184-200 refs Transl. into ENGLISH from the book "Vliyanie Solnechnoi Aktivnosti na Atmosferu i Biosferu Zemli" Moscow, Nauka Press, 1971

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Biomedical data concerning the effect of solar activity on the origin, course, and outcome of major diseases of the cardiovascular system are presented. Specific topics covered include: differences in incidence of cardiovascular diseases on quiet days and on days with geomagnetic disturbances; incidence of cardiovascular diseases and mortality as a function of intensity of geomagnetic disturbances; and effect of 11 year solar cycle on origin and outcome of cardiovascular diseases.

J.M.S.

N78-22576# Israeli Program for Scientific Translations Ltd., Jerusalem.

SUDDEN DEATH FROM CARDIOVASCULAR DISEASES AND SOLAR ACTIVITY

M. N. Gnevyshev, K. F. Novikova, A. I. Ol, and N. V. Tokareva *In its Effects of Solar Activity on the Earth's Atmosphere and Biosphere* (TT-75-50015) 1977 p 201-210 refs Transl. into ENGLISH from the book "Vliyanie Solnechnoi Aktivnosti na Atmosferu i Biosferu Zemli" Moscow, Nauka Press, 1971

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The phenomenon of sudden cardiac death is discussed as a specific stress reaction of an unstable biological system to electromagnetic signals associated with an increase in solar activity. The pattern of solar activity, oscillations of 'bead' type terrestrial currents, and active longitudes in geomagnetic disturbances are considered in relation to sudden death from cardiovascular diseases. Because of the time lag of the human response to solar activity it is concluded that an early warning system of unfavorable cosmic and geomagnetic situations would be helpful in the prevention of cardiovascular deaths.

J.M.S.

N78-22577# Israeli Program for Scientific Translations Ltd., Jerusalem.

SOLAR ACTIVITY AND THE VARIATION OF BLOOD COAGULATION BETWEEN 1949 AND 1966

A. T. Platonova *In its Effects of Solar Activity on the Earth's Atmosphere and Biosphere* (TT-75-50015) 1977 p 215-217 refs Transl. into ENGLISH from the book "Vliyanie Solnechnoi Aktivnosti na Atmosferu i Biosferu Zemli" Moscow, Nauka Press, 1971

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A large-scale shift in the indexes of blood coagulation in the healthy and the sick noted in data accumulated between 1949 and 1966 is described. The data on coagulation time are compared with the magnitude of solar activity, as characterized by the sunspot area on the entire solar disk. Results are given.

Author

N78-22578# Israeli Program for Scientific Translations Ltd., Jerusalem.

THE INFLUENCE OF SOLAR ACTIVITY ON THE FIBRINOLYTIC SYSTEM OF THE BLOOD

E. D. Rozhdestvenskaya and K. F. Novikova *In its Effects of Solar Activity on the Earth's Atmosphere and Biosphere* (TT-75-50015) 1977 p 218-223 ref Transl. into ENGLISH from the book "Vliyanie Solnechnoi Aktivnosti na Atmosferu i Biosferu Zemli" Moscow, Nauka Press, 1971

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The fibrinolytic activity in patients suffering from rheumatic vitium cordis was examined. Several mutually complementary biochemical methods were used along with methods of studying the activity of the fibrin-stabilizing factor and tolerance of the fibrin clot for plasmin. An analysis of the data revealed wide variations in the indexes of fibrinolysis in the same patient. A waveform character of alternation of phases of activation and suppression of fibrinolysis with periods of 7-9-11 days were observed. The indexes of fibrinolytic activity were compared with geomagnetic indexes obtained during the 27 day period of solar activity. Results indicate that a rise in the geomagnetic disturbance level increases the probability of thrombogenesis.

J.M.S.

N78-22579# Israeli Program for Scientific Translations Ltd., Jerusalem.

THE MECHANISM OF THE INFLUENCE OF SOLAR ACTIVITY OSCILLATIONS ON THE HUMAN ORGANISM

A. Osipov and V. P. Desyatov *In its Effects of Solar Activity on the Earth's Atmosphere and Biosphere* (TT-75-50015) 1977 p 232-237 refs Transl. into ENGLISH from the book "Vliyanie Solnechnoi Aktivnosti na Atmosferu i Biosferu Zemli" Moscow, Nauka Press, 1971

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The effect of solar activity on mortality and the human nervous system is considered. Cases of sudden death in infants due to lung pathology and in adults due to hypertension and atherosclerosis and the occurrence of automobile accidents are correlated with fluctuations in solar activity. It is found that the increase in mortality and in the number of automobile accidents on days of chromospheric flares and magnetic storms is statistically significant.

J.M.S.

N78-22580# Israeli Program for Scientific Translations Ltd., Jerusalem.

AN EXPERIMENTAL STUDY OF THE ULTRALOW-FREQUENCY ELECTROMAGNETIC FIELDS ON WARM-BLOODED ANIMALS AND MICROORGANISMS

B. M. Vladimirovskii, A. M. Volynskii, S. A. Vinogradov, Z. I. Brodovskaya, N. A. Temuryants, Yu. N. Achkasova, V. D. Rozenberg, and V. D. Cheikova *In its Effects of Solar Activity on the Earth's Atmosphere and Biosphere* (TT-75-50015) 1977 p 259-269 refs Transl. into ENGLISH from the book "Vliyanie Solnechnoi Aktivnosti na Atmosferu i Biosferu Zemli" Moscow, Nauka Press, 1971

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The influence of solar activity on the earth's biosphere through variations in the strength of alternating electromagnetic fields (AEF) was investigated. Eleven animals were irradiated 10 times and then killed by air embolism for anatomicopathological examination. In all the animals investigated there was a change in systolic rhythm, as well as in bioelectrical phenomena in the heart characterizing changes in the system producing excitation in the heart. Dynamic changes occurred in the electrical activity of the cortex and distinctive dynamic changes in the blood. Under the influence of AEF's, PO was found to be inactivated, the degree of inactivation of the enzyme depending on the field

strength. Anatomicopathological examinations revealed some destructive changes in the heart and lung tissues. Microorganisms reacted to AEF's by more intensive multiplication and nonhereditary changes of morphological and cultural properties. It is noted that the discovered effects of AEF action correspond qualitatively to the effects observed during magnetic storms of sudden onset.

Author

N78-22582 Drexel Univ., Philadelphia, Pa.
MAXIMUM EXPIRATORY FLOW, DIFFUSION AND CO₂ ELIMINATION DURING LIQUID VENTILATION
Ph.D. Thesis

Peter Arthur Koen 1978 152 p
 Avail: Univ. Microfilms Order No. 78-05649

Maximum expiratory flow (V sub max) and diffusion space were measured (V sub diff) in cats during fluorocarbon ventilation. Maximum CO₂ elimination was determined from these rate limiting factors. Results support the conclusion that (1) CO₂ elimination during liquid breathing is both diffusion and ventilation limited; (2) that liquid breathing can support the metabolic needs of an adult cat at twice its resting level; and (3) that the lung during liquid ventilation can be modeled as a linear resistance element with flow saturation at V sub max.

Dissert. Abstr.

N78-22583 Northwestern Univ., Evanston, Ill.
MODELLING OF OXYGEN AUTOREGULATION IN CANINE SKELETAL MUSCLE Ph.D. Thesis

Howard Edgar Guthermann 1977 301 p
 Avail: Univ. Microfilms Order No. 78-05272

A model was developed which could predict the change in active control systems, except the arteriolar flow control, given known changes in the arterial input and venous output to and from the muscle. The model takes into account the following phenomena thought to affect oxygen transport: extracapillary vascular hemodynamics, microvascular decreases in local hematocrit (the Fahraeus effect), and local tissue storage of oxygen as oxyhemoglobin. Overall blood flow did not change significantly during hyperoxia, justifying the omission of the precapillary resistance control from the model when hyperoxic changes were employed.

Dissert. Abstr.

N78-22584 Johns Hopkins Univ., Baltimore, Md.
MATHEMATICAL MODEL OF THE VESTIBULOOCULAR REFLEX Ph.D. Thesis

Kee Soon Chun 1977 250 p
 Avail: Univ. Microfilms Order No. 78-06243

This model included quick phases and also dealt with the stochastic behavior of quick phase timing and amplitude. The structure of the model was consistent with recent findings of neurophysiology. The positions to which and from which quick phases move the eye were injected into the model at neurophysiologically appropriate locations in such a way that the variances of these signals, and correlation between them computed from the model, were similar to those obtained from the cat.

Dissert. Abstr.

N78-22585* National Aeronautics and Space Administration, Goddard Space Flight Center, Greenbelt, Md.
RAPID, QUANTITATIVE DETERMINATION OF BACTERIA IN WATER Patent Application

Emmett W. Chappelle, Grace L. Picciolo, Richard R. Thomas (Boeing Co., Seattle), Eldon L. Jeffers (Boeing Co., Seattle), and Jody Deming, inventors (to NASA) (Hahnemann Hospital) Filed 20 Mar. 1978 40 p
 (NASA-Case-GSC-12158-1; US-Patent-Appl-SN-888434) Avail: NTIS HC A03/MF A01 CSCL 06I

The methods and apparatus for the quantitative determination of bacteria in salt or fresh water, sewage effluent, drinking supply water, or estuaries are presented. A synthetic polymer hollow fiber filter/concentrator was employed to concentrate bacteria in a water sample by forcing the water across a filter or by recirculating the water through the filter to remove the filtrate. A bioluminescent assay for making a quantitative determination of water borne bacteria was provided. Systems are presented for automating the assays.

NASA

N78-22586* National Aeronautics and Space Administration, Lyndon B. Johnson Space Center, Houston, Tex.

METHOD AND APPARATUS FOR CONTINUOUS MEASUREMENT OF BACTERIAL CONTENT OF AQUEOUS SAMPLES Patent Application

Eldon L. Jeffers (Boeing Aerospace, Houston, Tex.), Reuben E. Taylor, Grace L. Picciolo (Food and Drug Admin.), Richard R. Thomas (Boeing Aerospace, Houston, Tex.), and Emmett W. Chappelle, inventors (to NASA) Filed 29 Mar. 1978 41 p
 (NASA-Case-MSC-16779-1; US-Patent-Appl-SN-891247) Avail: NTIS HC A03/MF A01 CSCL 06I

The methods and apparatus for automatically and continuously making quantitative determinations of the bacteria present in water samples such as waste water, effluent or fresh water are presented. A bacteria adenosine triphosphate was used to determine the number of live bacteria present and the iron porphyrin assay to determine the total number of bacteria alive and dead present in the sample.

NASA

N78-22587* National Aeronautics and Space Administration, Pasadena Office, Calif.

BIOCONTAMINATION AND PARTICULATE DETECTION SYSTEM Patent Application

Jacqueline M. Jacobs, inventor (to NASA) (JPL) Filed 24 Feb. 1978 14 p
 (Contract NAS7-100)

(NASA-Case-NPO-13953-1; US-Patent-Appl-SN-880727) Avail: NTIS HC A02/MF A01 CSCL 06M

A method for determining the characteristics and amount of microscopic contaminants lodged on a photographed surface was investigated. An image enhanced full color photographic negative and print were taken of the contaminated surface. Three black and white prints were developed subsequently from red, green, and blue separation filter overlays of the color negative. Both the color and three monochromatic prints were then scanned to extract in digital form a profile of any contaminant possibly existing on the surface. The resulting profiles were electronically analyzed and compared with data already stored relating to the known contaminants.

NASA

N78-22588* National Aeronautics and Space Administration, Lyndon B. Johnson Space Center, Houston, Tex.

METHOD AND AUTOMATED APPARATUS FOR DETECTING COLIFORM ORGANISMS Patent Application

Reuben E. Taylor, W. Preston Dill (Boeing Co., Houston, Tex.), and Eldon L. Jeffers, inventors (to NASA) (Boeing Co., Houston, Tex.) Filed 4 Apr. 1978 36 p
 (Contract NAS9-13333)

(NASA-Case-MSC-16777-1; US-Patent-Appl-SN-893657) Avail: NTIS HC A03/MF A01 CSCL 06C

Method and apparatus are presented for automatically making periodic quantitative determinations of coliform organisms present in water such as waste water, effluent or fresh water by using electrochemical techniques based on detection of metabolic hydrogen liberated by the coliform organisms utilizing changes in electrode potentials.

NASA

N78-22589* National Aeronautics and Space Administration, Lyndon B. Johnson Space Center, Houston, Tex.

WATER QUALITY MONITORING SYSTEM Patent Application

Reuben E. Taylor, Richard R. Brooks (Boeing Co., Houston, Tex.), Gerald D. Poel (Boeing Co., Houston, Tex.), Eldon L. Jeffers (Boeing Co., Houston, Tex.), and Arthur T. Linton, inventors (to NASA) (Boeing Co., Houston, Tex.) Filed 4 Apr. 1978 29 p
 (Contract NAS9-13333)

(NASA-Case-MSC-16778-1; US-Patent-Appl-SN-893648) Avail: NTIS HC A03/MF A01 CSCL 06C

Methods and apparatus are presented for automatically and rapidly performing electrical, chemical, and biological assays for continuous monitoring water quality at a water treatment plant to ascertain the effectiveness of the treatment during the process flow. The invention is transportable in order that a single system may be utilized to service a number of separate or remote wastewater processing facilities.

NASA

N78-22590*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.

FLUID SAMPLE COLLECTION AND DISTRIBUTION SYSTEM Patent Application

Richard R. Brooks, inventor (to NASA) (Boeing Co., Houston, Tex.) Filed 4 Apr. 1978 21 p (Contract NAS9-13333)

(NASA-Case-MS-C-16841-1; US-Patent-Appl-SN-893382) HC A02/MF A01 CSCL 06C

Methods and apparatus are presented for automatically and continuously collecting samples from any one of a plurality of sampling points, filtering part of the samples collected and delivering both unfiltered and filtered samples to various analyzing sensors in order to determine the quality of the aqueous supply from which the sample is taken through various electrical, chemical, and biological means. NASA

N78-22591# Bureau of Radiological Health, Rockville, Md. **SYMPOSIUM ON BIOLOGICAL EFFECTS AND MEASUREMENT OF RADIO FREQUENCY/MICROWAVES**

DeWitt G. Hazard, ed. Jul. 1977 399 p refs Conf. held at Rockville, Md., 16-18 Feb. 1977 Prepared in cooperation with World Health Organ., Geneva, Switzerland

(HEW-Publ-(FDA)-77-8026) Avail: NTIS MF A01; SOD HC

Engineers and scientists met and collectively discussed their problems and how they interface with one another. The symposium was divided into the following sessions: (1) Behavior Effects; (2) Physical Measurement; (3) Growth and Development; (4) Nervous System Effects; (5) Occupational and Ocular Effects, with papers presented at each session.

N78-22592# Randonline, Inc., Huntingdon Valley, Pa. **BEHAVIORAL EFFECTS OF ELECTROMAGNETIC ENERGY**

Allan H. Frey *In* Bur. of Radiol. Health Symp. on Biol. Effects and Meas. of Radio Freq./Microwaves Jul. 1977 p 11-22 refs

Avail: NTIS MF A01; SOD HC

The results of two lines of investigation are presented. In one, the effect of exposure to electromagnetic energy on irritability and aggression in mammals is detailed. It was found that electromagnetic energy exposure elicits a 'docility' response in a pain induced aggression situation. In the other series of experiments, it was found that exposure to electromagnetic energy adversely affects motor coordination or balance in the task of balancing on a rotating rod. Author

N78-22593# Bureau of Radiological Health, Rockville, Md. Div. of Biological Effects.

FREE-OPERANT AVOIDANCE AND ESCAPE FROM MICROWAVE RADIATION

John C. Monahan and W. W. Henton *In its* Symp. on Biol. Effects and Meas. of Radio Freq./Microwaves Jul. 1977 p 23-33 refs

Avail: NTIS MF A01; SOD HC

The purpose of the present investigation was to determine the stimulus properties of microwaves in a free-operant avoidance-escape paradigm. Experimental subjects received microwaves plus tone and sham subjects received tone only. During the session, all subjects could make responses by interrupting a light beam which passed through the animal holder. If no response was made, then the tone remained on for the entire session. The data show a clear difference in response patterns between experimental and control subjects both in frequency and variability of responding. Furthermore, experimental subjects could be categorized by their response patterns into escape animals, avoidance animals, and mixed response animals. These data show that microwave radiation can serve as a noxious stimulus which will maintain an active instrumental avoidance or escape behavior over repeated experimental sessions. Author

N78-22594# Bureau of Radiological Health, Rockville, Md. Div. of Biological Effects.

MICROWAVE ABSORPTION AND TASTE AVERSION AS A FUNCTION OF 915 MHz RADIATION

J. C. Monahan and W. W. Henton *In its* Symp. on Biol. Effects and Meas. of Radio Freq./Microwaves Jul. 1977 p 34-40 refs

Avail: NTIS MF A01; SOD HC

Thirty-two rats were divided into four subgroups and exposed to 915 CW radiation at different intensities immediately following 15 minutes access to a 10 percent sucrose solution. Absorption of microwave energy was relatively unchanged throughout a 15-minute exposure to forward power of 5.0 W. Microwave absorption progressively decreased during exposure at forward power levels of 9.1 and 19.0 W. Each subject was again given access to sucrose 24 hours later, with no indication of a conditioned taste aversion. Author

N78-22595# California Univ., Los Angeles. Environmental Neurobiology Lab.

BEHAVIORAL PROTOCOLS AND PRELIMINARY OBSERVATIONS OF CHICKS EXPOSED TO WEAK AMPLITUDE MODULATED 450 MHz FIELDS

R. G. Medici and P. M. Sagan *In* Bur. of Radiol. Health Symp. on Biol. Effects and Meas. of Radio Freq./Microwaves Jul. 1977 p 41-53 refs Sponsored in part by HEW and ONR

Avail: NTIS MF A01; SOD HC

A series of studies has been designed to assay the behavioral effects of weak amplitude modulated VHF in neonatal chicks and wild mallard ducklings. This programmatic approach will be three dimensional: (1) across power levels, (2) across biologically relevant and non-relevant frequencies, (3) across increasingly complex time-based schedules of reinforcement. Preliminary studies at 5 mW/sq cm² with amplitude modulation set at 3 Hz or 16 Hz were done with an FT 30 sec (fixed time schedule of reinforcement). Results suggest that simple activity measures are inadequate assays of possible weak effects whereas latency measures are sensitive to the presence of the field. Author

N78-22596# Veterans Administration Hospital, Kansas City, Mo. Labs. of Experimental Neuropsychology.

MICROWAVE HYPERTHERMIA AND VISUALLY EVOKED POTENTIALS: PRELIMINARY OBSERVATIONS OF GUINEA PIGS

Don R. Justesen and Virginia BruceWolfe (Kansas Univ., Kansas City) *In* Bur. of Radiol. Health Symp. on Biol. Effects and Meas. of Radio Freq./Microwaves Jul. 1977 p 54-61 refs

Avail: NTIS MF A01; SOD HC

Latencies of an early component (N1) of the Visually Evoked electrocortical Response (VER) of guinea pigs were observed as a function of body temperature as elevated by brief exposures to intense 2450-MHz microwave radiations. A curvilinear relation obtained in which the N1 latency decreased as temperature fell from 41 to 39.5 C, then increased as body temperature continued to fall to 38 C was examined. The temperature for optimal rates of neural processing of sensory information may therefore be 1 to 2 C above that of the resting norm. Data from other studies indicate that elevations of body temperature to 39-40 C occur to novel stimuli and other sources of emotional provocation. The inverted U-function, if a valid reflection of the normal relation between body temperature and neural activity, can be taken as evidence for an adaptive role of the 'psychogenic fever' that attends behavioral hyperarousal. Author

N78-22597# Bureau of Radiological Health, Rockville, Md. Div. of Biological Effects.

INTERACTION BETWEEN MICROWAVE AND NEUROACTIVE COMPOUNDS

W. D. Galloway and Morris Waxler *In its* Symp. on Biol. Effects and Meas. of Radio Freq./Microwaves Jul. 1977 p 62-69

Avail: NTIS MF A01; SOD HC

Microwave radiation can produce an alteration in the behavior of an irradiated organism. It is commonly asserted that such behavioral effects are the result of a direct action by microwaves on some unspecified aspect of the central nervous system. However, the data to support such an assertion are weak. A study is reported which attempts to elucidate a neurotransmitter-linked mechanism of microwave action. Author

N78-22598# Bureau of Radiological Health, Rockville, Md. Div. of Electronic Products.

BROADBAND MEASUREMENTS OF DIELECTRIC PROPERTIES

Mays L. Swicord *In its Symp. on Biol. Effects and Meas. of Radio Freq./Microwaves* Jul. 1977 p 71-80 refs

Avail: NTIS MF A01; SOD HC

An appropriate quantity to be measured is the dielectric constant; appropriate for two reasons. First, most techniques of dielectric constant measurement inherently take into account the geometry and resulting resonances of the sample holder. In fact, such resonances are purposefully created. Secondly, the dielectric constant, from which the propagation constant can be determined, yields more information. Namely, the real as well as the imaginary part of the propagation constant. Not only for the possible determination of selective absorption processes of various biomaterials but for convenience in routine dielectric constant measurements, a method suitable for measurement of complex dielectric constants over a frequency range of 0.5 to 18 GHz was developed. Dielectric constant values from 1 to 50 with a loss tangent of as much as 0.5 are measured with an accuracy dependent only on the sensitivity of the particular system used.

Author

N78-22599# Washington Univ., Seattle. Bioelectromagnetics Research Lab.

QUANTITATION OF MICROWAVE BIOLOGICAL EFFECTS

Chung-Kwang Chou and Arthur W. Guy *In Bur. of Radiol. Health Symp. on Biol. Effects and Meas. of Radio Freq./Microwaves* Jul. 1977 p 81-103 refs

(Grants FD-00646; CA-05681-01)

Avail: NTIS MF A01; SOD HC

While emphasizing dosimetry and instrumentation, we have been able to demonstrate that the effects of acute exposure to CW microwaves on some of the electrophysiological properties of the nervous system are thermal in nature. Studies on the microwave auditory effect have provided strong evidence that the mechanism of microwave hearing is electromechanical in nature. Development of a chronic exposure system and carbon EEG electrodes will provide a means for other researchers in pursuing the studies of biological effects of low level chronic exposure of microwaves. In this reported research, the quantitation of microwave biological effects is stressed so that extrapolation to humans is possible.

Author

N78-22601# Maryland Univ., College Park. Inst. for Physical Science and Technology.

