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AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY WITH INDEXES



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Introduction

This issue of *Aerospace Medicine and Biology, A Continuing Bibliography with Indexes* (NASA SP-7011) lists 56 reports, articles, and other documents recently announced in the NASA STI Database.

In its subject coverage, *Aerospace Medicine and Biology* concentrates on the biological, physiological, psychological, and environmental effects to which humans are subjected during and following simulated or actual flight in the Earth's atmosphere or in interplanetary space. References describing similar effects on 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. Applied research receives the most emphasis, but references to fundamental studies and theoretical principles related to experimental development also qualify for inclusion.

Each entry in the publication consists of a standard bibliographic citation accompanied, in most cases, by an abstract.

Two indexes—subject and author are included.

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Appendix

Select **Appendix** for important information about NASA Scientific and Technical Information (STI) Office products and services, including registration with the NASA Center for AeroSpace Information (CASI) for access to the NASA CASI TRS (Technical Report Server), and availability and pricing information for cited documents.

Typical Report Citation and Abstract

ON MICROFICHE

- ↓
- ACCESSION NUMBER** → N96-10751# Sandia National Labs., Albuquerque, NM. ← **CORPORATE SOURCE**
- TITLE** → **Minimizing phylogenetic number to find good evolutionary trees**
- AUTHORS** → Goldberg, Leslie Ann; Goldberg, Paul W.; Phillips, Cynthia A.; Sweedyk, Elizabeth (California Univ., Berkeley, CA.); and Warnow, Tandy (Pennsylvania Univ., Philadelphia, PA.) ← **AUTHORS' AFFILIATION**
- PUBLICATION DATE** → 1995 26 p Presented at the 1995 Symposium on Combinatorial Pattern Matching, Helsinki, Finland, 4-7 Jul. 1995 Sponsored by California Legislative Grant
- CONTRACTS/GRANTS** → Contract(s)/Grant(s): (DE-AC04-94AL-85000; NSF CCR-94-57800)
- REPORT NO.(S)** → Report No.(s): (DE95-011893; SAND-95-0831C; CONF-9507123-1) Avail: CASI HC A03/MF A01 ← **AVAILABILITY AND PRICE CODE**
- ABSTRACT** → Inferring phylogenetic trees is a fundamental problem in computational-biology. We present a new objective criterion, the phylogenetic number, for evaluating evolutionary trees for species defined by biomolecular sequences or other qualitative characters. The phylogenetic number of a tree T is the maximum number of times that any given character state arises in T. By contrast, the classical parsimony criterion measures the total number of times that different character states arise in T. We consider the following related problems: finding the tree with minimum phylogenetic number, and computing the phylogenetic number of a given topology in which only the leaves are labeled by species. When the number of states is bounded (as is the case for biomolecular sequence characters), we can solve the second problem in polynomial time. We can also compute a fixed-topology 2-phylogeny (when one exists) for an arbitrary number of states. This algorithm can be used to further distinguish trees that are equal under parsimony. We also consider a number of other related problems.
- SUBJECT TERMS** → DOE
Algorithms; Biological Evolution; Chemical Evolution; Genetics; Molecular Biology

AEROSPACE MEDICINE AND BIOLOGY

A Continuing Bibliography (Suppl. 412)

MARCH 1996

51 LIFE SCIENCES (GENERAL)

N96-14107# William Beaumont Army Hospital, El Paso, TX.

Acute airway injury and response: Combined effect of smoke inhalation and combustion products on mucin gene expression and regulated mucin production in the tracheal-bronchial epithelium Final Report, 1 Jun. 1994 - 30 Jun. 1995

Bhattacharyya, Sambhu N.; 14 Jun. 1995 26 p
Report No.(s): (AD-A296999) Avail: CASI HC A03/MF A01

Rabbit tracheal epithelial cells showed time-dependent mucin gene expression and secretion when cultured in a serum-free and hormone-supplemented medium with retinoids (vitamin A). In the absence of vitamin A, the cells showed squamous differentiation with reduced mucin message. When supplemented with retinoids, the cells reverted back to normal. Time-dependent (5-20 minutes) exposure of rabbit tracheal explants to smoke from pine wood resulted in inflammation of the epithelium with very high expression of mucin message. When cultured in a medium with retinoids, the epithelium became normal with normal mucin gene expression. Without retinoids in the culture medium, injury to epithelium and mucin message did not recover well. Addition of an antisense mucin oligomer resulted in partial inhibition of mucin message and the cells showed normal profile. Thus, combined therapy of retinoids and antisense mucin oligomer have clinical implication in the treatment of people, including combat soldiers, exposed to toxic exposure like smoke.

DTIC

Epithelium; Gene Expression; Injuries; Mucus; Retinene; Secretions; Smoke; Trachea; Wound Healing;

N96-14143# Oklahoma Univ., Oklahoma City, OK. Coll. of Medicine.

The effects of ricin on the heart and coronary arteries Final Report

Robinson, Casey P.; 1 Feb. 1995 189 p
Contract(s)/Grant(s): (DAMD17-93-C-3036)

Report No.(s): (AD-A297059) Avail: CASI HC A09/MF A02

Effects of ricin on rabbit heart, coronary arteries, and distribution of blood flow to various organs and tissues were investigated. Ricin increased cardiac output, and blood flow to most organs/tissues. Ricin was given 0.22 micrograms/kg and 48 hours later changes were determined. Ricin decreased sensitivities of coronary arteries to 5-HT- and histamine contractions, increased sensitivity to NE relaxations, increased maximal contractions, but did not alter ACh-induced relaxations. Ricin increased basal IP3 levels, but histamine stimulated IP3 levels and basal hydrolysis rates from IP2 to IP1 were depressed. In myocardium, ricin depressed cAMP and cGMP accumulation but not phosphoinositide hydrolysis. Heart rate, bipolar electrocardiograms, action potentials and beta adrenergic receptor number or affinity were not altered. Ricin reduced left ventricular compliance and decreased left ventricular developed pressure per balloon volume.

DTIC

Arteries; Blood Flow; Cardiac Output; Coronary Circulation; Heart Rate; Histamines; Myocardium; Tissues (biology);

N96-14470# Louisiana State Univ., New Orleans, LA. Medical Center.

Multidiscipline approach to understanding of traumatic brain injury and the evaluation of drugs to enhance neurological recovery after traumatic brain injury Midterm Report, 2 Nov. 1992 - 2 May 1995

Carey, Michael E.; Jun. 1995 123 p
Contract(s)/Grant(s): (DAMD17-93-C-3008)
Report No.(s): (AD-A297497) Avail: CASI HC A06/MF A02

In combat, head wounds account for almost half of all single wound deaths. Since World War II neurosurgical mortality has approximated 10%, indicating no overall improvement in the lethality of brain wounds incurred in combat. In an attempt to alleviate this problem the US Army Medical Research and Development Command sponsored a project to develop an experimental model of brain wounding so that better treatments for brain wounded soldiers could be

developed. This project was halted by animal zealots. The present brain injury project being conducted at Louisiana State University Medical Center is an attempt to continue the U.S. Army's efforts to develop better treatments for brain injury. In this new effort we modeled brain injury in the anesthetized rat by impacting the right sensorimotor area with a pneumatically driven piston. Owing in no small measure to the animal activists, most brain trauma work around the world is now done in the anesthetized rat using fluid percussion, weight drop or a piston impact.

DTIC

Brain; Brain Damage; Combat; Drugs; Neurology;

N96-14503# Foreign Broadcast Information Service, Washington, DC.

FBIS report: Science and technology. Central Eurasia

8 Sep. 1995 42 p Transl. into ENGLISH from various Russian articles

Report No.(s): (FBIS-UST-95-035) Avail: CASI HC A03/MF A01

Translated articles cover the following topics: use of radar signals and its processing methods for ultrasonic flaw detection in composite materials; separation of flaw signal from noise during dynamic eddy-current inspection of articles made of composite materials; use of visual-vestibular effects in head-down position to increase resistance to motion sickness; effect of exercise on the risk of human decompression sickness during ascent in head down position; study of pharmaceuticals to treat vestibular-autonomous disturbances; and integrated evaluation of neurophysiological reactions to isolated and combined exposure to ionizing and microwave radiation.

