AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY

WITH INDEXES

(Supplement 165)

MARCH 1977
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AEROSPACE MEDICINE
AND BIOLOGY

A CONTINUING BIBLIOGRAPHY
WITH INDEXES

(Supplement 165)

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 February 1977 in

- *Scientific and Technical Aerospace Reports (STAR)*
- *International Aerospace Abstracts (IAA)*
NASA SP-7011 and its supplements are available from the National Technical Information Service (NTIS). Questions on the availability of the predecessor publications, Aerospace Medicine and Biology (Volumes I - XI) should be directed to NTIS.

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INTRODUCTION

This Supplement to Aerospace Medicine and Biology (NASA SP-7011) lists 198 reports, articles and other documents announced during February 1977 in Scientific and Technical Aerospace Reports (STAR) or in International Aerospace Abstracts (IAA). The first issue of the bibliography was published in July 1964; since that time, monthly supplements have been issued.

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

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

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

An annual index will be prepared at the end of the calendar year covering all documents listed in the 1977 Supplements.
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IAA ENTRIES (A77-10000 Series)

All publications abstracted in this Section are available from the Technical Information Service, American Institute of Aeronautics and Astronautics, Inc (AIAA), as follows: Paper copies are available at $5.00 per document up to a maximum of 20 pages. The charge for each additional page is 25 cents. Microfiche (1) are available at the rate of $1.50 per microfiche for documents identified by the # symbol following the accession number. A number of publications, because of their special characteristics, are available only for reference in the AIAA Technical Information Service Library. Minimum airmail postage to foreign countries is $1.00. Please refer to the accession number, e.g., (A77-10052), when requesting publications.

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TYPICAL CITATION AND ABSTRACT FROM STAR

N77-10799*# Joint Publications Research Service, Arlington, Va
ON THE POSSIBLE UNIQUENESS OF INTELLIGENT LIFE
IN THE UNIVERSE
(NASA Order W-13183)
(NASA-TT-F-17247) Available NTIS HC A02/MF A01 CSCL 03C

The modern conception of an expanding universe rejects theories of cosmic wonders, transformation of matter, or superintelligent cosmic factors as sources of intelligent life on earth. Life emerged on earth and became intelligent as the result of an extremely rare combination of improbable circumstances.

The expansion of intelligent life in the universe will be accomplished by the establishment of artificial biospheres orbiting the moon or stationed in galaxies. Communications between these space colonies will rely on computer technology and radio astronomy.

TYPICAL CITATION AND ABSTRACT FROM IAA

Effects of head-down tilt on fluid and electrolyte balance.
L Volger, R Jean-Charles, and A V Chobanian
(Boston University, Boston, Mass) Aviation, Space, and Environmental Medicine, vol 47, Oct 1976 p 1065-1068 26 refs Grants No NGR 22 004-021, No NIH-RR 533

The metabolic effects of 5 deg tilt were studied in eight normal individuals. Exposure to tilt for 24 hr increased sodium excretion and decreased plasma volume. Plasma renin activity and plasma aldosterone levels were not significantly different from supine values during the first 6 hr of tilting, but were increased significantly at the end of the 24-hr tilt period. Creatinine clearance and potassium balance were not affected by the tilt. These findings indicate that head-down tilt induces a sodium diuresis and stimulation of the renin-angiotensin-aldosterone system.
IAA ENTRIES

A77-12980  Requirements concerning biotelemetry systems with examples regarding the application (Anforderungen an Biotelemietrien mit Anwendungsbempielen) Mr. Hahn (Messerschmitt Bolkow Blohm GmbH, Ottobrunn, West Germany) Deutsche Gesellschaft für Luft- und Raumfahrt, Symposium über Telemetrie-Messdatenerfassung, Echtzeitdatenereducierung und -speicherung, Munich, West Germany, June 23, 24, 1976, Paper 76-123 7 p In German.

Biotelemetry, as it is understood today by the applier, involves the transmission of data in the HF range. The requirements concerning a suitable biotelemetry system are related to low weight, long times of operation, the needed range, the number of channels which are required, aspects of precision and frequency range, environmental requirements, and transducer characteristics. Attention is also given to the advances made in the development of biotelemetry since its introduction in 1949 and to problems which have yet to be solved to make a wider application of telemetry methods possible.


For a number of applications it is desirable to obtain biophysical-experimental data from probands who are swimming in the water or who are diving. Such applications can be related to tests conducted with new diving equipment or with protective clothing for navy fliers who after a crash are floating in the water. Applications involving the transmission of data in underwater archeological studies are also conceivable. A description is given of various approaches for solving the problems connected with the considered applications. Attention is given to the mechanical design of the telemetry encoders, aspects of power supply, and the possibilities which exist for the transmission of the PCM signals.

A77-13007  Potential biomedical applications of ion beam technology B A. Banks, A J. Wegand (NASA, Lewis Research Center, Cleveland, Ohio), C L. Van Kampen (Case-Western Reserve University, Cleveland, Ohio), and C A. Babbush American Institute of Aeronautics and Astronautics, International Electric Propulsion Conference, Key Biscayne, Fla., Nov. 14-17, 1976, Paper 76-1018 12 p 15 refs. Grant No. PHS 5-T-01 GM-01090-14.

Electron bombardment ion thrusters used as ion sources have demonstrated a unique capability to vary the surface morphology of surgical implant materials. The microscopically rough surface texture produced by ion beam sputtering of these materials may result in improvements in the biological response and/or performance of implanted devices. Control of surface roughness may result in improved attachment of the implant to soft tissue, hard tissue, bone cement, or components deposited from blood. Potential biomedical applications of ion beam texturing discussed include vascular prostheses, artificial heart pump diaphragms, pacemaker fixation, percutaneous connectors, orthopedic prosthesis fixation, and dental implants.


Experiments were conducted to study the performance quality of a human operator assigned with tracking functions and moving, without preliminary adaptation, into an environment with slightly reduced partial oxygen tension. Performance quality was examined using a model of single-coordinate tracking of a sinusoidal signal during breathing of air and a hypoxic mixture containing 15% O2. Analysis of tracking acts revealed four types of tracking. It is found that breathing the given hypoxic mixture degrades the tracking quality of a nonadapted operator due to impairment of the expiratory process on the specified trajectory. The influence of small values of hypoxia is characterized by significant individual differences.


The working capacity of a pilot during the time he is at the controls - in the presence of sufficient level of health, training, and motivation - may be defined as his ability to perform the required tasks with a given efficiency and proper tension of the psychophysiological systems of the body. The paper stresses that the working capacity should be assessed dynamically, based on a complex postflight analysis of the pilot's activities observed by automatic flight parameter recording systems, along with an analysis of the relevant changes in the physiological functions of the pilot's body. Attention should be directed to the evaluation of the pilot's 'attention potentiality' and to the structure of his control movements through the use of the stabilizer and manual control. Such a complex evaluation is particularly suitable during intense flight duty, long interruptions between vacations, and mastering of a new skill.

A77-13074

Experiments were conducted on 100 healthy subjects aged 16-35 yr of different occupations (candidate and professional pilots, surface transportation drivers, and individuals of various professions) to assess the capabilities of using cephalography for a quantitative evaluation of static equilibrium in the practice of aviation medicine, especially in flight medical examination. Three types of cephalograms are identified and discussed in terms of normal, asymmetrical, and irregular patterns. The last two types are observed in the case of well-defined phenomena of vestibular dysfunction.

A rapid and straightforward technique using a special ruler is described for assessing the cephalograms obtained, the whole process of evaluation requiring about 5 mm in all. A cephalogram index is proposed for exact characterization of disorders in static equilibrium.

A77-13074 # Changes in the heart rate and cardiac rhythm upon exposure to flight stress (Izmenennia chastoty i ritma serechenykh skokhreshchenni pod vliyanem letnoi nacazki) Iu N Karanukhov and Iu N Shishmarev Voenna-Meditsinski Zhurnal, Aug 1976, p 59-61 In Russian

Electrocardiography and mechanocardiography were applied to flight personnel subjects aged 18-45 yr to study the changes in the heart rate (HR) and cardiac function of these transport aircraft crewmembers during their performance of flight tasks, during the period between flights, and during 24 hours of postflight rest. The flight tests were performed at an altitude of up to 2000 m for about 3 hr on 19 subjects, composed of 7 captains, 6 copilots, and 6 navigators. A prestart HR enhancement is observed in all subjects due to mobilization of organic systems prior to forthcoming task. No in-flight arrhythmias were observed. Post-flight observations indicate that the captains and copilots exhibit the highest tendency of increase in the HR. Atrial extrasystole is observed in two captains, which disappeared in the period between flights and 12-24 hr after flight. Occurrence of extrasystoles points to the enhancement of myocardial excitation under the action of flight factors.

A77-13075 # Postflight changes in heart rate and arterial pressure in pilots (Izmenennia pul'sa i arterial'nogo davlenia u letchikov posle poletov) N N Shorokhov Voenna-Meditsinski Zhurnal, Aug 1976, p 73-75 In Russian

A77-13147 # Biology and physics (Biologija i fizika) O S Davydov Akademiia Nauk Ukrain'skoi RSR, Visnik, vol 40, Aug 1976, p 13-20 9 refs In Ukrainian

The paper reviews some of the basic concepts of the biophysics of proteins and takes note of some recent developments in the study of the role of solvents in energy transport in protein molecules and in the investigation of the molecular mechanism of muscular contraction. The high efficiency of energy transfer by proteins observed during hydrolysis of ATP may be explained by the creation of exceptionally stable excitations of the soliton type in the alpha-spiral strips of protein molecules. A model is proposed for solcomere contraction in which all parts of the myosin molecule are active elements. More than half the liberated energy of ATP hydrolysis is converted to kinetic energy of excitation, which is transferred to a soliton.


Frequency and content of autoantibodies to DNA, skin reaction to intracutaneous administration of DNA solution, and the desoxyribonuclease activity of blood serum were measured in 288 people of different age and sex who were deemed to be healthy. The frequency and pronouncedness of the autoimmune reactions to DNA were found to increase with age. The peak of the autoimmune reaction in men is observed to occur ten years earlier (at age 65) than in women (at age 75). The desoxyribonuclease activity of the blood serum decreases with age. In persons of advanced age, a certain decrease in the frequency of autoimmune reactions and increase in DNA-ase activity is observed in comparison to the age range 60-75 years.

A77-13152 # Investigating the mechanisms of neurohumoral regulation (Do svychennia mekhanizmiv neirogumoral'noi regulatsii) O F Makarchenko, R S Zlatin, and B A Roitrub (Akademiia Nauk Ukrain'skoi RSR, Institut Fiziologii, Kiev, Ukrainian SSR) Fiziologichni Zhurnal, vol 22, July-Aug 1976, p 435-442 34 refs In Ukrainian

The paper sheds light on methodological problems in the theory of neurohumoral regulation, which have arisen during experimental and clinical investigations conducted by the authors. The discussion covers the fundamental principles of regulation theory, phylogenetical aspects of neurohumoral regulation, and concepts on the remote types of humoral regulation. Particular attention is directed to the role of confomational mobility of blood proteins in maintaining the homeostasis of the organism, along with the types of regulatory influence of the hypothalamus. Also discussed are the principles of stability and liability as well as the importance of the principle of reliability in the activity of neurohumoral systems.

A77-13153 # Some possibilities of using the Sekhovsen effect of increasing working capacity to improve the functional state of the organism during motion sickness (Deiaki mozhetvosti Sekhovskenogho efektu pidvishchennia pratsyuzdatnosti v pokijalenni funktsional'nogo stanu organizmu pri `khvorobii neresuvanni`) M A Litiv'na (TS K DTSAAF, Ukrainian SSR) Fiziologichni Zhurnal, vol 22, July-Aug 1976, p 548-551 23 refs In Ukrainian

A77-13154 # A preamplifier for electrophysiological investigations (Poperedni pidvysuvach dla elektrofiziologichnikh doslidzhen') T L Davydov'ska and V M Davydov's'kii (Kiyiv's'kii Derzhavnyi Universitet, Kiev, Ukrainian SSR) Fiziologichni Zhurnal, vol 22, July-Aug 1976, p 561, 562 In Ukrainian

A77-13155 # Long-term adaptation of the heart to high-level stress (Dolgovremennaa adaptatsiia serdtsa k bol'shoi na-gruzke) F Z Meerson (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR) Uspekhi Fiziologicheskikh Nauk, vol 7, July-Sept 1976, p 34 56 84 refs In Russian

There exist two types of long-term adaptation of the heart to high-level stress. (1) Cardiac adaptation to continuous stress, which develops during all major circulatory diseases in the form of compensatory hypertrophy of the heart, and (2) cardiac adaptation to periodically applied stress, which develops during intensive physical work in the form of what is known as a trained heart. Both types are based on the activation of the synthesis of nucleic acids and proteins in the myocardium and regulatory system of the heart. However, the result of adaptation is different for each type of adaptation. The work that can be done by unit mass of myocardium is increased in the case of trained heart and decreased in the case of...
compensatory hypertrophy, as compared to normal level. Emphasis is placed on elucidating the mechanism underlying this difference. A comparison is drawn between the metabolism, structure and function of the heart for these two types of cardiac adaptation. All the differences appear to be accounted for by events taking place on the genome level.

A77 13156
Electrophysiology of the hippocampus (Elektrofiziolohicheskii Kakh, Nauk, vol 7, July-Sept 1976, p 57-81) 19 refs In Russian

The paper presents a review of experimental evidence on the electrophysiology of the hippocampus, available from Soviet and foreign literature. The characteristics of the morphological structure of the hippocampus are outlined. A detailed description is given of the electrophysiological properties of the hippocamp neurons, possible mechanisms of their interaction for excitation and inhibition, and the impact of certain cerebral structures on the electrical activity of the hippocampus. The overall electrical activity of the hippocampus is discussed as related to the electrophysiological program and evoked potentials, along with hypotheses on the nature of these phenomena. The study demonstrates the significance of the observed evidence to gain insight into the functional organization of the hippocampus and to elaborate some fundamental problems in general electrophysiology.

A77 13187

Changes of the alpha, delta and theta rhythms of four people, from 18 to 24 in age, conditioned by electrically induced sleep were recorded in an effort to study the development and mechanisms of such electric sleep. During electric sleep, a great increase (140-150% of the base value) was observed in the delta and theta activity of the cerebral cortex, while a great decrease (15-20% of the base value) was observed in the alpha rhythm. After electric stimulation was switched off, delta and theta activity decreased by 20-25%, while alpha activity increased by 50-55%. The effects of electric sleep on memory were also examined.

A77 13188
The effect of different volume rates of artificial blood circulation on the hemodynamics of an organism reanimated after death from asphyxia (Vliyanie razlichnykh ob'emu skorostei iskusstvennoi krovoobrashchenii na gemodmamiku organizma, ozhivlennogo posle smerti ot asfiksi) I I Lanovenko (Akademiia Nauk Ukrainskoi SSR, Institut Fiziologii, Kiev, Ukrainian SSR) Akademiia Nauk Ukrazskoi SSR, Doklady, vol 229, July 1, 1976, p 233-236 15 refs In Russian

The hemodynamics of fifteen dogs that were reanimated by a method of artificial circulation after clinical death for 12.14 min was studied as a function of different blood volume rates. 197 plus or minus 26 milliliters/kg/min at the beginning of reanimation and 127 plus or minus 24 milliliters/kg/min at the end, for the first group, and 38 plus or minus 15 (at the beginning) and 20 plus or minus 6 milliliters/kg/min (at the end) for the second group. The following parameters were studied: cardiac output, the systemic index, the mean arterial pressure, heart rate, the working index of the left ventricle, and the peripheral resistance of the vessels. For the first group of dogs, it was found that the hemodynamic response was conditioned by a syndrome of hyperdynamics, while the second group was found to suffer from a primary insufficiency of blood circulation along with cessation of the homeometric and heterometric mechanisms of the self-regulation of heart activity.

A77 13189
Characteristics of the monocular estimation of the orientation of a line by the right and left eye and their possible neurophysiological mechanisms (Osobennosti monokularnoi otsenki, orientatsii linii pravym i levym glazom i ikh vozmozhnye neurofiziologicheskie mekhanizmy) L I Leushina and A A Nevskaya (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR) Akademiia Nauk SSSR, Doklady, vol 229, July 1, 1976, p 237-240 11 refs In Russian

An experiment was devised to determine the systematic errors associated with the monocular identification of line orientation on a tachistoscope. Lines were oriented vertically, horizontally, and obliquely at 45 degree angles to the left and right of the vertical, and were viewed by the right and left eyes of three subjects. A matrix method for determining incorrect identifications showed that in the case of two of the subjects, a shift in line orientation 45 degrees clockwise predominates for the left eye, while a 45 degree counterclockwise shift predominates for the right eye. Exactly opposite shifts are observed for the third subject. The effect of binocular and monocular stimulation on the magnitude of response of binocular neurons of the visual cortex is investigated in an effort to define the mechanisms for the observed pattern of systematic errors.

A77 13334
Evolution of the neurons in vertebrates (L'evolution des neurones chez les vertebres) D Bowsher (Liverpool University, Liverpool, England) La Recherche, vol 7, Nov 1976, p 935-944 5 refs In French

Evolutionary inferences on the development of neuronal systems from lower to vertebrates are derived from comparative neurological/neurophysiological studies, in the absence of fossil evidence. While nerve systems for treatment of cutaneous sensonal information are basically similar in all vertebrates, even the most primitive, an evolutionary sequence in complexity of organization is traced in the parallel pathways of reticular neurons (responding to chemical stimuli and disturbances in gravitational equilibrium with epicrinal sensibility) and lemniscal neurons (exhibiting protopathic sensibility). While the reticular organization is itself versatile and adaptive, the lemniscal organization confers enormous advantages on life forms far afield the aquatic environment.