ELECTRIC FIELD MEASUREMENTS WITHIN BIOLOGICAL MEDIA

A. Y. Cheung *In Bur. of Radiol. Health Symp. on Biol. Effects and Meas. of Radio Freq./Microwaves* Jul. 1977 p 117-135 refs

Avail: NTIS MF A01; SOD HC

Analysis employing transmission line model of buried antenna as well as insulated dipoles was performed over the 0.9 to 10 GHz range. The antenna impedance modification as a result of interaction with the surrounding media was computed for a wide range of dielectric parameters typical of various biological materials, over a range of ambient temperatures. It was demonstrated analytically and experimentally that for deep implantation in muscle, relatively little change in probe response occurs with respect to the free space response of the probe over the frequency range of 0.915 GHz to 2.45 GHz. In addition, when in very close proximity to the muscle-fat or the worst case, muscle-air boundary, no significant change occurs in probe response because of dipole impedance variations. Calibration for electric field detection within muscular tissues has also been performed.

Author

N78-22604# Bureau of Radiological Health, Rockville, Md. Div. of Electronic Products.

A FINITE ELEMENT TECHNIQUE FOR CALCULATING INDUCED INTERNAL FIELDS AND POWER DEPOSITION

IN BIOLOGICAL MEDIA OF COMPLEX IRREGULAR GEOMETRY EXPOSED TO PLANE WAVE ELECTROMAGNETIC RADIATION

Stanley M. Neuder *In its Symp. on Biol. Effects and Meas. of Radio Freq./Microwaves* Jul. 1977 p 170-190 refs

Avail: NTIS MF A01; SOD HC

Computer programs were developed and utilized for calculating and graphing externally scattered and internally induced microwave fields in biological tissue. Results of calculations on a spherical multilayered model of the head and an irregularly shaped multilayered thigh model will be shown.

Author

N78-22605# Bureau of Radiological Health, Rockville, Md. Div. of Biological Effects.

COMPARISON OF CALCULATED ABSORBED DOSE RATE DISTRIBUTIONS IN PHANTOM HEADS EXPOSED TO 2450 MHz AND 915 MHz PLANE WAVE AND SLOT SOURCES

Henry S. Ho *In its Symp. on Biol. Effects and Meas. of Radio Freq./Microwaves* Jul. 1977 p 191-200 refs

Avail: NTIS MF A01; SOD HC

The deeper penetration due to the plane wave source exposure, contrasting the tenfold larger maximum absorbed dose rate due to slot source exposure, illustrates the vast difference in energy absorption patterns due to these two types of sources for both the 915 MHz and 2450 MHz source frequencies. An increase in penetration depth with increased slot width was noted for both source frequencies, while a change in source frequency from 2450 MHz to 915 MHz does not greatly change the penetration depth for a given slot size.

Author

N78-22606# Bureau of Radiological Health, Rockville, Md. Div. of Biological Effects.

CHANGE IN AVERAGE ABSORBED DOSE RATE OF A GROUP OF MICE UNDER REPEATED EXPOSURE TO 915 MHz MICROWAVE RADIATION

Henry S. Ho, Frieda Pinkavitch, and William P. Edwards *In its Symp. on Biol. Effects and Meas. of Radio Freq./Microwaves* Jul. 1977 p 201-215 refs

Avail: NTIS MF A01; SOD HC

Two groups of mice were irradiated eight hours per day during alternate working days of the week for a total period of two months. The air temperature, relative humidity, and air flow rate in the waveguide were 20-28 C, 40-50 percent and 37 liters/min respectively. For a forward power of 5W which resulted in an averaged absorbed dose rate of approximately 5 mW/g, a reduction of energy absorption after the first hour of each session was observed throughout the experiment for both groups of animals. A lower average absorbed dose rate was also observed for the first several sessions of the irradiation, compared to those of the remaining sessions. The result indicates possible problems in dosimetry determination for animal irradiation apparatus where parameters for the determination of average absorbed dose rate are not monitored during the irradiation.

Author

N78-22607# New York Univ. Medical Center. Inst. of Environmental Medicine.

THE DESCRIPTION OF A SYSTEM TO IRRADIATE CELLS IN CULTURE WITH MICROWAVES

James R. Rabinowitz, Robert B. Olcerst, and W. W. Mumford *In Bur. of Radiol. Health Symp. on Biol. Effects and Meas. of Radio Freq./Microwaves* Jul. 1977 p 216-229 refs Sponsored in part by the Navy

(Grants FD-00668; ES-00260)

Avail: NTIS MF A01; SOD HC

The need for identifying the biomolecular systems affected by microwave is discussed. A system for irradiating cultured cells or other biological samples is described. A formalism for treating the biological response in this system is introduced and analyzed. The effect of the temperature distribution within the sample on the biological response is illustrated for glucose efflux from red blood cells and ATPase activity.

Author

N78-22608# Bureau of Radiological Health, Rockville, Md. Div. of Electronic Products.

NEW TYPES OF MICROWAVE DIATHERMY APPLICATORS: COMPARISON OF PERFORMANCE WITH CONVENTIONAL TYPES

G. Kantor *In its* Symp. on Biol. Effects and Meas. of Radio Freq./Microwaves Jul. 1977 p 230-249 refs

(Grant FD-00790-0)

Avail: NTIS MF A01; SOD HC

Heating patterns induced in planar phantoms of simulated fat and muscle by direct contact applicators and by spaced applicators were compared. The new applicators provide for more uniform heating in the center of the temperature profiles than the conventional types presently in general clinical use. Unwanted irradiation of operator and unprescribed tissue of patient is much more easily controllable with direct contact applicators than with spaced applicators. Electric field measurements show that the leakage radiation of a commercially available direct contact applicator is less than 5 mW/sq. cm. 2 per 100 Watts of forward power at a spacing of 5 cm from the aperture-phantom boundary while scattered field levels for loaded spaced applicator can typically be 30 mW/sq. cm. 2 per 100 Watts of forward power at a distance of 13 cm in front of the aperture. Author

N78-22609# Rochester Univ., N. Y. Non-ionizing Radiant Energy Facility.

NEUROENDOCRINE RESPONSES IN THE RAT AND DOG EXPOSED TO 2450 MHz (CW) MICROWAVES

Sol M. Michaelson, Ronnie Guillet, W. Gregory Lotz, Shin-Tsu Lu, and Richard L. Magin *In Bur. of Radiol. Health Symp. on Biol. Effects and Meas. of Radio Freq./Microwaves Jul. 1977 p 263-279 refs* Sponsored in part by Navy and DOE

(Contract FD-74-111)

(UR-3490-1080) Avail: NTIS MF A01; SOD HC

Changes in endocrine function and hormone levels occur in rats and dogs acutely exposed to certain power density/time durations of 2450 MHz (CW) microwaves. Such effects were of a transient nature and are related to temperature increases of the individual gland or hypothalamic-hypophyseal responsiveness as a result of increased body temperature. Power density of 20 to 30 mW/sq cm seems to be a transitional range for stimulation of pituitary-adrenal activation in the rat. Author

N78-22610# Bureau of Radiological Health, Rockville, Md. Div. of Biological Effects.

THE EFFECT OF REPETITIVE PRENATAL LOW-LEVEL MICROWAVE EXPOSURE ON DEVELOPMENT IN THE RAT

Moris L. Shore, Richard P. Felten, and Anthony Lamanna *In its* Symp. on Biol. Effects and Meas. of Radio. Freq./Microwaves Jul. 1977 p 280-289 refs

Avail: NTIS MF A01; SOD HC

Rats were exposed to low level 2450 MHz microwave radiation daily for 5 hours from day 3 through day 19 of gestation at an average exposure level of 10 mW/sq cm 2. Exposed animals were positioned reproducibly in a square configuration so that 12 animals were parallel to the electric vector of the microwave field and 12 animals were parallel to the magnetic vector of the field. Following sham or microwave exposure, animals were allowed to deliver normally. Body and brain weight were determined on day 2, 3, 6, 7, 8, 9, 14, and 15 postpartum and were consistently lower control values for exposed animals oriented parallel to the electric vector of the microwave field. Author

N78-22611# George Washington Univ. Medical Center, Washington, D.C.

LIGHT AND ELECTRON MICROSCOPIC OBSERVATIONS ON THE BLOOD-BRAIN BARRIER AFTER MICROWAVE IRRADIATION

Ernest N. Albert *In Bur. Radiol. Health Symp. on Biol. Effects and Meas. of Radio Freq./Microwaves Jul. 1977 p 294-304 refs*

Avail: NTIS MF A01; SOD HC

Chinese hamsters were irradiated with microwaves at 2450 MHz and power density of 10 mW/sq cm 2 for 2 and 8 hours for 1 day. Control animals were sham irradiated. Following irradiation the animals were anesthetized and treated for gross, and microscopic light and electron, examination. Brain slices were scored for peroxidase leakage. Subsequent to embedding, semi-thin sections were cut and observed with dark field and bright field microscopy as well as electron microscopy. Author

N78-22612# California Univ., Los Angeles. Environmental Neurobiology Lab.

CALCIUM BINDING IN CEREBRAL TISSUE

Suzanne M. Bawain and W. Ross Adey *In Bur. Radiol. Health Symp. on Biol. Effects and Meas. of Radio Freq./Microwaves Jul. 1977 p 305-313 refs*

(Contracts N00014-69-A-0200-4037; F44620-75-C-0030; Grant FD-678)

Avail: NTIS MF A01; SOD HC

Possible effects of weak, extremely low frequency and amplitude modulated radio frequency fields on the calcium exchange between freshly isolated nervous tissue and a bathing physiological solution were investigated. Experimental results indicate that cerebral tissue responds to field stimulations contained within amplitude and frequency windows. Isolated skeletal muscles did not respond to stimulations affecting the calcium exchanges in brain tissue. Author

N78-22613# Texas Univ. Health Science Center, Dallas. Dept. of Physiology.

VESTIBULO-COCHLEAR SINGLE UNIT RESPONSES TO MICROWAVE RADIATION

Robert M. Lebovitz and Ronald L. Seaman *In Bur. Radiol. Health Symp. on Biol. Effects and Meas. of Radio Freq./Microwaves Jul. 1977 p 314-333 refs*

Avail: NTIS MF A01; SOD HC

The influence of microwave radiation (MWR) on functional neuronal properties was examined, and the effects of continuous wave MWR on units of the vestibular system were studied. The threshold for this effect appeared to be above the current standards for safe exposure; above a level for significant intracranial thermogenesis. The response of single auditory units to pulse modulated MWR were studied. Pulse parameters rather than average power density appeared to be the independent variable for this effect and responses were observed at pulse energy densities of 4 mvon J/g and lower. Overall, the response of a given single auditory unit to pulsed MWR was similar to its response to traditional acoustic click stimuli. Author

N78-22614# National Academy of Sciences - National Research Council, Washington, D. C. Medical Follow-up Agency.

CAUSES OF DEATH FOLLOWING OCCUPATIONAL EXPOSURE TO MICROWAVE RADIATION (RADAR) 1950 - 1974

C. Dennis Robinette and Charlotte Silverman (Bur. of Radiol. Health, Rockville, Md.) *In Bur. Radiol. Health Symp. on Biol. Effects and Meas. of Radio Freq./Microwaves Jul. 1977 p 338-344 refs*

Avail: NTIS MF A01; SOD HC

The effects of microwave radiation on the health of naval personnel was assessed, by taking advantage of marked occupational differences in level of exposure, and the availability of the extensive medical information recorded during service and subsequently in the veteran period of the Korean war. Extant records utilizing mortality and morbidity, and reproductive performance were utilized. Author

N78-22615# Armed Forces Inst. of Pathology, Washington, D. C. Ophthalmic Pathology Div.

EFFECTS OF REPEATED MICROWAVE IRRADIATIONS TO THE ALBINO RABBIT EYE

S. E. Hirsch (Walter Reed Gen. Hosp.), B. Appleton (Walter Reed Gen. Hosp.), B. S. Fine (Walter Reed Army Inst. of Res.), and P. V. K. Brown *In Bur. Radiol. Health Symp. on Biol.*

Effects and Meas. of Radio Freq./Microwaves Jul. 1977 p 345-350 refs
(Grant FD-00686)

Avail: NTIS MF A01; SOD HC

Exposure of 3000 MHz were administered to the left eye of each animal for a 15 minute period. Clinical examination, including light and electron microscopy, was carried out during the year. Below 300 mW/sq cm no ocular changes were detected. At 300 mW sq cm and above, all eyes reacted with congestion of the limbal vessels, pupillary constriction, and evidence of iritis. M.V.

N78-22616# Bureau of Radiological Health, Rockville, Md. Div. of Biological Effects.

ARE MICROWAVE CATARACTS THERMALLY CAUSED?

R. L. Carpenter, G. J. Hagan, and G. L. Donovan *In its Symp. on Biol. Effects and Meas. of Radio Freq./Microwaves* Jul. 1977 p 352-379 refs Sponsored in part by Naval Med. Res. and Develop. Command

Avail: NTIS MF A01; SOD HC

In the rabbit eye, 2.45 GHz radiation caused an immediate increase in intraocular temperature and, after a latent period of a few days, development of opacities in the posterior subcapsular cortex of the lens. External application of heat to the eye induced the same increase in intraocular temperature over the same duration of time as did a cataractogenic microwave exposure. It was concluded that an increase in intraocular temperature occurring during microwave irradiation was not the sole causative factor in microwave cataractogenesis. Author

N78-22617# Bureau of Radiological Health, Rockville, Md. Div. of Biological Effects.

HEAT-INVOKED CHANGES IN ASCORBIC ACID LEVELS ON THE RABBIT EYE

Esther S. Ferri *In its Symp. on Biol. Effects and Meas. of Radio Freq./Microwaves* Jul. 1977 p 380-386 refs Sponsored in part by Naval Res. and Develop. Command

Avail: NTIS MF A01; SOD HC

Levels of ascorbic acid were determined in the microwave irradiated eye of the rabbit. Results did not agree with an investigation previously reported using the same exposure and analyses conditions. A possible explanation of the cause of these discrepancies was attempted. Heat alone was ruled out as the causative factor involved in alterations of ascorbate in the microwave irradiation of the eye. Author

N78-22618# National Aeronautics and Space Administration, Lewis Research Center, Cleveland, Ohio.

THE USE OF AN ION-BEAM SOURCE TO ALTER THE SURFACE MORPHOLOGY OF BIOLOGICAL IMPLANT MATERIALS

A. J. Weigand 1978 28 p refs Presented at Soc. for Biomater. Conf., San Antonio, 29 Apr. - 2 May 1978 (NASA-TM-78851; E-9573) Avail: NTIS HC A03/MF A01 CSCL 06C

An electron bombardment, ion thruster was used as a neutralized-ion beam sputtering source to texture the surfaces of biological implant materials. Scanning electron microscopy was used to determine surface morphology changes of all materials after ion-texturing. Electron spectroscopy for chemical analysis was used to determine the effects of ion texturing on the surface chemical composition of some polymers. Liquid contact angle data were obtained for ion textured and untextured polymer samples. Results of tensile and fatigue tests of ion-textured metal alloys are presented. Preliminary data of tissue response to ion textured surfaces of some metals, polytetrafluoroethylene, alumina, and segmented polyurethane were obtained. Author

N78-22619# European Space Agency, Paris (France).

LIFE-SCIENCES RESEARCH IN SPACE

W. R. Burke, ed. and T. D. Guyenne, ed. Sep. 1977 374 p refs Proc. of a Symp. held at Cologne, 24-26 May 1977; co-sponsored by DFVLR, CNES, and Roy. Soc. (ESA-SP-130) Avail: NTIS HC A16/MF A01

Selected papers on life-science experiments for NASA-ESA spacelab flight, cardio-pulmonary and vascular problems, fluid metabolism, sensorial functions, plant physiology, radiobiology, and biomechanics are presented.

N78-22620* National Aeronautics and Space Administration, Lyndon B. Johnson Space Center, Houston, Tex.

SUMMARY OF PAST FINDINGS IN BIOMEDICAL RESEARCH ACCUMULATED DURING APOLLO AND SKYLAB MISSIONS

R. S. Johnston and L. F. Dietlein *In ESA Life-Sci. Res. in Space* Sep. 1977 p 7-27 refs

Avail: NTIS HC A16/MF A01 CSCL 06B

The specific equipment used in carrying out the experiments (including an evaluation of the cardiovascular system, a study of metabolic activity, investigations in the field of neurophysiology, the determination of changes in body fluids, measurement of total body metabolism, and a study of crew performance through a time and motion experiment) is outlined. The frequency and the test protocols are reviewed and the significant observations and data obtained are presented. In addition, the techniques used to monitor crew health to assist in making real-time mission decisions are discussed. ESA

N78-22621* National Aeronautics and Space Administration, Washington, D. C.

NASA - SELECTED LIFE SCIENCE EXPERIMENTS FOR THE FIRST NASA/ESA SPACELAB FLIGHT 1980

Carl A. Larson *In ESA Life-Sci. Res. in Space* Sep. 1977 p 29-34

Avail: NTIS HC A16/MF A01 CSCL 06B

Spacelab 1 will carry 17 NASA-sponsored research projects. Seven of these investigations will concern the life sciences. Because of NASA's interest in space motion sickness, two vestibular studies will be conducted. Two other experiments will be concerned with the effects of spaceflight on the hematologic system. The fifth life science study will involve mutations in plant organs. The sixth investigation will examine the effects of the Spacelab environment on circadian rhythms in microorganisms. Finally, cosmic radiation inside the Spacelab will be mapped. These seven life science experiments represent both basic and applied areas of research. Author (ESA)

N78-22622 European Space Agency, Paris (France).

LIFE SCIENCES SELECTED EXPERIMENTS FOR THE FIRST JOINT NASA/ESA SPACELAB MISSION

H. Oser *In its Life-Sci. Res. in Space* Sep. 1977 p 35

Avail: NTIS HC A16/MF A01

The life-sciences selected experiments on human physiology and radiation biology for the first joint NASA-ESA Spacelab mission are briefly summarized. ESA

N78-22624 Rome Univ. (Italy). School of Aerospace Medicine.

THREE-DIMENSIONAL BALLISTOCARDIOGRAPHY IN WEIGHTLESSNESS

Aristide Scano *In ESA Life-Sci. Res. in Space* Sep. 1977 p 51-57 refs

Avail: NTIS HC A16/MF A01

Essential information is given on the simple and non-invasive method of exploring cardiovascular functions and on the principal characteristics of the recording that can be obtained of body motions and accelerations due to cardiac activity and to the movement of blood in the large vessels. Mention is made of some uncertain and not yet clarified aspects of the phenomenon and of the reasons for the proposal to carry out research on it in the Spacelab. Finally a description is given of the purposes of this investigation, of the experimental method to be used on the ground and in flight, and of the tests in progress to improve its reliability and simplicity. Author (ESA)

N78-22625 Centre de Recherches de Medecine Aeronautique, Paris (France). Ecole d'Application.

ELECTRICAL IMPEDANCE AND MECHANOGRAPHY, METHODS OF CARDIO-VASCULAR INVESTIGATION IN SPACE

J. Colin and R. Carre /*In* ESA Life-Sci. Res. in Space Sep. 1977 p 59-67 refs
 Avail: NTIS HC A16/MF A01

Two non-invasive techniques can be used in space to study cardiac functions. These techniques consist in synchronous recording of the electrocardiogram, phonocardiogram and carotidogram, and (or) electrical impedance plethysmogram. The material and methods allow, with these techniques, measurement of systolic time intervals and evaluation of stroke volume and cardiac output. Compared results obtained are presented and discussed. They demonstrate the feasibility of using these techniques to estimate the transient changes in cardiovascular function during space flight.
 Author (ESA)

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CEREBRAL CIRCULATION IN WEIGHTLESSNESS: COMPARISON AND VALIDATION OF DIFFERENT METHODS

A. Bes, L. Braak, A. Guell, P. Jauzac, G. Geraud, and A. Blasco /*In* ESA Life-Sci. Res. in Space Sep. 1977 p 69-73

Avail: NTIS HC A16/MF A01

Some methods of cerebral blood flow measurement, with emphasis on the non-invasive methods are reviewed. The difficulties arising from the use of rheoencephalography are pointed out.
 ESA

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THE MEASUREMENT OF TISSUE THICKNESS AND TISSUE COMPLIANCE IN MAN

K. Kirsch, M. Barnkow, and W. Hepp (Dornier System G.m.b.H.) /*In* ESA Life-Sci. Res. in Space Sep. 1977 p 75-79 refs

Avail: NTIS HC A16/MF A01

In order to determine tissue thickness above an underlying bone, an ultrasonic device was used. With the help of a surrounding plexiglas chamber subatmospheric or hyperbaric pressures between -15 to +15 mmHg could be applied to the tissues. An attempt was made to calculate the compliance of the tissue structures. The values derived were in the range of from 3 to 6.5 ml/kg tissue/1 mmHg.
 Author (ESA)

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CARDIO-RESPIRATORY ADAPTATION AND CENTRAL BLOOD VOLUME DURING WEIGHTLESSNESS

G. Koch /*In* ESA Life-Sci. Res. in Space Sep. 1977 p 81-85

Avail: NTIS HC A16/MF A01

A brief review is given of the salient features of cardio-respiratory adaptation to exposure to 0-g conditions and to simulated weightlessness under whole body immersion. All physiological observations made hitherto in association with manned space flight are consistent with the concept that the weightlessness induced shift of blood volume from the lower body capacitance system to the central circulation acts as the trigger mechanism eliciting major changes in central hemodynamics, plasma volume, and renal function. Excellent studies performed during simulated weightlessness (immersion) are now available which quantitatively define the majority of changes occurring under these circumstances within the cardiovascular, respiratory, and renal systems. It appears imperative that advantage should be taken of future space flight programs to analyze quantitatively these changes during true in-flight weightlessness conditions as well. Concerning the cardio-respiratory system the key data desired are ventricular filling pressures and cardiac output.
 Author (ESA)

N78-22629 Deutsche Sporthochschule, Cologne (West Germany). Inst. fuer Physiologie.

CIRCULATORY, RENAL AND ENDOCRINE REACTIONS ON SIMULATED WEIGHTLESSNESS DEPENDENT ON PHYSICAL FITNESS STATE

J. Stegemann and W. Skipka /*In* ESA Life-Sci. Res. in Space Sep. 1977 p 87-92 refs (For availability see N78-22619 13-51)

Avail: NTIS HC A16/MF A01

Effects of head-out immersion on circulatory, renal, and endocrine reactions were estimated in endurance-trained athletes (TR) and untrained subjects (UT). Heart rate was increased in all subjects while blood pressure decreased. The reduced diuresis and natriuresis of the TR were caused by a smaller ADH inhibition, a smaller and delayed increase of GFR and a smaller diminution of aldosterone secretion. VMA excretion increased only in the UT, whereas plasma renin activity was attenuated in both groups. Furthermore the gain of blood pressure control was generally reduced in TR which leads to the more reduced orthostatic tolerance of this group. Intermittent exercise during immersion had a protective effect of orthostatic stability in all subjects.ESA

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POSSIBLE MECHANISMS OF MOTION AND SPACE SICKNESS

A. J. Benson /*In* ESA Life-Sci. Res. in Space Sep. 1977 p 101-108 refs

Avail: NTIS HC A16/MF A01

The malaise induced by head movements on initial exposure to weightlessness is similar in symptomatology and natural history to that induced by provocative motion on earth. It is argued that space sickness, like other forms of motion sickness, occurs because of a disruption of established associations in the pattern of sensory information from vestibular receptors. The sensory mismatch, caused by the abnormal stimulation of the otoliths in weightlessness, is identified, and the nature of the sensory rearrangement, that is an essential feature of adaptation to the atypical force environment, is examined.
 Author (ESA)

N78-22632 Neurologische Universitaetsklinik, Freiburg im Breisgau (West Germany). Abt. fuer Neurophysiologie.