Author

Life Sciences; Materials Science; Research and Development; Russian Federation; Technologies;

N96-14734# China Nuclear Information Centre, Beijing (China).

The radiosensitivity of alfalfa varieties and the fuzzy concentration analysis

Yufan, Kang; and Helin, MA; Sep. 1994 19 p

Report No.(s): (DE95-629578; CNIC-00874; CSNAS-0086) Avail: CASI HC A03/MF A01 (US Sales Only)

The dried alfalfa seeds (12.1% moisture) were exposed to Co-60 gamma radiation field with 0 to approximately 36.1 C/kg radiation doses (irradiation rate is $2.84 \times 10^{(exp -2)}$ C/(kg.min)) to observe and measure some radio-bio-effectivity. In the range of irradiation doses, vitality index, root length, seedling survival rate, seedling height, plant height and grass yield decreased and pollen sterility, micro-nucleus rate, free radical relative content increased as the amount of radiation increased. The activity of peroxidase increased as the amount of radiation increased within certain range of dose and tended to decreased beyond that range. Vitality

index and root length, which dosage effect curve is compatible with multiple targets-single hit model, and seedling survival rate, seedling height, plant height and grass yield, which dosage effect curve is compatible with linear regression model. There were strong co-relations between the seedling height, micro-nucleus cell rate and the free radical relative content (P less than 0.01). There were very significant difference (P less than 0.01) between the alfalfa species and varieties. With fuzzy concentration analysis method, the alfalfa sample were classified into five groups: higher sensitive, sensitive, intermediate, resistant, higher resistant. The suitable irradiation doses for the alfalfa species and varieties are between 12.9 and approximately 34.8 mC/kg.

DOE

Alfalfa; Gamma Rays; Irradiation; Radiation Dosage; Radiation Effects; Radiation Tolerance; Vegetation Growth;

N96-14741# Lawrence Livermore National Lab., Livermore, CA.

Statistical methods in physical mapping Ph.D. Thesis

Nelson, David Oscar; May 1995 133 p

Contract(s)/Grant(s): (W-7405-ENG-48)

Report No.(s): (DE95-016060; UCRL-LR-120999) Avail: CASI HC A07/MF A02

One of the great success stories of modern molecular genetics has been the ability of biologists to isolate and characterize the genes responsible for serious inherited diseases like fragile X syndrome, cystic fibrosis, and myotonic muscular dystrophy. This dissertation concentrates on constructing high-resolution physical maps. It demonstrates how probabilistic modeling and statistical analysis can aid molecular geneticists in the tasks of planning, execution, and evaluation of physical maps of chromosomes and large chromosomal regions. The dissertation is divided into six chapters. Chapter 1 provides an introduction to the field of physical mapping, describing the role of physical mapping in gene isolation and in past efforts at mapping chromosomal regions. The next two chapters review and extend known results on predicting progress in large mapping projects. Such predictions help project planners decide between various approaches and tactics for mapping large regions of the human genome. Chapter 2 shows how probability models have been used in the past to predict progress in mapping projects. Chapter 3 presents new results, based on stationary point process theory, for progress measures for mapping projects based on directed mapping strategies. Chapter 4 describes in detail the construction of an initial high-resolution physical map for human chromosome 19. This chapter introduces the probability and statistical models involved in map construction in the context of a large, ongoing physical mapping project. Chapter 5 concentrates on one such model, the trinomial model. This chapter contains new results on the large-sample behavior of this model, including distributional results, asymptotic moments, and detection error

rates. In addition, it contains an optimality result concerning experimental procedures based on the trinomial model. The last chapter explores unsolved problems and describes future work.

DOE

Chromosomes; Genes; Genetic Code; Genetics; Probability Theory; Project Planning; Statistical Analysis;

N96-14868# China Nuclear Information Centre, Beijing (China).

The biological effect of gamma radiation on in vitro culture in rice

Cailian, Wang; Gang, XU; Mei, Shen; and Qiufang, Chen; Aug. 1994 15 p

Report No.(s): (DE95-629577; CNIC-00832; CSNAS-0082) Avail: CASI HC A03/MF A01 (US Sales Only)

Radiobiological effects of gamma radiation on different types of rice before or during in vitro culture, combined treatments of Cs-137 gamma rays and NaN₃ on mature embryo culture, and irradiation on growth of calli derived from anther in rice were studied. The dose-effects relations of callus induction rate and callus growth rate could be fitted according to the multi-target and single-hit model. Effect of somatic cultures of different types in rice was different. Increase in plant regeneration capacity was found with 100, 150 Gy gamma rays. Decrease of callus induction rate, callus growth rate and callus differentiation rate (especially in the 1st culture) were observed in combined treatments of gamma-rays and NaN₃. However, mutagenic effects of treatments with gamma-rays were much higher than those of combined treatment of gamma-rays and NaN₃ in the 2nd and the 3rd culture. Combined treatments of Cs-137 gamma rays with 200 Gy and 2 mmol NaN₃ were suitable for explant in rice before culture. To irradiate the calli derived from anther in rice with 30 Gy gamma rays can rise plant regeneration capacity during continuing culture.

DOE

Biological Effects; Culture Techniques; Gamma Rays; Irradiation; Mutagens; Radiation Effects; Radiation Injuries; Radiobiology; Rice;

N96-14951*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, TX. Lab. of Cancer Biology.

Induction of carcinoembryonic antigen expression in a three-dimensional culture system

Jessup, J. M.; (Deaconess Hospital, Boston, MA.) Brown, D.; (Krug Life Sciences, Inc., Houston, TX.) Fitzgerald, W.; (Krug Life Sciences, Inc., Houston, TX.) Ford, R. D.; (Deaconess Hospital, Boston, MA.) Nachman, A.; (Deaconess Hospital, Boston, MA.) Goodwin, T. J.; and Spaulding, G.; 1 Jan. 1994 23 p Submitted for publication in *In Vitro Cellular and Developmental Biology*

Contract(s)/Grant(s): (NAG9-520; NAG9-650)

Report No.(s): (NASA-TM-111144; NAS 1.15:111144; NIPS-95-06161) Avail: CASI HC A03/MF A01

MIP-101 is a poorly differentiated human colon carcinoma cell line established from ascites that produces minimal amounts of carcinoembryonic antigen (CEA), a 180 kDa glycoprotein tumor marker, and nonspecific cross-reacting antigen (NCA), a related protein that has 50 and 90 kDa isoforms, in vitro in monolayer culture. MIP-101 produces CEA when implanted into the peritoneum of nude mice but not when implanted into subcutaneous tissue. We tested whether MIP-101 cells may be induced to express CEA when cultured on microcarrier beads in three-dimensional cultures, either in static cultures as non-adherent aggregates or under dynamic conditions in a NASA-designed low shear stress bioreactor. MIP-101 cells proliferated well under all three conditions and increased CEA and NCA production 3 - 4 fold when grown in three-dimensional cultures compared to MIP-101 cells growing logarithmically in monolayers. These results suggest that three-dimensional growth in vitro simulates tumor function in vivo and that three-dimensional growth by itself may enhance production of molecules that are associated with the metastatic process.

Author

Antigens; Cancer; Cells (biology); Culture Techniques;

N96-14952*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, TX. Dept. of Medical Cell Biology.