A77 13337
The heart in slow motion (Le coeur au ralenti) P Perrier La Recherche, vol 7, Nov 1976, p 964, 965 In French

An arrangement utilizing an ultrasonic imaging device which exerts no adverse effects on the cardiac patient, a laser beam, and an acousto-optic coupler, to produce immediate high-resolution in vivo images of heart action in depth is described. Ultrasonic information...
is transferred to the laser beam, by interference with a material boasting of a high acousto-optic coupling coefficient. A mirror oscillating in step with the ultrasonic pulses makes it possible to direct the light beam instantaneously onto the appropriate region of a tapered variable-focal-length lens. Image rate can be adjusted from 50 images per second to 1500 images per second, with roughly 1.5 mm resolution in two dimensions. The outlook for improved cardiological imaging instrumentation of this type, possibly incorporating charge-coupling devices, and with reductions in price, is touched upon briefly. 

A77-13507 \* Formation of nucleoside 5'-polyphosphates under potentially prebiological conditions R Lohrmann (Salk Institute for Biological Studies, San Diego, Calif) Journal of Molecular Evolution, vol 8, Oct 27, 1976, p 197-210 19 refs

The characteristics and efficiencies of biochemical reactions involving nucleoside 5'-diphosphates and -triphosphates (important substrates of RNA and DNA synthesis) under conditions corresponding to the primitive prebiotic earth are investigated. Urea catalysis of depolymerization to inorganic polyphosphates in aqueous media is demonstrated. Mg(++) prompts depolymerization to inorganic metaphosphate in aqueous solution. 


A77-13518 * Cardiac changes in man to a stream of cold air J M Hayward, W F Holmes, and B A Gooden (University Hospital, Nottingham, England) Cardiovascular Research, vol 10, Nov 1976, p 691-696 26 refs

A77-13508 Influence of inflation and atelectasis on the hypoxic pressor response in isolated dog lung lobes E J Guebberman (U S Veterans Administration Center, Wood, Wis) and C A Dawson (Wisconsin, Medical College, Milwaukee, Wis) Cardiovascular Research, vol 10, Nov 1976, p 672-677 17 refs Research supported by the Wisconsin Heart Association USVA Project 3415-02

A77-13506 Etiopathogenesis of motion sickness (K voproso ob etiopathogeneze bolezni dvrzhenia) E M Iuganov and F A Solodovnik Akademia Nauk SSSR, Izvestia, Seria Biologicheskaia, July-Aug 1976, p 485-494 82 refs In Russian

A77-13505 Influence of inflation and atelectasis on the hypoxic pressor response in isolated dog lung lobes E J Guebberman (U S Veterans Administration Center, Wood, Wis) and C A Dawson (Wisconsin, Medical College, Milwaukee, Wis) Cardiovascular Research, vol 10, Nov 1976, p 672-677 17 refs Research supported by the Wisconsin Heart Association USVA Project 3415-02

A77-13504 Effect of heat acclimatization on intravascular platelet count, factor III, and on the 1st, 2nd, 4th, and 10th day of a stay at high altitude S D Dawson (Wisconsin, Medical College, Milwaukee, Wis) Cardiovascular Research, vol 10, Nov 1976, pt 1, p 631-633 10 refs

A77-13503 Effect of heat acclimatization on intravascular platelet count, factor III, and on the 1st, 2nd, 4th, and 10th day of a stay at high altitude S D Dawson (Wisconsin, Medical College, Milwaukee, Wis) Cardiovascular Research, vol 10, Nov 1976, pt 1, p 631-633 10 refs

A77-13502 Effect of heat acclimatization on intravascular platelet count, factor III, and on the 1st, 2nd, 4th, and 10th day of a stay at high altitude S D Dawson (Wisconsin, Medical College, Milwaukee, Wis) Cardiovascular Research, vol 10, Nov 1976, pt 1, p 631-633 10 refs

A77-13501 Urinary catecholamine excretion on acute exposure to hypobarn hypoxia J T Maher (U S Army, Research Institute of Environmental Medicine, Natick, Mass), P H Levine (Memorial Hospital, Worcester, Mass), and A Cymerman (Massachusetts, University, Worcester, Mass) Journal of Applied Physiology, vol 41, Nov 1976, pt 1, p 702-707

Multiple coagulation studies were carried out in eight healthy young men at sea level (SL) and after 1, 24, and 48 hr at a simulated altitude of 4400 m Platelet aggregation, as induced by ADP, epinephrine, and collagen, was not significantly altered by high-altitude (HA) exposure Mean 2,3-diphosphoglycerate, a physiological inhibitor of platelet aggregation, rose (P less than 0.001) after 1 hr at HA and remained elevated while no changes in circulating catecholamines were observed Platelet count, factor III availability, and membrane lipid peroxide formation were likewise unaltered at HA, as were prothrombin and thrombin times and prothrombin paracoagulation test However, mean partial thromboplastin time was significantly shortened after 1 and 24 hr at HA, recovering to SL control by 48 hr Fibrinogen and factor VIII levels also fell after 1 hr at HA but remained elevated while no changes in circulating catecholamines were observed Platelet count, factor III availability, and membrane lipid peroxide formation were likewise unaltered at HA, as were prothrombin and thrombin times and prothrombin paracoagulation test However, mean partial thromboplastin time was significantly shortened after 1 and 24 hr at HA, recovering to SL control by 48 hr Fibrinogen and factor VIII levels also fell after 1 hr at HA but returned to the pre-exposure values by 24 hr Fibrin degradation products were transiently detectable in three subjects at
A77-13791 # Quantitative value of skin thermoreceptor firing in thermoregulation mechanisms from data on unanesthetized animals (Kolchestvennoe znachenie impul'satsii termoreseptorov koszh v mekanizmah termoregulatsii po dannym na nenarkot-
zirovannykh zhivotnykh) K P Ivanov, V A Konstantmov, N A
Malovichko, and N K Danilova (Akademna Nauk SSSR, Institut
Fiziologii, Leningrad, USSR) Akademna Nauk SSSR, Doklady, vol
229, Aug 21, 1976, p 1488-1491 8 refs In Russian

A77-13792 # Synaptic contacts in the vestibular ganglion of
the eighth cranial nerve of the frog (Sinapticheskie kontakty v
vestibuharnom ganglion VIII nerva lisogoliki) T F Kuleshova (Aka-
demna Nauk SSSR, Institut Fiziologii, Leningrad, USSR) Akademna
Nauk SSSR, Doklady, vol 229, Aug 21, 1976, p 1492 1495 14
refs In Russian

A77-13829 # Human factors and flight deck design J M
1976, p 6 9, 11-14 22 refs

A77-13850 Vision and acquisition Fundamentals of
human visual performance, environmental influences and appli-
cations in instrumental optics I Overington (British Aircraft Corp.,
Guided Weapons Div, Stevenage, Herts, England) Research
sponsored by the British Aircraft Corp London, Pentech Press, Ltd.,
New York, Crane, Russak and Co., Inc, 1976 391 p 1040 refs
$32 50

A77-14151 # Threshold time of visual recognition and level
of light adaptation (Porogovoe vremia zritel'nogo opoznaniia i
uroven' svetovoi adaptatsii) V M Kamrenkov (Akademna Nauk
SSSR, Institut Vyshei Nervnoi Deiatel'nosti i Nerofiziologii,
Moscow, USSR) Fiziologiya Cheloveka, vol 2, Mar-Apr 1976, p
222 227 16 refs In Russian

Experiments were conducted on ten healthy adult subjects of
both sexes with normal vision to study the dependence of threshold
time for recognition of geometrical figures on the level of light
adaptation under tachistoscopic presentation of the test stimuli.
Adaptive changes in the threshold time for recognition of geo-
metrical figures are revealed, which are different for central and
peripheral vision. The trend of these changes is indicative of the
training of the recognition function of the eye in the range of low
levels of illumination. The results obtained support the hypothesis
on the universality of the adaptive reorganization of the sensory fields
of the eye. The existence of an optimal range of background illu-
nimation may be of practical significance in organizing the
workspace of a human operator S D

A77-14152 # A property of the control system for the
tracking movements of the human eye (Ob odnom svoystve siste-
my upravleniia sledovaniem dvizheniami galaxy B A Karpov (III
Leningradskia Psihiatrcheskaia Bol'nis, Leningrad, Akademna
Nauk SSSR, Laboratorii Protesettov Zritel'nogo Vospriiatia,
Moscow, USSR) Fiziologiya Cheloveka, vol 2, Mar-Apr 1976, p
228 240 31 refs In Russian

The tracking characteristics of the human eye are investigated
by recording the eye movements of healthy subjects assigned to track
a rhythmically moving target that may be in a continuous-periodical
(sinusoidal and triangular) motion, noncontinuous-periodical (rec-
tangular) motion, or include smooth or interrupted components of
motion. It is shown that the eye is capable of exhibiting smooth
movements of follow-up both during continuous-periodical types and
during noncontinuous-periodical types of target motion. Particular
attention is given to a discussion of the role of target motion rhythm
in the development of smooth movements of visual tracking when
the input signal lacks such characteristics as velocity and acceleration
which are considered to be necessary for the occurrence of smooth
tracking movements of the human eye S D

A77-14154 # Mimical and vegetative components of emo-
tional state (Mimicheskie i vegetativnye komponenty emotsional'n-
ogo sostosaniiia) M N Rusalova (Akademna Nauk SSSR, Institut
Vyshei Nervnoi Deiatel'nosti i Nerofiziologii, Moscow, USSR)
Fiziologiya Cheloveka, vol 2, Mar-Apr 1976, p 247 252 12 refs In Russian

The paper is concerned with a study of techniques for the
dynamic diagnosis of human emotional state. The qualitative
characteristics of emotional state, which arise from mental repre-
sentation of various situations, were determined by EMG of facial
muscles in conjunction with recordings of ECG and respiration.
Experiments were conducted on dramatic arts students, actors, while
the control group consisted of individuals from other professions.
Three testing versions were used (1) mental representation of four
emotional states: joy, fear, anger, and sadness for events concerning
the subject himself, (2) masking of these emotional states, and (3) imitation of such emotional states without emotional experience. It is shown that mental representation of emotion-involving events results in changes in the activity of the mimical muscle of the face and indices of the autonomic nervous system, depending on the type of emotion. Each of the emotional states considered exhibits a characteristic EMG pattern.

A77-14155 # Bioelectrical activity of the brain during prolonged hypokinesia in the antorthostatic position (Bioelektricheskaya aktivnost mozga pri distsentnoj giperokinesii v antorthostatskom polozhenii) Z A Korovskaya, O G Rossinskaya, and E A Shaposhnikov (Akademia Meditsinskikh Nauk SSSR, Moscow, USSR) Fiziologia Cheloveka, vol 2, May-June 1976, p 318-324 9 refs in Russian

A77-14156 # Characterization of the transitory state from wakefulness to somnolence from EEG data (Kharaakteristika perehoda odnogo sostoinanii ot bodrnost'noj k dremove po dannym EEC) A Ts Gol'bin and Iu A Stupnitskii (Gorodskoe Spetsializirovanoe Otdelenie po Lecheniu Navrovykh Lesnom, Leningrad, USSR) Fiziologia Cheloveka, vol 2, May-June 1976, p 347-353 14 refs in Russian

The paper is concerned with a statistical study of the parameters pertaining to the frequency analysis of the EEG of the occipital and central regions in the brain of healthy adult subjects in the state of wakefulness, transition to somnolence, and somnolence. It is shown that the transitory state can be differentiated from related states by a variety of indicators, such as the mean level of alpha-activity, amplitude variation coefficients of high-frequency rhythms (alpha, low-beta, high-beta), and the cross-correlation coefficient of total energy and the alpha component of the biopotentials of the occipital and central regions. In particular, an increase in the correlation coefficient between the occipital and central regions with respect to total energy and to the alpha rhythm may be regarded as a characteristic feature of the transitory state.

A77-14157 # Movement as an active factor in the organization of sleep (Dvizhennia kak aktivylnyi faktor v organizatsii snia) A T S Gol'bin and Iu A Stepnitskii (Gorodskoe Spetsializirovannoe Otdelenie po Lechenii Navrovykh Lesnom, Leningrad, USSR) Fiziologia Cheloveka, vol 2, May-June 1976, p 364-361 16 refs in Russian

Experiments were carried out on 6 healthy subjects aged 14-16 yr. and 12 patients aged 10-16 yr. and afflicted with the 'swaying' syndrome with a view toward studying their behavioral and electrophysiological patterns of sleep and wakefulness. Repeated studies of night sleep revealed a regular periodicity in sleeping pose, which is individually constant for each healthy subject. In addition, maximum number of motor, somatovegetative, and vocal responses were observed during paradoxical sleep and transitory states, and minimum number during the 3rd stage of sleep. An analysis of sleep characteristics in the patients with the swaying syndrome supports the hypothesis that the parameters of evoked potential may be regarded as an objective indicator of the sensory and extrasensory factors of perception. The results support the hypothesis that the parameters of evoked potential may be regarded as an objective indicator for the dynamic interaction of two types of information during acquisition and processing of sensory information. The proposed hypothesis is verified using signal detection theory, which permits a qualitative evaluation of the sensory (analyzer sensitivity) and extrasensory (decision making) components of the sensory-perceptive process. The early components of evoked potential show a positive correlation with the index of sensory sensitivity, whereas the late waves of evoked potential correlate with the criterion of decision making.

A77-14158 # General and local changes in the bioelectrical activity of the brain during mental activity (Obshchie i lokal'nye izmenenii bioelektricheskoj aktivnosti mozga vo vremia psihicheskogo deistvii) E D Khromskaya (Moskovskii Gosudarstvennyi Universitet, Akademia Nauk SSSR, Institut Psykholoogy, Moscow, USSR) Fiziologia Cheloveka, vol 2, May-June 1976, p 372-385 143 refs in Russian

The paper presents a review of available theoretical and experimental evidence on the variation of the bioelectrical activity of the brain during mental activity such as performance of various psychological tests. Particular attention is given to general (generalized) and local (specific) changes in the various indices of the bioelectrical activity in different regions of the brain. These indices concern the frequency-amplitude changes in EEG, evoked potentials, spatial synchronization of biopotentials, and the like. Included in the discussion is the role of the frontal areas of the brain as well as the right and left hemispheres in achieving different types of mental activity. Evidence is presented in support of the integral or systemic nature of the bioelectrical activity of cortical and subcortical structures during mental activity.

A77-14159 # Interrelationship between the parameters of evoked potential and the structure of sensory-perceptive process (Vzaimootnosheniia medzhdu parametrami vyvokhnykh potentsiala struktur sensorno-pertsentivnogo protsessa) A M Ivanitskii and L V Matveeva (Nauchno-Issledovateli'skii Institut Sudebnogo Psikhatrii, Moscow, USSR) Fiziologia Cheloveka, vol 2, May-June 1976, p 386-399 38 refs in Russian

A psychophysiological experiment was conducted to determine the extent to which the parameters of evoked potential reflect the structure of sensory-perceptive processes and to assess the possibility of using the evoked potential as an objective indicator of the sensory and extrasensory factors of perception. The results support the hypothesis that the parameters of evoked potential may be regarded as an objective indicator for the dynamic interaction of two types of information during acquisition and processing of sensory information. The proposed hypothesis is verified using signal detection theory, which permits a qualitative evaluation of the sensory (analyzer sensitivity) and extrasensory (decision making) components of the sensory-perceptive process. The early components of evoked potential show a positive correlation with the index of sensory sensitivity, whereas the late waves of evoked potential correlate with the criterion of decision making.

A77-14160 # Memory and the functional state of the brain (Pamiat' i funkcional'noe sostoinie mozga) A M Vein and B I Kamenetskii (I Moskovskii Meditsinskii Institut, Moscow, USSR) Fiziologia Cheloveka, vol 2, May-June 1976, p 400-406 11 refs in Russian

Results are presented for an experimental psychological study of memory in 471 patients with damaged temporal, hypothalamo-mesencephalic, and stem structures of the brain. Attention is focused on the functional stresses directed toward increasing the wakefulness level and addressed to the emotional sphere of the patient. The results were submitted to computer-aided statistical and correlation analyses. A major conclusion is the existence of obvious memory failure during local lesions of the cited structures as related to the functional state of the brain. It is suggested that correct understanding of the genesis of memory disorders requires consideration of both the focus of cerebral lesion and the functional state of the brain.

A77-14161 # Human recognition of different types of acoustic signals emitted by monkeys /Cebus capucinus/ (Raspoznavanie chelovekou raznih tipov zvukovykh signalov, izdavayemykh obez'ianami /Cebus capucinus/) G V Garnshu, B V
Stressful mental activity and the regulatory state in the cardiovascular system (Napravlenie umstvennyh deiatel'nosti i sostojanie regulativnyh serdechno-sosudistoi sistemy) Iu I Kundiev, A O Navakatikian, L I Tomashevskaia, V S Derkach, and A I Kovaleva (Kievski Institut Gigan Truda i Profzabolovani), Kiev, Ukrainian SSR) Fiziologiia Cheloveka, vol 2, May-June 1976, p 433-440 45 refs In Russian

In-vivo and in-vitro experiments were conducted on subjects of both sexes aged 25-45 yr to study relevant regulatory parameters of cardiovascular functions during stressful mental activity involving such elements as time pressure, risk, and threat of electroshock penalty. The measurements were obtained by radiotelemetric recording of the cardiac rhythm, poycardiography, mechanocardiography, along with evaluation of circadian rhythm for excretion of epinephrime, norepynephrime, and corticosteroid-17 Subjective evaluation of stress was made by a ranking method. It is shown that mental activity involving high stress is accompanied by changes in the intrasystemic coordination of the functions of the cardiovascular system and returning of the rhythmic regulation of cardiac activity. The study also revealed an enhancement of adrenergic influences and changes in the circadian rhythm pertaining to the hormonal excretion of the sympathoadrenal system.