OPTICALLY INDUCED SELF-MOTION PERCEPTION
 Johannes Dichgans /*In* ESA Life-Sci. Res. in Space Sep. 1977 p 109-112 refs

Avail: NTIS HC A16/MF A01

Large moving visual fields elicit the sensation of ego-motion via convergence of visual inputs into the vestibular system. Through vision, the vestibular nuclei are supplied with constant velocity information. Motion stimuli in an earth vertical plane elicit the perception of continuous motion but limited displacement. Visuo-vestibular convergence subserves dynamic spatial orientation and postural stabilization.
 Author (ESA)

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EXPERIMENTAL VERTIGO, ATAXIA AND MOTION SICKNESS: VISUAL-VESTIBULAR INTERACTION ON EARTH AND IN SPACE

Thomas Brandt /*In* ESA Life-Sci. Res. in Space Sep. 1977 p 113-115 refs

Avail: NTIS HC A16/MF A01

Vertigo and optokinetic motion sickness can be elicited by pure angular oscillation of the visual around about a vertical axis or by summation of visual pseudo coriolis or Purkinje effects. Experiments on earth revealed a direction-specific optokinetic modulation of vestibular disorientation and nausea resulting in either inhibition or facilitation. It can be expected that weightlessness in space magnifies the relative importance of visual cues within the multisensory processes of dynamic spatial orientation.
 Author (ESA)

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VISUAL-VESTIBULAR INTERACTION DURING LINEAR MOTION

A. Berthoz, A. Buizza (Pavia Univ.), and R. Schmid (Pavia Univ.)
In ESA Life-Sci. Res. in Space Sep. 1978 p 117-125 refs

Avail: NTIS HC A16/MF A01

The studies of visual vestibular interaction in the case of linear motion which were made in the last few years by several groups are reviewed. They concern (1) the measurement of the psychophysical parameters of self-motion perception induced by visual scenes moving linearly (Linear Vection), (2) the fact that linear acceleration modifies the perceived velocity of a visual scene, (3) the postural readjustments induced by moving visual scenes on standing subjects and the effects of spatial frequency, and (4) the contribution of vision during postural perturbation during linear accelerations. The problem of the effect of linear acceleration on fusion during vergence and the possible contribution of the otolithic system to the improvement of the dynamics of fusional vergence was examined. Suggestive evidence is given that linear acceleration does improve the dynamics of fusion.

Author (ESA)

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VESTIBULAR TESTS DURING SPACE FLIGHT

Ulf Brandt *In ESA Life-Sci. Res. in Space Sep. 1977 p 127-129 refs*

Avail: NTIS HC A16/MF A01

In past space missions the assessment of vestibular function on operational and experimental conditions was mainly based upon subjective information. The findings have therefore been hard to insert in their correct physiological context. With Spacelab the medical supervision and the biomedical effort enter a new phase according to the facilities of in-flight electronystagmography. This will offer possibilities of re-evaluating a biological system which is conditioned by gravity. A description is given of a centrifuge method, which gives the opportunity of testing and recording objectively caloric reaction under varying g loads. The applicability of this provoked vestibular test during future space research is considered.

Author (ESA)

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THE EFFECT OF GRAVITY ON THE STATIC AND DYNAMIC PROPERTIES OF SINGLE VESTIBULAR UNITS INVESTIGATED IN THE BULL FROG BY MEANS OF A VESTIBULAR ORBITAL LABORATORY (VOL). NASA Shuttle Spacelab Vestibular Function Research Program (VFR)

Torquato Gualtierotti, Principal Investigator *In ESA Life-Sci. Res. in Space Sep. 1977 p 131-138 refs*

Avail: NTIS HC A16/MF A01

The NASA Vestibular Function (VFR) Program further investigates the behavior of the same simple vestibular units, comparatively, in free fall and at different g levels, earth gravity included. It is a study of basic vestibular physiology and an attempt to understand the mechanism of the space sickness. A follow-up of the OFO-A vestibular space experiment, which provided the first information on the effect of free fall on single vestibular units in the bull frog, the VFR program will test hypnotised mechanisms of the observed vestibular reversible or irreversible functional alterations. To this end a Vestibular Orbital Laboratory (VOL) will be flown in several shuttle Spacelab missions. The VOL is capable of fully supporting four bull frogs for up to 60 days, monitoring single vestibular units activity applying various stimulations to study the static and dynamic properties of efferents and afferents in weightlessness and during artificial gravities.

Author (ESA)

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THE RELATIONSHIP OF GRAVITY TO VESTIBULAR STUDIES

T. D. M. Roberts *In ESA Life-Sci. Res. in Space Sep. 1977 p 139-145 refs*

Avail: NTIS HC A16/MF A01

In the postural adjustments necessary for balance the vestibular system has hitherto been thought of as providing a reference indication of the upright direction. However, the reactions to overbalancing turn out to depend on recognition that the resultant of the supporting upthrusts is approaching the edge of the available area of support. In the absence of sufficient cues

the subject falls over. The otolith organs resemble accelerometers and must accordingly respond to stress gradient. This means that they will indicate the current direction of support thrust, even in a moving vehicle, rather than some reference direction such as that of gravity.

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THE MAMMALIAN OTOCYST IN VITRO. A MODEL SYSTEM FOR EXPERIMENTAL PATHOLOGY ON EARTH AND IN SPACE

P.-G. Lundquist, T. R. VanDeWater, J. Wersaell, and M. Anniko *In ESA Life-Sci. Res. in Space Sep. 1977 p 147-153 refs*

Avail: NTIS HC A16/MF A01

Labyrinthine receptor pathology is discussed with respect to toxic agents affecting the sensory cells directly or the secretory epithelia that is necessary for normal labyrinthine metabolism. Developmental hereditary malformations are discussed. The mammalian otocyst is presented as a model system for research in labyrinthine pathology. Studies are described which incorporate morphogenesis as well as the development of sensory structures in vitro. An outline of the experiment with the mammalian otocyst developing in a space travel environment is described and the possible effects of this environment upon labyrinthine receptors are discussed.

Author (ESA)

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INFLUENCE OF GRAVITY AND WEIGHTLESSNESS ON MATURATION OF THE EQUILIBRIUM FUNCTION

A. Gribenski *In ESA Life-Sci. Res. in Space Sep. 1977 p 155-162 refs*

Avail: NTIS HC A16/MF A01

In fish and in frog tadpoles it seems that weightlessness during development influences neither structure nor function of equilibrium organs. Experiments are being planned in order to know whether in the rat weightlessness (or hypergravity) has an influence on the maturation of equilibrium function. The equilibrium of young rats whose fetal and/or early postnatal development will have taken place in weightlessness (or in hypergravity) will be compared with that of young rats whose development will have taken place in normal conditions of gravity. Up to now the maturation of equilibration in the rat has been studied considering three types of reactions: air-righting, rotatory reactions, and dynamic equilibration on a horizontal mast rotating around its axis.

Author (ESA)

N78-22640 Paris Univ. (France). Faculty of Medicine Lariboisiere-St. Louis.

RESPONSES OF THE FROG TO ANGULAR ACCELERATIONS IN WEIGHTLESSNESS

M. Burgeat, D. Loth, C. Menguy, M. Toupet (Rouen Univ.), and A. Gribenski *In ESA Life-Sci. Res. in Space Sep. 1977 p 163*

Avail: NTIS HC A16/MF A01

It has been proposed to verify in an experiment how a change in the controlling effect of the otolith organs in frogs, caused by change of weightlessness, could modify the vestibular responses to angular accelerations during orbital flights. ESA

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DEVELOPMENT OF THE VESTIBULUM OF FROG EMBRYOS AND LARVAE ON THE FAST RUNNING CLINOSTAT

J. Neubert and W. Briegleb *In ESA Life-Sci. Res. in Space Sep. 1977 p 165-168 refs*

Avail: NTIS HC A16/MF A01

Some experiments were exposed to study the influence of simulated weightlessness on the development of the vestibular organ of frog embryos and larvae which grew up from fertilization of the eggs on a fast running horizontal clinostat. No abnormalities could be detected in the morphological structure with light and electron-microscopic methods. The results are discussed together

with those of comparable flown experiments (Soyuz 10, Salyut 4; Biosatellite 2, Gemini 8 and 12) and good accordance was found. Furthermore, some observations of behavior patterns of the animals are discussed. Author (ESA)

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VISION AND SPACEFLIGHTS

G. Perdriel *In* ESA Life-Sci. Res. in Space Sep. 1977 p 169-171

Avail: NTIS HC A16/MF A01

Since the first space flights, a more complete knowledge of the visual phenomena experienced by the astronauts, especially after the observations made in spacecraft has been acquired. The visual functions can be altered during the various phases of space navigation. During take-off, the deleterious effects of accelerations were prevented by placing the astronauts in a supine position. During long-term flight, at 0 gravity, visual acuity is improved but chromatic perception decreases. Abnormal visual perceptions (light flash phenomena) can also appear. Lunar approach and stay on the moon require adaptation of visual functions. Author (ESA)

N78-22643 Rome Univ. (Italy). Eye Clinic.

THE CRITICAL CENTRAL RETINAL FUSION FREQUENCY (CCRFF) AS A TEST OF THE RETINAL CIRCULATORY FUNCTION AND ITS RELATION WITH ENCEPHALIC CIRCULATION

Giacomo C. Modugno *In* ESA Life-Sci. Res. in Space Sep. 1977 p 173-175

Avail: NTIS HC A16/MF A01

The Critical Central Retinal Fusion Frequency (CCRFF) representing the power of fusing intermittent light stimuli is discussed in terms of physical factory effects, operational fatigue tests, and nonverbal mental attitude tests. The instrument developed for the quick measurement of CCRFF is briefly described. Investigations conducted at the Italian Air Force Aviation, at the Sports Medicine Institute of the Italian National Olympic Committee, at Rome University Oculistic Clinic are presented. ESA

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EFFECTS OF X-RAYS ON THE RAT RETINA AND ON RHODOPSIN

M. Doly, D. B. Isabelle, A. Teteftot, G. Gaillard, and G. Meyniel *In* ESA Life-Sci. Res. In Space Sep. 1977 p 177-181 refs

Avail: NTIS HC A16/MF A01

In order to explain the mechanism of phosphene induction during the space flight a study of the X-ray action on isolated retina and on separated rhodopsin was undertaken. An experimental set-up was developed to maintain albino rats' retina in a survival state and to record the electroretinogram (ERG) response for various types of stimulation. It was found that the ERG signal as well as the survival curve are similar for X-ray and light stimulations. A relative efficiency of X-ray vs. light was determined. To confirm the hypothesis of an X-ray direct action on the photoreceptors, the modifications of the rhodopsin absorption spectrum induced by X-ray irradiation were measured. It was found that the rhodopsin molecule is broken down by X-ray. Author (ESA)

N78-22645 Nijmegen Univ. (Netherlands). Dept. of Biochemistry.

EFFECTS OF HARD RADIATION ON THE VISUAL PIGMENT RHODOPSIN

S. L. Bonting, P. A. A. Jansen, and F. J. M. Daemen *In* ESA Life-Sci. Res. in Space Sep. 1977 p 185-189 refs Sponsored by Roy. Neth. Acad. of Sci.

Avail: NTIS HC A16/MF A01

Light flashes, seen by astronauts in the absence of visible light during translunar flights, are thought to be due to interactions of cosmic rays with the visual system. As part of a program for the assessment of the nature and reversibility of this interaction,

the visual pigment rhodopsin has been exposed to proton and electron irradiation. From determinations of various parameters it is concluded that this type of radiation at certain dosage levels can cause an irreversible breakdown of rhodopsin. The number of rhodopsin molecules damaged per incident proton varies from 1500 to 176,000 over the dose range, suggesting that passage of a single high energy particle through the retina could in principle excite a sufficient number of photoreceptor cells to cause observation of a light flash. Author (ESA)

N78-22646 University Coll., Cardiff (Wales). Botany Dept. **CIRCUMNUTATION AND GRAVITY**

David G. Heathcote *In* ESA Life-Sci. Res. in Space Sep. 1977 p 195-201 refs Sponsored in part by Roy. Soc.

Avail: NTIS HC A16/MF A01

A review of theoretical models of the mechanism underlying the rhythmic plant movement, circumnutation is presented. Evidence in support of the most widely accepted theory, proposed by Israelsson and Johnsson, which describes the movement in terms of a feedback oscillation of the geotropic attitude control system of the plant is briefly described, together with some new data that seem to conflict with the predictions of the model. It is suggested that final resolution of the problem requires experimental work in a mu-g environment. The rationale and objectives of a series of proposed Spacelab flight experiments on this subject are discussed. Author (ESA)

N78-22647 Oxford Univ. (England). Botany School.

TESTING THE MECHANISM OF GRAVITY SENSING IN PLANTS

B. E. Juniper *In* ESA Life-Sci. Res. In Space Sep. 1977 p 203-212 refs

Avail: NTIS HC A16/MF A01

The statolith theory of graviperception in plants has existed with fluctuating fortunes for over seventy-five years. The simple system in Chara is well authenticated but probably cannot be translated to the higher plant. A lot now is known about the fine structure, number and distribution of the cells that perceive gravity in the higher plant. But a common system for both shoot and root now seems unlikely, since both hormonal and transport systems appear to differ. In spite of considerable research no satisfactory system has been put forward and suggestions are made for testing the still speculative models of this rapid and flexible system. Author (ESA)

N78-22648 Bonn Univ. (West Germany). Inst. of Botany. **ULTRASTRUCTURAL ASPECTS OF GRAVITY-PERCEIVING CELLS IN CRESS ROOTS**

D. Volkmann and A. Sievers *In* ESA Life-Sci. Res. in Space Sep. 1977 p 213-216 refs

Avail: NTIS HC A16/MF A01

The gravity-perceiving cells (statocytes) of roots are polarly organized. They are characterized by sedimentable particles (amyloplasts) and a striking endomembrane system (ER complex). During the normal downward oriented growth of the root, the amyloplasts are sedimented on the ER complex. Some observations indicate that the amyloplasts stress the ER membranes by their sedimentation. The membranes of the ER complex fulfill the preconditions of a gravisensor. For a short time the amyloplasts can be separated from the ER complex under different experimental conditions. This is important for further information on graviperception. However, a long-term separation with consecutive experiments is possible only under 'total weightlessness' in space. Experiments for the Spacelab program are suggested. Author (ESA)

N78-22649 Paris VI Univ. (France). Lab. de Cytologie et Morphogenese Vegetales.

GEOPERCEPTION IN LENTIL ROOTS

G. Perbal *In* ESA Life-Sci. Res. in Space Sep. 1977 p 217-222 refs

Avail: NTIS HC A16/MF A01

The mode of action of the statoliths is analyzed on lentil roots. It is shown that the geotropic response of roots is due to

the displacement of the statoliths, their pressure and their contacts on a sensitive surface located along the distal wall of the statocytes. The nature and the position of this sensitive surface was also investigated. It is demonstrated that it could be the tubules of endoplasmic reticulum lining the plasmalemma, if a physical contact must occur between the sensitive surface and the amyloplasts. If such a contact is not needed it could also be represented by the microtubules or the plasmalemma. The preinversion effect is discussed in the light of these results. It is concluded that a space experiment should be done on the effects of low centrifugal accelerations on the development of roots.

Author (ESA)

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ROOT GEOREACTION: GRAVITY EFFECT ON HORMONE BALANCE

P. E. Pilet *In* ESA Life-Sci. Res. in Space Sep. 1977 p 223-227 refs

Avail: NTIS HC A16/MF A01

The root cap produced growth inhibiting regulators which control the root georeaction and the growth of root. These inhibitors (and abscisic acid is one of them) were transported basipetally and laterally (downward movement inside the apex of horizontal roots). The lower part of the root cap, from a geo-stimulated root, produced inhibitors in larger amount as compared with the upper part. Consequently, the level of these inhibitors was greater in the lower extending zone of the root which presents a positive georeaction.

Author (ESA)

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CONTROL OF CELL GROWTH AND HORMONE LEVELS BY GRAVITY

M. Wright and Daphne J. Osborne *In* ESA Life-Sci. Res. in Space Sep. 1977 p 229-233 refs

Avail: NTIS HC A16/MF A01

Flowering shoots of the grass *Echinochloa colonum* provide excellent material for studying the control of cell growth by gravity. Their georesponsive cells normally elongate only in response to a gravitational stimulus. These cells, located in the leaf sheath base (the nodes) elongate on the lower side but not on the upper side when shoots are placed horizontally. Elongation can be related to auxin content; within 30 mins of placing horizontal auxin levels increase on the lower side and decrease on the upper side of excised half nodes. Models are proposed in which changes in auxin levels and corresponding cell elongation are attributed to a growth promoting signal transmitted from the statocyte cells. Experiments, designed for the zero gravity conditions of Spacelab, could (1) indicate possible relationships between ultrastructure and geosensitivity and (2) give information on the mechanism of action of the statoliths.

Author (ESA)

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RADIOBIOLOGICAL EFFECTS AT LOW DOSES. THE ROLE OF SPATIAL AND TEMPORAL ENERGY DISTRIBUTION

Hedi Fritz-Niggli *In* ESA Life-Sci. Res. in Space Sep. 1977 p 257-262 refs

Avail: NTIS HC A16/MF A01

The complexity of the radiobiological chain of events leads to the conclusion that, particularly for the low mean doses, the pattern of microscopic energy distribution is extremely important. In the inhomogeneous cosmic radiation the high LET components can produce effects by even low mean doses. Our investigations on the Relative Biological Effectiveness (RBE) values of negative pions in the peak (star) region show that intrinsic properties of the reaction system (e.g. radiosensitivity due by O₂-tension) and the mode of realization determine the damage. Hypoxic systems with heteromultiple realization mechanisms (like embryonic damage, tumor induction) are the most suitable objects for space radiation biology.

Author (ESA)

N78-22655 Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Bad Godesberg (West Germany). Inst. fuer Flugmedizin.

RESULTS OF RADIOBIOLOGICAL SPACEFLIGHT EXPERIMENTS

Horst Buecker *In* ESA Life-Sci. Res. in Space Sep. 1977 p 263-270 refs

Avail: NTIS HC A16/MF A01

Research in space radiobiology mainly deals with: (1) combined effects of cosmic radiation and other extreme factors of spaceflight. From the Biosatellite 2 experiments it was followed, that weightlessness was the main factor of spaceflight influencing the radiation response of biological matter; (2) biological response to high atomic number Z and high Energy (HZE) particles of cosmic radiation. The last Apollo missions accommodated several experiments on this matter, ALFEMED, Biocore, and Biostack, which determined serious biological damage being produced by the passage of a single high atomic number Z and high energy (HZE) particle. The lateral distribution of biological effects around the trajectory of an high atomic number Z and high energy (HZE) particle was experimentally determined by means of high precision localization methods of the path of individual HZE-particles in relation to single biological cells; (3) radiation dosimetry during spaceflight, and (4) radiation protection guidelines for astronauts.

Author (ESA)

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RADIOBIOLOGICAL PROBLEMS OF EXOBIOLOGY

Gerda Horneck *In* ESA Life-Sci. Res. in Space Sep. 1977 p 279-284 refs

Avail: NTIS HC A16/MF A01

The main problems of exobiology are: (1) origin of life on earth or on any other place in the universe; (2) search for extraterrestrial forms of life; (3) interplanetary transfer of biological matter. In all of these topics the external influx of energy plays an important role. Sunlight, primarily in the ultraviolet (UV) region of the spectrum, was a powerful promoting factor in chemical and biological evolution, and it represents a strong sterilizing agent in space. Terrestrial microorganisms, directly exposed to space hard environment, were supersensitive to solar UV radiation. This is due to the production of non-repairable photoproducts. Terrestrial life is the only example of life we know until now. As long as the origin of life on earth was considered a kind of rare 'happy accident', there was little stimulus to search for extraterrestrial forms of life. However, there is every reason now to consider origin of life as a regular phenomenon during evolution of planets. Therefore, the events which led to the appearance of life on earth, may serve as a model for broader judgements of existence of life on other bodies of the universe.

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GENERAL REMARKS AND TECHNIQUES FOR SPACE CELL BIOLOGY

H. Planel *In* ESA Life-Sci. Res. in Space Sep. 1977 p 295-298

Avail: NTIS HC A16/MF A01

General remarks are given on different objectives of space biology. Possible effects of weightlessness and cosmic rays are discussed. Furthermore, details are given on automatic fixation devices developed in the Toulouse laboratory and a correlative method used in order to study the individual effects of the cosmic heavy ions.

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EFFECTS OF SPACE ENVIRONMENT ON ORGANISM DEVELOPMENT

J. Fautrez *In* ESA Life-Sci. Res. in Space Sep. 1977 p 299-303 refs

Avail: NTIS HC A16/MF A01

Among various epigenetic factors conditioning the embryonic development, gravity was repeatedly shown to be of real importance, at least in vertebrates. It can intervene in normal

development. It influences experimentally the organization of the germ. Experiments in weightlessness will show how gravity can influence the embryonic development. Author (ESA)

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PHYSIOLOGICAL CHANGES IN SPACE TRAVEL AND THE CELLULAR MEMBRANE INVOLVEMENT

L. Bolis *In* ESA Life-Sci. Res. in Space Sep. 1977 p 305-309 refs

Avail: NTIS HC A16/MF A01

After considering physiological problems encountered in space travel the importance of adaptive changes in living organisms is stressed. These changes are observed at organ level. The involvement of cellular membrane functional activities is described. Author (ESA)

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EXPECTED EFFECTS OF WEIGHTLESSNESS ON CELL ULTRASTRUCTURE

M. Bouteille *In* ESA Life-Sci. Res. in Space Sep. 1977 p 311-313 refs Sponsored in part by Inst. Natl. de la Sante et de la Rech. Med., Delegation a la Rech. Sci., and Min. de la Qualite de la Vie (Grant CNRS-E.R.189)

Avail: NTIS HC A16/MF A01

Previous Skylab experiments have shown no drastic change in the ultrastructure of cultured embryonic cells in zero gravity environment. In fact conspicuous alterations of the cell structure are only observed after prolonged and specific action of eventually lethal agents. Further studies may be of interest. Most cells exhibit polarity. The special relationship of cell organelles with respect to each other might be significantly altered by weightlessness. The reconstitution of cell nuclei, after mitosis, could also be influenced. Finally, the rate of kinetics of deoxyribonucleic acid and ribonucleic acid syntheses and the location of their products of synthesis as studied by electron microscopic techniques of localization are expected to be modified. Author (ESA)

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MICROBIOLOGY AND SPACE

C. Hannoun *In* ESA Life-Sci. Res. in Space Sep. 1977 p 315

Avail: NTIS HC A16/MF A01

Several aspects of microbiology, space technology and research are presented. The first approach deals with the conditions of the life of crew during manned flight; the second with the eventual effects of space environment and its main factors on host microorganisms to be brought back on earth at the end of the flight. Another aspect of research in space microbiology is related to the investigations on extraterrestrial life or forms of life. ESA

N78-22664 Brussels Univ. (Belgium). Interdisciplinary Bone Biomechanics Center.