Skeletal muscle satellite cells cultured in simulated microgravity

Molnar, Greg; (DuPont, Alfred I. Inst., Wilmington, DE.)Hartzell, Charles R.; (DuPont, Alfred I. Inst., Wilmington, DE.)Schroedl, Nancy A.; (DuPont, Alfred I. Inst., Wilmington, DE.)and Gonda, Steve R.; 1 Jan. 1993 22 p Submitted for publication in *In Vitro Cellular and Developmental Biology*

Contract(s)/Grant(s): (NAG9-656)

Report No.(s): (NASA-TM-111145; NAS 1.15:111145; NIPS-95-06162) Avail: CASI HC A03/MF A01

Satellite cells are postnatal myoblasts responsible for providing additional nuclei to growing or regenerating muscle cells. Satellite cells retain the capacity to proliferate and differentiate in vitro and therefore provide a useful model to study postnatal muscle development. Most culture systems used to study postnatal muscle development are limited by the two-dimensional (2-D) confines of the culture dish. Limiting proliferation and differentiation of satellite cells in 2-D could potentially limit cell-cell contacts important for developing the level of organization in skeletal muscle obtained in vivo. Culturing satellite cells on microcarrier beads suspended in the High-Aspect-Ratio-Vessel (HARV) designed by NASA provides a low shear, three-dimensional (3-D) environment to study muscle development. Primary cultures established from anterior tibialis muscles

of growing rats (approximately 200 gm) were used for all studies and were composed of greater than 75 % satellite cells. Different inoculation densities did not affect the proliferative potential of satellite cells in the HARV. Plating efficiency, proliferation, and glucose utilization were compared between 2-D flat culture and 3-D HARV culture. Plating efficiency (cells attached - cells plated x 100) was similar between the two culture systems. Proliferation was reduced in HARV cultures and this reduction was apparent for both satellite cells and non-satellite cells. Furthermore, reduction in proliferation within the HARV could not be attributed to reduced substrate availability since glucose levels in media from HARV and 2-D cell culture were similar. Morphologically, microcarrier beads within the HARVS were joined together by cells into three-dimensional aggregates composed of greater than 10 beads/aggregate. Aggregation of beads did not occur in the absence of cells. Myotubes were often seen on individual beads or spanning the surface of two beads. In summary, proliferation and differentiation of satellite cells on microcarrier beads within the HARV bioreactor results in a three dimensional level of organization that could provide a more suitable model to study postnatal muscle development.

Author

Bioreactors; Cells (biology); Culture Techniques; Microgravity; Muscles; Tissues (biology);

N96-14953*# National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, TX. Dept. of Medical Cell Biology.

Neonatal rat heart cells cultured in simulated microgravity

Akins, Robert E.; (DuPont, Alfred I. Inst., Wilmington, DE.)Schroedl, Nancy A.; (DuPont, Alfred I. Inst., Wilmington, DE.)Gonda, Steve R.; and Hartzell, Charles R.; (DuPont, Alfred I. Inst., Wilmington, DE.)1 Jan. 1994 24 p Submitted for publication in *In Vitro Cellular and Development Biology* Sponsored by Nemours Research Programs

Contract(s)/Grant(s): (NAG9-656)

Report No.(s): (NASA-TM-111146; NAS 1.15:111146; NIPS-95-06163) Avail: CASI HC A03/MF A01

In vitro characteristics of cardiac cells cultured in simulated microgravity are reported. Tissue culture methods performed at unit gravity constrain cells to propagate, differentiate, and interact in a two dimensional (2D) plane. Neonatal rat cardiac cells in 2D culture organize predominantly as bundles of cardiomyocytes with the intervening areas filled by non-myocyte cell types. Such cardiac cell cultures respond predictably to the addition of exogenous compounds, and in many ways they represent an excellent in vitro model system. The gravity-induced 2D organization of the cells, however, does not accurately reflect the distribution of cells in the intact tissue. We have begun characteriza-

tions of a three-dimensional (3D) culturing system designed to mimic microgravity. The NASA designed High-Aspect-Ratio-Vessel (HARV) bioreactors provide a low shear environment which allows cells to be cultured in static suspension. HARV-3D cultures were prepared on microcarrier beads and compared to control-2D cultures using a combination of microscopic and biochemical techniques. Both systems were uniformly inoculated and medium exchanged at standard intervals. Cells in control cultures adhered to the polystyrene surface of the tissue culture dishes and exhibited typical 2D organization. Cells in cultured in HARV's adhered to microcarrier beads, the beads aggregated into defined clusters containing 8 to 15 beads per cluster, and the clusters exhibited distinct 3D layers: myocytes and fibroblasts appeared attached to the surfaces of beads and were overlaid by an outer cell type. In addition, cultures prepared in HARV's using alternative support matrices also displayed morphological formations not seen in control cultures. Generally, the cells prepared in HARV and control cultures were similar, however, the dramatic alterations in 3D organization recommend the HARV as an ideal vessel for the generation of tissue-like organizations of cardiac cells in simulated microgravity.

Author

Bioreactors; Cells (biology); Culture Techniques; Heart; Microgravity; Tissues (biology);

N96-14956# Armed Forces Radiobiology Research Inst., Bethesda, MD.

AFRRI reports: Second quarter, April - June 1995

Aug. 1995 51 p

Contract(s)/Grant(s): (AF PROJ. NWE-D)

Report No.(s): (AD-A298340; AFRRI-SR95-11; AFRRI-SR95-16) Avail: CASI HC A04/MF A01

Seroepizootiology of *Helicobacter pylori* gastric infection in nonhuman primates housed in social environments is addressed. Other topics discussed: stimulation of thrombocytopoiesis in normal nonhuman primates by recombinant human megakaryocyte growth and development factor; possible involvement of prostaglandins in increases in rat plasma adrenocorticotrophic hormone and corticosterone levels induced by radiation and interleukin-1(alpha) alone or combined; and C-kit ligand gene expression in normal and sublethally irradiated mice. Effectiveness of radioprotection by 16,16 dimethyl prostaglandin E2 in male and female mice is addressed, along with differential effects of ionizing radiation on the acquisition and performance of response sequences in rats.

CASI

Adrenocorticotropin (acth); Biology; Cells (biology); Corticosteroids; Gene Expression; Hormones; Infectious Diseases; Ligands; Methyl Compounds; Prostaglandins; Radiation Effects;

N96-15003# Department of Energy, Richland, WA.
Evaluation of the metabolic fate of the munition material (TNT and RDX) in plant systems and initial assessment of material interaction with plant genetic material (DNA) - Initial assessment of plant DNA adducts as biomarkers Final Report

Harvey, Scott D.; Clauss, Therese W.; Fellows, Robert J.; and Cataldo, Dominic A.; Jun. 1995 34 p
 Report No.(s): (AD-A298520) Avail: CASI HC A03/MF A01

This exploratory study performs preliminary ground work towards identifying adducts formed between DNA and metabolically activated trinitrotoluene (TNT) intermediates for potential assessment of their applicability as biomarkers of environmental contamination. Chromatographic comparisons between control and TNT-adducted hydrolysates allowed the tentative identification of two TNT-adducted nucleotides. Chromatographic profiles of TNT-adducted DNA hydrolysates featured these compounds eluting in the 21.4- to 22.6-min retention window. The suspect adducts were not observed in all TNT adduct reactions performed, perhaps because of the formation at concentrations below the analytical detection limit. These studies can be added to the mounting evidence that specific TNT-DNA adducts may occur but definitive proof was not obtained.

DTIC

Adducts; Deoxyribonucleic Acid; Environment Effects; Plants (botany); Rdx; Trinitrotoluene;

N96-15037# Massachusetts Inst. of Tech., Cambridge, MA. Artificial Intelligence Lab.

Spatial reference frames for object recognition. Tuning for rotations in depth

Logothetis, Nikos K.; Pauls, Jon; and Poggio, Tomaso; Mar. 1995 20 p

Contract(s)/Grant(s): (N00014-93-1-0209; N00014-93-1-0385; NSF ASC-92-17041)

Report No.(s): (AD-A298760; MIT-AIM-1533; MIT-CBCL-120) Avail: CASI HC A03/MF A01

The inferior temporal cortex (IT) of monkeys is thought to play an essential role in visual object recognition. Infero-temporal neurons are known to respond to complex visual stimuli, including patterns like faces hands, or other body parts. What is the role of such neurons in object recognition? The present study examines this question in combined psychophysical and electrophysiological experiments, in which monkeys learned to classify and recognize novel visual 3D objects. A population of neurons in IT were found to respond selectively to such objects that the monkeys had recently learned to recognize. A large majority of these cells discharged maximally for one view of the object, while their response fell off gradually as the object was rotated away from the neuron's preferred view. Most neurons exhibited orientation-dependent responses also during view-plane

rotations. Some neurons were found tuned around two views of the same object. while a very small number of cells responded in a view-invariant manner. For five different objects that were extensively used during the training of the animals, and for which behavioral performance became view-independent, multiple cells were found that were tuned around different views of the same object. No selective responses were ever encountered for views that the animal systematically failed to recognize. The results of our experiments suggest that neurons in this area can develop a complex receptive field organization as a consequence of extensive training in the discrimination and recognition of objects. Simple geometric features did not appear to account for the neurons' selective responses. These findings support the idea that a population of neurons - each tuned to a different object aspect, and each showing a certain degree of invariance to image transformations - may, as an assembly, encode complex 3D objects.