Functional states of the human operator during monotonous work ( Funktsional'nye sostojania chelovekaoperatora pri monotonnoi rabote) L G Voronin, M E Kramnik, L F Solovev, and D M Ef'ter (Moskovski Gosudarstvenny Universitet, Moscow, USSR) Fiziologiia Cheloveka, vol 2, May-June 1976, p 441-445 7 refs In Russian

Results are presented for an experimental study of the fluctuations of the working capacity of a human operator assigned to perform a monotonous task in a man/machine system. Continuous recording of the functional state parameters was achieved for prognosis of successful performance. Three types of human operator activity were simulated simple sensorimotor responses, perception and evaluation of alphabetic information, and solution of mental tasks. The results indicate that monotonous working conditions produce drowsiness, thereby sharply degrading the quality of all the tasks performed. The optimal functional states which ensure highest working capacity are found to be different for different kinds of human activity. The most reliable and informative indicator for prognosis of successful performance is shown to be the frequency of background EEG rhythm, ECG, EOG, and GSR can only be viewed as supplementary indicators.

Local and spatial variations of the alpha-component in the EEG of human operators during task performance (Lokal'nye i prostranstvennye izmenenija al'falkomponenta EEE operatorov v protsesse deiatel'nosti) A V Mirolubov (Voenno-Meditsinskii Akademiya, Leningrad, USSR) Fiziologiia Cheloveka, vol 2, May-June 1976, p 517-520 6 refs In Russian
A77-14169 # Pulse technique for determining the electro-conductivity of brain tissue (Impal'senny metod oprodeleniya elektrourovodnosti tkani mozga) Yu V Khon (Akademiya Meditsinskikh Nauk SSSR, Leningrad, USSR) Fiziologiya Cheloveka, vol 2, May-June 1976, p 521-524 12 refs In Russian
Clinical-pysiological studies necessitate the use of a technique for determining the electrical resistance of brain tissue in the vicinity of the working surface of the electrode used, under rectangular pulse operation with parameters close to actual ones during electrical stimulation of various cerebral structures for diagnostics and treatment purposes. A pulse technique for measuring the transient electrical resistance of electrode-brain tissue is described and tested on patients with parkinsonism, provided with long-term implanted electrodes. Particular attention is given to the design of the equivalent circuit through direct modeling with RC components. The proposed pulse technique revealed a high stability in the electroconducting properties of the brain tissue.

A77-14170 # Slow electrical processes as indicators of the dynamics of functional state in the deep structures of the brain (Mehennyye elektroulekskue protsessy kak pokazatel' dinamiki funktsional'nogo sostoyanija gubkowych struktur golovnogo mozga) L S Labukhin (Akademiya Meditsinskikh Nauk SSSR, Leningrad, USSR) Fiziologiya Cheloveka, vol 2, July-Aug 1976, p 549-557 24 refs In Russian
Neurophysiological experiments using implanted electrodes were conducted to study the trend of changes in the slow electrical processes (SEP) in subcortical structures in patients with parkinsonism during diagnostic and therapeutic treatments. It is shown that SEP are capable of acting as a physiological indicator for objective evaluation and prediction of functional state dynamics both during diagnosis and therapy applied to patients with motor disturbances. Attention is focused on the arousal level estimated by the pronouncedness and spreading of responses of extra-slow SEP fluctuations to the activation of attention and emotionally significant tests.

A77-14171 # Time of recognition, threshold time of display, and masking duration of patterns (Vremia uznavamia, porogovoe vremia pred'avlennia i dhtel'nost' maskirovanna izobrazhenija) V M Krol' and L I Tanengol'ts (Akademiya Nauk SSSR, Institut Problem Upravlennia, Moscow, USSR) Fiziologiya Cheloveka, vol 2, July-Aug 1976, p 566-570 16 refs In Russian
Tachistoscopic experiments were carried out on five healthy subjects aged 22-25 yr to measure their motor reaction time to the display of single objects. Line segments of different orientation, and light flashes. The threshold time of display necessary for pattern recognition is determined, along with maximum and minimum recognition time for the alphabet considered. A hypothesis is advanced that brightness and noise masking have a surface effect and act only in the very early phases of the recognition process.

A77-14172 # Relation between the size of visual image and its estimation (O zavisimosti mezdu razmerom zritel'nogo izobrazenia i ego otsenki) M B Pavlovskaya (Akademiya Nauk SSSR, Institut Fiziologii, Leningrad, USSR) Fiziologiya Cheloveka, vol 2, July-Aug 1976, p 571-578 9 refs In Russian
Monocular tachistoscopic experiments were performed on human subjects to study the conversion of physical metrics for the true size of a given object to subjective-estimation metrics. Particular attention is given to establishing the type of image scaling in the human visual system. Size scaling was achieved by three methods: (1) method of selecting the average size between two reference values, (2) multiplication method for selecting the size greater than a reference value by a certain factor, and (3) fractionation method for selecting the size less than a reference value by a certain factor. It is shown that experimental findings compare well with the hypothesis on a power function for the conversion of physical metrics of size to subjective metrics with an exponent less than unity.

A77-14173 # Investigation of the throughput of the auditory analyzer in persons of different age groups (Issledovanie propusknoi sposobnosti sklykovogo analizatora u ludei razlichenykh vozrastnykh grupp) A I Lopotko (Sanitarno-Gigiencheski Meditsinskii Institut, Leningrad, USSR) and A A Sagal (Akademiya Nauk SSSR, Institut Evolutsionnoi Fiziologii i Biokhimii, Leningrad, USSR) Fiziologiya Cheloveka, vol 2, July-Aug 1976, p 588-592 12 refs In Russian
The paper presents a procedure based on Jacobson's (1951) acoustic concepts and results for the evaluation of age-related changes in the throughput of the human auditory analyzer from audiometric data. The study determined the number of signals discriminable in frequency and intensity within the 'auditory field' of individuals ranging in age between 16-19 and 94 yr. It is found that with increasing age the auditory throughput approximates a linear relation with a falling gradient of 0.05 bit/sec per year for simple signals and 0.5 bit/sec per year for multisecponent signals.

A77-14174 # Vibrational tonic reflex and postural position (Vibratsionnyi tonicheskiy refleks i polozhenie tela) M L Latah and V S Gur'kinkel' (Moskovskii Fiziko-Tekhnicheskii Institut, Dolgoprudny, USSR) Fiziologiya Cheloveka, vol 2, July-Aug 1976, p 593-598 13 refs In Russian
Electromyographic experiments using surface electrodes were conducted on m. rectus femoris and m. biceps femoris in six healthy subjects during vibrational stimulation of the quadriceps tendon. The effect of postural position on the vibrational tonic reflex (VTR) is discussed for various positions of the body. Changeover type effects during vibrational stimulation of the quadriceps tendon are demonstrated, which are comparable to reciprocal inhibition. VTR is shown to depend on the mutual position of body parts along with their spatial position. VTR can be suppressed by foot pressure on the support. No unique dependence of VTR on muscle length is revealed.

A77-14175 # Nature of tendon reflex (O pnrode sukhozhil'nygo refleksa) Ia M Kots (Institut Fizicheskoi Kul'tury, Moscow, USSR) Fiziologiya Cheloveka, vol 2, July-Aug 1976, p 599-610 52 refs In Russian
The nature of the Achilles tendon reflex in man is studied by comparing the changes occurring in this response and the electrically induced monosynaptic H-reflex in various experimental situations. It is found that in a resting man the Achilles tendon reflex has smaller amplitude than the H-reflex. A major conclusion is that unlike the H-reflex, the Achilles reflex lacks the post-tetanic potentiation typical of monosynaptic reflexes. The absence of post-tetanic potentiation in the Achilles reflex may be attributed either to the polysynaptic nature of this reflex or to a subthreshold afferent unit, or even to a combination of these two factors.

A77-14176 # Investigation of reflex excitability of motoneurons for two types of cyclic human motion (Issledovanie refelektornoi vozbudimosti motoneironov pri dvuh tspakh tsiklicheskikh dvizhenii u cheleoveka) A V Syroveg' and M G Sirota


A77-14180 // Objective techniques for investigation of human vision (OB'ektivnye metody issledovania zrenna cheleveka) V F Ananin (Vsosouznny Nauchno-Issledovatelli'ski Institut Meditsinskogo Priborostronnaia, Moscow, USSR) Fiziolgia Cheloveka, vol 2, July-Aug 1976, p 693-698 In Russian

The paper gives a brief description of several devices designed to record the parameters of the human visual analyzer, based on the principle of optical scanning of images followed by their conversion to a measurable electric signal. The discussion covers the design of a nystagmograph, a binocular recorder of ocular micromovements and papillary reflex, and a device for recording the accommodation response of the eye. Other devices include a recorder of the size of superficial ocular vessels, a recorder for intraocular blood pressure and tonography, and a device for objective recording of the visual field. Automated processing of the output signals is achieved through the use of minicomputer and programmed computer. The devices described have undergone successful clinical testing in different medical centers S D


The information capacity of the acoustic analyzer is chosen as an integrative characteristic for studying the evolution with age of the human acoustic analyzer. The information (transmission) capacity C is defined as the logarithm (base 2) of the number of signals distinguishable in the system. Sensitivity to pitch and loudness of tone pulses was measured in subjects in eight age groups from 15 yrs to over 90 yrs. A fairly simple linear dropping off of the transmission capacity of the acoustic analyzer with the age of the subjects was noted P T H


The effects on the lysosomal membranes of the eye of the following hormones were studied using sixty rabbits as test subjects: adrenaline, somatotropic hormone, thyroxin, thyreotrophic hormone, hydrocortisone, deoxycorticosterone, and testosterone. The effect of the hormones was evaluated on the basis of changes in the general and free activity of lysosomal glycosidases in the subcellular structures of the tissues examined. Electron microscopy performed on the subcellular structures of the eye tissues demonstrated that the lysosomes are distinguished according to electron density and size. Results showed that all the hormones tested changed the lysosomal glycosidase activity as compared with the control one hour after application of hormones, but that different hormones had different effects B J

A77-14467 // Hormonal regulation of the state of the lysosomal membranes of the eye tissues (Gormonal'naya regulatsiya sostoiania lizosomal'nykh membran tkanei glaza) B S Kisaynova, T V Ukhatina, and T D Churakova (Moskovski Nauchno-Issledovatelli'ski Institut Glaznykh Bol'neznii, Moscow, USSR) Akademia Nauk SSSR, Doklady, vol 228, June 11, 1976, p 1226-1229 15 refs In Russian

The effects on the lysosomal membranes of the eye of the following hormones were studied using sixty rabbits as test subjects: adrenaline, somatotropic hormone, thyroxin, thyreotrophic hormone, hydrocortisone, deoxycorticosterone, and testosterone. The effect of the hormones was evaluated on the basis of changes in the general and free activity of lysosomal glycosidases in the subcellular structures of the tissues examined. Electron microscopy performed on the subcellular structures of the eye tissues demonstrated that the lysosomes are distinguished according to electron density and size. Results showed that all the hormones tested changed the lysosomal glycosidase activity as compared with the control one hour after application of hormones, but that different hormones had different effects B J

A77-14566 // Perceptual analysis of moving patterns J Hochberg and P Fallon (Columbia University, New York, N.Y.) Science, vol 194, Dec 3, 1976, p 1081-1083 5 refs Grant No NIH-R01-HD-06768-01A1

Configurations of moving points are often perceptually analyzed into relative and common vectors that are different from the actual
motions. If a movement configuration is abruptly replaced by a test point whose objective velocity continues the apparent (but illusory) course of one of the original points, observers perceive that course as uninterrupted and colinear. This finding provides a quantitative measure of the vector extraction phenomenon and was used to show that neither of the two current models adequately fits that phenomenon.

(Author)

A77-14582 Ergonomics and space medicine (Ergonomika i kosmicheskai meditsina) I Rudnyi and I Pestov Aviatsia i Kosmonavtika, no 7. 1976, p 34, 35 In Russian

Immediate and secondary effects of prolonged weightlessness under expected or already-tested space station conditions are discussed, along with a general discussion of spacecraft ergonomic problems. Adaptation of the human body to weightlessness, engineering adaptation of instruments and spacecraft furnishings to weightlessness, and adaptation of the machine-human system to weightlessness are emphasized. Medical tests as part of the planning for prolonged residences in orbit or in deep space, and ways of coping with shifted loads on human organs and atrophy or deconditioning of human organs and structures under weightlessness conditions, are also discussed. Principal factors to be considered in ergonomic design are outlined and some ergonomic defects encountered in space flights and spacecraft to date are mentioned.

R D V

A77-14626 Effects of the frequency content in complex air shock waves on lung injuries in rabbits C J Clemenson and A Jonsson (Fortworths Forskningsanstalt, Sundbyberg, Sweden) Aviation, Space, and Environmental Medicine, vol 47, Nov 1976, p 1143-1152 15 refs

Rabbits were exposed in a nearly closed compartment to complex air shock waves of long duration and low overpressure. Severe lung injuries were observed at overpressures that, according to criteria applicable to simple waveforms, should have caused no primary lung injury. Pressure-time functions near the thorax and, in some cases, within the thorax, were recorded. The former functions were subjected to spectral analysis, and were also used for calculating with mathematical models the response of the thorax of man and rabbit, respectively. Recorded and calculated pressure-time functions in the lungs of the rabbits showed good agreement. The analysis indicates that the frequency spectrum of the waves and resonance effects in the thorax might have been factors of importance for the production of the lung injuries and, therefore, should be considered when estimating hazards to man from experiments performed with animals.

(Author)

A77-14627 Instrumentation for the rhesus monkey as a cardiovascular analog for man during air-combat maneuvering acceleration H H Erckson (USAF, School of Aerospace Medicine, Brooks AFB, Tex.) and J R Ritzman (US Army, Brooke Army Medical Center, Fort Sam Houston, Tex.) Aviation, Space, and Environmental Medicine, vol 47, Nov 1976, p 1153-1156 24 refs

The development of high-performance, fighter aircraft has created a need for new techniques and methods to study the effects of acceleration stress on the cardiovascular system. Instrumentation methods were developed in the rhesus monkey (Macaca mulatta), in order to evaluate cardiovascular performance in a high-G, air-combat maneuvering environment. The results indicate that the rhesus monkey is a useful model in studying the effects of gravitational forces encountered by man during repetitive and maneuvering acceleration. The model permits investigation of risk limits, damage mechanisms, fatigue of the cardiovascular system, and pathophysiological responses to acceleration. Increasing the seat angle during acceleration provides protection to the cardiovascular system and results in improved eye-level blood pressure. Repeated exposure to sustained and maneuvering acceleration indicates that fatigue occurs and that cardiovascular compensation becomes inadequate.

(Author)

A77-14628 Effectiveness of four water-cooled undergarments and a water-cooled cap in reducing heat stress G F Fonsica (US Army, Military Ergonomics Div., Natick, Mass.) Aviatio, Space, and Environmental Medicine, vol 47, Nov 1976, p 1159-1164 10 refs

The cooling provided by four different water-cooled undergarments was directly measured on a heated copper manikin dressed in a basic hot weather flight ensemble. This cooling, which represents absorption of the heat produced by the metabolic processes of the body plus that from the ambient environment in the cabin, was found to be almost directly proportional to the difference between the manikin skin temperature and the temperature of the cooling water at the inlet to a water-cooled undergarment. Although these cooling garments did not, by themselves, completely isolate the manikin surface against heat gain from the hot environment, they did remove about one-half of the potential for heat gain from the ambient environment before the heat reached the manikin surface. The water-cooled cap removed heat from the manikin equivalent to about one-third of the total metabolic heat production of a seated person.

(Author)

A77-14629 Reaction time and accuracy of the saccadic eye movements of normal subjects in a moving-target task R W Baloh and V Honrubia (California, University, Los Angeles, Calif) Aviation, Space, and Environmental Medicine, vol 47, Nov 1976, p 1165-1167 16 refs Research supported by the Deafness Research Foundation, Grant No PHS-NS-09823.

Reaction time and accuracy of saccadic eye movements in following a target which moved horizontally and in a step-wise fashion were quantitatively assessed in 32 normal subjects using a laboratory digital computer. At 95% confidence intervals, mean saccadic reaction time and accuracy were 142 to 230 ms and 76 to 100% respectively. In any single subject reaction time and accuracy were highly symmetrical. There was no significant correlation between saccade amplitude and either reaction time or accuracy.

(Author)

A77-14630 Simple reaction time during exercise, heat exposure, and heat acclimation E Shvarts, A Meroz, A Mechtinger, and H Birnfeld (Tel Aviv University, Sheba Medical Center, Tel Aviv, Israel) Aviation, Space, and Environmental Medicine, vol 47, Nov 1976, p 1168-1170 8 refs

Simple reaction time (RT) to a visual stimulus was recorded in six young men for 10 successive days. On the first day, RT was recorded at rest and during 4 h of bench-stepping at a load of 38 W at room temperature of 23 C. On the next 8 d, the same measurements were repeated during exercise in heat (40 C DB, 30 C WB), and on the tenth day they were again performed at 23 C. As compared with the resting position, exercise RT increased about 30% during exercise in both the temperate and hot environments on Days 1 and 2 in an unacclimated condition, despite the large increase in rectal temperature in heat. Heat acclimation resulted in the usual decreases in heart rate and rectal temperature and in a decrease in RT. On Day 10 at 23 C, exercise RT did not differ from resting RT. The results show that exercise adversely affects simple RT, which is probably more related to the vibration experienced during exercise than to the increase in body temperature.

(Author)

A77-14631 Heart biochemical responses 14 days after +Gz acceleration R T Dowell, L A Sordahl, J N Lindsey, and H L

The rationale, construction, operation, and protection assessment methodology of the Naval Air Development Center Fuel Fire Test Facility is described. The background and developmental progress to date are discussed. It is shown that the main difficulties associated with full-scale evaluation of fire-protective clothing have been identified and largely surmounted for present practical purposes. Evaluation can now be made reliably with a reasonably small number of prototypes. Modifications in apparatus and method can be made to provide for other studies. Future effort should be directed toward engineering development of scalar models on the one hand and, on the other, basic research into the depth of burns associated with thermal exposures to radiation and to flame contact. Contact engineering effort on scalar modeling may greatly reduce the time and cost of obtaining valid burn protection assessments.