THE APPLICATION OF IN-VIVO MEASUREMENTS OF BONE STRAIN TO SPACELAB PROGRAM. PRELIMINARY RESULTS

F. Burny, M. Hinsenkamp, R. Bourgois, V. Demolder, M. Donkerwolcke, and F. Moulart *In* ESA Life-Sci. Res. in Space Sep. 1977 p 321-326 refs

Avail: NTIS HC A16/MF A01

It is of great interest to measure the incidence of weightlessness on the functional loading of the bones. Strain gages attached to the bone can record their deformation during various activities, for short periods of time. The objective of this study is to compare the mechanical response of a bone of an animal submitted normal gravitation and to weightlessness; long term measurements are therefore needed. A transducer made of a strain gage embedded in epoxy resin (the nucleus) was developed. The nucleus is sealed in a porous shell with epoxy adhesive. The fixation of the transducer will occur by bone ingrowth into the porous shell. Preliminary results are presented. Author (ESA)

N78-22665 Max-Planck-Institut fuer Landarbeit und Landtechnik, Bad Kreuznach (West Germany).

HUMAN RESPONSE TO VIBRATION UNDER DIFFERENT CONDITIONS

H. Dupuis *In* ESA Life-Sci. Res. in Space Sep. 1977 p 327-333 refs

Avail: NTIS HC A16/MF A01

Vibration stress is the vibration environment (of a physical nature) which externally effects the man. Vibration strain may be defined as the sum of all reactions of the human being to the vibration stress. This includes biomechanical behavior of particular parts of the body, physiological reactions of circulation, respiration, muscular system, nervous system, and systems of the senses, subjective intensity of vibration perception, decrease of performance, and injuries to health. Knowledge about these reactions is necessary to evaluate man's vibration stress and to improve technical transportation systems. Author (ESA)

N78-22666 Centre de Recherches de Medecine Aeronautique, Paris (France). Lab. Central de Biologie Aeronautique.

DETERMINATION OF THE BIOMECHANICAL PARAMETERS OF MAN'S VERTEBROMUSCULAR AXIS

P. Quandieu, B. Cailler, L. Pellieux, and P. Borredon *In* ESA Life-Sci. Res. in Space Sep. 1977 p 335-341

Avail: NTIS HC A16/MF A01

A model of man's vertebro-muscular axis shaped as an equal beam stress, the marrow being the neutral line and the bony column exhibiting a buckling phenomenon is presented. This model obeys the law of visco-elasticity. Its deformation under the effect of applied forces or displacements can be calculated using the NASTRAN program (method of finite elements). ESA

N78-22667 Royal Aircraft Establishment, Farnborough (England). Flight Systems Dept.

HUMAN TOLERANCE OF REPEATED SHOCKS

G. R. Allen *In* ESA Life-Sci. Res. in Space Sep. 1977 p 343-349 refs

Avail: NTIS HC A16/MF A01

The first tentative approach to a possible ISO specification covering repeated shocks is restated, and the reasoning and assumptions underlying this approach are explained. A recent elaboration by Peter Payne of the U.S. is outlined and discussed, including important problem areas which need to be resolved. New evidence from the U.K. is presented, and, together with that from Payne, is used to help prepare a further draft specification. A plea is made for the provision of more data and for critical, constructive consideration of the foundations of the approach. Author (ESA)

N78-22668# Joint Publications Research Service, Arlington, Va.

SPACE BIOLOGY AND AEROSPACE MEDICINE, VOL. 11, NO. 6, 1977

14 Feb. 1978 142 p refs Transl. into ENGLISH of Kosm. Biol. Aviakosm. Med. (Moscow), v. 11, no. 6, 1977 139 p (JPRS-70633) Avail: NTIS HC A07/MF A01

Various studies are presented on biological problems encountered during space flight due to weightlessness and lack of exercise. Problems such as hypokinesia, hypothalamus, motion sickness, and blood disorders are examined.

N78-22669# Joint Publications Research Service, Arlington, Va.

CHANGES IN PERIPHERAL BLOOD OF CREW MEMBERS OF THE SALYUT-4 ORBITAL STATION

V. I. Legenkov, R. K. Kiselev, V. I. Gudim, and G. P. Moskaleva *In* its Space Biol. and Aerospace Med., v. 11, No. 6, 1977 (JPRS-70633) 14 Feb. 1978 p 1-12 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow) v. 11, no. 6, 1977 p 3-12

Avail: NTIS HC A07/MF A01

The hematological indices of crew members of the Salyut-4 orbital station and, for the sake of comparison, the same parameters of the crew of Salyut-3 after a 16-day mission are discussed. Author

N78-22670# Joint Publications Research Service, Arlington, Va.

HUMAN ENDURANCE OF RECURRENT +G SUB X ACCELERATIONS

S. R. Kotovskaya, R. A. Vartbaronov, and M. N. Khomenko *In its Space Biol. and Aerospace Med.*, V. 11, No. 6, 1977 (JPRS-70633) 14 Feb. 1978 p 13-21 refs Transl. into ENGLISH from *Kosm. Biol. Aviakosm. Med. (Moscow)*, v. 11 no. 6, 1977 p 12-19

Avail: NTIS HC A07/MF A01

Endurance of recurrent +Gz accelerations that are closer to piloting conditions was examined. It was necessary to study the following: (1) maximum tolerance of recurrent accelerations as related to acceleration gradient, as well as magnitude of maximum and minimum accelerations; (2) distinctions and dynamics of physiological reactions in the course of recurrent exposure to accelerations; and (3) effect of operator activity on endurance of recurrent accelerations. Author

N78-22671# Joint Publications Research Service, Arlington, Va.

EFFECT OF PROLONGED WEIGHTLESSNESS ON METABOLISM OF PROTEINS IN RED AND WHITE SKELETAL MUSCLES OF RATS

V. A. Kazaryan, E. A. Rapoport, L. A. Goncharova, and S. Ya. Bulycheva *In its Space Biol. and Aerospace Med.*, V. 11, No. 6, 1977 (JPRS-70633) 14 Feb. 1978 p 23-27 refs Transl. into ENGLISH from *Kosm. Biol. Aviakosm. Med. (Moscow)*, v. 11 no. 6, 1977 p 19-23

Avail: NTIS HC A07/MF A01

Biosynthesis of protein molecules was examined in different structural components of muscles of the fast and slow type in rats after they had made a 22-day flight on the Cosmos-605 biosatellite. The findings were compared to data obtained at comparable times on animals involved in a concurrent (synchronous) ground-based experiment, in a spacecraft cabin with the same life support systems. Author

N78-22672# Joint Publications Research Service, Arlington, Va.

FLUID-ELECTROLYTE METABOLISM IN ALBINO RATS AFTER A FLIGHT ON THE KOSMOS-690 BIOSATELLITE

N. A. Ilyushko, Ye. A. Ilin, Yu. I. Kondratyev, V. I. Korolkov, L. V. Kokoreva, and Yu. I. Khodkevich *In its Space Biol. and Aerospace Med.*, V. 11, No. 6, 1977 (JPRS-70633) 14 Feb. 1978 p 28-31 refs Transl. into ENGLISH from *Kosm. Biol. Aviakosm. Med. (Moscow)*, v. 11, no. 6, 1977 p 23-26

Avail: NTIS HC A07/MF A01

The fact that maintenance conditions, duration of flight and diet were identical on Cosmos-605 and Cosmos-690 made it possible to make a comparative analysis of the changes in some indices of fluid and electrolyte metabolism in the readaptation period. Author

N78-22673# Joint Publications Research Service, Arlington, Va.

CLINICAL ASPECTS OF CHANGES IN THE NERVOUS SYSTEM IN THE COURSE OF 49-DAY ANTIORTHOSTATIC HYPOKINESIA

T. N. Krupina and A. Ya. Tizul *In its Space Biol. and Aerospace Med.*, V. 11, No. 6, 1977 (JPRS-70633) 14 Feb. 1978 p 32-38 refs Transl. into ENGLISH from *Kosm. Biol. Aviakosm. Med. (Moscow)*, v. 11, no. 6, 1977 p 26-31

Avail: NTIS HC A07/MF A01

The condition of the nervous system of nine individuals ranging in age from 20 to 35 years was studied in the course of 49-day antiorthostatic hypokinesia. In addition to clinical tests, thermoregulation and the muscular system were monitored once every 7-10 days. Subjects were questioned about their well-being daily. Author

N78-22674# Joint Publications Research Service, Arlington, Va.

STATE OF RAT MUSCLE MOTONEURON SYSTEM IN THE CASE OF RESTRICTED MOBILITY

Ye. I. Iliina-Kakuyeva and V. V. Portugalov *In its Space Biol. and Aerospace Med.*, V. 11, No. 6, 1977 (JPRS-70633) 14 Feb. 1978 p 39-44 refs Transl. into ENGLISH from *Kosm. Biol. Aviakosm. Med. (Moscow)*, v. 11, no. 6, 1977 p 31-35

Avail: NTIS HC A07/MF A01

The condition of motor elements (nerves) in muscles subjected to hypokinesia is discussed. Atrophying muscles in astronauts due to lack of physical exercise and weightlessness are also considered. J.A.M.

N78-22675# Joint Publications Research Service, Arlington, Va.

EFFECT OF PHYSICAL LOADS ON SOME PARAMETERS OF LIPID AND CARBOHYDRATE METABOLISM DURING HYPOKINESIA

T. M. Lobova and A. V. Chernyy *In its Space Biol. and Aerospace Med.*, V. 11, No. 6, 1977 (JPRS-70633) 14 Feb. 1978 p 45-51 refs Transl. into ENGLISH from *Kosm. Biol. Aviakosm. Med. (Moscow)*, v. 11, no. 6, 1977 p 36-40

Avail: NTIS HC A07/MF A01

For studies of lipid and carbohydrate metabolism, experiments were conducted on 140 white, male rats weighing 150-230g with different amounts of motor activity. The first group of animals was on an unrestricted regimen, in ordinary vivarium cages, with 5 animals in each; the second group was on an unrestricted regimen with measured physical exercise (swimming at 30-32 deg temperature). The third group of animals was kept in small cages that restricted mobility; in the fourth group, hypokinesia was combined with swimming, following a regimen analogous to the one of the second group. Author

N78-22676# Joint Publications Research Service, Arlington, Va.

CIRCADIAN CHANGES IN ACTIVITY OF THE HYPOTHALAMUS-HYPOPHYSIS-ADRENAL SYSTEM IN ANIMALS DIFFERING IN INDIVIDUAL RADIO-SENSITIVITY

Yu. P. Druzhinin, Ye. I. Zubkova-Mikhaylova, and G. N. Podluzhnaya *In its Space Biol. and Aerospace Med.*, V. 11, No. 6, 1977 (JPRS-70633) 14 Feb. 1978 p 52-58 refs Transl. into ENGLISH from *Kosm. Biol. Aviakosm. Med. (Moscow)*, v. 11, no. 6, 1977 p 40-45

Avail: NTIS HC A07/MF A01

A study was undertaken to determine the activity of the hypothalamus-hypophysis-adrenal system at different times of day in specimens differing in sensitivity to acute radiation. The epinephrine test was used to select two groups of animals differing in radiosensitivity. These tests were conducted on male Wistar rats weighing 180-200g. J.A.M.

N78-22677# Joint Publications Research Service, Arlington, Va.

FUNCTIONAL STATE OF THE RAT LIVER UNDER THE PRIMARY DELETERIOUS EFFECT OF IMPACT ACCELERATIONS

Ye. Ye. Simonov and K. B. Ryklin *In its Space Biol. and Aerospace Med.*, V. 11, No. 6, 1977 (JPRS-70633) 14 Feb. 1978 p 59-65 refs Transl. into ENGLISH from *Kosm. Biol. Aviakosm. Med. (Moscow)*, v. 11, no. 6, 1977 p 45-50

Avail: NTIS HC A07/MF A01

A parallel study of histology and histochemistry of the liver was conducted for animals exposed to impact accelerations of landing that did not elicit primary damage in the lungs. Along with the histological and histochemical study of hepatic tissue of experimental animals, biochemical composition of blood was also examined. Experiments were conducted on 184 male albino rats weighing 150 to 300 g, 40 of which served as a biological control, while the rest were divided into two almost equal experimental groups and exposed to impact accelerations in the back-chest direction on a special stand. [1.5]. The landing rate

constituted 3 m/s and accelerations constituted 410 plus or minus 50 units (U) in the first experimental group, 10 m/s and 465 plus or minus 50 U, respectively, in the second. Author

N78-22678# Joint Publications Research Service, Arlington, Va.

MODEL OF MOTION SICKNESS IN DOGS USED TO EVALUATE EFFICACY OF PHARMACOLOGICAL AGENTS

L. A. Radkevich *In its Space Biol. and Aerospace Med.*, V. 11 No. 6, 1977 (JPRS-70633) 14 Feb. 1978 p 66-69 refs Transl. into ENGLISH from *Kosm. Biol. Aviakosm. Med. (Moscow)*, v. 11, no. 6, 1977 p 50-53

Avail: NTIS HC A07/MF A01

The task was undertaken of creating conditions for inducing motion sickness in dogs, under which the occurring accelerations would affect as many as possible of the receptor elements of the vestibular system, thus inducing maximum accumulation of stimuli. Several agents were tested on the selected group of animals susceptible to motion sickness: marezine, an antihistamine (50 mg/kg); tigan, bromotigan (100 mg/kg), as well as metachlorpromide (1 mg/kg), which are antiemetics; diphenidol (2 mg/kg), a cholinolytic, and a few other products. These studies warrant the conclusion that products in the cholinolytic group and, to a lesser extent, antihistamines have protective properties with regard to canine motion sickness. A similar effect was obtained in studies on humans with the use of these groups of products. This confirms the fact that dogs are quite suitable biological objects for preliminary screening of pharmacological agents that prevent motion sickness. Author

N78-22679# Joint Publications Research Service, Arlington, Va.

HYGIENIC APPRAISAL OF WATER REGENERATED FROM DIVERSE FLUID-CONTAINING WASTE

Z. P. Pak, Yu. S. Koloskova, and S. V. Chizhov *In its Space Biol. and Aerospace Med.*, V. 11, No. 6, 1977 (JPRS-70633) 14 Feb. 1978 p 75-82 refs Transl. into ENGLISH from *Kosm. Biol. Aviakosm. Med. (Moscow)*, v. 11, no. 6, 1977 p 57-63

Avail: NTIS HC A07/MF A01

The results are given of a comprehensive hygienic evaluation of diverse specimens of regenerated water, according to the findings of physicochemical and organeleptic studies as well as investigation of physiological effects of this factor on fluid and mineral metabolism in man. Author

N78-22680# Joint Publications Research Service, Arlington, Va.

VARIANTS OF CONTROL FOR AN ECOSYSTEM THAT IS CLOSED WITH REGARD TO EXCHANGE OF GASES, WITH PERIODICALLY FUNCTIONING AUTOTROPHIC COMPONENT

V. G. Shabelnikov *In its Space Biol. and Aerospace Med.*, V. 11, No. 6, 1977 (JPRS-70633) 14 Feb. 1978 p 83-89 refs Transl. into ENGLISH from *Kosm. Biol. Aviakosm. Med. (Moscow)*, v. 11, no. 6, 1977 p 63-68

Avail: NTIS HC A07/MF A01

A study is continued of the possibility of controlling an ecosystem, closed with respect to gas exchange, by means of periodic function of an autotrophic component. The objective of such control is to maintain a stable atmosphere in the ecosystem, the composition of which changes periodically but always remains within the range tolerated by man. Author

N78-22681# Joint Publications Research Service, Arlington, Va.

EFFECT OF SEDUXEN ON THE COURSE OF EXPERIMENTAL HYPOKINESIA

L. V. Zorya *In its Space Biol. and Aerospace Med.*, V. 11, No. 6, 1977 (JPRS-70633) 14 Feb. 1978 p 90-97 refs

Transl. into ENGLISH from *Kosm. Biol. Aviakosm. Med. (Moscow)*, v. 11, no. 6, 1977 p 68-73

Avail: NTIS HC A07/MF A01

The pathological changes occurring with hypokinesia are related in certain ways to the time and conditions under which it is induced. Thus, it is believed that the functional changes observed for the first 2 weeks of limited movement are aggravated, by the effects of emotional stress on the animal or human organism. Of all the reactions of the organisms to restricted mobility, impairment of oxygen balance plays a rather significant role, and it is also manifested the most distinctly in the first 16 days of hypokinesia. On the basis of these considerations, seduxen was used to remove emotional stress and, at the same time, normalize disturbances referable to oxygen balance. According to the literature, this drug has both tranquilizing-sedative and antihypoxic properties. Author

N78-22682# Joint Publications Research Service, Arlington, Va.

EFFECTS ON THE HUMAN BODY OF COMPLEX TESTS SIMULATING FLIGHT CONDITIONS ON THE SALYUT-4 SPACECRAFT

V. P. Dzedzichuk, N. Ye. Panferova, and Ye. V. Kukolevskaya *In its Space Biol. and Aerospace Med.*, V. 11, No. 6, 1977 (JPRS-70633) 14 Feb. 1978 p 98-101 refs Transl. into ENGLISH from *Kosm. Biol. Aviakosm. Med. (Moscow)*, v. 11, no. 6, 1977 p 74-75

Avail: NTIS HC A07/MF A01

The studies were conducted in a spacecraft mockup. The living conditions were made as similar as possible to inflight conditions. There were two male participants in tests lasting 50 days. During the tests, the pulse rate of the subjects was counted every 3 hrs, arterial pressure was measured twice a day. A functional test, 40 squats/90 s, was performed every 2 days. The subjects performed physical exercises, the amount of which was adjusted to the inflight level. The volume of the foot was measured in seated position and while standing for 1.5 min, before and after the tests, using a water plethysmometer. Determination was made of rate of propagation of the pulse wave in seven parts of the vascular system. The capillaroscopic appearance of the eponychium of the 4th finger and first toe was examined. A passive 20-min orthostatic test and a test on a bicycle ergometer with stepped up increase in load were conducted. The subject's well-being was satisfactory during the tests. They adapted to the conditions by the 6th-10th day, which is consistent with the time of adaptation to flight conditions. Author

N78-22683# Joint Publications Research Service, Arlington, Va.

MORPHOLOGY OF BONE MARROW CELLS OF RATS ON THE KOSMOS-605 BIOSATELLITE

V. N. Shuets and N. P. Krivenkova *In its Space Biol. and Aerospace Med.*, V. 11, No. 6, 1977 (JPRS-70633) 14 Feb. 1978 p 102-105 refs Transl. into ENGLISH from *Kosm. Biol. Aviakosm. Med. (Moscow)*, v. 11, no. 6, 1977 p 75-78

Avail: NTIS HC A07/MF A01

A study was done of bone marrow morphology in rats who had spent 22 days in flight on the Kosmos-605 biosatellite and examined on the 2d and 27th day after landing. In order to study the size of the population of hemopoietic stem cells in rats that had been in orbital flight, the method of cultivation of bone marrow cells in the organism of lethally irradiated animals Cs-137 gamma rays, were used. For this purpose, (CBAx57B1)F1 mice and Wistar rats were exposed to Cs-137 gamma rays, in a dosage of 900 R delivered at the rate of 37 R/min. One day after irradiation, recipients were given intravenous injections of a suspension of bone marrow cells taken from rats on the 2d and 27th day after a 22-day flight onboard Kosmos-605. It was found that only negligible changes, manifested by depression of erythroblasts and appearance of altered megakaryocytes, occur in the bone marrow cells of rats following a 22-day space flight. Author

N78-22684# Joint Publications Research Service, Arlington, Va.

BLOOD PLASMA CORTICOSTERONE IN RATS AFTER FLIGHT IN KOSMOS-690 BIOSATELLITE

N. F. Kalita and R. A. Tigranyan *In its Space Biol. and Aerospace Med.*, V. 11 No. 6, 1977 (JPRS-70633) 14 Feb. 1978 p 106-107 refs Transl. into ENGLISH from *Kosm. Biol. Aviakosm. Med. (Moscow)*, v. 11, no. 6, 1977 p 78-79

Avail: NTIS HC A07/MF A01

Data are given from studies of corticosterone concentration in blood plasma of rats after completion of a 20.5-day space experiment in the Kosmos-690 biosatellite. The studies indicate that exposure to 800 rad gamma-radiation under space flight conditions does not induce significant changes in blood plasma corticosterone content, whereas exposure to low doses (220 rad) is associated with a reliable increase in concentration of this hormone in blood. Author

N78-22685# Joint Publications Research Service, Arlington, Va.

EXCITABILITY OF NEUROMUSCULAR SYSTEM OF MONKEYS DURING ORTHOSTATIC TESTS

G. S. Belkaniya *In its Space Biol. and Aerospace Med.*, V. 11, No. 6, 1977 (JPRS-70633) 14 Feb. 1978 p 108-112 refs Transl. into ENGLISH from *Kosm. Biol. Aviakosm. Med. (Moscow)*, v. 11, no. 6, 1977 p 79-81

Avail: NTIS HC A07/MF A01

The monosynaptic H-reflex was studied in 15 Macaca rhesus monkeys. The animals were immobilized on the platform of a turntable on their abdomen. Square-wave pulses lasting 0.05-0.1 ms delivered by an electronic stimulator were used to stimulate the tibial nerve. The active spherical electrode was secured in the popliteal fossa and the silent (positive) plate electrode was placed on the shaved anterior aspect of the thigh. The studies revealed that the method of monosynaptic testing (H-reflex) on monkeys is quite informative. One of the real manifestations of antigravity function in them is the increase in excitability of motoneurons and number of activated motor units. Intensification of functional activity of the neuromuscular system, induced by orthostatic orientation of the body in space, is one of the chief factors providing for a certain level of background activation of central nervous structures and organization of antigravity function of the organism. Author

N78-22686# Joint Publications Research Service, Arlington, Va.