DTIC

Cells (biology); Electrophysiology; Nervous System; Pattern Recognition; Performance Tests; Spatial Distribution; Visual Perception; Visual Stimuli;

N96-15101# Naval Health Research Center, San Diego, CA.

Human electrophysiological responses to tactile stimuli presented at different rates Final Report, 1989

McLaughlin, Debra; and Makeig, Scott; Jan. 1995 29 p
 Report No.(s): (AD-A298108; NHRC-95-3) Avail: CASI HC A03/MF A01

Traditionally, studies of somatosensory evoked potentials (SEP's) in humans have employed primarily by punctate electrical stimulation of peripheral nerve (e.g. Allison et al. 1989, 1991a, 1991b; Desmedt 1988; Erwin et al. 1987; Larrea et al. 1992). Although responses to electrical shocks have served well to elucidate the neural genesis of these surface-recorded potentials (Allison et al. 1989, 1991a, 1991b, 1992; Desmedt 1988), they have, nevertheless, failed to provide a physiologically meaningful correlate of psychophysically-relevant tactile experience (Rosner and Goff 1967; Sherrick and Cholewiak 1986; Uttal and Cook 1964). Stimuli that engage normal transduction mechanisms, e.g taps or vibrations delivered to the skin, have been employed in only a few studies (e.g. Franzen and Offenloch 1969; Galambos 1982; Gjerdingen and Tomsic 1970; Hamalainen et al. 1990; Hari 1980; Hashimoto et al. 1988, 1990; Hay and Davis 1971; Huttunen and Homberg 1991; Johnson et al. 1975; Kekoni et al. 1992; Pratt et al. 1980, 1986; Stowell 1975). Because driving of skin mechanoreceptors with vibratory stimuli has proved particularly useful in characterization of the input channels involved in tactile perception, it has been used extensively in psychophysical studies of somatosensation in humans (Gescheider and Wright 1968; Gable and Hollins 1993; Hahn 1968; Hollins et al. 1990). Vibratory

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input is also useful for exploration of system linearity at progressively higher levels along the somatosensory pathway (Goochin, John and Darian-Smith 1989; Mountcastle 1984; Namerow et al. 1974; olMara et al. 1988).

DTIC

Bioelectric Potential; Cells (biology); Electrophysiology; Evoked Response (psychophysiology); Mechanoreceptors; Nervous System; Sensory Perception; Shock (physiology); Skin (anatomy); Vibration Effects;

N96-15262# Gordon Research Conferences, Inc., Kingston, RI.

Gordon research conference on chronobiology, 1995 Final Report, 1 Apr. - 30 Sep. 1995

Daan, Serge; and Block, Gene D.; 30 Sep. 1995 47 p

Contract(s)/Grant(s): (F49620-95-1-0245)

Report No.(s): (AD-A298335; AFOSR-95-0541TR) Avail: CASI HC A03/MF A01

The Gordon Research Conference on Chronobiology was held from April 30 till May 5 at the hotel II Cioccio, Barga, Italy. Applications for participation were received from 179 scientists, and 144 eventually attended the conference (Appendix A). Of these, 30.9% were graduate students and postdocs, and 41.7% were women. Countries of origin were distributed worldwide: 33% USA and Canada; 50% Western Europe; 4% Eastern Europe; 13% Australia, Asia, South America. Chronobiology is a strongly multidisciplinary field of research. This was reflected in the program of the conference, which spanned the breadth from human circadian rhythms to molecular analysis of rhythms in bacteria. The program (appendix B) listed 25 speakers and 9 discussion leaders. In addition to the oral presentations there were four daily poster sessions, during which a total of 85 posters was presented. These were actively attended and led to vivid information exchange and many new contacts between research groups worldwide.

DTIC

Activity Cycles (biology); Circadian Rhythms; Conferences; Multidisciplinary Research; Rhythm (biology);

N96-15345# Norwegian Defence Research Establishment, Kjeller (Norway).

The toxic extract of the marine flagellate *Prymnesium patelliferum*: A study of its effects on cell membrane properties

Meldahl, Anne-Sophie; 12 Oct. 1995 144 p

Report No.(s): (NDRE-PUBL-95/04648; ISBN-82-464-0026-6; NIPS-95-06369) Avail: CASI HC A07/MF A02

A new test method for the algal toxin desired from *Prymnesium* and *Chrysochromulina* has been developed. The toxin from *Prymnesium* interacts with sodium and calcium channels in nerve ending particles. The toxic effect on

fish could therefore be due to a disturbance of ion regulation of the fish gills.

CASI

Algae; Cell Membranes (biology); Fishes; Marine Biology; Synapses; Toxicity;

N96-15394# Air Force Inst. of Tech., Wright-Patterson AFB, OH. School of Engineering.

Physiologically-based pharmacokinetic modeling of skin absorption using dermal subcompartments M.S. Thesis

Bookout, Jr., Richard L.; Jun. 1995 90 p

Report No.(s): (AD-A297356; AFIT/GCS/ENC/95J-01) Avail: CASI HC A05/MF A01

Dermal penetration of chemicals and drugs is important to both toxicologists and pharmacologists. Drug developers try to enhance and environmental professionals try to limit penetration of chemicals through the skin. Both can use predictive biologically-based mathematical models to assist in understanding the processes involved. When these models are based on physiological and biochemical parameters which can be measured in the laboratory, they can be extremely useful. Appropriately validated models based on first principles can be predictive of human exposures when the processes involved are adequately understood. In this thesis we develop four new physiologically-based pharmacokinetic (PBPK) models to predict blood concentrations of dibromomethane (DBM) in rats after neat liquid and vapor exposure. These four new models expand previously developed homogeneous models by adding skin subcompartments. These new models improve the prediction of the blood concentrations especially early in the exposure. Sensitivity analysis shows that one of the permeability constants followed by the blood air partition coefficient have the most impact on blood concentration predictions. With proper validation the new models could be used to improve species, dose, and duration extrapolations of chemical or drug penetration. They could also be used to investigate and predict concentrations of drugs or chemicals in different parts of the skin.

DTIC

Biochemistry; Blood; Concentration (composition); Drugs; Pharmacology; Physiology; Skin (anatomy);

N96-16062# Los Alamos National Lab., NM.

Three-dimensional model of a selective theophylline-binding RNA molecule

Tung, Chang-Shung; Oprea, Tudor I.; Hummer, Gerhard; and Garcia, Angel E.; 1995 25 p Presented at the 11th International Symposium on Affinity Chromatography and Biological Recognition, San Antonio, TX, 25-30 May 1995 Contract(s)/Grant(s): (W-7405-ENG-36)

Report No.(s): (DE95-015310; LA-UR-95-1798; CONF-9505281-1) Avail: CASI HC A03/MF A01

We propose a three-dimensional model for an RNA molecule that selectively binds theophylline but not caffeine. This RNA, which was found using SELEX, is 10,000 times more specific for theophylline ($K_d = 320$ nM) than for caffeine ($K_d = 3.5$ mM), although the two ligands are identical except for a methyl group substituted at N7 (present only in caffeine). The binding affinity for ten xanthine-based ligands was used to derive a Comparative Molecular Field Analysis (CoMFA) model ($R(\text{sup } 2) = 0.93$ for 3 components, with cross-validated $R(\text{sup } 2)$ of 0.73), using the SYBYL and GOLPE programs. A pharmacophoric map was generated to locate steric and electrostatic interactions between theophylline and the RNA binding site. This information was used to identify putative functional groups of the binding pocket and to generate distance constraints. Based on a model for the secondary structure, the 3D structure of this RNA was then generated using the following method: each helical region of the RNA molecule was treated as a rigid body; single-stranded loops with specific end-to-end distances were generated. The structures of RNA-xanthine complexes were studied using a modified Monte Carlo algorithm. The detailed structure of an RNA-ligand complex model, as well as possible explanations for the theophylline selectivity will be discussed.