Compatibility of the human operator and automatic cockpit systems, system components, design problems, new considerations in the selection and training of fighter aircraft personnel, and pilot work underloading in an automatic cockpit setting are discussed. Revisions of psychomotor and cognitive testing, possible preference for cerebrotransient response over musculotonic response in pilots, and the suitability of some pilot candidates, rejected in earlier tests, for automated cockpit performance, are dealt with. Psychological problems involving monotony, anomie, and abrupt transition from underactivity to heightened tension and immediate decision making but without the kinetic activity typical of pre automation cockpit behavior are discussed. Some accident scenarios reconstructed from flight data recorder records illustrate the importance of data display compatible with immediate pilot responses in stressed situations are cited.

A77-14635 Evaluation of a face cooling device integrated with the standard HGU-type USAF flight helmet A T Kissin, M Alexander, D C Smedley, W J Bushing, S L Ward, and D H Lowe (USAF, Aerospace Medical Research Laboratory, Wright-Patterson AFB, Ohio) Aviaton, Space, and Environmental Medicine, vol 47, Nov 1976, p 1188-1192 USAF-sponsored research

The effectiveness of face cooling in ameliorating the physiological impact of a moderate-to-severe, operationally realistic, hypothermic stress was demonstrated in a previous paper. Justification of the principle prompted efforts to develop a cooling device of improved design which, aesthetically and operationally, interfaced with the HGU 26/P standard Air Force helmet. A single-piece fiberglass partition was form-fitted to and mounted on the helmet shell to provide sufficient elevation to provide an air plenum between the two Ventilating air of 23 C at 0.17 cu m/min (1 cfm) entered the plenum from the side and exited over the anterior edge of the helmet. Tracking performance was unchanged with face cooling, however, significant reduction in psychologic strain was demonstrated. Elevations of rectal temperature and heart rate were suppressed by 46% and 45%, respectively. Sweat loss was reduced by 43%. Structural modifications of the helmet to accommodate the device are minimal.

A77-14636 Arousing environmental stresses can improve performance, whatever people say E C Poulton (Medical Research Council, Applied Psychology Unit, Cambridge, England) Aviaton, Space, and Environmental Medicine, vol 47, Nov 1976, p 1193-1204 81 refs Research supported by the Medical Research Council of England

Contributions of some levels of heat, noise, vibration, and general stress to improve performance, despite results of tests indicating that these discomforting factors degrade efficiency and performance, are discussed. Measures taken to avoid bias in subjective assessments are described. Some cases of discrepancies between actual performance and subjective assessments of performance reflecting discomfort factors known to the subject are cited. Evidence of improved performance accompanying increased discomfort (within limits) is cited. Bias built into experiments, whether instrumented or requiring subjective ratings by subjects, is cited. Experiments reported in the literature are analyzed extensively, and ways of eliminating bias are suggested.

A77-14637 Denitrogenation interruptions with air J P Cooke (USAF, School of Aerospace Medicine, Brooks AFB, Tex) Aviaton, Space, and Environmental Medicine, vol 47, Nov 1976, p 1205-1209 31 refs NASA Order T 82170

A 3-h denitrogenation period at ground-level pressure with 95% O2-5% N2, with an air interruption of 5 min or more and matched with additional denitrogenation time equal to the interruption, will later result occasionally in altitude decompression sickness ("bends") during a 2-h decompression exposure at 38 psia (10,058 m equivalent) with 92% O2-8% N2. Thus the equal time or "mirror image" make-up time for loss of denitrogenation did not prevent bends 7 times in 17 subjects during 71 exposures with air interruptions. On the other hand, no case of bends was reported after uninterrupted denitrogenation periods. Nitrogen-loading during the interruptive period is believed to resupply the bends sites with additional nitrogen, which re-establishes conditions favoring a return to a high incidence of bends.

A77-14638 Airborne testing of three antimotion sickness preparations W H Johnson (Toronto, University, Toronto, Canada)
Acquired bundle branch block and its response to exercise testing in asymptomatic aircrewmen - A review with case reports

J E Whinnery and V Froelicher, Jr (USAF, Wilford Hall Medical Center, Lackland AFB, Tex) Aviation, Space, and Environmental Medicine, vol 47, Nov 1976, p 1217-1225 88 refs

Using a flight of the Soyuz spacecraft by way of illustration, space, and environmental medicine - control of the health of cosmonauts in flight based on DLHB functional testing is suitable for diagnosis of the propensity of the human organism to syncope and vaso-autonomic instability, and that its relative simplicity and safety of application make it recommendable for extensive use in the practice of aviation physical examination

A77-14747 * Effects of water immersion on renal hemodynamics in normal men M Epstein, R Levinson, and R Loutzenhiser (US Veterans Administration Hospital, Miami, University, Miami, Fla) Journal of Applied Physiology, vol 41, Aug 1976, p 230-233 23 refs Research supported by the US Veterans Administration, Grants No NGR 10-007-097, No NIH-RR 261

The present study was undertaken to delineate the effects of water immersion on the kidney. Immersion did not alter either clearance at a time when sodium excretion was increasing markedly. The constancy of PAH clearance during NI suggests that renal blood flow is unaltered and that the naureis of NI is mediated independently of alterations in overall renal perfusion. The sluggish decline of a naureis during recovery is consistent with the presence of a humoral factor contributing to the encountered naureis

A77-14801 # Some problems of space medicine (Nekotorye problemy kosmicheski meditsiny) N N Gurovskii and A D Egorov Kosmicheskaia Biologia i Aviakosmicheskaia Meditsina, vol 10, no 6, 1976, p 3-14 29 refs In Russian

The paper is concerned with a number of problems being solved by space medicine along with its major development stages. Particular attention is given to a discussion of the symptom complex that is superficially similar to motion sickness, changes in motor function during flight, cardiovascular changes during prolonged spaceflight, changes in blood electrolyte balance, calcium depletion in the bony tissue, as well as the anemia syndrome and changes in the immunologic susceptibility of the organism. The paper states that renal plasma flow and glomerular filtration rate are unaltered during NI. Immersion does not alter either clearance at a time when sodium excretion is increasing markedly. The constancy of PAH clearance during NI suggests that renal blood flow is unaltered and that the naureis of NI is mediated independently of alterations in overall renal perfusion. The sluggish decline of a naureis during recovery is consistent with the presence of a humoral factor contributing to the encountered naureis

A77-14802 # The cardiovascular system during hypokinesia of varying duration and intensity (Serdechno-sosudistaya sistema pri gipokinesii razlichoi dlitelnosti i vyrazhennosti) N E Panferova Kosmicheskaia Biologia i Aviakosmicheskaia Meditsina, vol 10, no 6, 1976, p 15-20 15 refs In Russian

The paper gives and compares data on the orthostatic tolerance of man exposed to different hypokinetic conditions of varying duration - water immersion (10 days), supine position in the chair close to the mean physiological rest posture (7-20 days), bed rest (10-120 days) and altered gravity (10 days). The tolerance to orthostatic tests decreased to a larger extent after experiments in which the motor activity was significantly lowered water immersion, supine position in the chair and 120-day bed rest orthostatic tolerance reduced to a lesser extent after altitude chamber experiments. The level of decline of the motor activity was more important than the time of hypokinetic exposure. The most noticeable
A77-14803 // Hypokinetic tolerance of persons adapted to high altitudes (Perenosimost' gopoknezii liu'mi, adaptirovannyim k vysokogor'iu) V I Korol'kov and M M Mirakhimov Kosmicheskaia Biologia i Avakosmicheskaia Meditsina, vol 10, no 6, 1976, p 20-24. 23 refs In Russian

After a 26-day exposure to an altitude of 3200 m test subjects were kept in bed for 10 and 24 days. Each experimental group consisted of 6 test subjects. Physiological effects of the exposure were measured with respect to changes in the respiration, circulation and red blood systems as well as in the orthostatic and exercise tolerance. High altitude adaptation which preceded bed rest did not arrest the development of orthostatic intolerance or the decrease of physical performance that resulted from the bed rest experiment.

(Author)

A77-14804 // Effect of prolonged hypokinesia on the PO2 dynamics in the rat brain tissues during orthostatic and antiorthostatic tests (Vliiane dlitel'noi gipokinezn na dinamiku PO2 v tkannakh gelovogo mozga krys pri ortostaticheskoj i antortostaticheskoj problehi) E A Kovalenko and A V Riazhskn Kosmicheskaia Biologia i Avakosmicheskaia Meditsina, vol 10, no 6, 1976, p 24-27 In Russian

Orthostatic (+6 deg) and antiorthostatic ( -2 deg) 30-day bed rest resulted in reduced taste sensitivity to nutritional stimuli, elevated mobilization of taste receptors of the tongue and decreased amplitude of the gastric reflex. An exposure to the antorthostatic position at a greater angle (5 deg) yielded opposite changes in the thresholds of taste sensitivity, phase changes in the mobilization of taste receptors and decreased amplitude of the gastrointestinal reflex. During the recovery period, taste sensitivity rapidly returned to the normal level.

(Author)


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(Author)

A77-14806 // Changes in the central and peripheral circulation and acid-base balance of blood in dogs during tilt tests (izmenennia tsentral'nogo i perifericheskogo krovoobrashchennia krovii u sobak vo vremia passyvnoi ortostaticheskoi probki) V E Ketsko Kosmicheskaia Biologia i Avakosmicheskaia Meditsina, vol 10, no 6, 1976, p 31-36. 61 refs In Russian

Integral changes in circulation and acid-base equilibrium of blood were studied on urethane-chloralose anesthetized dogs during a 20 min tilt test. Against the background of a relatively stable mean pressure in the aorta, the blood flow in the aorta and carotid artery diminished, pressure in the right atrium decreased and the heart rate increased. The phase of isometric contraction of the left ventricle increased, ejection time, mechanical systole and intrasystolic index decreased whereas the myocardial contractility increased. The blood flow in the liver, spleen and hind limb skin reduced and in hind limb muscles remained unaltered. The arterial blood metabolic acidosis and hyperventilation developed.

(Author)

A77-14807 // Effect of muscle electrostimulation treatment, on orthostatic tolerance in man (Vliiane kursa elektrotimuliatsii na ortostaticheskuiu ustoichivost' cheleoveka) V M Khaitov and V S Georgievsk Kosmicheskaia Biologia i Avakosmicheskaia Meditsina, vol 10, no 6, 1976, p 37-41. 29 refs In Russian

Two series of experiments were conducted on six and twelve (3 groups of 4 persons each) healthy subjects in ambulatory and bed-ridden conditions, respectively, to assess the effect of electrostimulation on their orthostatic tolerance. The first series of experiments consisted of a 30-day (5 times a week, 25 30 mm daily) electrostimulation treatment for the muscle groups of the calves, thighs, back, and abdomen. The second series of experiments consisted of 45-day (6 times a week, twice a day for 30 min) electrostimulation treatment given to the subjects in a bed-ridden orthostatic position with two different procedures for two of the three groups, the third group serving as the control Heart rate and blood pressure results were submitted to statistical treatment. It is found that muscle electrostimulation had a beneficial effect on orthostatic tolerance in the ambulatory subjects. In the bed ridden subjects, 20 electrode electrostimulation gave better results than 12-electrode electrostimulation. The third group of subjects, who were not electrostimulated during hypokinesia, showed a pronounced reduction in orthostatic tolerance.

(Author)

A77-14808 // Functional state of the acoustic analyzer in man exposed to +Gx (Funktionsnal'noe sostojanie uchastnikov +Gx) A B Barer and V E Grishanov Kosmicheskaia Biologia i Avakosmicheskaia Meditsina, vol 10, no 6, 1976, p 41-47. 23 refs In Russian

The functional state of the human acoustic analyzer was investigated during an exposure to +Gx acceleration of 4-14 g applied at an angle of 78 deg to the longitudinal axis of the body. During an exposure to 8 10 g the hearing state began to deteriorate. This included an increase in the tonal thresholds of hearing sensitivity with respect to the aural and bone conduction, and an increase in the differential thresholds of hearing with respect to intensity and pitch. With an increase in the acceleration value, these changes grew, reaching a maximum at 14 g. It is suggested that possible mechanisms of changes in the hearing sensitivity are associated with disorders in the systems of sound conduction and perception.

(Author)


Results are presented of an experimental study in which skin portions of different areas in piglets were exposed to soft X-rays. The biological effect of radiation was evaluated in terms of clinical, hematological, and biochemical changes in the animal's body. The data obtained point to the development of burn illness whose severity increased with an increase in the area of irradiated skin surface.

(Author)

A77-14810 // Clinical course of radiation damage at high altitudes (Klinichesko techenie radiatsionnogo porazheniya v usloviiakh vysokogor'ia) Iu G Grigor'ev, S B Damiatov, M M Mirakhimov, Iu V Farber, M P Kaladarnova, B U Moldotashiev, G N Prizhwoit, and A V Shafirkin Kosmicheskaia Biologia i Avakosmicheskaia Meditsina, vol 10, no 6, 1976, p 51-54. 6 refs In Russian

Experiments were carried out on dogs at an altitude of 3200 m above sea level to evaluate the effect of high altitudes on the course of radiation sickness in animals exposed to gamma radiation. Clinical
observations, morphological examination of blood and bone marrow, and measurements of blood coagulation parameters were made at different time intervals. It is found that radiation of animals after a preliminary 25-day high altitude acclimatization and further stay at a high altitude results in alleviating the severity of radiation sickness. The clinical course of radiation sickness aggravated in dogs who were re-acclimatized to high altitude following radiation exposure. It is suggested that dogs maintained at high altitudes before and after radiation exposure exhibit a more intense recovery, especially in erythropoiesis. These animals also showed steady decrease in blood clotting rate and prolonged maintenance of high activity for the fibrinolytic system.

A77-14811 # Significance of the nonverbal characteristics of a speech signal in evaluating the psychophysical state of a pilot (Znachenie neverbal'nykh karakteristik rechevogo sinala dla otsenki psikhcheskogo i fizicheskogo sostoyaniia letchika) I. Schultz Kosmicheskaia Biologiya i Avakosmicheskaia Meditsina, vol 10, no 6, 1976, p 54-58 18 refs In Russian

Results are presented for an experimental study designed to compare the objective characteristics of the speech signal of pilots and operators exposed to real extremal psychological stress with the voice characteristics of persons subjected to different kinds of stressors simulating various types of flying operations in the laboratory. Analysis of the frequency, time, and dynamic characteristics of the acoustic signal is one of the useful and reliable methods for an objective assessment of the psychophysical state of a pilot. It is shown that the human voice alters most seriously in response to psychological stressors and factors that affect the normal mechanics of respiration as related to breathing under increased pressure and under acceleration. The voice remains unchanged during exposure to hypoxia and high ambient temperatures.

A77-14812 # Excretion dynamics and composition of human wastes as derived from one-year experimental results (Dinamika vydeleniia i sostav nekotorykh produktov zhiznedeiatel'nosti cheloveka po rezultatam godichnogo eksperimenta) Iu G Neledov, A N Kochetkova, V N Sokolov, and V G Vysotski Kosmicheskaia Biologiya i Avakosmicheskaia Meditsina, vol 10, no 6, 1976, p 58-62 17 refs In Russian

The one-year experiment in which three test subjects participated provided data on the rate and frequency of excretion of urine and feces, their composition and amount. The results obtained should be taken into consideration when designing and manufacturing human waste systems for space cabins.

A77-14813 # Dependence of blood carboxyhemoglobin level and expired carbon monoxide content in testes upon the CO concentration in the sealed-chamber atmosphere (Zavisimost' soderzhashche geksakhlorofena v krovi i okisi uglera v vydykhahomom vozduke ispytatel'nogo kontsentratci CO v vozduke germokarmy) V P Savina, N L Sokolov, and E I Nikitin Kosmicheskaia Biologiya i Avakosmicheskaia Meditsina, vol 10, no 6, 1976, p 62-66 11 refs In Russian

The hygienic examination of 12 samples of knitted underwear that contained hexachlorophene added during fiber formation allowed the selection of four types that can be used under poor sanitary conditions. Considering possible changes in the proportion of various microorganisms during prolonged space flights, it is recommended that extensive investigation be carried out in order to demonstrate the suitability of antimicrobial underwear in space missions.


Utilization of water supply recovery systems requires an operative monitoring of the quality of reclaimed water in space missions, which should be evaluated with a minimum number of parameters to ensure its physiological acceptability. The paper examines the suitability of measuring the total content of organic carbon as an effective tool for estimating the quality of reclaimed water. Data are presented on total organic carbon content, ratio of chemical consumption of oxygen and carbon in atmospheric condensate, in urine condensate from low-temperature urine evaporation, and in potable water reclaimed from these sources by a sorption technique.

A77-14815 # Investigating the possibility of using the transpiration moisture condensate of sweet potato for plant cultivation in biological life support systems (Issledovanie vozmozhnosti izpolzovaniia kondensatsa transpiratsionnoi vlagi batata dlia vyrashhivaniia rasteni v biologicheskikh sistemakh zhizneobespecheniya) T A Derendieva Kosmicheskaia Biologiya i Avakosmicheskaia Meditsina, vol 10, no 6, 1976, p 70-73 8 refs In Russian

A77-14816 # Hygiene evaluation of experimental samples of the antimicrobial underwear containing hexachlorophene (Gigienicheskaia otsenka eksperimental'nykh obraztsov antimikrobnoho belia, soderzhashche geksakhlorofena) V B Borshchenko, F K Savinch, V P Gorshkov, and A P Rogatovskaya Kosmicheskaia Biologiya i Avakosmicheskaia Meditsina, vol 10, no 6, 1976, p 73-76 7 refs In Russian

Six inductive seismocardiographic transducers were tested on a vibration rig to determine their amplitude frequency response and to evaluate their effect on the thoracic cage surface oscillation with a view toward reducing the errors in assessing the contractile function of the heart. The measurement results were used to construct the mechanical equivalent diagram for the transfer of vibrations at the transducer/body surface interface, with allowance for the transducer weight. It is found that the resonant frequency of the transducer is 25 Hz, which lies within the working range for the frequency of precordial vibrations of low and ultralow frequency (0-50 Hz). The amplitude of the transducer's output signal is found to depend on its spatial orientation. Distortions caused by transducer weight can be eliminated by using a transducer that is 10 grams lighter with a sufficiently firm pressure on the thoracic cage without deforming it. One way of reducing the nonuniformity of the amplitude-frequency response of a seismocardiographic transducer is to increase damping through increased viscosity of the damping fluid.