SANITARY AND HYGIENIC EVALUATION OF WATER REGENERATED FROM URINE

N. I. Omelyanets, L. I. Artemenko, L. P. Vlasova, N. V. Martyshchenko, and S. I. Nozdrachev *In its Space Biol. and Aerospace Med.*, V. 11, No. 6, 1977 (JPRS-70633) 14 Feb. 1978 p 113-117 refs Transl. into ENGLISH from *Kosm. Biol. Aviakosm. Med. (Moscow)*, v. 11, no. 6, 1977 p 82-84

Avail: NTIS HC A07/MF A01

Regeneration of water by means of freezing and subsequent additional treatment by the sorption method, addition of salts and decontamination with ionic silver yields water from human urine, which meets the sanitary and hygienic requirements for potable water. The obtained results are consistent with the data's previous investigations. On the basis of these studies, this technological system is recommended to provide water for crews of spacecraft. Author

N78-22687 Stanford Univ., Calif.

NONINVASIVE DETERMINATION OF BONE STIFFNESS
Ph.D. Thesis

Kent Roy Petersen 1977 216 p

Avail: Univ. Microfilms Order No. 78-02216

A low frequency impedance probe method for the determination of the bending stiffness of the long bones was developed. The arm or leg was constrained at each end, a transverse harmonic

force was applied near the midspan, and the driving point impedance was measured. Initial experiments on monkey arm specimens demonstrated that the soft tissue between the probe and the bone was causing typical errors of 30 to 70 percent in the determination of the bone stiffness. This unpredictable response or masking effect of the soft tissue was the major problem which prevented previous investigators from developing a noninvasive method. This problem was solved by modifying the shape of the impedance probe, improving the supports, and using appropriate data analysis. The typical error in determining the bone stiffness was reduced to less than 15 percent with possibilities for future improvement. Dissert. Abstr.

N78-22688 Wyoming Univ., Laramie.

SPECTRAL ANALYSIS OF AUDITORY EVOKED POTENTIALS WITH PSEUDORANDOM NOISE EXCITATION
Ph.D. Thesis

Sarabudla Narasimha Reddy 1977 153 p

Avail: Univ. Microfilms Order No. 78-00178

There is a great demand to test human auditory system with complex signals rather than pure-tones, as is often done, and to clarify the neurological and audiological aspects of the information so obtained. Pseudorandom noise (PRN) of various bandwidths was used in testing four normal and three hearing impaired subjects by means of auditory evoked potentials. Taking advantage of the advanced computers and signal processing techniques now available, the evoked potentials were studied in the frequency domain rather than the time domain. The power spectral densities of the audio PRN stimuli and their respective evoked potentials were obtained by means of spectral analysis. Transfer and coherence functions were also obtained. Dissert. Abstr.

N78-22689 Marquette Univ., Milwaukee, Wis.

A MULTIPLE INDICATOR-DILUTION STUDY OF TRANSPORT AND METABOLIC PROCESSES IN THE LUNG
Ph.D. Thesis

Michael Richard Prisco 1977 168 p

Avail: Univ. Microfilms Order No. 78-01929

A mathematical model which describes both diffusional and saturable uptake of a permeating substance and subsequent metabolism in the extravascular space of an organ was derived. This model of saturable uptake and metabolism describes the space and time variations of the concentrations of a permeating substance and its metabolite in both the vascular and extravascular spaces. A numerical technique was presented for the solution of the model which consists of four nonlinear partial differential equations. An experiment involving prostaglandin E1 PGE1 was analyzed using the modeling developed in this study. This analysis has afforded some insight into the nature of the PGE1 uptake process in the cat lung as well as an estimate of the kinetic constants for uptake and metabolism. Using these constants, model simulations of experiments performed at varying doses and blood flow rates were carried out. Dissert. Abstr.

N78-22690 New York Univ., N. Y.

THE EFFECT OF VARIOUS AUGMENTED VISUAL FEEDBACK TECHNIQUES ON ADULT SKELETAL MUSCLE
Ph.D. Thesis

Raymond Louis Blakely 1977 142 p

Avail: Univ. Microfilms Order No. 78-03002

The training effect of various visual feedback methods on a muscle in which the neuromotor mechanisms are intact, but the muscle is not normally under voluntary control was determined by training the abductor digiti minimi of the nondominant foot of 60 volunteers. The following feedback methods were used: electromyographic signals displayed on an oscilloscope, reflected image from a mirror, direct visual feedback without biomechanical or bioelectrical devices, and no visual feedback. All four visual feedback methods resulted in a significant difference at the 0.05 level between group mean pretraining and group mean posttraining scores. Dissert. Abstr.

N78-22691 Missouri Univ., Columbia.
COMPARISON OF BLOOD FLOW IN NORMAL SUBJECTS DURING APPLICATIONS OF HEAT, COLD, AND EXERCISE AT THERAPEUTIC LEVELS Ph.D. Thesis

Kenneth Lloyd Knight 1977 257 p
 Avail: Univ. Microfilms Order No. 7803730

There was a significant exercise effect and a significant temperature effect for both total blood flow and minimum blood flow, and a significant exercise effect for peak blood flow. Within non exercise there was a temperature effect, however, there was not a temperature effect within exercise. Heat applications caused an increase in both peak and total blood flow. Cold caused a decrease in blood flow during the 25 minute cold pack application and during the 20 minute post-application period. Both total blood flow and peak blood flow were significantly greater during cold exercise cryokinetics, than during heat applications.
 Dissert. Abstr.

N78-22692 Maryland Univ., Baltimore.
THE ORGANIZATION AND AUTONOMIC INNERVATION OF THE VASCULAR SYSTEM OF THE MAMMALIAN SPINAL CORD; AN ULTRASTRUCTURAL STUDY Ph.D. Thesis

Juanita J. Anders 1976 235 p
 Avail: Univ. Microfilms Order No. 78-00650

There have been no systematic ultrastructural examinations of either the vasculature of the spinal cord or of the autonomic innervation of these vessels, in spite of their importance to current investigation on blood flow in the spinal cord, spinal cord injury and possible functional regeneration after injury. Electron microscopic techniques were applied to a survey of the vessels comprising this system and to an analysis of their autonomic innervation. The widespread distribution of autonomic innervation to all types of vessels supplying the spinal cord suggests that autonomic neurovascular influences on the spinal vasculature may be correspondingly broad. The role that these autonomic nerves may play in the dynamic or tonic regulation of extrinsic and intrinsic vessels of the spinal cord is of great potential importance.
 Dissert. Abstr.

N78-22693 Rutgers - The State Univ., New Brunswick, N. J.
MODEL-BASED HEMODYNAMIC INDICATORS OF LEFT VENTRICULAR PERFORMANCE IN ACUTE MYOCARDIAL INFARCTION Ph.D. Thesis

Yasha M. Kresh 1977 234 p
 Avail: Univ. Microfilms Order No. 7805098

A mathematical equivalent pressure source model for the pumping left ventricle was adopted. The generator pressure and the internal source impedance were computed experimentally from hemodynamic measurements of the left ventricular pressure and flow. Analytical techniques and experimental methods were developed which assessed the function of the heart as a pulsating pump independently of the aortic input impedance. The analytical performance indicators were computed from a sequential analysis of the source parameters in progressive acute myocardial infarction. The pump performance status as predicted analytically was compared to the corresponding set of measurable parameters suggested by the model.
 Dissert. Abstr.

N78-22694 Ohio State Univ., Columbus.
A CARDIAC ARRHYTHMIA MONITORING SYSTEM Ph.D. Thesis

Michael Ralph Kramer 1977 321 p
 Avail: Univ. Microfilms Order No. 7805872

The R-R histogram monitoring system enabled the patient to be monitored during his daily routine. The system provided both graphic and numerical information concerning the cardiac rhythm. This information was used to determine the type and the frequency of the arrhythmias that were present. Four R-R histogram data collection units were built and tested for accuracy using clinical data. The results indicated an overall accuracy of approximately 95%.
 Dissert. Abstr.

N78-22695 Iowa State Univ. of Science and Technology, Ames.
NONINVASIVE, REAL-TIME EXAMINATION OF ATRIO-VENTRICULAR CONDUCTION SYSTEM Ph.D. Thesis

Masayuki Ishijima 1977 154 p
 Avail: Univ. Microfilms Order No. 78-05941

The theoretical aspects and the limitations of the noninvasive method for examining the bundle of His activity are discussed. The bundle of His activity, as represented by the H complex of the His bundle electrogram, was modeled. The calculated waveforms had agreement with those which were actually obtained by a catheter electrode. In the calculations which pertained to the H complex, the size of the ring electrode on the catheter, the nonlinear velocity of the depolarization wavefront, and the effect of the bandpass filter were also considered.
 Dissert. Abstr.

N78-22696* Washington Univ., Seattle. Div. of Nuclear Medicine.

TOTAL BODY CALCIUM ANALYSIS USING THE Ca-12(n, ALPHA) Ar-37 REACTION Final Technical Report, 1 Oct. 1976 - 1 Dec. 1977

T. K. Lewellen and Wil B. Nelp 1 Dec. 1977 31 p refs
 (Contract NAS9-13029)
 (NASA-CR-151675) Avail: NTIS HC A03/MF A01 CSDL 06P

A low dose neutron activation technique was developed to measure total body calcium in vivo. The effort had included development of irradiation and processing facilities and conduction of human studies to determine the accuracy and precision of measurement attainable with the systems.
 Author

N78-22697# Royal Aircraft Establishment, Farnborough (England).

THE EFFECT OF THE BENZODIAZEPINE ADUMBRAN ON THE RESTING AND SLEEP EEG AND ON THE VISUAL EVOKED POTENTIAL IN ADULT MAN

G. Dolce and E. Kaemmerer Oct. 1976 14 p refs Transl. into ENGLISH from Med. Welt (West Ger.), v. 67, no. 9, 1967 p 510-514

(RAE-Lib-Trans-1906; BR55679) Avail: NTIS HC A02/MF A01; HMSO;PHI

The administration of 20 to 40mg of Adumbran to 27 adults gave rise to no significant clinical changes in vigilance in the waking state and no appreciable change in the EEG pattern, particularly as regards frequency. In tests to determine psychic disturbances after eliminating or shortening paradoxical sleep, the effect of Adumbran on the sleep EEG was recorded polygraphically. The overall duration of sleep lengthened under medication, with a simultaneous intensification of slow sleep. Paradoxical sleep was only shortened by an insignificant amount and was not suppressed. The visual evoked potential suffered only a slight reduction in amplitude, while there was no appreciable increase in latency.
 Author

N78-22698# Institut de Mecanique des Fluides de Toulouse (France). Groupe de Rheologie.

A MODEL OF BLOOD FLOWS STUDIES

D. P. Ly, D. Bellet, Y. Fanjeau, and A. Bousquet 1977 17 p refs Presented at the Intern. Conf. on Bioeng., Cape Town, Apr. 1977

Avail: NTIS HC A02/MF A01

The typical effects of a conical geometry of a duct were studied. This particular geometry was chosen owing to the common occurrence of the reduction of blood vessel diameter as one moves away from the heart and an increase in diameter just before a bifurcation. The regular variation of the useful flow area in the different cases was taken into consideration. Pressure gradients were obtained by the superposition of a constant component and a fluctuating component which was a sinusoidal function of time. The determination of velocity profiles in different sections and the flow rates were made at different instants with the aid of two complementary methods: a theoretical method, based on perturbations leading to analytical solutions, and an experimental method using a laser anemometer. The aqueous solutions at different concentrations of high polymers were used to simulate blood.
 Author

N78-22699# Fachhochschule, Munich (West Germany).
PRESSURE MEASUREMENTS OF THE WALL AFTER BIFURCATIONS AND VISUAL OBSERVATION OF STREAMING FLUID IN GLASS MODELS OF BIFURCATIONS

Dieter Liepsch 1977 16 p refs Presented at the Intern. Conf. on Bioeng., Cape Town, Apr. 1977
 Avail: NTIS HC A02/MF A01

A model consisting of a continuous tube with two branching tubes, one behind the other, was used to simulate branching conditions in the human arterial system. Flow conditions of a birefringent solution were observed with the aid of a tension optical apparatus. The static pressure on the wall of the continuous tube was measured before and after the branching tubes. Immediately after the ramification a sudden increase of pressure occurs in the continuous tube, depending on the flow rate. In the circulatory system this zone of higher static pressure can stress the artery walls and in some cases lead to wall damage and increased particle deposition. Author

N78-22700# Cape Town Univ. (South Africa). Dept. of Bioengineering.
THE INFLUENCE OF STRAIN RATE ON THE MECHANICAL PROPERTIES OF HUMAN SKIN AND SUBCUTANEOUS TISSUE

J. F. North 1977 13 p refs Presented at the Intern. Conf. on Bioeng., Cape Town, Apr. 1977
 Avail: NTIS HC A02/MF A01

The influence of strain rate on the mechanical properties of human skin and subcutaneous tissue were investigated. Tests were carried out using a drop tower and a hydraulic testing machine. Strain rates from 0.03 to 1500/s were examined and stress-strain profiles are presented. Human skin and subcutaneous tissue were strain rate sensitive within the range examined and possessed definite load distribution and energy absorption properties. The importance of structural integrity and the interaction of tissues resisting mechanical forces is emphasized. Author

N78-22701# National Research Inst. for Mathematical Sciences, Pretoria (South Africa).
SIMULATION RESPONSES OF A CONTROL MODEL OF HUMAN SKELETAL MUSCLE

H. Hatze 1977 9 p refs Presented at the Intern. Conf. on Bioeng., Cape Town, Apr. 1977
 Avail: NTIS HC A02/MF A01

Results are presented of the simulation of isometric force development of skeletal muscle when the stimulation is switched on and off abruptly, i.e. when bang-bang controls are applied. It is shown that the resulting forcing function is continuous and exhibits all the special features of isometric force production observed experimentally. It is suggested that the present control model of skeletal muscle is well suited for inclusion in a more complex model of the human musculoskeletal system. Author

N78-22702# Tel-Aviv Univ. (Israel). School of Engineering.
A NEW METHOD FOR DETERMINING THE ACTIVE FORCE SYSTEM IN LOWER LIMBS DURING HUMAN LOCOMOTION

M. Arcan, M. A. Brull, R. Scholten (G.m.b.H., Friedrichshafen, West Germany), and H. Rohrlé (G.m.b.H., Friedrichshafen, West Germany) 1977 18 p refs Presented at the Intern. Conf. on Bioeng., Cape Town, Apr. 1977
 Avail: NTIS HC A02/MF A01

The method for measuring the contact pressure distribution between the foot and the ground was extended to gait and locomotion analysis; and the foot-ground pressure pattern characteristics were related to the kinematics of the body. A method for calculating muscle forces based on logical physical assumptions is presented. Author

N78-22703# Witwatersrand Univ., Johannesburg (South Africa). School of Mechanical Engineering.
MODELLING THE THERMAL EFFECTS OF BLOOD FLOW IN HUMAN SKIN

A. M. Patterson 1977 11 p refs Presented at the Intern. Conf. on Bioeng., Cape Town, Apr. 1977
 Avail: NTIS HC A02/MF A01

Existing models of the thermal behavior of human skin are briefly reviewed. The availability of precisely measured temperature profiles taken from the outer 2 to 3 mm of skin of a human forearm has made possible an analytical model relating such variables as skin blood flow, skin surface heat loss, skin surface temperature, and other geometrical and thermal parameters. Agreement was obtained between experimental data and numerical evaluations of model predictions. Author

N78-22704# Witwatersrand Univ., Johannesburg (South Africa).
DYSFUNCTIONING OF THE FLUID MECHANICAL CRANIO-SPINAL SYSTEMS AS REVEALED BY STRESS/STRAIN DIAGRAMS

K. Lewer Allen and E. A. Bunt 1977 21 p refs Presented at the Intern. Conf. on Bioeng., Cape Town, Apr. 1977
 Avail: NTIS HC A02/MF A01

The functioning of the two fluid mechanical systems of the brain; the cerebrospinal fluid and cerebral vascular, were related to their pressure levels and outflow control. Information is presented concerning both normal and pathological functioning of these systems which can be derived from stress-strain diagrams of the human brain, making use of either a lumbar puncture or a ventricular tapping. Author

N78-22705*# Massachusetts General Hospital, Boston.
ZERO GRAVITY AND CARDIOVASCULAR HOMEOSTASIS. THE RELATIONSHIP BETWEEN ENDOGENOUS HYPERPROLACTINEMIA AND PLASMA ALDOSTERONE SUPPLY
 Report, 1 Feb. 1977 - 31 Jan. 1978

Edgar Haber, Richard N. Re, Ione A. Kourides, Albert C. Weihl, and Farahe Maloof 31 Jan. 1978 22 p refs
 (Contract NAS9-15182)
 (NASA-CR-151715) Avail: NTIS HC A02/MF A01 CSCL 06S

Prolactin, thyrotropin and aldosterone were measured by radioimmunoassay and plasma renin activity by the radioimmunoassay of angiotensin I in normal women before and after the intravenous injection of 200 micrograms of thyrotropin releasing hormone. Prolactin increased at 15 minutes following thyrotropin releasing hormone. Plasma renin activity was not different from control levels during the first hour following the administration of thyrotropin releasing hormone, nor did the plasma aldosterone concentration differ significantly from the control levels during this period. However, with upright posture, an increase in aldosterone and in plasma renin activity was noted, demonstrating a normal capacity to secrete aldosterone. Similarly, no change in aldosterone was seen in 9 patients with primary hypothyroidism given thyrotropin releasing hormone, despite the fact that the increase in prolactin was greater than normal. These data demonstrate that acutely or chronically elevated serum prolactin levels do not result in increased plasma aldosterone levels in humans. Author

N78-22706# Naval Aerospace Medical Research Lab., Pensacola, Fla.

THE EFFECTS OF STIMULUS ORIENTATION AND RESPONSE BIAS UPON DYNAMIC VISUAL ACUITY, Interim Report

Lawrence H. Frank 19 Aug. 1977 19 p refs
 (AD-A047827; NAMRL-1241) Avail: NTIS HC A02/MF A01 CSCL 05/10

In experiments on dynamic visual acuity, test stimuli are characteristically presented in various orientations to the subject as they are moved across his visual field. However, current literature on static visual acuity indicates that acuity thresholds vary as a function of stimulus orientation. Static acuity thresholds are reported to be lower for the vertical and horizontal orientations, whereas, higher thresholds are found for oblique orientations. This has been referred to as the 'oblique effect.' It is not known whether the same phenomenon operates in dynamic visual acuity. Hence, it is of interest to determine whether such an effect occurs under moving target conditions. The present

studies utilized the up-and-down method to determine acuity thresholds for eight orientations (4 cardinal and 4 oblique) of Landolt Cs over three angular velocities. Response-bias scores were computed for each subject and compared to the threshold data. A significant orientation effect was found for both dynamically and statically presented targets, but it was not an oblique effect. That is, thresholds were not consistently higher for oblique orientations. The data further revealed a significant negative rank-order correlation between the subject's response-bias scores and their threshold scores across orientations, for dynamically presented targets. The data were suggestive that a subject's response bias contributes to the error in the measurement of psychophysically derived acuity thresholds. Author (GRA)

N78-22707# Army Research Inst. of Environmental Medicine, Natick, Mass.

DEVELOPMENT AND EVALUATION OF HEAT TRANSFER EQUATIONS FOR A MODEL OF CLOTHED MAN

J. M. Stewart and R. F. Goldman Mar. 1977 20 p
(DA Proj. 3E7-62777-AB-45)
(AD-A050542; USARIEM-M-10/77) Avail: NTIS
HC A02/MF A01 CSCL 06/19

Two equations have been derived for heat transfer from a cylinder. The cylinder had a wet surface and was wrapped with a layer having uniform properties. One equation is a special case of the other, a more general equation. The equation for the special case is equivalent to equations currently being used to describe heat transfer from clothed men. The special case implies that current equations are valid when sweat evaporates at the body skin surface only, i.e. no evaporation may occur at the clothing surface. Both (forms of the) equations gave good representation of the steady state data which were obtained from studies on a clothed, heated manikin with either a wet or dry skin ($r = 0.99$). The clothing resembled industrial clothing. Skin (and hence clothing) wetness increased the conductance of sensible heat by 32%. Failure to account for this effect caused insensible heat transfer to be underestimated by 13% and a systematic error was introduced into the prediction of total heat transfer. Author (GRA)

N78-22708# Franklin Inst. Research Labs., Philadelphia, Pa.
COMPUTER SIMULATION OF HUMAN THORACIC SKELETAL RESPONSE: ABSTRACT SUMMARY REPORT
Final Report, 26 Jun. 1975 - 31 Jan. 1977

M. M. Reddi and H. C. Tsai Feb. 1977 25 p
(Contract DOT-HS-5-01180)
(PB-276705/1; FURL-F-C4216-1; DOT-HS-803208) Avail:
NTIS HC A02/MF A01 CSCL 13F

The work consisted of a study and selection of techniques to simulate rib fracture, restraint systems, and experimental constraints as well as a total of five simulations of actual cadaver experiments consisting of three with impactors, one with belt restraints and one with an air bag equipped energy absorbing steering column. GRA

N78-22709# Franklin Inst. Research Labs., Philadelphia, Pa.
COMPUTER SIMULATION OF HUMAN THORACIC SKELETAL RESPONSE-THEORY, VOLUME 1 Final Report, 26 Jun. 1975 - 31 Jan. 1977

M. M. Reddi and H. C. Tsai Feb. 1977 224 p refs
(Contract DOT-HS-5-01180)
(PB-276706/9; FURL-F-C4216-1-Vol-1; DOT-HS-803209-Vol-1)
Avail: NTIS HC A10/MF A01 CSCL 13F
For abstract, see N78-22708.

N78-22710# Health Effects Research Lab., Research Triangle Park, N. C. Clinical Studies Div.