DOE

Caffeine; Molecular Structure; Ribonucleic Acids; Three Dimensional Models;

52 AEROSPACE MEDICINE

Includes physiological factors; biological effects of radiation; and effects of weightlessness on man and animals.

N96-14100# Army Aeromedical Research Lab., Fort Rucker, AL.

US Army aviation epidemiology data register: Incidence of color vision deficiency among US Army aviators Final Report

Mason, Kevin T.; Shannon, Samuel G.; and Slattery, Michael J.; Apr. 1995 25 p

Report No.(s): (AD-A296977; USAARL-95-28) Avail: CASI HC A03/MF A01

The Chief, Visual Sciences Branch, U.S. Army Aeromedical Research Laboratory, requested a determination of the incidence of color vision deficiency among Army aviators. As we enter the next century, the color vision requirements of Army aviators will increase with the introduction of multicolored displays. Since aviator training applicants are disqualified routinely from training due to color vision deficiency, there should be no aviators with color vision deficiency. However, this paper details incidents of exception to policy for known color vision deficiency, acquired color vision deficiency, and aviation medicine clinic screening program failures due to poor methods or deception by appli-

cants and conspirators. The in-flight evaluation of aviators discovered to have color vision deficiency is described.

DTIC

Aerospace Medicine; Aircraft Pilots; Color Vision; Epidemiology; Eye Diseases; Ophthalmology; Pilot Selection;

N96-14137# Duke Univ., Durham, NC. Medical Center. **Cardiopulmonary responses to pressure breathing Final Report, Apr. 1993 - Sep. 1994**

Stolp, Bryant W.; Arles, Stephen P.; Dear, Guy L.; Chimlak, James M.; and Gleaton, Charles H.; May 1995 81 p

Contract(s)/Grant(s): (F33615-90-D-0606)

Report No.(s): (AD-A297022; AL/CF-TR-1995-0049)

Avail: CASI HC A05/MF A01

The effects of positive pressure breathing (PPB) on pulmonary gas exchange were investigated. The multiple inert gas elimination technique was used with 10 human subjects to quantify changes in ventilation/perfusion ($V(\text{sub } a)/Q$) relationships during PPB. Subjects wore the Combined Advanced Technology Enhanced Design G Ensemble (COMBAT EDGE) with a 1:1 G-suit to mask pressure ratio. Experimental conditions included breathing air and 100% oxygen at 0, 30, and 60 mmHg of PPB at ground level and breathing air and 100% oxygen at 0 and 60 mmHg of PPB at 24,900 feet in an altitude chamber. Results showed the following: (1) an almost five-fold increase in minute ventilation at 60 mmHg mask pressure; (2) PPB caused a shift of ventilation and perfusion to lung units at higher $V(\text{sub } a)/Q$; (3) the data supported the notion that PPB reduces shunt and perfusion to low $V(\text{sub } a)/Q$ lung units; (4) while oxygen pressure breathing resulted in minor effects on some variables, there was a statistically significant effect of altitude exposure on heart rate, arterial blood pressure, and respiratory effects on hemodynamics; and (5) phasic swings in mask pressure seemed to augment venous return and sustain mean arterial pressures in some subjects during PPB.

Author

Aerospace Medicine; Heart Function; High Altitude Breathing; Hyperventilation; Oxygen Breathing; Physiological Responses; Pressure Breathing; Pressure Effects; Pulmonary Functions; Respiratory Physiology;

N96-14138# Armstrong Lab., Brooks AFB, TX. Crew Systems Directorate.

Relationship between age and susceptibility to decompression sickness Interim Report, Jan. - Jun. 1994

Sulaiman, Zahid M.; Pilmanis, Andrew A.; Oconnor, Robert B.; and Baumgardner, F. W.; Jul. 1995 16 p

Contract(s)/Grant(s): (AF PROJ. 7930)

Report No.(s): (AD-A297023; AL/CF-TR-1994-0095)

Avail: CASI HC A03/MF A01

Susceptibility to decompression sickness (DCS) is influenced by a multitude of factors. The purpose of this study was to determine the effect of age on susceptibility to

DCS. A review of the literature on the relationship between age and susceptibility to DCS found an appreciable effect of age on group and individual susceptibility. Most of the studies reviewed were done during World War 2 and were limited to the age group between 18 and 30. However, Armstrong Laboratory (AL) DCS research database does include data for subjects over 40 years of age. The results from the AL DCS research database show that there was a significant increase in DCS risk for subjects over 42 years of age. They also show that susceptibility to DCS increases with age. There is generally a linear relationship between increasing age and increasing individual susceptibility to DCS.

DTIC

Aerospace Medicine; Age Factor; Aging (biology); Altitude Sickness; Decompression Sickness;

N96-14147# North Dakota State Univ., Fargo, ND.
The ventriculo-arterial coupling ratio during transient Gz events Journal Article

Crisman, R. P.; Convertino, V. A.; Offerdahl, C. D.; and Ewert, D. L.; Jul. 1995 7 p

Contract(s)/Grant(s): (F33615-90-D-0606)

Report No.(s): (AD-A297414; AL/AO-JA-1995-0093)

Avail: CASI HC A02/MF A01

It has been shown by Westerhof et al. that the ratio TIT (where $\pi = R_p \cdot SAC$ and R_p is total peripheral resistance, SAC is systemic arterial compliance, and T is heart period) is approximately a constant in all mammals under resting conditions such that diastolic pressure is sufficiently high to assure adequate coronary perfusion. The aim of this study is to determine if the ratio TIT is constant under the transient condition of a rapid onset rate +Gz acceleration. We hypothesize that the ratio is held constant by the cardiovascular control system. Four male baboons were subjected to 10 second rapid onset +Gz profiles and aortic pressure and flow were recorded. R_p and C were calculated using a 2-element windkessel model and T was determined by the inverse of heart rate. All parameters were calculated on a beat-to-beat basis. It was found that the ratio increased very little at +2 Gz and increased dramatically at +3 and +5 Gz, disproving our hypothesis. This increase was due to large increases in peripheral resistance and changes in heart rate over the course of a Gz run. The increases are presumed to represent baroreceptor reflex response to the drop in aortic pressure experienced during +Gz stress. The ratio TIT returned to its initial resting value shortly after the +Gz stressor was removed.

DTIC

Acceleration (physics); Aorta; Arteries; Baroreceptors; Diastolic Pressure; Heart; Heart Rate;

N96-14206# Army Research Inst. for the Behavioral and Social Sciences, Alexandria, VA.

Helicopter simulator sickness: A state-of-the-art review of its incidence, causes, and treatment Final Report, Nov. 1993 - Nov. 1994

Wright, Robert H.; Jun. 1995 39 p

Report No.(s): (AD-A297285; ARI-RR-1680) Avail: CASI HC A03/MF A01

Helicopter simulator sickness literature was reviewed and analyzed to estimate the scope of the problem in the Army. It is concluded that pilot reluctance to divulge symptoms, in combination with the survey methods used, leads to underestimation of the incidence and severity of symptoms. Lack of truly anonymous survey procedures and potential adverse flying career consequences are suggested as reasons that the more severe symptoms and aftereffects may not be reported in surveys. Potential adverse career impact is also suggested as a probable reason for failure to find any relationship between simulator sickness aftereffects and accidents or safety incidents. Guidelines are suggested for minimizing the development of simulator sickness and the safety consequences of its aftereffects.

DTIC

Aerospace Medicine; Aircraft Pilots; Flight Simulators; Helicopters; Motion Sickness; Pilot Training;

N96-14773 Direction des Recherches, Etudes et Techniques, Paris (France).