A77-14866 # Two-dimensional linear models of biped walking (Plasovee lin'nye modeli dvanogosho khod'by) V V Beletskii and T S Kirsanova Akademia Nauk SSSR, Izvestiia, Mekhanika Tverdogo Tela, July-Aug 1976, p 51-62 5 refs In Russian

An analytical two-dimensional model is constructed for the motion of a biped walking machine consisting of a balancing upper part and two legs. The rhythmic (periodic) motions of the machine
are examined along with the kinematics of leg transfer. Equations of motion are solved in an explicitly analytical form, assuming the machinery to be making small two-dimensional oscillations. Three different walking styles: complete, symmetrically human, and nonsymmetrically human are analyzed and compared energetically.

B J

A77 14903 Estimate of capillary vessel performance during acceleration (Ocena zachowania sie naczyn wlosowatych podczas dzialania przyspieszen) J Domaszuk and M Wojtkowiak (Wojkowy Instytut Medycyny Lotniczej, Warsaw, Poland) Postepy Astronautyki, vol 9, no 3, 1976, p 73-80 10 refs In Polish

The vascular system of rats subjected to +Gz acceleration forces in a centrifuge was investigated. Albumin microspheres 20-50 microns in diameter labelled with 1-131 isotope were injected intravenously before the centrifuge tests. Scintigrams revealed that the +Gz acceleration forces result in a progressive dilatation of capillaries in the lower parts of the body. Under extremal values of acceleration the diameter of dilated capillaries exceeds 50 microns. However, +Gz accelerations do not cause capillary expansion in the pulmonary circulation. P T H


Aspects of hypertrophy, hyperplasia, and structural dilatation of the human heart are considered along with the effects of physical training and detraining on intrinsic cardiac control mechanisms, the effects of acute ischemia on cyclic AMP levels and other parameters in the cytosol and in mitochondria of hypertrophied and nonhypertrophied hearts, the collagen metabolism of the rat heart during experimental cardiac hypertrophy and the effect of digoxin, treatment, and protein metabolism in the work-overloaded myocardium. Attention is given to factors controlling protein synthesis in heart muscle, the effect of complete and partial deconditioning on exercise-induced cardiovascular changes in the rat, physical activity and coronary collateral development, and occupational physical activity and coronary artery disease. G R

A77 15203 Models to aid user measurement of a computer network D E Morgan and R C Kolanko (Waterloo, University, Waterloo, Ontario, Canada) In National Telecommunications Conference, New Orleans, La., December 1-3, 1975, Conference Record Volume 2 New York, Institute of Electrical and Electronics Engineers, Inc., 1975, p 44-1 to 44-5 10 refs

A computer system model is described which aids monitoring, evaluating, and understanding the behavior of computer systems and networks from a user's viewpoint. The approach defines a real man-computer system in terms of layers of abstract machines, determines the measures needed in terms of these machines, makes the measurements on the real system, and then interprets them in terms of the abstract machines. A model instrumentation system based on simple queuing theory is presented, which serves as a basis for the computer network monitoring system used to observe the performance of a simple two-node computer network. The hierarchical approach to measurement allows the user to determine the measurements needed to achieve his goals, along with the tools and techniques necessary to perform the desired measurements. S D

A77 15204 Human perception of telecommunications responsiveness T E Bell (TRW Systems Group, Redondo Beach, Calif.) In National Telecommunications Conference, New Orleans, La., December 1-3, 1975, Conference Record Volume 2 New York, Institute of Electrical and Electronics Engineers, Inc., 1975, p 44-18 to 44-20 6 refs

It is argued from the point of view of informal studies that the analysis of the responsiveness of a computer system must use metrics that are related to responsiveness as humans perceive it. Attention is given to human perception of computer responsiveness in relation to the use of standard metrics (the mode and the mean), metrics of multiple parameters, and objective-directed metrics. Perceived responsiveness is discussed in terms of static vs dynamic metrics. It is concluded that the standard metrics appear inadequate and a different methodology for designing and tuning on-line systems should be adopted. B J

A77 15429 Calibration of a multimode microwave exposure chamber E L Bronaugh and D R Kerns (Southwest Research Institute, San Antonio, Tex.) In International Symposium on Electromagnetic Compatibility, San Antonio, Tex., October 7-9, 1975, Record New York, Institute of Electrical and Electronics Engineers, Inc., 1975, p S11b1-S11b6 8 refs

The experimental calibration program reported uses calorimetry as the means for measuring the power absorbed by the calibrating material. A nonionized water is employed as the calibrating material. An approach is described for obtaining the relationship between the power density of a plane wave illuminating a parcel of material and the power absorbed by the parcel. Attention is given to aspects of power absorption in a chamber, the characteristics of power absorption by materials other than water, the experimental data needed, the plane-wave heating rate, the chamber heating rate, the equivalent plane-wave power density, and the variability of power absorption. G R


The BIOS-3 experimental complex was designed to test the feasibility of a life support system controlled autonomously from within by the inhabitants. The experiment lasted for six months, three men inhabiting the hermetic system simultaneously, and consisted of three stages: (1) the first stage used two equivalent phytotrons (a compartment of higher plants for photosynthesis), consisting of a wheat culture, and an assortment of vegetable plants; (2) the second stage one of the phytotrons was removed while a compartment of chlorella cultivators was introduced; and (3) the third stage used a phytotron which was exclusively an assortment of vegetable cultures. It was shown that an autonomous life control system using photosynthesis is feasible within a small confined space, but that immunological and microbiological research indicates that the medium created by the system is not fully suitable for man. B J

A77 15524 Adaptation to an 8-h shift in living routine by members of a socially isolated community D G Hughes (Alderhay Hospital, Liverpool, England) and S Folkard (Medical Research Council, Experimental Psychology Laboratory, Brighton, Sussex, England) Nature, vol 264, Dec 2, 1976, p 432-434 11 refs

A77 15616 The cost of categorization in visual search: Incomplete processing of targets and field items H Gietman (Pennsylvania, University, Philadelphia, Pa.) and J Jonides (Michigan, University, Ann Arbor, Mich.) Perception and Psycho-
A partial processing hypothesis is proposed to account for performance under a visual search condition where target and field items belong to the different conceptual categories, letter and digit (between-category search), as compared to a condition in which they belong to the same category (within-category search). This hypothesized mechanism implies that less information is registered and/or retained in between than in within-category search. This prediction was tested and confirmed in three experiments. The results indicate that both targets and field items are processed less deeply in between than in within-category search. 

(Author)

A77-15617  

Head restraint enhances visual monitoring performance J S Warm, R G Wait (Cincinnati, University, Cincinnati, Ohio), and M Loeb (Louisville, University, Louisville, Ky.) Perception and Psychophysics, vol 20, no 4, Oct 1976, p 299-304 22 refs Grant No NGL-36-004-014  

Subjects monitored a visual display for occasional increments in the horizontal movement of a bar of light. When the display was viewed without head restraint, detection probability was directly related to the amplitude of the increments in movement which constituted critical signals and inversely related to background event rate (the frequency of neutral events in which critical signals were embedded). When positioning of the head was restrained by a headrest, the detectability of low-amplitude signals was enhanced considerably and the influence of background event rate was attenuated. The results are considered as providing further support for the importance of sense mode coupling in visual monitoring. 

(Author)

A77-15808  

Negative aftereffects in visual perception O E Favreau (Montréal, Universite, Montreal, Canada) and M C Corbalis (McGill University, Montreal, Canada) Scientific American, vol 235, Dec 1976, p 42-48 5 refs  

It is found that, after looking at a bright light, a dark image of the object remains in the visual field for some time afterward. The phenomenon is called a negative afterimage. Attempts to understand visual aftereffects are discussed, taking into account investigations conducted by Plateau, the concept of normalization proposed by Gibson, the tilt aftereffect, general aspects of the neurophysiology of the visual system, and studies regarding the properties of neurons in the visual cortex of the cat brain. It appears that afterimages depend on the fatigue of cells in the early stages of visual processing. Figural and motion aftereffects appear to depend on properties of neurons at a higher level, perhaps in the visual cortex. 

G R

A77-16052  

Photokeratography using moiré techniques M Chander, M M Bindal, A Kulshreshtha, and B K Agarwala (National Physical Laboratory of India, New Delhi, India) Applied Optics, vol 15, Dec 1976, p 2964, 2965 12 refs  

The new technique for determining the corneal topography of the human eye described is a modification of the normal moiré technique (known as the oblique shadow method) for this purpose. The specific features of the modification are explained on the basis of a schematic of the experimental setup. Results obtained by the technique are presented. One is the modulated image of the grating, on the corneal surface, obtained with single exposure, it shows how the grating lines are modulated over the corneal surface. Another result is a moiré contour photograph of the cornea, the moiré pattern was obtained by double exposure, superposing the unmodulated image of the grating over the reflected corneal image. 

V P
STAR ENTRIES

N77-12666 Virginia Commonwealth Univ., Richmond

TOPOLOGY IN BIOLOGY. THE RELATIONSHIP OF STRUCTURE TO FUNCTION. Ph.D. Thesis
Wayne Arthur Wiegand 1976 153 p
Avail Univ Microfilms Order No 76-23718

The problem of studying these systems is undertaken with the goal of showing that techniques are now available which allows one to consider complex spatial organization in developing models for the study of the dynamics of biological systems. A specific example of the mitochondrial respiratory cycle in a stirred tank is given and this is contrasted to the situation where the outer membrane introduces the aspect of component transport. It is indicated that the complex reaction-diffusion systems one sees in single mitochondria as well as in aggregates of mitochondria are capable of multiple steady states and are also capable of establishing ion gradients as required for filtration in the proximal tubulars. Multiple steady states also allow for a switching process that can turn chemical reaction systems on and off. The techniques presented strongly suggest that many complex processes involving reaction-diffusion systems will exhibit multiple steady states and as such cannot be modeled by previous techniques which do not consider the structure.

Dissert Abstr

N77-12667 Armed Forces Radiobiology Research Inst., Bethesda, Md

MICROWAVE EXPOSURE FACILITY. MULTIPLE ANIMAL EXPOSURE AT EQUAL POWER DENSITY
S A Oliva and G N Catravas Apr 1976 24 p refs
(DNA Proj NWED-QAXMC912)
(AD-A024939 AFRR-SR76-12) Avail NTIS HC A02/MF A01 CSCL 14/2

A microwave irradiation facility for multiple animals is described. A feature of the facility is that the natural radiation characteristics of the microwave field are utilized to ensure that each animal in the array receives an equal exposure. Also the animals are separated sufficiently to ensure minimum interactions between animals due to microwave reflections. Cages of sufficient microwave transparency to minimize microwave reflections are incorporated in the facility. Overall, the facility provides equal exposure to all animals to within + or - 15 percent.

Author (GRA)

N77-12668 Illinois Univ., Chicago Dept of Biological Sciences

METABOLIC RATES IN FIVE ANIMAL POPULATIONS AFTER LONG-TERM EXPOSURE TO SANGUINE/SEA-FAKER ELF ELECTROMAGNETIC FIELDS IN NATURE
Bernard Greenberg Apr 1976 35 p refs
(Contract N00039-73-C-0030)
(AD-A024955) Avail NTIS HC A03/MF A01 CSCL 06/18

Five species of animals dwelling in or on the soil were collected under the U.S. Navy's Extremely Low Frequency (ELF) antennas at the Wisconsin Test Facility during summer 1975, and tested for oxygen consumption and respiratory quotients (R Q). The animals collected include the redbacked salamander, the woodlouse, the slug, the earthworm and the redworm. No significant differences in either oxygen consumption or R Q were found. Analyses of metabolic rates employing past data were also performed and showed no seasonally linked change in sensitivity to the electromagnetic fields. Finally, short term (one week) exposure of earthworms to the electromagnetic fields did not alter metabolic rates but confinement in nylon bags and translocation did thereby limit meaningful conclusions.

Author (GRA)

N77-12669 West Virginia Univ. Morgantown

THE COLLECTION, ANALYSIS, AND COMPARISON OF HUMAN SENSIBLE PERSPIRATION BETWEEN SEDENTARY AND CONDITIONED MALE CAUCASIANS AS TO THE VARIATION IN SELECTED ELECTROLYTE COMPOSITION. Ph.D. Thesis
Robert Edward Moore 1976 149 p
Avail Univ Microfilms Order No 76-22439

The specific task was to collect, analyze and compare human sensible perspiration (eccrine sweat) between sedentary and conditioned male Caucasians as to the variation in selected electrolyte concentrations: sodium chloride, potassium, calcium, and magnesium. It was concluded from the investigation that the sedentary and conditioned groups differed significantly only in the quantity of calcium and magnesium secreted in sweat. These differences showed that the sedentary group secreted the larger quantity of these two electrolytes.

Dissert Abstr

N77-12671 Defence Research Board, Ottawa (Ontario) Dept of Physiology

NEUROPHYSIOLOGY AND ROAD SAFETY CONTRIBUTION OF THE FRONTAL LOBES TO VISUAL ORIENTING
D Gutton and G Mandl In its DRB Aviation Med Res Unit Rept. Vol 5 Sep 1976 p 1-9 refs
Avail NTIS HC A13/MF A01

The functional role of the frontal lobe is described as a major importance in visual orientation. The neural processes and frontal lobe disorders are studied showing their effects on visuo-motor coordination.

M C F

N77-12672 Defence Research Board, Ottawa (Ontario)

COLOR INPUTS TO ORIENTATION DETECTORS IN THE HUMAN VISUAL SYSTEM
C R Sharpe and G Mandl In its DRB Aviation Med Res Unit Rept. Vol 5 Sep 1976 p 69-84 refs
Avail NTIS HC A13/MF A01

The interaction of spatial and chromatic (red and blue) channels in the human visual system is described. Results from psychophysical experiments have shown that superimposing a low luminance uniform background of one color upon a sinusoidal grating (4c/deg) of another color has no effect upon a subject's contrast threshold for that grating. This lack of contrast dilution was taken to indicate that, at low background luminance, the spatial pattern detectors responsible for detecting the grating were color specific. Cross-color spatial adaptation is orientation specific. The orientation selectivities of same color and cross-color
adaption were compared by the equivalent contrast transformation. When testing red gratings, the tuning curves were broader for cross-color (adapt blue test red) than for same-color (adapt red, test red) adaptation. The converse was true for testing blue gratings. As the experiments were so arranged that cross-color adaption could not have been the result of direct test channel excitation, it is suggested that such adaption may be the aftereffect of prolonged inhibition between orientation specific spatial pattern detectors.

**N77-12674**

Defence Research Board, Ottawa (Ontario)

**THE VESTIBULAR SYSTEM FOR EYE MOVEMENT CONTROL**


Avail NTIS HC A13/MF A01

Inputs to the oculo-motor system are discussed using rotational and linear accelerative stimuli. Eye movements relative to head positions are discussed.

**N77-12675**

Defence Research Board, Ottawa (Ontario)

**PLASTICITY IN THE ADULT VESTIBULO-OCULAR REFLEX ARC**

G Melvill Jones *In its* DRB Aviation Med Res Unit Rept., Vol 5 Sep 1976 p 102-123 refs

Reflex movements of the eye are discussed in relation to vestibular contribution to orientation in adverse environments of flight and space.

**N77-12676**

Defence Research Board, Ottawa (Ontario)

**AN ADAPTIVE NEURAL MODEL COMPATIBLE WITH PLASTIC CHANGES INDUCED IN THE HUMAN VESTIBULO-OCULAR REFLEX BY PROLONGED OPTICAL REVERSAL OF VISION**

P Davies and G Melvill Jones *In its* DRB Aviation Med Res Unit Rept., Vol 5 Sep 1976 p 124-134 refs

A neural model was formulated to answer questions about changes between the vestibular and oculomotor system and whether these changes are responsible for complex gain phase behavior. It is shown that both excitatory and inhibitory influences can impinge simultaneously on cells in the vestibular nuclei projecting to the oculomotor system.

**N77-12677**

Defence Research Board, Ottawa (Ontario)

**THE RESPONSE TO SOUND OF IDENTIFIED RETICULO-SPALINAL CELLS**

S Rossignol *In its* DRB Aviation Med Res Unit Rept., Vol 5 Sep 1976 p 135-182 refs

Avail NTIS HC A13/MF A01

The anatomy and physiology of reticulo-spinal (RS) cells were reported together with a comparison of the pattern of response to sound and other stimuli. Identification of RS cells was done by stimulating the ventral surface of the upper lumbar cord and recording extra-cellulary in the brain stem with large stainless steel microelectrodes. Because RS cells respond to sound and due to their role in locomotion, it was concluded that auditory influences on motor control may be mediated through reticulo-spinal pathways.

**N77-12678**

Defence Research Board, Ottawa (Ontario)

**SUBJECTIVE DETECTION OF VERTICAL ACCELERATION A VELOCITY DEPENDENT RESPONSE?**

G Melvill Jones and L R Young *In its* DRB Aviation Med Res Unit Rept., Vol 5 Sep 1976 p 245-255 refs Sponsored by NASA

Avail NTIS HC A13/MF A01

Subjective detection of vertical acceleration could not have been the result of direct test channel excitation which identified specifically the direction of imposed acceleration to be the difficulty rather than low sensitivity to vertical acceleration. The product of angular acceleration and time to detect proves to be constant over a wide range of suprathreshold step changes of angular acceleration. It is concluded that threshold conditions are determined by the velocity attained rather than the acceleration amplitude for the semicircular canals.