HUMAN EXPOSURE SYSTEM FOR CONTROLLED OZONE ATMOSPHERES

Arthur A. Strong Oct. 1977 24 p refs
(PB-276618/6; EPA-600/1-77-048) Avail: NTIS
HC A02/MF A01 CSCL 06B

An experimental exposure system for health effects research in environmental pollutants that permits the introduction and

control of ozone (O3) to an acrylic plastic chamber in which a human subject actively resides is described. Ozone is introduced into the chamber air intake and is controlled by an electro-mechanical feedback system operating from the electrical output of an O3 gas analyzer. A continuous record of O3 concentration, temperature, and dew point is provided by an analog multipoint strip chart recorder. If the chamber O3 levels exceed preset limits, an alarm system automatically stops the O3 flow and switches the chamber exhaust to purge operation. A complete air exchange occurs every 72 seconds. In an emergency, the chamber can be purged in 190 seconds. Chamber temperature and humidity are dependent upon conditioned laboratory air. GRA

N78-22711# Unilever Research, Vlaardingen (Netherlands).
DIETARY FATS AND ARTERIAL THROMBOSIS: EFFECTS AND MECHANISM OF ACTION

Gerard Hornstra [1977] 27 p refs Submitted for publication
Avail: NTIS HC A03/MF A01

Dietary fats have a pronounced effect on arterial thrombosis: in rats, long-chain saturated fatty acids are thrombogenic, oleic acid is neutral, and linoleic acid is anti-thrombotic. These effects are likely to be mediated, at least in part, by changes in platelet fatty acid composition and, consequently, platelet function. Blood coagulability and differences in vitamin E intake seem of no (or minor) importance. In man, dietary linoleic acid inhibits platelet aggregation and other parameters of platelet activation. Dietary fat effects on vascular prostacyclin formation have not yet been found. Author (ESA)

N78-22712# Syracuse Research Corp., N. Y. Center for Chemical Hazard Assessment.

INFORMATION PROFILES ON POTENTIAL OCCUPATIONAL HAZARDS

Jane E. Hoecker, Patrick R. Durkin, Arnold Hanchett, Leslie N. Davis, William M. Meylan, and Stephen J. Bosch Oct. 1977 334 p refs

(Contract PHS-NIOSH-210-77-0120)
(PB-276678/0; TR-75-565; TR-77-565; NIOSH-210-77-0120)
Avail: NTIS HC A15/MF A01 CSCL 06J

Information profiles on potential occupational hazards of a series of chemical compounds and industrial processes are presented in the form of data sheets describing chemical structures, biological effects, human effects, exposure limits, prevailing standards, etc. Chemical compounds covered are: benzyl chloride; carbon black; furfuryl alcohol; hexachlorocyclopentadiene; hexafluoroacetone; hydrogen chloride gas; methyl chloride; 2-butanone peroxide; oxalic acid; ozone; talc; vinyl cyclohexene dioxide; wood dust; boron and its compounds; brominated aromatic compounds; cobalt and its compounds; fumigants; glycidyl ethers; inorganic azides; and inorganic chromium compounds. GRA

N78-22713# Mount Sinai School of Medicine, N. Y. Dept. of Pediatrics.

APPLICATION TO ANIMALS AND HUMANS OF A CONTINUOUS MONITORING OXYGEN SYSTEM Final Report, 15 May 1975 - 15 Aug. 1977

Edwin G. Brown Jan. 1978 95 p refs
(Contract NO1-HR-5-2949)
(PB-276448/8; NIH-N01-HR-52949-1F) Avail: NTIS
HC A05/MF A01 CSCL 06K

A useful polarographic oxygen tension (PO2) sensing electrode system was constructed by the incorporation of a sensing electrode (cathode) in the wall of an intravascular catheter. The reference electrode (anode) is located in the Luer hub of the catheter remote from the sensing electrode. Electrical continuity between the cathode and anode is maintained by an electrolyte solution contained within the central lumen of the catheter. The device can accurately and continuously monitor changes in oxygen tension. Use of the sensor in a limited number of adults and newborn infants indicates that it reliably and accurately measures intravascular oxygen tension. GRA

N78-22714 Minnesota Univ., Minneapolis.
OSMOTIC RELATIONSHIPS BETWEEN BLOOD, CEREBROSPINAL FLUID AND INNER EAR FLUIDS
 Ph.D. Thesis

Sergio Aquirre Prado 1977 110 p
 Avail: Univ. Microfilms Order No. 7802732

The osmotic relations among blood, cerebrospinal fluid (CSF), and perilymph was established in experimental animals by quantitative analyses of osmotic pressure under various experimental conditions. The results obtained by animal experiments served as baseline information to evaluate the effect of the alteration of blood or CSF composition on the inner ear fluid homeostasis in clinical conditions. An hypothesis of disturbances on inner ear fluids microhomeostasis by osmotic imbalance as a possible mechanism for the production of endolymphatic hydrops is presented. Dissert. Abstr.

N78-22715# Royal Aircraft Establishment, Farnborough (England).

CAN ATTENTION BE DIVERTED?

R. Johansson and A. Jonsson Sep. 1977 23 p refs Transl. into ENGLISH from report FOA-2-C-2482-H5, from Research Inst. of National Defence, Stockholm, 1971 23 p (RAE-Lib-Trans-1936; BR61785) Avail: NTIS HC A02/MF A01

If two objects of similar shape but different contrast are searched for in a cluttered environment, how much difference in contrast is needed for the object with the greater contrast to be detected first, and does detection of the first object cause delay in detecting the second object? Two experiments were carried out with the aid of a tachistoscope to answer this question. One with the objects placed in a cluttered environment and the other with the objects in a terrain background. Results indicate that it is possible with a high level of probability, to direct an observer's attention towards the desired objects. A delaying effect can be demonstrated but many other factors are capable of interfering with it. Author

N78-22716# Federal Aviation Administration, Washington, D. C. Office of Aviation Medicine.

DEVELOPMENT OF NEW SELECTION TESTS FOR AIR TRAFFIC CONTROLLERS

John T. Dailey and Evan W. Pickrel Dec. 1977 11 p refs (AD-A049049; FAA-AM-77-25) Avail: NTIS HC A02/MF A01 CSCL 05/9

The multiplex controller aptitude test included the traditional types of aptitude test items, in addition to the measurement of the applicant's ability to identify potential conflicts in air traffic. The test was administered experimentally to groups whose abilities approximate those of the applicant population, and results indicated it had satisfactory results. Author

N78-22717 Wayne State Univ., Detroit, Mich.
THE EFFECT OF ENERGY ABSORBING DEVICES ON SPINAL LOADS RESULTING FROM MINUS G(X) ACCELERATION
 Ph.D. Thesis

Paul Charles Begeman 1977 343 p
 Avail: Univ. Microfilms Order No. 78-05158

The biodynamic response of cadaver torsos subjected to -Gx impact acceleration were studied with particular emphasis on the response of the vertebral column, and the reduction of forces and accelerations on the torso using energy absorbing devices. Strain measurements were made on several lumbar and thoracic vertebral bodies and the pelvis. Their magnitude and time of occurrence of peaks under restraint conditions of military harness, cross chest harness, no shoulder belt, and no head were used to infer biodynamic response and the mechanism of axial spinal loads leading to spinal injury. Spinal curvature as well as the restraint system are important in the generation of this force. Mathematical model results and high speed film analysis were used to confirm this motion. Dissert. Abstr.

N78-22718*# Massachusetts Inst. of Tech., Cambridge.
POTENTIAL USE OF NUTRITIONAL FACTORS TO OPTIMIZE PERFORMANCE UNDER STRESS Final Report, 1 Dec. 1976 - 30 Nov. 1977

H. N. Munro Nov. 1977 74 p refs
 (Contract NAS9-15194)
 (NASA-CR-151676) Avail: NTIS HC A04/MF A01 CSCL 06S

A study of the effects of amino acids on hypothalamo-pituitary capacity to secrete ACTH, and the response of the adrenal gland in terms of corticosterone level in the plasma was discussed in the first part of this report. Second, the report includes a study of the response of protein metabolism in various levels of corticosterone elevation in the plasma. This second part is regarded as having considerable significance for space travel, since this data indicate a threshold level of plasma corticosteroids above which there is increased catabolism of muscle protein.

Dissert. Abstr.

N78-22719*# Umpqua Research Co., Myrtle Creek, Ore.
WATER SYSTEM MICROBIAL CHECK VALVE DEVELOPMENT
 Interim Report

Gerald V. Colombo, Dale R. Greenley, and David F. Putnam Feb. 1978 77 p
 (Contract NAS9-15079)
 (NASA-CR-151678; URC-80208) Avail: NTIS HC A05/MF A01 CSCL 06K

Development work on a device for the Space Shuttle that will prevent the transfer of viable microorganisms within water systems is described. The device serves as a check valve in that it prevents the transfer or cross-contamination of microorganisms from a nonpotable system into a potable water system when these systems are interconnected. In this regard, the function of the device is similar to that of the air gap found in conventional one gravity systems. The device is essentially a bed of resin material impregnated with iodine. Basic design data for a variety of flow and temperature conditions are presented, together with results of challenging the beds with suspensions of seven microorganisms including aerobes, anaerobes, and spore formers. Author

N78-22720*# National Aeronautics and Space Administration, Ames Research Center, Moffett Field, Calif.

SWEAT COLLECTION CAPSULE Patent Application

John E. Greenleaf and Robert W. Delaplaine, inventors (to NASA) Filed 19 Apr. 1978 10 p
 (NASA-Case-ARC-11031-1; US-Patent-Appl-SN-897828) Avail: NTIS HC A02/MF A01 CSCL 06B

A sweat collection capsule permitting quantitative collection of sweat is described. The capsule was comprised of a frame held immobile on the skin, a closure secured to the frame and absorbent material located next to the skin in a cavity formed by the frame and the closure. The absorbent materials was removed from the device by removing the closure from the frame while the frame was held immobile on the skin. NASA

N78-22721*# National Aeronautics and Space Administration, John F. Kennedy Space Center, Cocoa Beach, Fla.

A PROSTHESIS COUPLING Patent Application

Vert Mooney (Rancho Los Amigos Hospital Rehabilitation Center, Downey, Calif.), James B. Reswick (Rancho Los Amigos Hospital Rehabilitation Center, Downey, Calif.), Charles W. Bright, and Lester J. Owens, inventors (to NASA) Filed 9 Feb. 1978 11 p
 (NASA-Case-KSC-11069-1; US-Patent-Appl-SN-876438) Avail: NTIS HC A02/MF A01 CSCL 06B

A coupling for use in apparatus for connecting a prosthesis to a bone of a stump of an amputated limb is presented. The apparatus includes a tubular female socket having an open lower end adapted to be inserted within the intermedullary cavity of the bone. A biocompatible sleeve provides an interface between the female socket and the skin directly below the opening in the socket. A lock pin is carried by the prosthesis and has a stem portion adapted to be coaxially disposed and slideably within the tubular female socket for securing the prosthesis to the stump. The coupling is constructed of resilient material with one end thereof being attached to the socket and the other end thereof being attached by any suitable material to the biocompatible sleeve. NASA

N78-22722# Chamber of Mines, Johannesburg (South Africa).
**DEVELOPMENT AND EVALUATION OF HEAT TRANSFER
 EQUATIONS FOR A MODEL OF CLOTHED MAN**

J. M. Stewart and R. F. Goldman (Military Ergonomics Lab., Natick, Mass.) 1977 18 p refs Presented at the Intern. Conf. on Bioengineering, Cape Town, Apr. 1977
 Avail: NTIS HC A02/MF A01

Two equations were derived for heat transfer from a cylinder with a wet surface and wrapped with a layer having uniform properties. Both equations represented the steady state data which were obtained from studies on a clothed, heated manikin with either a wet or dry skin. Skin wetness increased the conductance of sensible heat by 32%. Author

N78-22723*# Life Systems, Inc., Cleveland, Ohio.
**TECHNOLOGY ADVANCEMENT OF THE ELECTROCHEMICAL
 CO₂ CONCENTRATING PROCESS Annual Report**

F. H. Schubert, R. R. Woods, T. M. Hallick, and D. B. Heppner
 Mar. 1978 75 p refs
 (Contract NAS2-8666)
 (NASA-CR-152098; LSI-ER-258-11) Avail: NTIS
 HC A04/MF A01 CSCL 06*

The overall objectives of the present program are to:
 (1) improve the performance of the electrochemical CO₂ removal technique by increasing CO₂ removal efficiencies at pCO₂ levels below 400 Pa, increasing cell power output and broadening the tolerance of electrochemical cells for operation over wide ranges of cabin relative humidity; (2) design, fabricate, and assemble development hardware to continue the evolution of the electrochemical concentrating technique from the existing level to an advanced level able to efficiently meet the CO₂ removal needs of a spacecraft air revitalization system (ARS); (3) develop and incorporate into the EDC the components and concepts that allow for the efficient integration of the electrochemical technique with other subsystems to form a spacecraft ARS; (4) combine ARS functions to enable the elimination of subsystem components and interfaces; and (5) demonstrate the integration concepts through actual operation of a functionally integrated ARS. Author

N78-22724# Aeronautical Systems Div., Wright-Patterson AFB, Ohio.

**A COMPARISON OF INTER-SYSTEM CONTRAST RATIOS
 FOR SEGMENTED DIGITAL READOUTS Final Report, Sep.
 1975 - Jun. 1976**

Jane M. Kline Dec. 1977 45 p refs
 (AD-A050630; ASD-TR-77-64) Avail: NTIS HC A03/MF A01
 CSCL 14/2

Twelve subjects viewed a Chicago Miniature segmented digital readout display to compare symbol legibility under two inter-symbol contrast ratio conditions - 4:1 and 2:1. Using two test lamps designated A and B, a series of test trials was presented under both conditions randomly intensifying the three horizontal segments of symbol A to determine the effect, if any, on symbol legibility. The stimuli consisted of numerical digits; digits 3, 5, and 9 were presented at symbol A and digits 0-9 at symbol B. Performance data were based on subject's digital readout error scores. From evaluation of the performance data, it was concluded that the 4:1 inter-symbol contrast ratio was significantly better than the 2:1 condition and that there was no apparent 'aural effect' degrading performance under either condition. Additionally, 'five' was significantly misidentified more often--primarily as a 'nine'. This identification error was attributed to insufficient distinguishing cues between the two digits. Author (GRA)

N78-22725# Army Research Inst. of Environmental Medicine, Natick, Mass.

**UNDERCLOTHING AND ITS PHYSIOLOGICAL EFFECTS IN
 A HOT-DRY ENVIRONMENT**

Fred R. Winsmann, Roger G. Soule, and Ralph F. Goldman Jan. 1977 20 p refs
 (DA Proj. 3E7-62777-AB-45)
 (AD-A050540; USARIEM-M-6177) Avail: NTIS
 HC A02/MF A01 CSCL 06/17

When underclothing of any type is worn, data collected using a static, copper manikin clearly indicate a slightly increased insulation and decreased evaporative transfer. In order to assess air movement in the dynamic state ('pumping'), the present study involved 8 men (21.2 yr., 175.2 cm and 69.1 kg) to evaluate 4 underclothing systems worn under a desert uniform: (1) no underwear; (2) std boxer shorts and t-shirt; (3) fish net 'Brynje'; and (4) ladder net 'Brynje'. The physiological trial was designed using the copper man data to select an environment and work combination which would maximize the physiologic differences expected. Accordingly, each subject walked at 4.8 km/hr with each system (40 min walk, 20 min rest and 40 min walk) at 49 C, 20% R.H. Test results show that: (1) No underwear resulted in significantly cooler mean weighted skin temperature at minutes 60, 80, and 100; (2) Rectal temperature was slightly lower at a given time interval with no underwear; (3) There was a rise in heart rate during the work periods, but no differences among underwear systems; (4) Sweat production showed no differences; and (5) The ratio of evaporated/produced sweat showed that no underwear allowed better evaporative cooling than any of the other systems. Neither fish- nor ladder-net underwear appear to offer any advantage over regular underwear; subjective comfort ratings support these conclusions. GRA

N78-22732# Joint Publications Research Service, Arlington, Va.

IMAGE OF FLIGHT ARTICLE DISCUSSED

P. Bazanov *In its* Transl. on USSR Sci. and Technol.: Phys. Sci. and Technol., No. 29 (JPRS-70659) 21 Feb. 1978, p 44-50 Transl. into ENGLISH from Aviat. Kosmonaut. (USSRI), no. 12, 1977 p 6-9

Avail: NTIS HC A05/MF A01

Opinions expressed by a group of pilots on how one orients oneself in space particularly when flying on instruments without seeing the ground or the natural horizon are discussed. Aspects of spatial orientation perception are reviewed and the detrimental effects of switching from one type of display to another are examined. During automatic control, the image of flight becomes the primary means of controlling and correlating incoming information to assess the operational accuracy of the control and to forecast future developments. A.R.H.

N78-22734# Joint Publications Research Service, Arlington, Va.

SEARCH FOR LIFE ON MARS

S. A. Nikitin *In its* Transl. on USSR Sci. and Technol.: Phys. Sci. and Technol., No. 29 (JPRS-70659) 21 Feb. 1978 p 65-75 Transl. into ENGLISH from Priroda (USSR), no. 10, Dec. 1977 p 118-125

Avail: NTIS HC A05/MF A01

Data obtained before the Viking flights indicate that in the past the planet could have had an adequate amount of liquid water and a sufficiently dense atmosphere in order to insure life. Measurements of the Martian atmosphere and surface composition by Viking-1 and Viking-2 are discussed, as well as the design of experiments conducted to determine the planet's capability to support life. A.R.H.

N78-23022*# National Aeronautics and Space Administration, Electronics Research Center, Cambridge, Mass.

**SOME MODERN CONTROL TECHNIQUES FOR HUMAN
 OPERATOR MODELING AND IDENTIFICATION**

Richard S. Shirley *In* NASA, Washington Fourth Inter-Center Control Systems Conf. Jan. 1978 p 261-298 refs

Avail: NTIS HC A22/MF A01 CSCL 05H

Some recent results in quantitative modeling of the human operator are reviewed as well as a method for processing his input-output data. Modern control techniques are applied to the pilot operating in a dynamic compensatory tracking task. Trained pilots are known to behave in an optimal manner under fully stressed conditions. This has led to the development of an optimal control model of the human operator which takes his limitations into account. A rationale for determining the appropriate cost functions is determined. Experimental results indicate that the

model can closely predict pilot performance in one- or two-axis tracking tasks. The model predicts pilot remnant (noise), error scores, and frequency response in both single-axis and multi-axis tracking tasks. Author

N78-23032* National Aeronautics and Space Administration, Lewis Research Center, Cleveland, Ohio.

DESIGN AND PERFORMANCE OF HEART ASSIST OR ARTIFICIAL HEART CONTROL SYSTEMS

John A. Webb, Jr. and Vernon D. Gebben / In NASA, Washington Fourth Inter-Center Control Systems Conf. Jan. 1978 p 495-506 refs

Avail: NTIS HC A22/MF A01 CSCL 12B

The factors leading to the design of a controlled driving system for either a heart assist pump or artificial heart are discussed. The system provides square pressure waveform to drive a pneumatic-type blood pump. For assist usage the system uses an R-wave detector circuit that can detect the R-wave of the electrocardiogram in the presence of electrical disturbances. This circuit provides a signal useful for synchronizing an assist pump with the natural heart. It synchronizes a square wave circuit, the output of which is converted into square waveforms of pneumatic pressure suitable for driving both assist device and artificial heart. The pressure levels of the driving waveforms are controlled by means of feedback channels to maintain physiological regulation of the artificial heart's output flow. A more compact system that could achieve similar regulatory characteristics is also discussed. Author

N78-23041# Joint Publications Research Service, Arlington, Va.

SOVIET-CZECH SPACE MISSION, COSMONAUT TRAINING DISCUSSED

Gy. L. / In its Transl. on Eastern Europe (JPRS-70992) 21 Apr. 1978 p 1-4 Transl. into ENGLISH from Magy. Nemzet (Budapest), 11 Mar. 1978 p 3

Avail: NTIS HC A04/MF A01

Two astronauts from Hungary, Bulgaria, Cuba, Mongolia, and Romania were selected to join Polish and East German astronauts already undergoing a 12 to 18 month training program at the Gagarin training center in Star City. The initial phase of the program is devoted to the theory of space research and spaceflight. Studies include astronomy, ballistics, geology, agriculture, biology, and the operational characteristics of various spacecraft types. The second phase involves training for specific missions by using simulators of the Soyuz and Salyut spacecraft. Training facilities are described, and the trainees' daily schedule is included.

N78-23706* National Aeronautics and Space Administration, Ames Research Center, Moffett Field, Calif.

AN INDUCTIVELY POWERED TELEMETRY SYSTEM FOR TEMPERATURE, EKG, AND ACTIVITY MONITORING

Thomas B. Fryer, Gordon F. Lund (San Jose State Univ., Calif.), and Bill A. Williams (San Jose State Univ., Calif.) May 1978 43 p refs

(Grant NsG-2293)

(NASA-TM-78486; A-7423) Avail: NTIS HC A03/MF A01 CSCL 06B

An implant telemetry system for the simultaneous monitoring of temperature, activity, and EKG from small animals, such as rats, was designed with the feature that instead of a battery the system is energized by an inductive field. A 250 kHz resonant coil surrounds the cage (30 x 30 x 20 cm) and provides the approximately 100 microns of power required to operate the implant transmitter while allowing the animal unrestrained movement in the cage. The implant can also be battery operated if desired. RF transmission is in the 8-10 MHz band, which allows the use of a simple, essentially single IC chip, receiver. Author

N78-23707# Institut Franco-Allemand de Recherches, St. Louis (France).

PRESSURE MEASUREMENTS IN THE COCHLEA OF A GUINEA PIG [MESURES DE PRESSION DANS LA COCHLEE DU COBAYE]

A. Dancer 9 May 1977 13 p In FRENCH Presented at 2d Symp. of the Min. for Cult. and Environ. on Noise Effects, San Bastiano, Corsica, 2-4 May 1977

(ISL-CO-206/77) Avail: NTIS HC A02/MF A01

Pressure variations occurring in the inner ear of a guinea pig during exposure to impulse noise with different physical parameters were studied experimentally. Results concerning the intercochlear pressure amplitude were related to the middle ear transfer function determined from cochlear microphone potential measurements. ESA

N78-23708# Joint Publications Research Service, Arlington, Va.

SPACE BIOLOGY AND AEROSPACE MEDICINE, VOLUME 12, NO. 2

11 May 1978 134 p refs Transl. into ENGLISH from Kosm. Biol. i Aviakosm. Med. (Moscow), v. 12, no. 2, 1978 p 1-73 (JPRS-71096) Avail: NTIS HC A07/MF A01

Topics covered include cosmonaut selection and training, the evaluation and analysis of accumulated data to facilitate ongoing transition from orbital to interplanetary flights; human tolerance during long term flight; space psychology and physiology, spacecraft environments, and biotelemetry.

N78-23709# Joint Publications Research Service, Arlington, Va.