Physiopathology of serious burns Final Report [Physiopathologie de la brûlure grave]

Court, L.; Fatome, M.; and Stephant, M.; 1995 210 p In FRENCH

Report No.(s): (PB95-257986) Avail: Issuing Activity (National Technical Information Service (NTIS))

The study describes the physiopathological disturbances suffered by serious burn victims, specifically the neurovegetative and behavioral disturbances that often lead to death following an episode of mental confusion and neuropsychic disorders. It discusses burn patients's functional encephalopathy and decrease in mental alertness, and the mechanisms underlying those developments, and suggests preventive and therapeutic measures. The study concludes with a brief discussion of how to approach these patients psychologically. The bulk of the report consists of appended, related papers profiling the type of patients cared for by the authors from 1988-1991, and discussing the psychology of burn victims, disfigurement; traumatic neurosis, psychic traumatism, and reduction of burn victims; and the contribution psychology can make to the success of cosmetic repair surgery and the use of prosthetic devices by disfigured burn victims.

NTIS

Aerospace Medicine; Burns (injuries); Mental Health;

Pathological Effects; Patients; Psychological Effects; Psychophysics; Stress (psychology);

N96-14875# Pennsylvania State Univ., University Park, PA.

**Role of persistence cues in disorientation/motion sickness
Final Technical Report, 1 Jan. 1994 - 31 May 1995**

Stern, Robert M.; Leibowitz, Herschel W.; and Ray, William J.; 31 Jul. 1995 12 p

Contract(s)/Grant(s): (F49620-94-1-0122)

Report No.(s): (AD-A298391; AFOSR-95-0499TR) Avail: CASI HC A03/MF A01

The primary objective of the three studies completed was to determine whether motion sickness susceptibility was related to different measures of visual persistence. In these studies, motion sickness susceptibility was determined by exposing the subjects to a rotating optokinetic drum while the electrogastrogram and subjective indices of motion sickness were recorded concurrently. Subjects were tested for persistence of visual cues using one or more of the following procedures: a walking task, a computer simulation task, a temporal measures of vection, and three measures of spatial abilities. In Experiment 1, 50 subjects were tested; in Experiment 2, 24; and in Experiment 3, 45 were studied. Mixed results were obtained in the three experiments, but in general, those subjects who showed greater persistence, reported more severe symptoms of motion sickness. In addition, those subjects who did poorly on a water level test of spatial abilities, reported greater symptoms of motion sickness. We continue to believe that perceptual/cognitive style is germane to the issue of individual differences in responding to rapidly changing visual environments.

DTIC

Aerospace Medicine; Disorientation; Motion Sickness; Physiological Tests; Signs and Symptoms; Visual Control; Visual Stimuli;

N96-14964# International Atomic Energy Agency, Vienna (Austria).

Comparative assessment of radiation versus nutritional and other factors that may influence immune status

1994 35 p Presented at the Joint IAEA/WHO Advisory Group Meeting on Comparative Assessment of Radiation Versus Nutritional and Other Factors That May Influence Immune Status, Vienna, Austria, 3-6 May 1994

Report No.(s): (DE95-627791; NAHRES-24; CONF-9405312) Avail: CASI HC A03/MF A01 (US Sales Only)

An Advisory Group Meeting was convened jointly by the International Atomic Energy Agency and the World Health Organization in May 1994 to review the role of radiation, nutrition, toxic chemicals and other factors that may influence immune status in human populations. Priorities for future research were proposed, and possibilities for using isotope in such studies were identified. The Group recom-

mended that the IAEA should initiate a broadly based Coordinated Research Programme (CRP) focussed mainly on the effects of low-level radiation on immune status in human populations. The main variables of interest are (1) the level of individual radiation exposure, and (2) the nutritional status. Possible experimental groups include persons living in areas of high radiation background (e.g. in countries where areas of high radiation background are known to occur naturally, or at high altitudes, or in areas affected by Chernobyl accident). Other possible experimental groups comprise radiation workers and uranium miners. It was also recommended that the contribution of toxic chemical exposure to immune dysfunction in these population groups should be assessed. Such research should be complemented by animal studies, and possibly also by in vitro studies with human and animal cells, by some participants in the CRP. This report has been prepared as a source of information for potential participants in the proposed CRP and for other persons associated with related programmes of the IAEA and the WHO.

DOE

Biological Effects; Chemical Effects; Health; Human Beings; Immune Systems; Nutrition; Radiation Effects; Research; Toxicity;

N96-15002# Armstrong Lab., Wright-Patterson AFB, OH. Biodynamics and Biocommunications Div.

Human auditory response to low-level aircraft flyover noise: Raw data Interim Report, Jan. 1992 - Sep. 1993

West, Denise M.; and Green, Nancy K.; Aug. 1994 121 p

Contract(s)/Grant(s): (AF PROJ. 7231)

Report No.(s): (AD-A298507; AL/CF-TR-1994-0153) Avail: CASI HC A06/MF A02

Changes in human hearing from exposure to low-flying aircraft noise representative of military training routes were measured during a laboratory study. In Phase 1, subjects were exposed to single flyover noise at levels of 115, 120, 125, and 130 dB(A). In Phase 2, subjects were exposed to eight successive repetitions of a single flyover noise at a level of 125 dB(A) in one session and at a level of 130 dB(A) in a second session. Hearing threshold levels were measured immediately prior to and following each noise exposure. Some subjects experienced small decreases and others small increases in hearing sensitivity following the exposures. The temporary decreases in hearing sensitivity (temporary hearing losses) had disappeared in all subjects by the end of the test session in which they occurred. Overall, the data suggest that within the definitions of the laboratory study, which used worst-case noise exposures relative to real-world exposures, the probability of noise induced hearing loss from low-flying aircraft noise in exposed populations is very small.

DTIC

Aerodynamic Noise; Aircraft Noise; Auditory Perception; Hearing; Human Tolerances; Noise Intensity;

N96-15035# Naval Air Warfare Center, Warminster, PA.
Physiologic instrumentation in the naval air warfare center human-use centrifuge to determine the effects of cumulative +Gz on cognitive performance Final Report, Jan. 1993 - May 1994

Forster, Estrella M.; Morrison, Jeffrey G.; Hitchcock, Edward M.; and Scerbo, Mark W.; 1 Oct. 1994 50 p Limited Reproducibility: Document partially illegible
 Report No.(s): (AD-A298203; NAWCADWAR-95006-4.6)
 Avail: CASI HC A03/MF A01

A study to determine the effect of intermittent periods of positive acceleration (+Gz) on human physiology and cognitive performance was accomplished at the Naval Air Warfare Center (NAWC) human-use centrifuge. This report discusses the materials and methods utilized to obtain various physiologic measures during this study: electroencephalogram (EEG); electrooculogram (EOG); electromyogram (EMG); infrared plethysmography (IRP); electrocardiogram (ECG); and respiration rate (RM). The methods discussed herein are specific to the NAWC centrifuge and may serve as a guide for future research.

DTIC

Acceleration Stresses (physiology); Aerospace Medicine; Bioinstrumentation; Electrocardiography; Electroencephalography; Electromyography; Eye Movements; Human Centrifuges; Physiological Tests; Plethysmography; Respiratory Rate;

N96-15192*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, CA.

Lower body negative pressure chamber: Design and specifications for tilt-table mounting

Salamacha, Laura; Gundo, D.; Mullenburg, G. M.; and Greenleaf, J. E.; 1 Nov. 1995 20 p

Contract(s)/Grant(s): (RTOP 199-18-12-07)

Report No.(s): (NASA-TM-110372; NAS 1.15:110372; A-960221; NIPS-95-06258) Avail: CASI HC A03/MF A01

Specifications for a lower body negative pressure chamber for mounting on a tilting table are presented. The main plate is made from HEXEL honeycomb board 1.0 inch thick. The plate, supported at three edges, will be subjected to a uniform pressure differential of -4.7 lb/sq in. A semi-cylindrical Plexiglass top (chamber) is attached to the main plate; the pressure within the chamber will be about 10lb/sq in during operation. The stresses incurred by the main plate with this partial vacuum were calculated. All linear dimensions are in inches.