**N77-12679**

Defence Research Board, Ottawa (Ontario)

**HUMAN SUBJECTIVE AND REFLEX RESPONSES TO SINUSOIDAL VERTICAL ACCELERATION**

G Melvill Jones, R Rolph, and G H Downing *In its* DRB Aviation Med Res Unit Rept Vol 5 Sep 1976 p 256-270 refs

Avail NTIS HC A13/MF A01

Response characteristics are discussed of both subjective sensation and involuntary oculomotor response to a wide range of sinusoidal frequencies of linear accelerations imposed in a vertical direction. Measurements of eye movements were conducted with eyes open behind blackout goggles at least 45 minutes dark adaptation to ensure minimal changes in electrooculographic gain. The results reveal quite different patterns of subjective and involuntary reflex dependence on the frequency of sinusoidal stimulation.

**N77-12680**

Methodist Hospital, Houston, Tex

**AUTOMATED ELECTROENCEPHALOGRAPHY SYSTEM AND ELECTROENCEPHALOGRAPHIC CORRELATES OF SPACE MOTION SICKNESS. PART 2 Final Report**


(NASA-CR-151106) Avail NTIS HC A02/MF A01

Sleep pattern alterations were detected in two subjects by electroencephalographic, electrographic, and electromyographic monitoring before during and after a 28 day bed rest. Standardized criteria were used for data analysis. During the second half of the bed-rest period, sleep latency and stage 3 increased, while total sleep time, stage 2, and REM latency decreased. In addition, during bed rest both subjects showed an increase in the number of REM periods and a slight increase in stage REM amount. No major alterations were seen in the recovery period. Of the alterations found to be associated with bed rest only one, the increase in stage 3 sleep, was also seen consistently during Skylab. Conversely, none of the postflight changes seen following Skylab were observed during the post-bed-rest recovery period.

**N77-12681**

Witwatersrand Univ., Johannesburg (South Africa)

School of Mechanical Engineering

**THE BEHAVIOUR OF SKIN TEMPERATURE PROFILES IN THE FOREARM OF A NUDE RESTING SUBJECT AT AIR TEMPERATURES FROM 24 C TO 34 C**


Avail NTIS HC A04/MF A01

The transient responses of the temperature profiles during a period of four hours after entry into the climatic chamber are presented. The results show that the depth of a surface at which heat is believed to be released within the skin varies systematically with the rate of heat release, and depths of between 0.4 mm and 2.7 mm were observed in this study. A direct, in vivo determination of the thermal conductivity of unperfused skin tissue...
is also made, and the result 0.1 W/m K obtained. The fact that skin surface heat loss is predominantly accounted for by heat convected to the skin by blood is confirmed.

**N77-12682**

Istituto Superiore di Sanita, Rome (Italy) Lab di Fisica

**REVIEW OF RADIOCHEMICAL METHODS FOR PU-239 DETECTION IN ENVIRONMENTAL AND BIOLOGICAL SAMPLES**


Radiochemical methods for detection and quantitative analysis of Pu-239 low levels in environmental (soil, water) or biological (urine, human wastes, etc.) samples are described. The methods include the ion exchange chromatography and the solvent extraction. The main physico-chemical properties of Pu-239 and its radiotoxic hazards are reviewed.

**N77-12683**

Istituto Superiore di Sanita, Rome (Italy) Lab di Fisica

**RADIATION EXPOSURE OF THE ITALIAN POPULATION DUE TO MEDICAL DIAGNOSTIC EXAMINATIONS IN 1974**


The genetically significant dose received by the Italian population due to diagnostic X-ray examinations and radiopharmaceuticals was investigated. Preliminary results are presented. A rough estimation of dosage gives about 30 rems, in good agreement with the values obtained from authors in different industrialized countries. These studies are being carried out to reveal eventual abuses of diagnostic radiation sources and to take adequate corrective measures.

**N77-12684**

Istituto Superiore di Sanita, Rome (Italy) Lab di Fisica

**HEALTH IMPLICATIONS OF THE RISKS CONNECTED WITH THE USE OF AMERICIUM 241 FOR LIGHTNING PROTECTION**


Americium metabolism is reviewed together with some information on the biological and pathological effects following americium 241 contamination. In order to assess the risk due to the use of radioactive isotopes in lightning conductor installations and the resulting implications on public health, some aspects of radioprotection are presented and it is concluded that the use of americium 241 for lightning protection exposes the population to undue risks.

**N77-12685**

Istituto Superiore di Sanita, Rome (Italy) Lab di Fisica

**ELECTRON SPIN RESONANCE OF LYOPHILIZED BLOOD SAMPLE**


Results obtained on lyophilized blood samples (whole blood, red cells, and plasma) from a control group are presented. The measurements show clearly the imperfections of the lyophilization method in obtaining reproducible results. Consequently, it is evident that the electron spin resonance of lyophilized blood, at least in the region of free radicals, is unlikely to be of value as a diagnostic screening test for cancer.

**N77-12686**

Illinois U, Chicago Dept of Materials Engineering

**A MODEL FOR ANALYTIC INVESTIGATION OF THREE-DIMENSIONAL HEAD-SPINE DYNAMICS** Final Report, 1 Dec 1973 - 30 Nov 1976


A three dimensional, discrete model of the human spine, torso, and head was developed for the purpose of evaluating mechanical response in pilot ejection and it was developed in sufficient generality to be applicable to other body response problems, such as occupant response in aircraft crash and arbitrary loads on the head-spine system. There are no restrictions on the distribution or direction of applied loads, so a wide variety of situations can be treated. Results are presented for a variety of conditions, such as different rates on onset, ejection at angles, effects on lumbar curvature, and eccentric head loading. It is shown that large internal curvatures and perfectly vertical acceleration loading result in substantial flexural response of the spine, which cause large bending moments. It is further shown that the combination of the spine's low flexural stiffness, internal curvature, and mass eccentricity are such that stability cannot be maintained in a 10 g ejection without restraints or spine-torso-musculature interaction.

**N77-12687**

Air Force Weapons Lab, Kirtland AFB, N Mex

**ADJOINT MONTE CARLO GENERATED RADIATION RESPONSE FUNCTIONS FOR THE B-1 AIRCRAFT** Final Report


The adjoint Monte Carlo radiation transport technique is used to calculate radiation response functions for the B-1 aircraft. These radiation response functions are given for the neutron dose and also for the neutron plus the secondary gamma dose. The response functions are given for the head and stomach positions of the left front crew member. They can be varied with any angle and energy dependent neutron and/or gamma ray field exposure to give the radiation dose. The MORSE multigroup, coupled neutron-gamma ray, Monte Carlo code is used for the adjoint transport in the B-1 aircraft which is evaluated with combustion geometry. The theory and equations needed to evaluate the coupling integral in terms of the statistical weight of the adjunction on the coupling surface are developed.

**N77-12688**

Army Aeromedical Research Lab. Fort Rucker, Ala

**AEROMEDICAL REVIEW OF OXYGEN REQUIREMENTS OF US ARMY AVIATORS**


Aeromedical review of US Army aircraft oxygen design criteria and military specification indicates physiologic inconsistencies. Oxygen duration charts in use for U-21 aircraft are computed on the basis of military specification using inspiratory minute volume (IMV) of 13.12 liters per minute (LPM), normal temperature (70F), and pressure, dry (NTPD). Current oxygen duration charts for the RU-21 aircraft using constant flow regulator have overstated oxygen availability of 62.3% at 10,000 feet and 18.7% at 15,000 feet. Type regulator and dilution schedule are listed for U-21 series aircraft. The current design inspiratory minute volume of 13.12 LPM NTPD is the basic design deficiency. The effects of the activity and stress of flight require an increase of design IMV.

**N77-12689**

Human Factors Research, Inc. Goleta, Calif

**MOTION SICKNESS INCIDENCE. EXPLORATORY STUDIES**
Michael E McCauley, Jackson W Royal, C Dennis Wylie, James F O'Hanlon, and Robert R Mackie Apr 1976 63 p refs (Contract N00014-73-C-0040, NR Proj 105-841)
(AD-A024709, Rept-1733-2) Avail NTIS HC A04/MF A01 CSCL 06/19

A series of experiments on human subjects assessed the effects of pitch and roll and habituation on motion sickness incidence (MSI). Pitch and roll angular accelerations even larger than expected at sea failed to systematically increase MSI. Habituation was evident in susceptible subjects who received consecutive daily 1-hour or 2-hour exposures to vertical motion. Habituation was greater for the longer exposure and the more severe motions. A mathematical model describing MSI as a function of the frequency and acceleration of vertical oscillation was refined by including exposure time as an independent variable. Investigation of frequencies of oscillation above 5 Hz confirmed the prediction of the model that MSI continues to decrease as a function of frequency for all frequencies greater than approximately 16 Hz.

EFFECTS OF SOUND ON THE VESTIBULAR SYSTEM Final Report
D E Parker L A Ritz, R L Tubbs, and D L Wood Wright-Patterson AFB Ohio AMRL Mar 1976 83 p refs (Contract F33615-73-C-402 AF Proj 7231)
(AD-A025965, AMRL-TR-75-89) Avail NTIS HC A05/MF A01 CSCL 06/5

Vestibular responses have been evoked from guinea pigs, monkeys, and human beings following stimulation with static pressure infrasound sustained audiofrequency sound, and repetitive audiofrequency transients. These observations lead to suggestions concerning the manner in which sound affects the vestibular receptors as well as to proposals concerning levels of sound exposure that might disturb human performance by influencing behaviors mediated at least in part by the vestibular system.

EFFECTS OF ACCELERATION ON SELECTED SERUM ENZYMES Final Report, Mar - May 1974
Donald R Sellers Clarence M Olloff, Ray D Brown and Vittorio Nino Mar 1976 10 p refs (AF Proj 7222)
(AD-A025965, AMRL-TR-75-62) Avail NTIS HC A02/MF A01 CSCL 06/19

Human volunteers were exposed to 30-second bouts of acceleration at 3, 4, 5, 6, and 7 G at each of three seat back angles on several different experimental days. Blood samples were taken immediately before the experiment and 24 hours later. Samples were analyzed for hematocrit, lactate dehydrogenase, lactate dehydrogenase isoenzyme distribution, creatine phosphokinase, creatine phosphokinase isoenzyme distribution, glutamate oxaloacetate transaminase and glutamate pyruvate transaminase. None of the assays showed biochemical parameters that were outside normal clinical limits, however, small but statistically significant increases in creatine phosphokinase in two subjects and increases in lactate dehydrogenase and creatine phosphokinase in the subjects as a group were evident.

ELECTROENCEPHALOGRAPHIC RECORDS AND SATURATION OF HYDROGEN GAS IN MAN WITH SPECIAL EMPHASIS ON THE BRAIN
Carl Wilhelm Sem-Jacobsen 1976 63 p refs (Contract N00014-72-C-0345)

HYDROGEN ENZYME FREQUENCY RESPONSES A study was made of hydrogen enzyme frequency responses in the human brain. Hydrogen gas clearance and saturation in the earlobes may vary from 1 to 5 minutes, and from 2 to 20 minutes in the skeletal muscles. Changes in respiration produce great fluctuation in the half time for gas clearance and saturation. Changes in blood flow in general or focal to some areas of the body produce drastic changes in the half time for gas clearance and saturation to the involved area.

THE EFFECT OF CONTINUOUS NOISE ON SHORT-TERM MEMORY PERFORMANCE TASKS M S Thesis
Iver John Rivenes, Ill Sep 1975 33 p refs (AD-A025446) Avail NTIS HC A03/MF A01 CSCL 05/10

Naval officers routinely perform a number of tasks requiring short-term memory under conditions of moderate background noise levels. The performance of 20 Navy officers on a serial short-term memory task was analyzed under two levels of difficulty and two different sound levels. The purpose of the experiment was to determine whether moderate intensity, continuous noise had an effect on short-term memory. Analysis of the data indicated that continuous noise at a sound level pressure of 85 dB had no effect on the subjects' short-term memory. Levels of difficulty resulted in a significant difference in performance on the serial short-term memory task used in this experiment.

AN INVESTIGATION OF THE EFFECTS OF CONTINUOUS NOISE ON SHORT-TERM MEMORY PERFORMANCE TASKS

A study was made of the effects of continuous noise on short-term memory performance tasks. The performance of 20 Navy officers on a serial short-term memory task was analyzed under two levels of difficulty and two different sound levels. The purpose of the experiment was to determine whether moderate intensity, continuous noise had an effect on short-term memory. Analysis of the data indicated that continuous noise at a sound level pressure of 85 dB had no effect on the subjects' short-term memory. Levels of difficulty resulted in a significant difference in performance on the serial short-term memory task used in this experiment.

Caroline Williams

N77-12690# Miami Unv, Oxford, Ohio
EFFECTS OF SOUND ON THE VESTIBULAR SYSTEM Final Report
D E Parker L A Ritz, R L Tubbs, and D L Wood Wright-Patterson AFB Ohio AMRL Mar 1976 83 p refs (Contract F33615-73-C-402 AF Proj 7231)
(AD-A025965, AMRL-TR-75-89) Avail NTIS HC A05/MF A01 CSCL 06/5

Vestibular responses have been evoked from guinea pigs, monkeys, and human beings following stimulation with static pressure infrasound sustained audiofrequency sound, and repetitive audiofrequency transients. These observations lead to suggestions concerning the manner in which sound affects the vestibular receptors as well as to proposals concerning levels of sound exposure that might disturb human performance by influencing behaviors mediated at least in part by the vestibular system.

N77-12691# Aerospace Medical Research Labs., Wright- Patterson AFB, Ohio
EFFECTS OF ACCELERATION ON SELECTED SERUM ENZYMES Final Report, Mar - May 1974
Donald R Sellers Clarence M Olloff, Ray D Brown and Vittorio Nino Mar 1976 10 p refs (AF Proj 7222)
(AD-A025965, AMRL-TR-75-62) Avail NTIS HC A02/MF A01 CSCL 06/19

Human volunteers were exposed to 30-second bouts of acceleration at 3, 4, 5, 6, and 7 G at each of three seat back angles on several different experimental days. Blood samples were taken immediately before the experiment and 24 hours later. Samples were analyzed for hematocrit, lactate dehydrogenase, lactate dehydrogenase isoenzyme distribution, creatine phosphokinase, creatine phosphokinase isoenzyme distribution, glutamate oxaloacetate transaminase and glutamate pyruvate transaminase. None of the assays showed biochemical parameters that were outside normal clinical limits, however, small but statistically significant increases in creatine phosphokinase in two subjects and increases in lactate dehydrogenase and creatine phosphokinase in the subjects as a group were evident.

N77-12692# EEG Research Inst., Oslo (Norway)
CLEARANCE AND SATURATION OF HYDROGEN GAS IN MAN WITH SPECIAL EMPHASIS ON THE BRAIN
Carl Wilhelm Sem-Jacobsen 1976 63 p refs (Contract N00014-72-C-0345)

N77-12693# Joint Publications Research Service, Arlington Va
USSR ACADEMY OF MEDICAL SCIENCES

A description of the USSR Academy of Medical Sciences, its components and membership is given.

N77-12694# Naval Postgraduate School, Monterey Calif
THE EFFECT OF CONTINUOUS NOISE ON SHORT-TERM MEMORY PERFORMANCE TASKS M S Thesis
Iver John Rivenes, Ill Sep 1975 33 p refs (AD-A025446) Avail NTIS HC A03/MF A01 CSCL 05/10

Naval officers routinely perform a number of tasks requiring short-term memory under conditions of moderate background noise levels. The performance of 20 Navy officers on a serial short-term memory task was analyzed under two levels of difficulty and two different sound levels. The purpose of the experiment was to determine whether moderate intensity, continuous noise had an effect on short-term memory. Analysis of the data indicated that continuous noise at a sound level pressure of 85 dB had no effect on the subjects' short-term memory. Levels of difficulty resulted in a significant difference in performance on the serial short-term memory task used in this experiment.

N77-12695# Illinois Unv Urbana Coordinated Science Lab
PILOT INTERACTION WITH AUTOMATED AIRBORNE DECISION MAKING SYSTEMS Semiannual Progress Report, May - Oct. 1976
William B Rouse, Yee-Yeen Chu, Joel S Greenstem, and Rex S Walden Oct 1976 50 p refs (AD-A025546) Avail NTIS HC A03/MF A01 CSCL 05/10

An investigation was made of interaction between a human pilot and automated on-board decision making systems. Research was initiated on the topic of pilot problem solving in automated and semi-automated flight management systems and attempts were made to develop a model of human decision making in a multi-task situation. A study was made of allocation of responsibility between human and computer, and discussed were various pilot performance parameters with varying degrees of automation. Optimal allocation of responsibility between human and computer was considered and some theoretical results found in the literature were presented. The pilot as a problem solver was discussed. Finally the design of displays, controls, procedures and computer aids for problem solving tasks in automated and semi-automated systems was considered.
EFFECTIVENESS OF FOUR WATER COOLED UNDERGARMENTS AND A WATER COOLED CAP IN REDUCING HEAT STRESS

George F Fonseca Dec 1975 30 p refs (AD-A025216 USARIEM-T-23/76) Avail NTIS HC A03/MF A01 CSCL 06/17

The cooling provided by four different water cooled undergarments was directly measured on a heated copper manikin dressed in a basic hot-weather flight coverall aircrew helmet socks and black boots. This cooling which represents absorption of the heat produced by the metabolic processes of the body plus that from the ambient environment in the cabin, was found to be almost directly proportional to the difference between the manikin skin temperature and the temperature of the cooling water at the inlet to a water cooled undergarment. Isolation of the manikin surface from the hot environments was provided by only a water cooled undergarment and the basic hot-weather clothing ensemble. Although these cooling garments did not by themselves completely isolate the manikin surface against heat gain from the hot environment, they did remove about one-half of the potential for heat gain from the ambient environment before the heat reached the manikin surface. The water cooled cap, which covered just the head (or only about 6% of the total body surface area) removed about 1/3 of the total metabolic heat production of a seated person.