PRINCIPLES OF ENGINEERING PSYCHOLOGY INVOLVED IN OPTIMIZING CONTROL SYSTEMS OF AIRCRAFT AND SPACECRAFT

V. A. Bodrov and G. M. Zarakovskiy / In its Space Biol. and Aerospace Med., Vol. 12, No. 2 (JPRS-71096) 11 May 1978 p 7-15 refs Transl. into ENGLISH from Kosm. Biol. i Aviakosm. Med. (Moscow), v. 12, no. 2, 1978 p 8-14

Avail: NTIS HC A07/MF A01

Experience in operating new aviation and space technology shows that the engineering-psychological flaws of control systems cannot be compensated solely by screening, educating, and training personnel. The patterns of activity of pilots and other crew members must be reflected in the control circuits and systems of flight vehicles. The conformity of the information model with the pilot's conception of the spatial location of the vehicle and with the time organization of attention must be considered. In choosing algorithms, provision must be made for reducing the number of operations to be performed by man and optimizing the layout of information and motor fields. A.R.H.

N78-23710# Joint Publications Research Service, Arlington, Va.

IMMUNOLOGICAL REACTIVITY AND PREDICTION OF ALLERGIC COMPLICATIONS IN THE CREW OF THE SECOND EXPEDITION OF SALYUT-4

I. V. Konstantinov, Yu. G. Nefedov, A. V. Yerebin, V. I. Drozdova, A. S. Skryabin, O. A. Guseva, and N. N. Mukhina / In its Space Biol. and Aerospace Med., Vol. 12, No. 2 (JPRS-71096) 11 May 1978 p 16-21 refs Transl. into ENGLISH from Kosm. Biol. i Aviakosm. Med. (Moscow), v. 12, no. 2, 1978 p 15-19

Avail: NTIS HC A07/MF A01

A combination of factors in long term space flight significantly increase the probability of allergic and autoimmune disturbances. Sensitization to allergens of the main human microbial autoflora was evaluated as well as the immunological reactivity of crew members of the Salyut-4 space station before and after the 63 day mission. Examination of the blood taken from the cubital vein revealed the quantitative characteristics of T and B type lymphocytes involved in the main immunological reactions. Indices of specific immunological activity on preflight, and on the 2d and 7th day post flight are presented in tables. The necessity for including allergy tests in the screening and training of astronauts is discussed. Author

N78-23711# Joint Publications Research Service, Arlington, Va.

STUDIES OF REACTIVITY OF THE ORGANISM USING SOME PHARMACOLOGICAL TESTS

T. N. Krupina, Kh. Kh. Yarullin, A. Ya. Tizul, V. P. Barkhatova, M. P. Aleksandrova, and N. P. Belyakov *In its Space Biol. and Aerospace Med.*, Vol. 12, No. 2 (JPRS-71096) 11 May 1978 p 22-28 refs Transl. into ENGLISH from *Kosm. Biol. i Aviakosm. Med. (Moscow)*, v. 12, no. 2, 1978 p 19-24

Avail: NTIS HC A07/MF A01

The activity of the sympathoadrenal system was studied by investigating the metabolism and biosynthesis of catecholamine and its precursors in 34 male subjects following insulin injection and depravein intake. The dynamics of excretion of epinephrine, morepinephrine, dopamine, and dopa precursors was examined as well as bioelectrical activity (EEG) and cerebral blood flow. Thermoregulation, the state of the cardiovascular system, and the sugar curve were also tested. Insulin and depravein, which have a selective mechanism of action on catecholamine metabolism can be used as functional load tests in dynamic studied of the state and reactivity of the human sympathoadrenal system.

A.R.H.

N78-23712# Joint Publications Research Service, Arlington, Va.

CONSUMPTION OF FREEZE-DRIED FOOD IN WEIGHTLESSNESS

L. L. Gerdauskene, R. V. Kudrova, N. D. Radchenko, G. N. Savel'yeva, and A. A. Simakov *In its Space Biol. and Aerospace Med.*, Vol. 12, No. 2 (JPRS-71096) 11 May 1978 p 29-33 refs Transl. into ENGLISH from *Kosm. Biol. i Aviakosm. Med. (Moscow)*, v. 12, no. 2, 1978 p 25-28
N78-23708 14-51)

Avail: NTIS HC A07/MF A01

Foods with specific indices of surface tension, adhesiveness and viscosity can be consumed in weightlessness. Six freeze-dried foods of various consistency, whose viscosity was regulated by a latering moisture content of the product or adding modified starch for thickening were tested to determine the consistency that is most convenient for intake in weightlessness using ordinary flatware. Sufficient viscosity and adhesiveness were found in mashed potatoes with a moisture content of 75-85%, cottage cheese pudding with 60 and 70 moisture, cottage cheese with mashed black currants with 50% moisture, and cottage cheese with nuts with 50 66% moisture. Foods such as stew with fat and noodles with meat, prepared using conventional technology, were unsuitable regardless of their consistency. Author

N78-23713# Joint Publications Research Service, Arlington, Va.

CHECKING EFFECTIVENESS OF PREVENTION OF HIGH-ALTITUDE DECOMPRESSION DISORDERS BY MEANS OF PREBREATHING IN AN OXYGEN ENVIRONMENT

R. T. Kazakova and I. P. Poleshchuk *In its Space Biol. and Aerospace Med.*, Vol. 12, No. 2 (JPRS-71096) 11 May 1978 p 34-38 refs Transl. into ENGLISH from *Kosm. Biol. i Aviakosm. Med. (Moscow)*, v. 12, no. 2, 1978 p 28-31

Avail: NTIS HC A07/MF A01

The heart, respiration rate, and arterial pressure were monitored during tests conducted in a pressure chamber to determine whether completeness and effectiveness of denitrogenization during pure oxygen breathing affects penetration of nitrogen through the integument. Data obtained during ascents to 11,000 m altitude with the performance of exercises and prebreathing for 5, 6, and 8 hours are presented and compared with results obtained without pressure suits. No substantial differences with regard to decompression disorders were revealed. No particular differences were demonstratable with regard to intensity of pain and altitude at which symptoms of decompression disturbances disappeared. Evidently, the nitrogen that penetrates through the integument when an individual breaths pure oxygen in an air atmosphere does not affect the development of decompression disorders. Author

N78-23714# Joint Publications Research Service, Arlington, Va.

SOME PROBLEMS OF PATHOGENESIS OF RESPIRATORY DISORDERS OCCURRING AT +G SUB z ACCELERATIONS COMBINED WITH BREATHING PURE OXYGEN

M. A. Tikhonov, A. V. Kondakov, V. I. Babushkin, D. Yu. Arkhangel'skiy, and D. N. Gavrilyuk *In its Space Biol. and Aerospace Med.*, Vol. 12, No. 2 (JPRS-71096) 11 May 1978 p 39-46 refs Transl. into ENGLISH from *Kosm. Biol. i Aviakosm. Med. (Moscow)*, v. 12, no. 2, 1978 p 32-38

Avail: NTIS HC A07/MF A01

Six healthy males, ranging in age from 20 to 23 years and wearing anti-G suits were subjects in a series of tests conducted on a centrifuge to determine the significance of various factors which lead to the onset and development of functional disorders of the respiratory system. All subjects were exposed to each factor twice, once while breathing air, and once while breathing pure oxygen. Changes in the functional state of the respiratory system were evaluated before and after each acceleration on the basis of subjective sensations and the results of spiographic examination. The biophysical bases of the process of atelectasizing of the lungs in the presence of accelerations combined with breathing pure oxygen were demonstrated. The severity of functional disturbances of the respiratory system depends on the magnitude and duration of accelerations, but the time factor is more important. The theoretical conception of pathogenesis of pulmonary atelectases warrants the assumption that the duration of prebreathing, the time during which the subject breathes pure oxygen prior to exposure to accelerations, has influence on the intensity of the respiratory disorders. Author

N78-23715# Joint Publications Research Service, Arlington, Va.

POSSIBILITY OF RETAINING THERMAL BALANCE OF THE HUMAN BODY IN AN EXTREMELY RAREFIED ATMOSPHERE BY MEANS OF VACUUM EVAPORATION OF PERSPIRATION FROM THE BODY SURFACE

I. N. Chernyakov *In its Space Biol. and Aerospace Med.*, Vol. 12, No. 2, (JPRS-71096) date p 47-51 refs Transl. into ENGLISH from *Kosm. Biol. i Aviakosm. Med. (Moscow)*, v. 12, no. 2, 1978 p 38-41

Avail: NTIS HC A07/MF A01

The dynamics of heat transfer were studied in 64 tests conducted on 24 subjects with prolonged (3-8 h) exposure to high (up to 40-55C) ambient temperature at rest and while performing exercises associated with energy expenditure of up to 2.5 kcal min. to determine the effectiveness of vacuum perspiration in retaining thermal homeostasis in man in the presence of exogenous and endogenous heat loads in a rarefied atmosphere. Subjects were lifted to an altitude of 25 km in gear consisting of a pressure helmet and an altitude-compensating nylon-6 jumpsuit having a thin rubber liner converging the trunk and limbs and connected to the PH and oxygen gear to regulate excess pressure in the helmet and lungs. With lowering of the pressure in chamber, the appropriate rarefaction was generated under the liner. Perspiration boiled on the body surface and vapor passed through the pores of the underwear into a collector and was removed. Vacuum evaporation prevented overheating of the body effectively at a temperature of 40 C and with the performance of mild exercise. The heat transfer conditions did not restrict man's endurance of thermal stress. Author

N78-23716# Joint Publications Research Service, Arlington, Va.

INFLUENCE OF LOCATION OF INDICATORS ON PSYCHOPHYSIOLOGICAL DISTINCTIONS OF COMBINED ACTIVITY

V. A. Bodrov and Iv Ye. Doroshenko *In its Space Biol. and Aerospace Med.*, Vol. 12, No. 2 (JPRS-71096) 11 May 1978 p 52-56 refs Transl. into ENGLISH from *Kosm. Biol. i Aviakosm. Med. (Moscow)*, v. 12, no. 2 1978 p 42-45

Avail: NTIS HC A07/MF A01

The efficiency of combined solving of problems varying in psychological structure is related to the mutual position of displays.

as well as the importance of the problem, and is determined by the nature of sharing attention. Ten healthy males ranging in age from 20 to 35 years, were seated in an armchair with a headrest in such a position that the tracking display was in line with his eyes, and the screen on which the problem was presented was under it, at angles of 0-2, 15, 30, 45, and 60 deg from the vertical angle of vision. Problem investigation included: (1) unidimensional tracking of a sinusoidal function signal (0.1 Hz and 40 mm amplitude); (2) visual gauging of the distance between an object velocity of the object; and (3) sensorimotor choice reaction to presentation of one out of two light signals. Author

N78-23717# Joint Publications Research Service, Arlington, Va.

HUMAN VISUAL FUNCTIONS AS RELATED TO MILD VESTIBULAR STIMULI

V. I. Kartsev and A. A. Shipov *In its Space Biol. and Aerospace Med.*, Vol. 12, No. 2 (JPRS-71096) 11 May 1978 p 57-62 refs Transl. into ENGLISH from *Kosm. Biol. i Aviakosm. Med.* (Moscow), v. 12, no. 2, 1978 p 45-49

Avail: NTIS HC A07/MF A01

The effect of mild stimulation of otolithic and cupular receptors on the visual efficiency of man was measured in subjects wearing opaque glasses to rule out optokinetic stimuli. Reactions measured include: (1) time of appearance of Purkinje's phenomenon and dark adaptation; (2) thresholds of color discrimination after stimulation; and (3) the restoration of central vision. A.R.H.

N78-23718# Joint Publications Research Service, Arlington, Va.

HUMAN ENDURANCE OF MEASURED EXERCISE IN THE PRESENCE OF CHRONIC HYPERCAPNIA

G. L. Apanasenko, V. S. Shchegolev, and V. I. Kuleshov *In its Space Biol. and Aerospace Med.*, Vol. 12, No. 2 (JPRS-71096) 11 May 1978 p 63-67 refs Transl. into ENGLISH from *Kosm. Biol. i Aviakosm. Med.* (Moscow), v. 12, no. 2, 1978 p 49-52

Avail: NTIS HC A07/MF A01

The effect of prolonged exposure of high concentrations of CO₂ on the human body was studied in subjects working under conditions of prolonged isolation and hypokinesia. The amount of CO₂ in the inhaled air was in the range of 0.8-1.8% at normal atmospheric pressure, while the level of motor activity constituted 1000-1500 locomotions per day. The heart rate, arterial pressure, vital capacity and excursion of the thorax were measured as well as results of functional tests with measured exercise and breath holding, oxymetry, and examination of blood alkaline reserve. In the first week of isolation, changes occur that are inherent in the effects of high concentrations of the gas, which reached a maximum on the 45th day of the test. Author

N78-23719# Joint Publications Research Service, Arlington, Va.

FUNCTIONAL RESERVES OF THE CARDIAC SYMPATHETIC SYSTEM IN THE PRESENCE OF HYPOXIA

N. K. Khitrov and A. M. Alaverdyan *In its Space Biol. and Aerospace Med.*, Vol. 12, No. 2 (JPRS-71096), 11 May 1978 p 68-72 refs Transl. into ENGLISH from *Kosm. Biol. i Aviakosm. Med.* (Moscow), v. 12, no. 2, 1978 p 53-56

Avail: NTIS HC A07/MF A01

The degree of resistance to hypoxia in male albino rats was compared to the capacity of the sympathetic systems of the heart to stabilize the norepinephrine level. A spectrophotometer and the trioxindole method were used to estimate changes in dopa and norepinephrine content under the influence of test hypoxia for 20 and 60 min, and in control rats and in animals submitted to adaptation to hypoxia lasting 21 and 35 days. Hypertrophy of the myocardium gradually increased with increase in duration of hypoxia. However, optimum supply of norepinephrine to the heart, as a result of increased functional reserves of cardiac sympathetic systems is possible only up to a specific degree of hypertrophy of such genesis. The capability of adrenergic

structures of the heart changes in the same direction as the change in resistance of the organism to hypoxia. Author

N78-23720# Joint Publications Research Service, Arlington, Va.

MOTOR ACTIVITY AND PREVENTION OF CONSEQUENCES OF HYPOKINESIA (ON THE BASIS OF INDICES OF TISSULAR METABOLISM)

I. V. Fedorov *In its Space Biol. and Aerospace Med.*, Vol. 12, No. 2 (JPRS-71096) 11 May 1978 p 73-7 refs Transl. into ENGLISH from *Kosm. Biol. i Aviakosm. Med.* (Moscow), v. 12, no. 2, 1978 p 56-61

Avail: NTIS HC A07/MF A01

The total protein and nucleic acid (DNA and RNA) content of the tissues of the liver, kidney, brain, and gastrocnemius muscle of 240 mongrel albino rats decapitated on the 15, 20, 60, and 90th day were examined to determine the effectiveness of various exercise programs in preventing the consequences of hypokinesia. In the case of long-term hypokinesia, there is reorganization of metabolic processes that have a substantial influence on the composition and properties of tissues. The slow and uneven normalization in the recovery period is attributed to some metabolic sluggishness of altered tissues, and the effect of movement against the background of prior kinesia as a unique stimulus. A.R.H.

N78-23721# Joint Publications Research Service, Arlington, Va.

DEVELOPMENT OF NEOPLASMS IN DOGS AFTER CHRONIC EXPOSURE TO GAMMA RADIATION DELIVERED AT A LOW DOSE RATE

V. I. Yakovleva *In its Space Biol. and Aerospace Med.*, Vol. 12, No. 2 (JPRS-71096) 11 May 1978 p 80-86 refs Transl. into ENGLISH from *Kosm. Biol. i Aviakosm. Med.* (Moscow), v. 12, no. 2, 1978 p 61-67

Avail: NTIS HC A07/MF A01

The incidence, localization, and nature of tumors revealed by pathoanatomical examination of 80 dogs which died or were sacrificed within 5 years of chronic continuous irradiation from Co-60 sources are discussed. With increased duration of chronic irradiation, the endocrine glands presented focal hyperplastic changes in addition to dystrophic, atrophic, and sclerotic changes. Both malignant and benign neoplasms developed in the glands. A.R.H.

N78-23722# Joint Publications Research Service, Arlington, Va.

EXPERIMENTAL SUBSTANTIATION OF MAXIMUM PERMISSIBLE CONCENTRATIONS OF ACETONE AND ACETALDEHYDE IN RECLAIMED POTABLE WATER

N. I. Omel'yanets, N. V. Mironets, N. V. Martyshchenko, I. A. Gubareva, L. F. Piven, and S. N. Starchenko *In its Space Biol. and Aerospace Med.*, Vol. 12, No. 2 (JPRS-71096) 11 May 1978 p 87-91 refs Transl. into ENGLISH from *Kosm. Biol. i Aviakosm. Med.* (Moscow), v. 12, no. 2, 1978 p 67-70

Avail: NTIS HC A07/MF A01

Subacute and chronic experiments were conducted to demonstrate the toxic effects of acetone and acetaldehyde in albino rats. On the basis of comparison of threshold doses according to the organoleptic feature of action and ineffective doses according to the sanitary and toxicological factor, the maximum perishable concentration for acetone is 14.0 mg/lambda (0.7 mg/lambda kg) according to the sanitary and toxicological factor index of deleteriousness. The concentration for acetaldehyde is 0.2 mg/lambda according to the organoleptic action. The recommended maximum perishable concentrations for reclaimed water to be consumed for 1 to 3 months are 39.6 mg/lambda for acetone and 0.2 mg/lambda for acetaldehyde. A.R.H.

N78-23723# Joint Publications Research Service, Arlington, Va.

THE COMBINED EFFECT OF VOLATILE PRODUCTS OF THERMAL OXIDATION DECOMPOSITION OF LUBRICATING OIL AND HYPOXIC HYPOXIA ON THE ORGANISM

V. V. Kustov and V. G. Litau *In its Space Biol. and Aerospace Med.*, Vol. 12, No. 2 (JPRS-71096) 11 May 1978 p 92-95 refs Transl. into ENGLISH from *Kosm. Biol. i Aviakosm. Med.* (Moscow), v. 12, no. 2, 1978 p 70-73

Avail: NTIS HC A07/MF A01

The toxic effects of the mixed volatile products of the thermal oxidation decomposition of 36/1KUA lubricant were studied in 80 white mice following exposure to the mixture for 4 h at ground barometric pressure in a chamber, as well as in three additional groups of like number that were exposed simultaneously to the same mixture and hypoxic hypoxia in a rarefaction corresponding to altitudes of 5,000, 7,000, and 8,000 m respectively. The intensity of oxygen uptake and the mortality rates at the different altitudes are discussed. At the same level of intensity of mixture, the toxic effect in the presence of hypoxia increases with increase in degree of rarefaction, and conversely, with the same level of the latter, the deleterious influence of the mixture on the overall effect of both factors increases with increase in level thereof in inhaled air. A.R.H.

N78-23724# Joint Publications Research Service, Arlington, Va.

TRANSLATIONS ON USSR SCIENCE AND TECHNOLOGY: BIOMEDICAL AND BEHAVIORAL SCIENCES, NO. 28. EFFECTS OF NONIONIZING ELECTROMAGNETIC RADIATION

18 May 1978 56 p refs Transl. into ENGLISH from various Russian journals

(JPRS-71136) Avail: NTIS HC A04/MF A01

The response of biological systems to nonionizing electromagnetic radiation was explored. The types of radiation used included electromagnetic fields, electric fields, and alternating magnetic fields. Immunological, biochemical, and metabolic responses were evaluated as well as the whole organism response in some cases.

N78-23725# Joint Publications Research Service, Arlington, Va.

EFFECTS OF LOW-FREQUENCY (50 Hz) ELECTROMAGNETIC FIELD ON FUNCTIONAL STATE OF THE HUMAN BODY

Yu. D. Dumanskiy, V. M. Popovich, and I. P. Kozyarin *In its Transl. on USSR Sci. and Technol.: Biomed. and Behavioral Sci.*, No. 28 (JPRS-71136) 18 May 1978 p 1-5 Transl. into ENGLISH from *Gig. Sanit.* (Moscow), no. 12, 1977 p 32-35

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Several series of observations of the physical condition of volunteers were conducted in order to study the biological effects of industrial frequency electromagnetic fields (IFEMF) of varying intensity. The observations were conducted under natural conditions, i.e., directly in areas of superhigh voltage power lines. One group stayed in the IFEMF generated by 330 kV power lines for 2 hours daily, for 30 days. The second and third groups were exposed to the IFEMF, 750 kV power lines, 3 times a day for 30 minutes, with 1 hour intervals between exposure, for 6 days. A number of physiological parameters were examined to evaluate the effects of IFEMF on the functional state of the body. The observations of the health status of volunteers exposed to IFEMF indicate that this is a biologically active environmental factor and that the extent of its activity is related to the intensity and duration of exposure. P.R.A.

N78-23726# Joint Publications Research Service, Arlington, Va.

EFFECT OF ENERGY OF SUPERHIGH-FREQUENCY ELECTROMAGNETIC FIELDS ON THE BODIES OF EXPERIMENTAL ANIMALS UNDER DIFFERENT CONDITIONS OF ULTRAVIOLET IRRADIATION

R. D. Gabovich and O. I. Shutenko *In its Transl. on USSR Sci. and Technol.: Biomed. and Behavioral Sci.*, No. 28 (JPRS-71136) 18 May 1978 p 6-14 refs Transl. into ENGLISH from *Gig. Tr. Prof. Zabol.* (Moscow), no. 9, 1977 p 31-37

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Male albino rats were subjected to an electromagnetic field with a frequency of 2,840 mc and varying doses of ultraviolet radiation close in its spectrum to solar radiation. The physiological parameters evaluated were: body weight, work fitness, latent time of defensive reflex reaction to electric stimulation, blood serum cholinesterase activity, content of SH-groups in the blood, immunological indicators, and exchange of trace elements. A 4 month daily (3 hour) dosage of superhigh frequency energy produced unfavorable changes in the parameters studied in experimental rats kept under conditions of ultraviolet deficit. Irradiation of animals with ultraviolet rays increased their tolerance for the effect of superhigh frequency energy. The effect of a superhigh frequency field with an excess of ultraviolet irradiation approximates the effects observed with ultraviolet deficit. For preventive purposes, it is advisable to control the ultraviolet conditions of workers subjected to the effects of superhigh frequency electromagnetic fields. P.R.A.

N78-23727# Joint Publications Research Service, Arlington, Va.