Author

Aerospace Medicine; Attitude (inclination); Cylindrical Chambers; Human Factors Engineering; Lower Body Negative Pressure; Pressure Chambers; Vacuum Systems;

N96-15222* National Aeronautics and Space Administration, Washington, DC.

Aerospace medicine and biology: A continuing bibliography with indexes (supplement 408)

Dec. 1995 51 p

Report No.(s): (NASA-SP-7011(408); NAS 1.21:7011(408))
 Avail: CASI HC A04

This bibliography lists 84 reports, articles and other documents introduced into the NASA Scientific and Technical Information System during Dec. 1995. Subject coverage includes: aerospace medicine and physiology, life support systems and man/system technology, protective clothing, exobiology and extraterrestrial life, planetary biology, and flight crew behavior and performance.

Author

Aerospace Medicine; Bibliographies; Biological Effects; Exobiology; Flight Crews; Life Sciences; Physiological Effects;

N96-15424 Selskapet for Industriell og Teknisk Forskning, Trondheim (Norway).

Gas reclaim in saturation diving. Environmental factors: What do we know, what do we not know

Ahlen, C.; 31 Jan. 1995 24 p

Report No.(s): (PB95-257242; STF23-A95006) Avail: Issuing Activity (National Technical Information Service (NTIS))

This report is a summary from a working-meeting on gas reclaim systems for saturation diving. The meeting 'collected' participants both from user (diving industry), producers and researchers connected to operational saturation diving. The meeting covered two main areas: (1) divers gas reclaim and (2) chamber gas reclaim. Regarding diver gas reclaim details regarding personal equipment were also discussed. To our knowledge, there are only a limited number of studies performed from such systems in operational use. A number of questions were raised about both design and function of gas reclaim systems. Ingression of seawater was experienced as a common problem area for both the chamber gas reclaim (gas bag) and the divers gas reclaim, and was verified both from producers and uses of the systems.

NTIS

Breathing Apparatus; Diving (underwater); Gas Composition; Hyperbaric Chambers; Pressure Breathing;

N96-15881# Pacific Northwest Lab., Richland, WA.

A novel approach to modeling and diagnosing the cardiovascular system

Keller, P. E.; Kangas, L. J.; Hashem, S.; Kouzes, R. T.; and Allen, P. A.; Jul. 1995 5 p Presented at the World Congress on Neural Networks Conference, Washington, DC, 17-21 Jul. 1995

Contract(s)/Grant(s): (DE-AC06-76RL-01830)

Report No.(s): (DE95-016808; PNL-SA-26102; CONF-

9507155-1) Avail: CASI HC A01/MF A01

A novel approach to modeling and diagnosing the cardiovascular system is introduced. A model exhibits a subset of the dynamics of the cardiovascular behavior of an individual by using a recurrent artificial neural network. Potentially, a model will be incorporated into a cardiovascular diagnostic system. This approach is unique in that each cardiovascular model is developed from physiological measurements of an individual. Any differences between the modeled variables and the variables of an individual at a given time are used for diagnosis. This approach also exploits sensor fusion to optimize the utilization of biomedical sensors. The advantage of sensor fusion has been demonstrated in applications including control and diagnostics of mechanical and chemical processes.

DOE

Cardiovascular System; Diagnosis; Mathematical Models; Neural Nets; Physiological Responses;

N96-15994*# Bionetics Corp., Cocoa Beach, FL.

Influence of the helicopter environment on patient care capabilities: Flight crew perceptions

Meyers, K. Jeffrey; Rodenberg, Howard; (Florida Univ., Gainesville, FL.) and Woodard, Daniel; 21 Jun. 1994 9 p
Report No.(s): (NASA-TM-110607; NAS 1.15:110607)
Avail: CASI HC A02/MF A01

Flight crew perceptions of the effect of the rotary wing environment on patient care capabilities have not been subject to statistical analysis. We hypothesized that flight crew perceived significant difficulties in performing patient care tasks during air medical transport. A survey instrument was distributed to a convenience sample of flight crew members from twenty flight programs. Respondents were asked to compare the difficulty of performing patient care tasks in rotary wing and standard (emergency department or intensive care unit) settings. Demographic data collected on respondents included years of flight experience, flights per month, crew duty position, and primary aircraft in which the respondent worked. Statistical analysis was performed as appropriate using Student's t-test, type 111 sum of squares, and analysis of variance. Alpha was defined as p is less than or equal to .05. Fifty-five percent of programs (90 individuals) responded. All tasks were rated significantly more difficult in the rotary wing environment. Ratings were not significantly correlated with flight experience, duty position, flights per month, or aircraft used. We conclude that the performance of patient care tasks are perceived by air medical flight crew to be significantly more difficult during rotary wing air medical transport than in hospital settings.

Author

Air Transportation; Emergencies; Flight Crews; Helicopters; Patients;

53 BEHAVIORAL SCIENCES

Includes psychological factors; individual and group behavior; crew training and evaluation; and psychiatric research.

N96-14103# Georgia Univ., Athens, GA.

Environmental context and implicit and explicit memory M.S. Thesis

Guiton, Ginni L.; 1995 56 p

Report No.(s): (AD-A296985) Avail: CASI HC A04/MF A01

We have all had experiences in which we were on our way to perform a task and forgot what we were going to do until we returned to the original place, or environmental context, where we first decided to do the task. What is it that enables us to remember the task when we return to the original context? What cognitive mechanisms underlie contextual memory support? Does environmental context differentially affect various types of memory? Are there differences between the ways younger and older adults use environmental context to recall information? Does a change in environmental context between encoding and retrieval affect memory performance? The relationship between environmental context and memory performance is of theoretical importance because it serves as an underlying assumption for many of the current theoretical models including the effects of memory activation and availability, the connection between current episodic context and what is studied, and the strength of association effects on the probability of recall. This study focuses on how the three components of age, environmental context, and memory interact; how, across the life span, context for to-be-remembered material affects memory.

DTIC

Age Factor; Cognitive Psychology; Environments; Memory; Psychological Effects;

N96-14189# Naval Postgraduate School, Monterey, CA.

Perceptions of racial and gender bias in Naval Aviation flight training M.S. Thesis

Miller, Scot A.; Dec. 1994 124 p

Report No.(s): (AD-A297589) Avail: CASI HC A06/MF A02

Naval Aviation policy makers are concerned that bias may exist in Naval Aviation flight training. This bias takes two general forms; a negative bias against minority/female flight students, and a double standard bias in which minority/female flight students are given more opportunities to succeed. This study presents an objective, quantitative analysis to determine if evidence of either kinds of bias exist in flight training. A database of several thousand student performance records are the primary source of information. An opinion survey augments the performance data by recording current student and instructor beliefs about bias in the training command. Analysis shows that the success rate of white

males in flight training is 10-20 percent higher than that of female and minority students. Efforts to determine the sources of these performance differences remain inconclusive. Multiple regression analysis of pilot Primary flight grades indicates that race may be associated with poorer flight grades. There is potential evidence of a double standard. Female students receive more flight time and instructional hops in Primary pilot training than white males. The opinion survey suggests significant differences in the perceptions of bias between black and white flight students and female and male students.

DTIC

Bias; Females; Flight Training; Males; Personnel Selection; Pilot Training; Regression Analysis;

N96-14243 Research Inst. of National Defence, Stockholm (Sweden). Dept. of Human Sciences.

Color as carrier of information [Faerg som information-sbaerare]

Derefeldt, G.; and Berggrund, U.; Nov. 1994 146 p In SWAHILI; Text in SWEDISH; summary in ENGLISH Report No.(s): (PB95-256632; FOA-R-94-00048-5.2-SE) Avail: Issuing Activity (National Technical Information Service (NTIS))

The report gives a brief overview of principles for the use of color and summarizes its possibilities and limitations for the presentation of information. It supplies background information on the concept and definition of color and on the physical psychological and neurophysiological basis for human color perception and cognition. Basic perceptual phenomena are described. Color appearance terms, color notation systems, and color order systems for VDU applications are discussed, along with congenital color deficiencies, emotional contents of colors and color preferences.