...
Physical characteristics of the head and neck were measured on 18 male Navy volunteers who had previously undergone testing on the NAMRL sled facility at Michoud Station, New Orleans. Measurements include 55 standard anthropometric measures, 32 anthropometric measures of the seated subject, three dimensional head and neck range of motion, neck muscle reflex times in response to head jerks and neck muscle voluntary isometric strength. These latter measurements were taken in both the sagittal and lateral planes. Measurement results were used to establish parameter values for the MVMA-2D Crash Victim Simulator data set in an attempt to reproduce the dynamic response of these volunteers to Gx sled acceleration at 6 and 15 G's. Procedures used for computing the various parameter values and comparisons between predicted and experimental results are presented in addition measurement data for 18-24 year females taken previously have been utilized to predict the dynamic response that would be expected if these subjects were tested at 6 and 15 G's.

### N77-12703
**Aerospace Medical Research Labs** Wright-Patterson AFB, Ohio

**TEST PLOT EVALUATION OF A RECLINED COCKPIT SEAT AS AN AID TO G TOLERANCE AND PERFORMANCE Final Report,** Sep 1973 - Mar 1975

John W. Frazier and Kenneth W. McElreath

Jan 1976 24 p refs (AF Proj 7222)

(AD-A025784, AMRL-TR-75-73) Avail NTIS HC A02/MF A01 CSCL 06/17

Twenty-two student test pilots have participated in closed-loop tracking indoctrination runs on the Dynamic Environment Simulator. Each pilot flew through a series of profiles up to 6 G in both the conventional upright seat position and a 55 deg tilt back seat position. The subjective responses and pilot questionnaires are presented.

### N77-12704
**Naval Aerospace Medical Research Lab** Pensacola, FL

**DEVELOPMENT OF A PROTOTYPE EXPERIMENTAL PLAN TO EVALUATE STABILIZED MEASURES OF AIRSICKNESS POTENTIAL**

W. Carroll Hixson, Fred E. Guedry, Jr., Joel W. Norman, and David D. Gluck

May 1976 31 p ref Supported in part by Army (AD-A025455, NAMRL-1223 USAARL-76-15) Avail NTIS HC A03/MF A01 CSCL 05/8

Investigators at the Naval Aerospace Medical Research Laboratory and the U. S. Army Aeromedical Research Laboratory conducted a combined field and laboratory study to evaluate observer performance while using an improved XM-76 stabilized viewing device. Air-to-ground observations were made in a UH-1 aircraft flying maneuvers modeled in part after a scout helicopter scenario. The experimental protocol was such that the observers were performed on the simulator without the device. In contradiction to the hypothesis that the stabilization feature was protection from retinal burns and flash blindness due to atomic flash, vision with the AN/PVS-5 night vision goggle in-flight evaluation of optically stabilized target acquisition devices, and the correction of presbyopia.

### N77-12705
**Quest Research Corp** McLean, Va

**FEASIBILITY OF IMPLEMENTING SPECIFIC PERFORMANCE MEASUREMENT TECHNIQUES Final Report**

Diane G. Loental, Wright-Patterson AFB, Ohio

Mar 1976 110 p refs (Contract F38615-73-C-4121)

(AD-A025945, AMRL-TR-74-95) Avail NTIS HC A06/MF A01 CSCL 05/9

The report presents two techniques for performance measurement in a manned weapon system. The particular system studied was the F-106 coplanar attack simulator located at the Systems Effectiveness Branch, Aerospace Medical Research Laboratory, Wright-Patterson Air Force Base, Ohio. The first technique involves a theoretical model of the human operator's flight control policies on the simulator. The second technique is empirical and derives performance measures from the simulator data.

### N77-12706
**Federal Highway Administration, Washington, D.C. Traffic Systems Div**

**THE EFFECT OF AUDITORY AND VISUAL PRESENTATION OF NAVIGATIONAL MESSAGES ON MESSAGE RETENTION Final Report**

Frank P. Gatling, Jun 1976 27 p refs

(PB-256599/2, FHWA-RD-76-94) Avail NTIS HC A03/MF A01 CSCL 05J

Navigational messages containing from two to seven units of information were presented to three groups of subjects. One group receives the messages after they had an alerting sign and, in response to the sign, turned the radio to a specified frequency to receive the message. A second group received the messages automatically and aurally (automatic group). The third group received the information visually. Performance of the three groups is compared.

### N77-12707
**Virginia Polytechnic Inst and State Univ., Blacksburg** Dept. of Aerospace and Ocean Engineering

**NOTES ON THE COMPUTATION OF THE GENERALIZED ZETA AND DIGAMMA FUNCTIONS WITH PROGRAMS AND TABLES**

W. H. Mason and B. E. Neney, Oct 1974 38 p refs

(Contract N00014-72-A-0136-0001 NR Proj 061-197)

(AD-A025134, VPI-Aero-023) Avail NTIS HC A03/MF A01 CSCL 12/1

A function subprograms for the computation of the digamma function and generalized zeta function are presented. Some new analytic results are given, and tables of 20 place values of the functions are provided in order to check the computer codes. The digamma function is tabulated for x = 0.05(0.05)1.0, and the generalized zeta function is given for s = 2(1)42, a = 0.05(0.05)1.0(1)0.1(1)2. Author (GRA)

### N77-12708
**Advisory Group for Aerospace Research and Development, Paris (France)**

**VISUAL AIDS AND EYE PROTECTION FOR THE AVIATOR**

Thomas J. Tredici (School of Aerospace Medicine Brooks AFB Tex.) Oct 1976 89 p Presented at the Aerospace Med Panel Specialist Meeting Copenhagen, 5-9 Apr 1976

(AGARD-CP-191, ISBN 92-935-0177-2) Avail NTIS HC A05/MF A01

Information concerning visual aids and eye protective devices used by the aviator is discussed. Among the topics considered were protection from retinal burns and flash blindness due to atomic flash, vision with the AN/PVS-5 night vision goggle in-flight evaluation of optically stabilized target acquisition devices, and the correction of presbyopia.

### N77-12709
**Royal Aircraft Establishment Farnborough** (England) Neurosciences Div

**EYE PROTECTION, PROTECTIVE DEVICES AND VISUAL AIDS**
The role of image intensifiers in aviation is also discussed. The high ocular hazards encountered in military aviation are described and some protective measures which may be adopted are discussed. The hazards considered are solar glare, bird strike, wind blast, miniaturized detonating cord, lasers, and nuclear flash. The role of image intensifiers in aviation is also discussed.

Avail NTIS HC A05/MF A01

D H Brennan In AGARD Visual Aids and Eye Protection for the Aviator Oct 1976 p 12

The recent technological developments have resulted in additional functions being assigned to the helmet and visor. The additional functions range from static aids for distant vision to dynamic displays of information for use in weapon control and guidance, and aircraft management and situational information. Basic requirements for the protective equipment were established. The expanded functions for the protective equipment require that modifications be made in the equipment configuration. The modifications must be accomplished without sacrificing the basic functions of protection. Accomplishment of these two goals requires cooperation between the display designers and crew equipment specialists.

Author

INTEGRATION OF AVIATORS EYE PROTECTION AND VISUAL AIDS

Gloria T Chisum and Phyllis E Morway In AGARD Visual Aids and Eye Protection for the Aviator Oct 1976 p 7

Visual Aids and Eye Protection for the Aviator Oct 1976 p 6 refs

Billy J Pfofp (ASD/SMLS Life Support SPO, Wright-Patterson, AFB, Ohio), J Thomas Cutchen and J O Harris In AGARD Visual Aids and Eye Protection for the Aviator Oct 1976 p 6 refs

Four subjects were tested in a pressurized tank to determine the physiological effects of flexible contact lenses having 40% absorbency. Corneal sensitivity, ocular tone, and the permeability of lachrymal ducts were observed. Lachrymal secretion and absorbency, corneal sensitivity, ocular tone, and the permeability of lachrymal ducts were measured. The advantages of soft contact lenses over hard lenses are discussed.

Author

PROTECTION FROM RETINAL BURNS AND FLASHBLINDNESS DUE TO ATOMIC FLASH

Billy J Pfofp (ASD/SM/S Life Support SPO, Wright-Patterson, AFB, Ohio), J Thomas Cutchen and J O Harms In AGARD Visual Aids and Eye Protection for the Aviator Oct 1976 p 6 refs

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Author

Air Force Systems Command Brooks AFB Tex

USAF AVIATOR CLASSES HGU-4/P HISTORY AND PRESENT STATE OF DEVELOPMENT

Thomas J Tredici In AGARD Visual Aids and Eye Protection for the Aviator Oct 1976 p 6 refs

The aviator goggle HGU-4F has the important fundamental role of enhancing and protecting the vision of U S Air Force aviators. The spectrum of presently available lenses is reviewed. Studies to improve the product are detailed, in particular, the impact tests, both drop ball and ballistic, of glass (heat treated and chemical ion exchange) and plastic (CR-39 and polycarbonate). The practical tests of plastic versus glass lenses used in the field are reviewed. The culmination of this research has resulted in the presently available product one that is felt to be the best that the state-of-the-art can presently produce.

Author

N77-12714# Service de Sante pour l'Armee de l'Air, Paris (France)

FLIGHT FITNESS AND PLANT CONTACT LENSES [AP-TITUDE AU VOL ET LENTILLES DE CONTACT SOUPLES]

J P Chevaleraud and G Parddel In AGARD Visual Aids and Eye Protection for the Aviator Oct 1976 p 4 refs

Four subjects were tested in a pressurized tank to determine the physiological effects of flexible contact lenses having 40% absorbency. Corneal sensitivity, ocular tone, and the permeability of lachrymal ducts were observed. Lachrymal secretion and absorbency, corneal sensitivity, ocular tone, and the permeability of lachrymal ducts were measured. The advantages of soft contact lenses over hard lenses are discussed.

Author

Army Aeromedical Research Lab, Fort Rucker, Ala

VISION WITH THE AN/PVS-5 NIGHT VISION GOGGLE

Roger W Wiley and Frank F Holly In AGARD Visual Aids and Eye Protection for the Aviator Oct 1976 p 12 refs

Avail NTIS HC A05/MF A01

Results are presented from a series of experiments in which visual performance using the AN/PVS-5 night vision goggle was measured. Visual modulation transfer functions of the man-goggle system were determined and compared to results obtained with unaided viewing. The man-goggle system performance was superior to unaided visual performance at average target luminances equivalent to 5% and 25% moon illuminances A t, a target luminance equivalent to a full moon illuminance, unaided visual performance was superior at higher spatial frequencies, while remaining poor at the lower spatial frequencies. Using a modified Howard-Dolman apparatus, it was determined that the stereoscopic threshold was degraded with the man-goggle system. Field measurements of relative depth discrimination using all available visual cues showed that performance of the man-goggle system was statistically equivalent to unaided photopic visual performance at intermediate viewing distances, but was inferior to unaided viewing at distances of 500 feet or greater.

Author

N77-12716# Centre de Recherches du Service de Sante des Armees, Clamart (France)

EXPERIMENTAL STUDY OF VISION DIMMING IN AN ANIMAL [ETUDE EXPERIMENTALE DE L'EBLOUISSEMENT CHEZ L'ANIMAL]

L Court, J P Chevaleraud, G Perdnel, and M Basin In AGARD Visual Aids and Eye Protection for the Aviator Oct 1976 p 11 refs

Avail NTIS HC A05/MF A01

Vision dimming is a temporary deficit in visual perception in a subject submitted to intense luminous energy, at a level higher than that of his level of adaptation. Electrodes were implanted in a monkey and a rabbit to study the electrophysiological rectification and behavior caused by glare. The time of recuperation is measured.

Transl by A H

N77-12713# Centre Principal d'Expertises Medicales du Personnel Navigant Paris (France)

VISION WITH THE AN/PVS-5 NIGHT VISION GOGGLE

Roger W Wiley and Frank F Holly In AGARD Visual Aids and Eye Protection for the Aviator Oct 1976 p 12 refs

Avail NTIS HC A05/MF A01

Results are presented from a series of experiments in which visual performance using the AN/PVS-5 night vision goggle was measured. Visual modulation transfer functions of the man-goggle system were determined and compared to results obtained with unaided viewing. The man-goggle system performance was superior to unaided visual performance at average target luminances equivalent to 5% and 25% moon illuminances A t, a target luminance equivalent to a full moon illuminance, unaided visual performance was superior at higher spatial frequencies, while remaining poor at the lower spatial frequencies. Using a modified Howard-Dolman apparatus, it was determined that the stereoscopic threshold was degraded with the man-goggle system. Field measurements of relative depth discrimination using all available visual cues showed that performance of the man-goggle system was statistically equivalent to unaided photopic visual performance at intermediate viewing distances, but was inferior to unaided viewing at distances of 500 feet or greater.

Author

N77-12716# Centre de Recherches du Service de Sante des Armees, Clamart (France)

EXPERIMENTAL STUDY OF VISION DIMMING IN AN ANIMAL [ETUDE EXPERIMENTALE DE L'EBLOUISSEMENT CHEZ L'ANIMAL]

L Court, J P Chevaleraud, G Perdnel, and M Basin In AGARD Visual Aids and Eye Protection for the Aviator Oct 1976 p 11 refs

Avail NTIS HC A05/MF A01

Vision dimming is a temporary deficit in visual perception in a subject submitted to intense luminous energy, at a level higher than that of his level of adaptation. Electrodes were implanted in a monkey and a rabbit to study the electrophysiological rectification and behavior caused by glare. The time of recuperation is measured.

Transl by A H

N77-12713# Centre Principal d'Expertises Medicales du Personnel Navigant Paris (France)
when the device was stabilized and the magnitude when caged

Avail NTIS HC A05/MF A01

Several target acquisition devices are compared in-flight Considering size weight complexity, and performance in an in-flight visual acuity task one of the devices looked promising A group of twenty-nine subjects used a single device in a scout helicopter flight scenario The device produced motion sickness and the experimental plan was designed to assess this as well as visual acuity in flight The subjects flew the scenario first with an unaided eye and then with the device in both a stabilized and unstabilized (caged) mode The latter two flights were counterbalanced across subjects Following the flight phase, the subjects were given a series of tests to evaluate individual susceptibility to motion sickness Performance in the visual acuity task was significantly correlated with the airickness rating of an on-board experimenter however there was no significant difference between the magnitude of the symptoms observed when the device was stabilized and the magnitude when caged

Author

N77-13635 Dartmouth Coll Hanover N.H

COMPUTER BASED ELECTRON BEAM TREATMENT PLANNING Ph D Thesis
Joseph Yen Teng 1976 305 p

Avail Univ Microfilms Order No 76-24970

The development of a computer based system for electron beam treatment planning in radiation therapy is discussed Two major projects were completed to obtain the i.e patient and machine information required (1) a hardware-software project to obtain tissue density of internal structures of patients and (2) a detailed study of the radiation characteristics of the BSC-45 MeV An electronic device was designed and built to accept transmission intensity data from patients examined with a dual probe scanner and to transmit this data to a large time sharing computer nearby

Dissert Abstr

N77-13638 Iowa Univ Iowa City

Joseph Marcus Winston 1976 115 p

Avail Univ Microfilms Order No 76-26351

The hypothesis that there are non-carboxy/hemoglobin related actions of carbon monoxide which contribute to its lethality was investigated Possible clinically significant interactions between carbon monoxide and drugs were also studied An experimental design was developed which included determining the effect of various pretreatments including drugs and acute pre-exposure to carbon monoxide or hypoxic hypoxia, on carbon monoxide and hypoxic hypoxia lethality If the lethal mechanism of carbon monoxide and hypoxic hypoxia are the same it was felt that pretreatments should alter lethality in a similar manner Differing alternations of lethality by pretreatments would be evidence for different lethal mechanisms of carbon monoxide and hypoxic hypoxia

Dissert Abstr

N77-13637 Wayne State Univ Detroit Mich

Larry Allen Frazier 1976 106 p

Avail Univ Microfilms Order No 76-26130

The relationship between acoustic reflexes and loudness discomfort levels was investigated Acoustic reflex threshold levels and loudness discomfort levels were obtained from sixteen normal hearing subjects for nine stimuli including speech babble, a 1000 Hz pure tone and seven noise bands centered around 1000 Hz (10 Hz 30 Hz 100 Hz 1/2, 1 2, and 4 octaves) Acoustic reflex thresholds were measured on an electroacoustic impedance bridge and subjects tracked their loudness discomfort levels through the use of a recording attenuator The study was designed to compare the acoustic reflex and loudness discomfort level along six dimensions (1) mean thresholds (2) acoustic reflex-loudness discomfort level correlations, (3) size of the critical bandwidth (4) shape of threshold curves as a function of stimulus bandwidth, (5) pure tone vs narrow band noise threshold, and (6) pure tone vs speech thresholds

Dissert Abstr

N77-13634 Texas Univ Austin

STUDIES OF THE ISOTOPE CHEMISTRY OF MOLECULAR OXYGEN IN BIOLOGICAL SYSTEMS Ph D Thesis
Wooi-Luh Jeng 1976 80 p

Avail Univ Microfilms Order No 76-25472

Dissolved oxygen and its del 0-18 value show striking correlations in depth profiles of the open Gulf of Mexico and shallow marine bays Diurnal variation of dissolved oxygen and its del 0-18 value in the marine ecosystem of Redfish Bay is clearly observed and strongly correlated Isotope effects in biological processes photosynthesis and respiration, were investigated to explain the fractionation of dissolved stable oxygen isotopes in the marine environment The relationship observed between dissolved oxygen and its del 0-18 value in the depth profile and diurnal variation is a biological effect The equilibrium isotope effect in the reaction oxygen in equilibrium with oxyhemoglobin which relates to the process of respiration was studied The enrichment of stable oxygen isotopes due to respiration is not purely a kinetic isotope effect The inorganic oxidation of ferrous ion enriches the 0-18 of the oxygen pool

Dissert Abstr
manipulation of the rate of air pressure change? and (2) what effect on amplitude and shape of the tympanogram is generated by manipulation of the direction of air pressure change? The rate of air pressure change alters the amplitude of tympanograms in both groups and direction has no effect.