DISTINCTIVE REACTIONS OF THE BODY'S IMMUNOLOGICAL SYSTEM TO THE COMBINED EFFECTS OF PHYSICAL AND CHEMICAL ENVIRONMENTAL FACTORS

G. I. Vinogradov and A. N. Marzeyev *In its Transl. on USSR Sci. and Technol.: Biomed. and Behavioral Sci.*, No. 28 (JPRS-71136) 18 May 1978 p 15-19 refs Transl. into ENGLISH from *Gig. Sanit.* (Moscow), no. 10, 1977 p 28-31

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The patterns of immune reactions of the organism to superhigh frequency electromagnetic fields (SHF EMF) were studied at different levels of energy flow density and in combination with two common air pollutants, formaldehyde and carbon monoxide. A group of guinea pigs were exposed to the separate effects of SHF EMF, formaldehyde alone, or carbon monoxide alone. A second group received exposure to the chemicals against a background of prior irradiation, while a third group consisted of animals irradiated after prior administration of the chemicals. The combined effect of formaldehyde and SHF EMF led to a depression of all phagocytic indices studies and complement titer. Exposure of carbon monoxide treated animals to SHF EMF led to stimulation of the phagocytic reaction and elevation of complement titer. The result of combined exposure to the SHF EMF and chemical agents is determined by the nature and extent of the sensitizing effect of each of the physical and chemical environmental factors studied. P.R.A.

N78-23728# Joint Publications Research Service, Arlington, Va.

THE EFFECT OF ELECTROMAGNETIC FIELDS ON ENZYME ACTIVITY

S. L. Arber *In its Transl. on USSR Sci. and Technol.: Biomed. and Behavioral Sci.*, No. 28 (JPRS-71136) 18 May 1978 p 20-23 refs Transl. into ENGLISH from *Elektron. Obrab. Mater.* (Kishinev), no. 1, 1978 p 63-65

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The manner in which the dielectric relaxation of molecules of a polar reagent affects the kinetics of a chemical reaction was shown. The electromagnetic field influences the rotatory diffusion of polar molecules taking part in the reaction, which in turn decreases the probability of contact of the active center of the molecule with the substrate. It is the precise orientation of the catalytic groups which is necessary for enzyme catalysis, and when the groups are polar the effect of an electromagnetic field will slow the enzyme reaction. This conclusion was used to explain the fact that certain enzymes have decreased activity in electromagnetic fields, while the activity of others remains insensitive to microwave irradiation. P.R.A.

N78-23729# Joint Publications Research Service, Arlington, Va.

REACTION OF CENTRAL AND PERIPHERAL MEDIATOR ELEMENTS OF THE SYMPATHOADRENAL SYSTEM TO SINGLE EXPOSURE TO ALTERNATING MAGNETIC FIELD

S. A. Sakharova, A. I. Ryzhov, and N. A. Udintsev *In its Transl. on USSR Sci. and Technol.: Biomed. and Behavioral Sci.*, No. 28 (JPRS-71136) 18 May 1978 p 24-30 refs Transl. into ENGLISH from: *Biol. Nauki (Moscow)*, no. 9, 1977 p 35-39

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Phasic changes were demonstrated in levels of catecholamines and dopa in the central and peripheral mediator elements of the sympathoadrenal system following single exposure of male rats to an alternating magnetic field for 24 hours. In the first phase there was increased uptake of dopamine and epinephrine in the brain stem, norepinephrine in the hypothalamus, intensified transfer of epinephrine from blood to the heart and liver, and increased norepinephrine content of the liver and spleen. In the second phase, the epinephrine level remained low in brain stem tissues, norephrine content remained high in the liver and spleen and reverted to normal in the heart and hypothalamus. In the third phase, catecholamine levels dropped in all organs with the exception of the heart. Author

N78-23730# Joint Publications Research Service, Arlington, Va.

COPPER, MOLYBDENUM, IRON AND MANGANESE METABOLISM IN RAT TISSUES IN RESPONSE TO A 50 Hz ELECTRIC FIELD

R. D. Gabovich, I. P. Kozyarin, I. A. Mikhalyuk, and L. D. Fesenko *In its Transl. on USSR Sci. and Technol.: Biomed. and Behavioral Sci.*, No. 28 (JPRS-71136) 18 May 1978 p 31-38 refs Transl. into ENGLISH from *Ukr. Biokhim. Zh. (Kiev)*, no. 2, 1978 p 206-211

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Male rats were exposed to electric fields of different intensities in order to study the change in distribution of copper, molybdenum, iron, and manganese in their tissues. Different groups were exposed to field intensities of 7, 12, 15 kv/meter respectively for 30 minutes each day for 4 months. Urine and feces were collected 30 minutes each day to determine microelement concentrations and the animals were then decapitated. Tissue copper, molybdenum, iron, and manganese concentration were determined by spectrographic methods. Results indicate that exposure of the bodies of experimental animals to an industrial frequency electric field causes a change in the distribution of the analyzed microelements in organs and tissues, the extent of these changes depending on field intensity. P.R.A.

N78-23731# Joint Publications Research Service, Arlington, Va.

EVALUATION OF HYGIENIC SIGNIFICANCE OF ELECTRIC FIELD OF POWER LINES IN POPULATED AREAS

I. P. Kozyarin and V. M. Popovich *In its Transl. on USSR Sci. and Technol.: Biomed. and Behavioral Sci.*, No. 28 (JPRS-71136) 18 May 1978 p 39-44 refs Transl. into ENGLISH from *Vrach. Delo (Kiev)*, no. 11, 1977 p 120-124

Copyright. Avail: NTIS HC A04/MF A01

Experiments were performed to demonstrate the correlation between intensity and duration of exposure to an electric field and the biological effects this factor induces. Male rats were put in special cages, with simulation of a 50 Hz field generated by means of high voltage transformers. Physiological and biochemical tests were performed prior to the experiment, monthly, and 30 days after irradiation. They included examination of organs and physiological systems that are the most sensitive to electromagnetic fields. Electric fields of 7 and 15 kv/m were the biologically effective levels for 2 hour daily exposures over a 4 month period. All observed changes were reversible and there was normalization within a month after discontinuing irradiation. Positive correlation was shown between the severity of biological effects and the time of exposure and intensity of the field. P.R.A.

N78-23732# Joint Publications Research Service, Arlington, Va.

ELECTROMAGNETIC FIELD ON GROWTH AND DEVELOPMENT OF PLANTS

A. I. Belskiy *In its Transl. on USSR Sci. and Technol.: Biomed. and Behavioral Sci.*, No. 28 (JPRS-71136) 18 May 1978 p 45-48 refs Transl into ENGLISH from *Elektron. Obrab. Mater. (Kishinev)*, no. 6, 1977 p 69-71

Avail: NTIS HC A04/MF A01

In order to assess the effects of the earth's magnetic field on plants and their shape, a model was constructed, in which the earth's magnetic field was simulated with a direct current field. The results indicated that plants and seedlings grow slower and there is 10 to 12 cm less increment of runners per vegetation than in the control, when they are in the zone of a strong electromagnetic field. P.R.A.

N78-23733 Indiana Univ., Bloomington.
INVESTIGATION OF A NEW CARDIAC ARRHYTHMIA MONITORING SCHEME Ph.D. Thesis
John Kitchen Cuddeback 1977 312 p
Avail: Univ. Microfilms Order No. 78-05628

A monitoring scheme was proposed that addressed recognized limitations of currently implemented CCU monitors. With only one additional ECG electrode, the spatial magnitude of the projection of the cardiac vector onto the frontal plane was computed; this signal was much less susceptible to geometric ambiguity than were bipolar leads. Parameters were reliably measured; the interbeat interval, which revealed the rhythmic behavior of the cardiac pacemaker, and the duration of the ventricular complex, which corresponded to the conduction velocity of the ventricular depolarization wave. Dissert. Abstr.

N78-23735# Electrotechnical Lab., Tokyo (Japan).
SPATIAL FREQUENCY RESPONSES OF THE HUMAN VISUAL SYSTEM

Takashi Nagano Oct. 1977 109 p refs In JAPANESE; ENGLISH summary
(Circ-193) Avail: NTIS HC A06/MF A01

Effects of various temporal factors such as, the flicker, drift, exposure duration, etc., on the modulation transfer function are surveyed. Effects of other factors such as the mean luminance of the screen, subtending visual angle of the screen, viewing distance, etc., on the modulation transfer function are summarized. Many findings for the multiple channel theory are described. Many neurophysiological studies on the responses of single cells to gratings are described. Effects of color on the modulation transfer function, a few findings on the two-dimensional modulation transfer function and some other findings on the modulation transfer function are also described. Author

N78-23736# Royal Aircraft Establishment, Farnborough (England).

THE EFFECT OF THE BENZODIAZEPINE ADUMBRAN ON THE RESTING AND SLEEP EEG AND ON THE VISUAL EVOKED POTENTIAL IN ADULT MAN

G. Dolce and E. Kaemmerer 1 Oct. 1976 14 p refs Transl. into ENGLISH from *Med. Welt (West Ger.)*, no. 9, 1967 p 510-514
(RAE-Lib-Trans-1906; BR55679) Avail: NTIS HC A02/MF A01; HMSO; PHI

The administration of 20 to 40 mg of Adumbran gave rise to no significant clinical changes in vigilance in the waking state and no appreciable change in the EEG pattern, particularly as regards frequency. In tests to determine psychic disturbances after eliminating or shortening paradoxical sleep, the effect of Adumbran on the sleep EEG was recorded polygraphically. The overall duration of sleep lengthened under medication, with a simultaneous intensification of slow sleep. The visual evoked potential suffered only a slight reduction in amplitude, while there was no appreciable increase in latency. Author

N78-23737# Connecticut Univ., Storrs. Dept. of Electrical Engineering and Computer Science.

A CROSSED BEAM DOPPLER ULTRASOUND CONCEPT FOR IMPROVED DETECTION OF ATHEROSCLEROSIS Annual Report, 1 Jun. 1976 - 31 Aug. 1977

Martin D. Fox 15 Nov. 1977 51 p refs
(Contract N01-HV-5-2863-2)
(PB-276859/6; NIH-N01-HV-5-2963-2) Avail: NTIS
HC A04/MF A01 CSCL 06B

A unique duplex Doppler and B-mode ultrasonography device was designed and a prototype constructed, for noninvasive detection, quantification, and visualization of atherosclerotic lesions and associated modifications in blood flow. The prototype included a computer controlled linear phased array for electronic B scan, and a unique Doppler velocimeter arrangement that employed multiple pairs of crossed transmit beams to obtain a calibrated indication of flow velocity and turbulence. GRA

N78-23738# Army Medical Research Inst. of Infectious Diseases, Frederick, Md.

DISTRIBUTION OF TISSUE WATER AND ELECTROLYTES IN NORMAL RHESUS MACAQUES Interim Report

C. T. Liu and M. J. Griffin 2 Mar. 1978 18 p
(AD-A052019) Avail: NTIS HC A02/MF A01 CSCL 06/16

Techniques for the determination of water and electrolytes in individual tissues of normal rhesus monkeys are described. Base-line values for intracellular and extracellular distribution of water and electrolytes in 14 different tissues including skin, skeletal muscle (gastrocnemius), cardiac muscle (left ventricle), lung, diaphragm, liver, renal cortex, outer medulla and inner medulla, cerebral cortex, cerebellum, thalamus-hypothalamus complex, medulla oblongata, and spinal cord are presented. Author (GRA)

N78-23739# Bolt, Beranek, and Newman, Inc., Cambridge, Mass. BIOMECHANICAL AND PERFORMANCE RESPONSE OF MAN IN SIX DIFFERENT DIRECTIONAL AXIS VIBRATION ENVIRONMENTS

William H. Levison and Carlold B. Harrah Sep. 1977 91 p refs

(Contract F33615-76-C-5015)
(AD-A052069; BBN-3343; AMRL-TR-77-71) Avail: NTIS
HC A05/MF A01 CSCL 06/4

A series of experiments was performed to explore biodynamic response and tracking performance in various whole-body vibration environments. The primary experimental variable was the direction of the vibration: X-pitch, Y-roll, Z, roll, pitch, and yaw. Tracking axis (pitch or roll) and control-stick spring constant were additional experimental variables. Data from these experiments were analyzed to derive engineering descriptions of biodynamic response and tracking behavior, and a model was developed to relate tracking performance to biodynamic response parameters.

Author (GRA)

N78-23740# Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.

NONLINEAR BIOMECHANICAL MODEL OF THE CERVICAL-THORACIC TRANSREGIONAL JOINT Ph.D. Thesis

William C. Eddy Jun. 1977 96 p refs
(AD-A052068; AMRL-TR-76-90) Avail: NTIS
HC A05/MF A01 CSCL 06/4

A two dimensional model of the cervical-thoracic transregional joint is developed, which incorporates vertebra geometry and the measured material response properties of the ligaments and intervertebral disc. The model provides a useful tool for the parametric study of the effects of anatomical elements on the overall joint motion. In the model, the joint motion is restricted to the sagittal plane, and the articulating facet surfaces for the adjacent vertebrae are represented by two curves. The requirement that point contact be maintained between these curves constitutes a kinematic constraint on the relative motion between the two vertebrae. The model considers the vertebrae to be rigid bodies and the masses of the vertebrae are neglected. The characterization of the velocity dependent response of the anterior and posterior longitudinal ligaments is based on a set of experiments in which load versus deflection data were generated at deflection rates of 0.5 and 1 inch per second. From these data, a constitutive equation is derived, consisting of a third order polynomial of the deflection plus a fifth term, the product of an arbitrary constant, the deflection and the deflection velocity. GRA

N78-23741# Air Force Systems Command, Wright-Patterson AFB, Ohio. Foreign Technology Div.

EXPERIMENTAL ANALYSIS OF THE INFORMATION CONTENT OF AN AURAL ELECTRICAL FIELD OF THE HUMAN BODY

P. I. Gulyayev and V. I. Zabotin 10 Aug. 1977 13 p Transl. into ENGLISH from Nervnaya Sistema (USSR), no. 11, 1970 p 145-149

(AD-A051096; FTD-ID(RS)T-1340-77) Avail: NTIS
HC A02/MF A01 CSCL 06/2

This paper discusses the electromagnetic fields of the 'electrical aura' around living substances which carry information about the functional state of the body's organs. Two sources of 'aural' fields have been discovered. The first is the internal fluctuating electrotonic field of the body's active organs while the second is the triboelectrical static changes of the body's surfaces. This paper describes a procedure for recording the variable electrical component of 'aural' fields. GRA

N78-23742# Istituto Superiore di Sanita, Rome (Italy). Lab. di Fisica.

THE 'PROTECTION AGAINST X-RAY DAMAGES ACT' OF 1973 PROMULGATED BY THE GERMAN FEDERAL REPUBLIC

S. Risica 20 Nov. 1976 75 p In ITALIAN; ENGLISH summary

(ISS-R-76/13) Avail: NTIS HC A04/MF A01

The purpose of this Act was to regulate the use of X rays in industries and hospitals with special regard to the protection of the patients from unnecessary exposure. A comparison is made between the principal points contained in the German law and the I.C.R.P. Publication n.15 'protection against Ionizing Radiation from External Sources'. A translation of the German Act into Italian is annexed. Author (ESA)

N78-23743# National Physical Lab., Teddington (England). **TABLES FOR THE ESTIMATION OF NOISE-INDUCED HEARING LOSS**

D. W. Robinson and M. S. Shipton Jun. 1977 176 p refs Revised

(NPL-Ac-61-Rev) Avail: NTIS HC A09/MF A01

Tables are given of the essential parameters required to predict hearing loss due to long-term exposure to noise, in terms of the statistical distribution of hearing levels in non-pathological populations. A brief description of the formulation of the latter is also given together with examples of their use. ESA

N78-23744# National Physical Lab., Teddington (England). **HEARING HAZARD FROM OCCUPATIONAL NOISE: OBSERVATIONS ON A POPULATION FROM HEAVY INDUSTRY**

W. Burns (London Univ.), D. W. Robinson, M. S. Shipton, and A. Sinclair (Brit. Steel Corp.) Jan. 1977 39 p refs
(NPL-Ac-80) Avail: NTIS HC A03/MF A01

A group of over 700 workers between the ages of 60 and 65 with long service in heavy industry were examined audiometrically. Hearing levels for the whole group were compared with those of a normal sub-group having no auditory pathology other than that due to noise exposure. The difference in hearing levels is shown to account for divergencies in prediction of the incidence of occupational hearing loss between ISO Standard 1999 and British Standard 5330. The numerical analysis highlights the care needed in comparing audiometric data from different sources and has significant implications for the setting of industrial noise exposure limits. Author (ESA)

N78-23745 National Technical Information Service, Springfield, Va.

NIGHT VISION AND DARK ADAPTATION. A BIBLIOGRAPHY WITH ABSTRACTS Progress Report, 1964 - Feb. 1977

Pernell W. Crockett Mar. 1978 121 p Supersedes NTIS/PS-77/0187; NTIS/PS-76/0133; NTIS/PS-75/172 (NTIS/PS-78/0206/9; NTIS/PS-77/0187; NTIS/PS-76/0133; NTIS/PS-75/172) Copyright. Avail: NTIS HC \$28.00/MF \$28.00 CSCL 06P

Research reports are cited on the physiological aspects of night vision, as applied to human engineering for motor vehicle operators, pilots, military personnel, and other persons who must perform in low intensity illumination. GRA

N78-23746* National Aeronautics and Space Administration, Langley Research Center, Langley Station, Va.

INSTRUCTOR AND STUDENT PILOTS' SUBJECTIVE EVALUATION OF A GENERAL AVIATION SIMULATOR WITH A TERRAIN VISUAL SYSTEM

Gary W. Kiteley (Auburn Univ., Ala.) and Randall L. Harris, Sr. Apr. 1978 34 p refs

(NASA-TM-78698) Avail: NTIS HC A03/MF A01 CSCL 05H

Ten student pilots were given a 1 hour training session in the NASA Langley Research Center's General Aviation Simulator by a certified flight instructor and a follow-up flight evaluation was performed by the student's own flight instructor, who has also flown the simulator. The students and instructors generally felt that the simulator session had a positive effect on the students. They recommended that a simulator with a visual scene and a motion base would be useful in performing such maneuvers as: landing approaches, level flight, climbs, dives, turns, instrument work, and radio navigation, recommending that the simulator would be an efficient means of introducing the student to new maneuvers before doing them in flight. The students and instructors estimated that about 8 hours of simulator time could be profitably devoted to the private pilot training. Author

N78-23747* Federal Aviation Administration, Washington, D. C. **RADAR TRAINING FACILITY PROGRAM IMPLEMENTATION PLAN**

A. Asch (Mitre Corp.), G. Beeker (Mitre Corp.), and L. Wuebler Sep. 1977 163 p

(Contract DOT-FA69NS-162)

(AD-A050319/3; FAA-ED-21-5) Avail: NTIS HC A08/MF A01 CSCL 05/9

Information to be utilized for program guidance and management direction during the development and implementation phases of the Federal Aviation Administration's Radar Training Facility (RTF) is presented. The RTF is to be installed at the Aeronautical Center as an element of the FAA Academy for academy level radar training and effective evaluation of developmental terminal and en route Air Traffic Control Specialists. Author

N78-23748* Life Systems, Inc., Cleveland, Ohio.

EVALUATION OF A SPACECRAFT NITROGEN GENERATOR Final Report

R. D. Marshall, M. K. Lee, and F. H. Schubert Apr. 1978 51 p refs

(Contract NAS2-8732)

(NASA-CR-152097; ER-251-6) Avail: NTIS HC A04/MF A01 CSCL 06K

A research and development program was successfully completed towards the development of a method of generating nitrogen for cabin leakage makeup aboard space vehicles. The nitrogen generation concept used liquid hydrazine as the stored form of nitrogen. This reduced tankage and expendables weight associated with high pressure gaseous and cryogenic liquid nitrogen storage. The hydrazine was catalytically dissociated to yield a mixture of nitrogen and hydrogen. The latter was separated to provide the makeup nitrogen. The hydrogen will be used in the reduction of metabolic carbon dioxide. Author

N78-23749# Air Force Human Resources Lab., Brooks AFB, Tex.

ANNOTATED BIBLIOGRAPHY OF THE AIR FORCE HUMAN RESOURCES LABORATORY TECHNICAL REPORTS-1976 Final Report

Esther M. Barlow Jan. 1978 53 p

(AF Proj. 9991)

(AD-A051982; AFHRL-TR-78-1)

Avail: NTIS

HC A04/MF A01 CSCL 05/5

This annotated bibliography presents a listing of technical reports (1976) dealing with personnel and training research conducted by the Air Force Human Resources Laboratory (AFHRL). The research has been conducted by professional personnel representing a variety of disciplines, including psychologists, operations research specialists, mathematicians, computer analysts, economists, electronic engineers, aeronautical engineers, and technical support personnel. AFHRL is charged with the planning and execution of USAF exploratory and advanced development programs for selection, motivation, training, retention, education, assignment, utilization, and career development of military personnel; also the composition of the personnel force and training equipment. This laboratory also provides technical and management assistance to support studies, analyses, development planning activities, acquisition, test evaluation, modification, and operation of aerospace systems and related equipment. Author (GRA)

N78-23750# Royal Aircraft Establishment, Farnborough (England).

THE TRANSMISSION OF VERTICAL VIBRATION TO THE HEADS AND SHOULDERS OF SEATED MEN

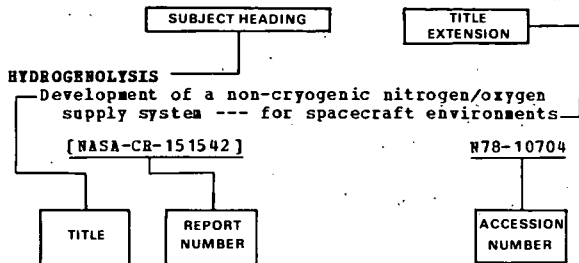
G. F. Rowlands May 1977 117 p refs

(RAE-TR-77068; BR59517) Avail: NTIS HC A06/MF A01

An investigation of the frequency response of the human body to vertical vibration, using six subjects on a rigid seat is described. The input used was swept sine acceleration, where the frequency of the vibration varied linearly with time between an upper and lower value at a fixed amplitude. The use of such an input facilitated measurement of amplitude ratio and phase angle plots of the ratio of head and shoulder acceleration to seat acceleration against frequency, to be made for various postures and limb positions was presented. Resting the back against the seat and putting the legs forward were both found to have a major effect on transmission. Attempts are made to model these response curves so that by simply monitoring floor vibration in vehicles and assuming the seat response is known, one can predict the range of vibrations present at the head and shoulders. Theoretical analysis is used to demonstrate that the response of cushions is directly related to the human frequency response. Author (ESA)

SUBJECT INDEX

Typical Subject Index Listing



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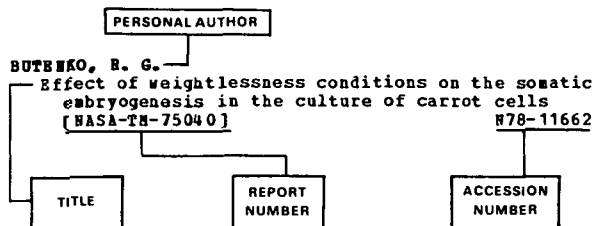
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