Dissert Abstr

N77-13639 Wichita State Univ Kans
HEMISPHERIC ASYMMETRY OF PERCEPTUAL AND ELECTROENCEPHALIC RESPONSES TO SPEECH STIMULI Ph D Thesis
Marilyn Park Warren 1976 259 p
Avail Univ Microfilms Order No 76-25358

Stimulus and task effects on perceptual and electroencephalographic asymmetry of responses to speech stimuli were examined in a two-part investigation. A total of 18 subjects listened to diphthong and diphthong consonant-vowel (CV) syllables consisting of a voiceless bilabial stop (p/ /t/). or /k/) plus the vowel /a/ spoken by a man, woman, or child. The stimulus tape contained equal numbers of four types of CV pairs: diphthong CV/diphthong voice, diphthong CV/diphthong voice, diphthong CV/diphthong voice. Subjects heard all stimuli twice once performing a phonemic discrimination task in which they identified the two CVs which they perceived and once performing a non-phonemic discrimination task in which they identified the two voices they perceived. Results for 12 right-handed female subjects showed a right ear advantage for the phonemic discrimination task but no ear advantage for the non-phonemic discrimination task.

Dissert Abstr

N77-13640 Illinois Univ Urbana-Champaign
INEQUALITY BETWEEN INSPIRED AND EXPired GAS-EOUS NITROGEN IN MAN FACT OR TECHNICAL ARTIFACT? Ph D Thesis
Ingrid Charlotte Kupprat 1976 132 p
Avail Univ Microfilms Order No 76-24122

Gaseous N2 exchange was measured in nine healthy young men once while fasting and once 1 1/2 hours after high protein ingestion. Data were collected during bed rest for the last 3 hours of a 17-hour period of controlled diet, environment and activity. On the average, an N2 inequality was observed. High protein ingestion resulted in a significantly greater N2 evolution than fasting. However, there was a significant linear trend in the mean N2 evolved each hour. From comparison of the observed variations with subjects diet and time with the expected variation of instrumentation to measure N2, it concluded that inequality between the minute volume of N2 inspired and expired at rest is a real phenomenon not a technical artifact. This results raise questions as to the universal applicability of the traditional open-circuit technique for measuring respiratory gas exchange, which assumes that N2 inspired equals N2 expired.

Dissert Abstr

N77-13641 Ohio State Univ Columbus
James Patrick Ary 1976 108 p
Avail Univ Microfilms Order No 76-24551

Stimulation of left or right half visual fields produces different evoked potential distributions across the occipital scalp. One model for the source of this potential distribution is an equivalent dipole located near the medial fissure and oriented tangential to the occipital scalp. It was found that stimulating with white lateral half checkerboard flashes produces two changes: (1) a shift toward a scalp surface-radial evoked potential distribution, and (2) a shift of localization toward the midline. To clarify the color dependence of this effect the brightness of the adapting field was raised above rod saturation to 2,000 cd/sq m and flashed checks of four different colors were employed as stimuli. Two of the three subjects tested showed potential distributions for yellow stimuli which were distinctly different from the distributions for the other colors.

Dissert Abstr

N77-13642 Washington Univ Seattle
TRANSIENT RESPONSES TO SHIFTS OF ANGLE OF ILLUMINATION IN RETINAL NEURONS Ph D Thesis
Jack Henrik Bellum 1976 79 p
Avail Univ Microfilms Order No 76-25388

Intracellular recordings were made from Necturus retinal neurons. The retina was alternately illuminated by either of two large overlapping fields of background light incident upon the retina at different angles. A test flash of the same angle of incidence as one of the two backgrounds was presented on each background in turn. The intensity of one of the two backgrounds was systematically varied over a range of intensities likely to include an intensity matching the other background. Cells exhibiting the properties of receptors responded to each exchange with a transient hyperpolarization that could not be explained by an intensity mismatch. Bipolar cells produced equal and substantial responses to both exchanges at the matched intensity, as did amacrine cells. Ganglion cells also produced transient responses to exchange.

Dissert Abstr

N77-13643 Pittsburgh Univ Pa
TRANSIENT PHYSIOLOGICAL RESPONSES TO STEP CHANGES IN WORK RATE Ph D Thesis
Thomas Edward Bernard 1975 96 p
Avail Univ Microfilms Order No 76-25911

The transient responses of heart rate, pulmonary ventilation, oxygen uptake, and carbon dioxide elimination were measured on a breath-to-breath basis for six young men. Three pairs of step changes in work rate were applied on a laddermill ergometer such that each pair represented an increasing change and a decreasing change in work rate over the same range. The transfer functions relating the work application to the responses were determined through curve fitting. Heart rate responses were characterized by a second order function. Pulmonary ventilation was characterized by an immediate zero order change followed by a delayed first order change. Both oxygen uptake and carbon dioxide elimination followed a simple first order response. For pulmonary ventilation oxygen uptake, and carbon dioxide elimination followed a simple first order response. For pulmonary ventilation oxygen uptake, and carbon dioxide elimination the responses displayed the qualities of a linear system. The heart rate response displayed non-linear characteristics.

Dissert Abstr

N77-13644 Virginia Univ Charlottesville
THE MICROCIRCULATORY BASIS OF FUNCTIONAL HYPEREMIA IN STRIATED MUSCLE Ph D Thesis
Richard John Gorczynski 1976 215 p
Avail Univ Microfilms Order No 76-25012

An investigation of the microcirculation of striated muscle was undertaken in an effort to (1) directly describe the behavior of the arterioles from capillary bed during striated muscle contraction (2) investigate the hypothesis that a change in the oxygen tension of contracting striated muscle is involved either directly by effect on the vascular smooth muscle of the arterioles or indirectly, via an effect upon striated muscle metabolism in the medication of contraction induced arteriolar vasodilation (3) to investigate the possibility that the release of potassium by active muscle mediates the initiation of functional arteriolar vasodilation during contraction. Experiments were performed on the cremaster muscle of hamsters prepared for in vivo microscopy of the microcirculation.

Dissert Abstr

N77-13645 California Univ, Los Angeles
HUMAN EEG RESPONSE TO CERTAIN RHYTHMIC PATTERNED AUDITORY STIMULI, WITH POSSIBLE RELATIONS TO EEG LATERAL ASYMMETRY MEASURES AND EEG CORRELATES OF CHANTING Ph D Thesis
Linda Jean Rogers 1976 119 p
Avail Univ Microfilms Order No 76-25237

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Human EEG responses to simple, rhythmic visual and auditory stimuli (sinusoidally modulated white light and sinusoidally modulated white noise) were recorded. In addition, a contrast-evoked response was reported for patterned rhythmic visual stimulation. A human EEG response to patterned auditory stimulation is also investigated. The patterned rhythmic stimuli presented were music and chanting. The activity of the skeletal muscles, in conjunction with a mathematical model, was observed. The physiological responses of six hydrated human male subjects working in both 23°C and 41°C environments were compared to their own normally hydrated control responses. Results of the study indicate that plasma volume varied inversely with both ambient temperature and exercise level when normally hydrated and expanded 1-2% above resting control values when hydrated. The exercise on a bicycle ergometer for two consecutive thirty-minute periods. Plasma volume varied inversely with both ambient temperature and exercise level when normally hydrated and expanded 1-2% above resting control values when hydrated.

The results of the task analysis parameters were evaluated and presented were music and chanting. A view to analyzing mental load factors and to studying the differential participation of the cerebral hemispheres. The second related area concerns EEG correlates of religious meditation.

**N77-13646**

Saint Louis Univ., Mo

**HUMAN PHYSIOLOGICAL RESPONSE TO HYPERHYDRATION IN A HOT ENVIRONMENT Ph D Thesis**

Ronald Alvin Weiss 1975 215 p

Avail Univ Microfilms Order No 76-25831

The physiological responses of six hydrated human male subjects working in both 23°C and 41°C environments were compared to their own normally hydrated control responses. The study examines the effects of hyperhydration on the human body in terms of temperature, exercise level, and plasma volume.

**N77-13647**

Wisconsin Univ. Madison

**EFFECT OF LOAD, SPEED, AND CONFIGURATION ON THE ELECTROMYOGRAPHIC ACTIVITIES OF THE SKELETAL MUSCLES Ph D Thesis**

Norman Richard Miller 1976 437 p

Avail Univ Microfilms Order No 76-18986

The feasibility of utilizing the electromyographic output of the skeletal muscles (in conjunction with a mathematical musculoskeletal model) for quantification of muscle response to load and speed variations during human activities is examined. The study describes the effects of load and speed on the electromyographic activity of the skeletal muscles. Results are discussed in detail.

**N77-13648**

Lockheed Missiles and Space Co., Sunnyvale, Calif

**STARPAC INTERIM EVALUATION REPORT, MAY 1975 - APRIL 1976**

15 Jun 1976 164 p

(Contract NAS9-13170)

(NASA-CR-151126 LMSC-D500704) Avail NTIS HC A07/MF A01 CSCL OBE

The primary goal of the STARPAHC Program is to provide data for developing health care for future manned spacecraft. The feasibility of the STARPAHC concept for improving the delivery of health care to remote areas on earth is evaluated. The hardware and medical evaluations initiated during the first 6 months of system operation were continued and expanded during the second 6-month period. The evaluations are based on what has been proven to be a relatively stabilized 6-month period wherein system failures which occurred during the initial shakedown period in the first 6 months have been minimized. Early trends and performance data reported in the first semi-annual report were reexamined to either verify, modify, or change earlier conclusions. The highlights are given of the total year of operation with emphasis on comparisons between the first and second semi-annual reporting period. An analysis of costs is summarized.

**N77-13649**

Nederlands Instituut voor Preventieve Geneeskunde TNO, Leiden

**RECORDING AND PROCESSING OF ELECTROENCEPHALOGRAMS DESCRIPTION OF TECHNIQUES [REGISTRATIE EN VERWERKING VAN ELECTROENCEPHALOGRAMMEN BESCHRIJVING VAN METHODIEKEN]**

J D Nye and H P DeRoos Jun 1975 47 p refs In DUTCH

Avail NTIS HC A03/MF A01

A method to record electroencephalographic (EEG) data on magnetic tape and to process the data by means of a digital computer is described. The IBM-1800 computer was used to digitize and filter the EEG signals for processing on an IBM-370 computer. Using FORTRAN 4, the spectra can be calculated auto spectrum, cross-spectrum, and coherence function. The reliability of these spectra is discussed, and the Spectral (spectrum estimation) program is dealt with. The EEG recording system was tested by noise measurement, involving Fourier transformation.

**N77-13650**

Navy Medical Research and Development Command, Bethesda, Md

**BIBLIOGRAPHY OF REPORTED BIOLOGICAL PHENOMENA (EFFECTS) AND CLINICAL MANIFESTATIONS ATTRIBUTED TO MICROWAVE AND RADIO-FREQUENCY RADIATION, SUPPLEMENT NUMBER 7 Medical Research Interim Report**

Zorach R Glaser May 1976 30 p refs

(MF51524015)

(AD-A025354) Avail NTIS HC A03/MF A01 CSCL 06/18

More than 350 additional references on the biological responses to radio frequency and microwave radiation, published up to May 1976, are included in this bibliography of the world literature. Particular attention has been paid to the effects of non-ionizing radiation on man at these frequencies. The citations are arranged alphabetically by author (where possible), and contain as much information as possible so as to assure effective retrieval of the original documents. Soviet and East European literature is included in detail. This report is the seventh supplementary, 'up-dated bibliographic listing to Naval Medical Research Institute.

**N77-13651**

Nederlands Instituut voor Preventieve Geneeskunde TNO, Leiden

**WORKLOAD OF THE RADAR-AIR TRAFFIC CONTROLLERS AT SCHIPHOL Interim Report [INTERIMRAPPORT WERKBELASTING RADAR-LUCHTVERKEERSLEIDERS SCHIPHOL]**

C K Pasmooij Jun 1975 29 p refs In DUTCH

(IRA-1) Avail NTIS HC A03/MF A01

The workload at the Amsterdam airport was measured with a view to analyzing mental load factors and to studying the effect of task performance on the air traffic controller. Number and content of the air traffic information strips, radio telephone communication coordination with other air traffic sectors and telephone calls with other air traffic control centers were registered for five air traffic controllers during the week of August 6 1973. The results of the task analysis parameters were evaluated and preliminary conclusions were made.
COMMAND AND CONTROL TASKS [MENSELIJKE STUUR-EN REGELTAKEN VERSLAG VAN EEN ONDERZOEK BIJ VIER VERSCHILLENDE STUUR- EN REGELTAKEN]

C L Ekkers, W T M Ouijendijk and J J Schwarz Aug 1975 141 p refs In DUTCH Sponsored in part by Min van Econ Zaken, and Min van Sociale Zaken

Avail NTIS HC A07/MF A01

The pilot phase of an investigation on the conditions under which command and control tasks are carried out was analyzed. The investigation was made on the personal task, and social system level. The planning of the investigation is dealt with and the four tasks are described. Train scheduling of the Netherlands Railways, operation and control of a natural gas based power station, hospital patients under narcosis power supply and safety of the Netherlands Railways. Observations of the tasks were made and questionnaires were filled in. The results are discussed and preliminary conclusions drawn.

ES&A

N77-13657/ Technische Hogeschool, Delft (Netherlands) Dept of Aeronautical Engineering

PILOT'S TRACKING BEHAVIOUR UNDER ADDITIONAL WORKLOAD

R A W Hosman Jun 1975 91 p refs

(VTH-199) Avail NTIS HC A05/MF A01

An experiment to study the influence of task interference on the information processing of the human pilot is described. Two hypothetical limited capacity models of human information processing, the multi-channel model and the single-channel model, are reviewed and the results of the experiment are discussed in relation to these models. The experimental task consisted of a single axis tracking task under additional workload. The three controlled elements used were a simulated transport aircraft at three different center of gravity positions, at which it was stable, neutral, and unstable respectively. The forcing function was a gust signal acting on the simulated aircraft. The additional loading task was an auditory binary choice task. The results of the experiment tend to favor the single-channel model of human information processing.

Author (ESA)

N77-13658/ Air Force Flight Dynamics Lab Wright-Patterson AFB Ohio

LOW VISIBILITY LANDING PILOT MODELING EXPERIMENT AND DATA. PHASE 1 Final Report. May - Sep 1974

Randall V Gressang Daniel L Kugel Jonn R Stone and Joseph E Pollard Apr 1976 394 p refs

(AF Proj 2187) Avail NTIS

(A-D-A025885. AFFDL-TR-75-41) Avail NTIS HC A17/MF A01

This report describes an experiment conducted to provide data for constructing a mathematical pilot model for low visibility landing. The experiment was conducted using a hybrid flight simulator equipped with a three degree of freedom motion system and a terrain board visual system. The aircraft simulated was a C-135B and low visibility was simulated using a sky plate in the visual system. Pilots were obtained from the USAF Instrument Flight Center. Gust disturbances were used to increase pilot workload. The worst visibility simulated was Category 2 minimums.

GRA

N77-13659/ Army Combined Arms Combat Developments Activity Fort Leavenworth Kans

ANALYSIS OF PHASE 2A OF FE 43 B

Rudolph J Pabon, Robert A Davison and William I Parks Feb 1976 30 p refs

(A-D-A025823. CACDA-TR-2-76) Avail NTIS HC A17/MF A01

This report analyzes data collected from Field Experiment 43 B the ground-to-air visual detection experiment. Phase IIa was a one-sided experiment using AH-1G and OH-58 helicopters for detection at ranges from 1 to 5 kilometers by ground observers with unaided vision. The experiment provided...
data on the time required for a ground observer to detect an observation helicopter, an attack helicopter (AH) or an attack helicopter team (AHT) and the frequency of detection for each configuration while situated in a firing position. Independent variables tested in the experiment were range, search sector, canopy or no canopy helicopters, lateral or no lateral movement, sky or terrain background, single ship or helicopter team presentation, and for multiple pop-up tactics, elapsed time between first and second pop-up, and location of the second pop-up with respect to the initial pop-up. Data gained from this experiment when coupled with data from Phase IIB, the air-to-ground experiment will produce information required to develop helicopter employment tactics. Detection time determined from the analysis of the data will be used in subsequent experiments as a guide for constraining helicopter pop-up times to reduce AHT vulnerability.

N77-13660# Aeronautical Systems Div, Wright-Patterson AFB, Ohio

Christopher J Hyatt and Oak H DeBerg Aug 1975 23 p refs
(AD-A025782, ASD-TR-75-17) Avail NTIS HC A02/MF A01 CSCL 05/8

The Crew Station Design Facility's scoring system for ILS approaches and landings has been extended for use with Microwave Landing System (MLS) approaches. The philosophy of scoring systems is briefly discussed and the rationale for this application is developed.

N77-13661# Army Aeromedical Research Lab, Fort Rucker, Ala

DYNAMIC VISUAL ACUITY IN FATIGUED PILOTS Final Report
Isaac Behar, K A Kimball, and D A Anderson Jun 1976 15 p refs
(DA Proj 3AO-62110-A-819) (AD-A027663 USAARL-76-24) Avail NTIS HC A02/MF A01 CSCL 17/8

Six rotary wing aviators were subjects in a continuous operation regimen involving some 12 hours of flying and 3.5 hours sleep daily for five days. Estimates of performance on a dynamic visual acuity (DVA) task were obtained several times each day during the study using target velocities of 25 deg and 40 deg/sec. DVA performance varied significantly during the fatigue regimen when measurements were made with target velocities of 40 deg/sec, with lower velocity targets differences in DVA scores were not significant. This indicates the need to tax the oculomotor system to demonstrate fatigue effects. Fatigue effects were partially obscured by practice effects which are considerable in the DVA task. DVA scores correlated only modestly with subjective estimates of fatigue intensity and flying performance and IP ratings of performance, but the cluster of correlations provided a consistent picture.

N77-13971 European Space Agency, Paris (France)

DISCRETE TIME MODELLING OF HUMAN PILOT BEHAVIOUR
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AEROSPACE MEDICINE AND BIOLOGY / A Continuing Bibliography (Suppl. 165)  MARCH 1977

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