NTIS

Color; Color Vision; Neurophysiology; Physiological Effects; Psychophysiology; Visual Perception; Visual Signals;

N96-14246# Research Inst. of National Defence, Stockholm (Sweden). Dept. of Human Sciences.

Stress and performance, November 1994

Bergstroem, B.; Nov. 1994 32 p See also report dated Dec. 1991, AD-A274774

Report No.(s): (PB95-256673; FOA-R-94-00069-5.2-SE) Avail: CASI HC A03/MF A01

The report is intended as a 'quick reference' to current theories of stress and skilled performance. The concept of arousal is employed as a unitary term for the stress processes. Stress effects on basic functions like memory and cognition as well as some system functions are discussed. The results are summarized in concrete terms, so that for instance mili-

tary personnel and system designers might be better able to recognize and understand stress effects.

NTIS

Human Performance; Physiological Responses; Stress (physiology);

N96-14897# Armstrong Lab., Brooks AFB, TX. Human Resources Directorate.

Dimensions of Air Force pilot combat performance Final Technical Report, Nov. 1992 - Apr. 1994

Murray, Michael W.; Siem, Frederick W.; Duke, Anne P.; and Weeks, Joseph L.; Aug. 1995 8 p

Contract(s)/Grant(s): (AF PROJ. 7719)

Report No.(s): (AD-A297610; AL/HR-TP-1995-0008) Avail: CASI HC A02/MF A01

A study was conducted to determine the dimensionality of United States Air Force pilot combat performance using performance incidents from Desert Shield/Storm. Subjects were 265 operational pilots representing seven different aircraft platforms. Some pilots generated critical incidents representing superior and average combat performance, and others sorted the incidents into categories corresponding to similar behaviors. The co-occurrence of incidents in the same performance category was used as proximity data for multi-dimensional scaling analyses. A combination of data analyses and expert judgement indicated that pilot combat performance could be defined by the following six dimensions: (1) compliance with regulations, (2) knowledge, skill, and ability, (3) crew management, (4) leadership, (5) situational awareness, and (6) planning. Use of these performance dimensions for measurement of effective performance and for pilot selection test development is described.

DTIC

Combat; Data Acquisition; Data Reduction; Flight Crews; Military Operations; Pilot Performance; Pilot Selection;

N96-14921# Naval Health Research Center, San Diego, CA.

Light levels aboard a submarine: Results of a survey with a discussion of the implications for circadian rhythms Interim Report

Hunt, P. D.; (Department of the Navy, Washington, DC.) and Kelly, T. L.; Feb. 1995 11 p

Report No.(s): (AD-A298064; NHRC-TD-95-1A) Avail: CASI HC A03/MF A01

Circadian rhythms are daily fluctuations in physiological and behavioral functions generated by an internal pacemaker. Mismatch between the endogenous circadian rhythms and imposed activity schedules (circadian desynchrony) can be associated with decreased alertness and performance. The U.S. Congress has designated the effects of circadian rhythms on shift workers as an area needing further investigation. Navy operational requirements sometimes demand the use of work schedules requiring personnel to

work out of synchrony with their internal rhythms. The 6-on/12-off schedule, which is necessitated by the intrinsic limitations in the number of personnel available aboard submarines, is an extreme example of this. On this schedule, workers not only are frequently required to work during their circadian low period, they also must live by a non-24-hr daily cycle. It is common knowledge that this is a difficult schedule to work under, and interventions to promote adaptation to this schedule could be valuable.

DTIC

Activity (biology); Adaptation; Cardiometers; Circadian Rhythms; Physiological Effects; Physiology; Schedules; Work-rest Cycle;

N96-14930# Minnesota Univ., Minneapolis, MN. Dept. of Psychology.

Psychophysical analyses of perceptual representations Final Report, 15 Apr. 1990 - 14 Feb. 1995

Biederman, Irving; 6 Jul. 1995 23 p

Contract(s)/Grant(s): (AF PROJ. 3484)

Report No.(s): (AD-A298271; AFOSR-95-0545TR) Avail: CASI HC A03/MF A01

This report is divided into two parts. The first part describes studies done at the University of Minnesota. The second part describes studies done at the University of Southern California. In both cases, full lists of citations are given to work supported in full or in part by this grant. Because most of these projects have been described in detail in previous reports, the purpose of this final report is to provide summary of the many studies and a complete list of citations. At both Minnesota and USC, the research focused on linking early sensory representations to higher-level perceptual representations. For this reason, we refer to our Center informally as the 'Middle Kingdom.' Studies outlined below have examined the sensory/perceptual 'middle ground' in object recognition, depth perception, reading, and auditory perception.

DTIC

Psychophysics; Sensory Perception;

N96-14969# California Univ., Berkeley, CA. Dept. of Psychology.

Visual perception and memory of objects Final Report, 15 Sep. 1990 - 29 May 1995

Treisman, Anne; 29 May 1995 28 p

Contract(s)/Grant(s): (AF-AFOSR-0370-90; AF PROJ. 2313)

Report No.(s): (AD-A298074; AFOSR-95-0502TR) Avail: CASI HC A03/MF A01

We have worked on a number of different projects relating to visual perception and memory for features and objects, exploring the processing that converts visual sensory data to representations of objects and events. An important focus has been to define the role played by attention in this process-

ing and in the - memory representations which result. I divide this report into four main sections: One deals with studies of relatively early visual processing of features; another with the role of attention in feature integration; another major project explores the effects of the initial perception of novel objects on their re-perception, either immediately, after a single presentation, or after multiple trials or long delays, using negative priming tasks to explore the memory traces formed for novel objects, both with and without attention; the final section explores the notion of object tokens in the context of perceptual learning and priming in visual search automatization.

DTIC

Image Motion Compensation; Image Processing; Memory; Mental Performance; Pattern Registration; Visual Perception;

N96-14971# Naval Health Research Center, San Diego, CA.

The effects of bright light and LEET on 6-sulphatoxymelatonin, core temperature, and cognitive performance after a 10-hour phase delay

Kelly, Tamsin; Ryman, David; Hayduk, Roza; (Scripps Clinic and Research Foundation, La Jolla, CA.) and Kripke, Daniel F.; (California Univ., San Diego, CA.) 30 Sep. 1994 30 p

Report No.(s): (AD-A298083; NHRC-95-12) Avail: CASI HC A03/MF A01

Circadian desynchronization caused by shiftwork or jet lag can have detrimental effects on alertness and performance, which could impair productivity and safety. With jet lag this is ordinarily a temporary problem. However, even long-term night-shift workers rarely show complete adjustment of circadian rhythms to the reversed sleep/wake cycle. Circadian desynchronization can also disturb sleep, which may impair subsequent performance, thereby compounding the problem. Some interventions may offset problems produced by shiftwork or jet lag, either by speeding up resynchronization to a new sleep/wake schedule, or by improving sleep, with secondary improvement of alertness and performance. Possible interventions include sleeping medications, application of bright light, and administration of melatonin. Sleeping medications can increase the duration of daytime sleep in night-shift workers or nighttime sleep in jet-lagged individuals. However, sedative hypnotics are not generally recommended for chronic usage, because these agents become ineffective and individuals may become dependent on them. Additionally, since sedatives are, not surprisingly, associated with a decrement in performance and alertness for some time after ingestion, these agents have drawbacks in environments where personnel are required to respond quickly to emergency conditions.

DTIC

Alertness; Circadian Rhythms; Human Performance;

Illuminating; Jet Lag; Sedatives; Sleep Deprivation; Work-rest Cycle;

N96-15029# Oklahoma Univ., Norman, OK. Dept. of Psychology.

Microgravity effects on cognitive performance measures: Practice schedules to acquire and maintain performance stability Final Report, May 1992 - Oct. 1993

Schlegel, Robert E.; Shehab, Randa L.; Gilliland, Kirby; Eddy, Douglas R.; (Department of the Air Force, Brooks AFB, TX.) and Schiflett, Damuel G.; (Department of the Air Force, Brooks AFB, TX.) Aug. 1995 163 p

Contract(s)/Grant(s): (F41624-91-C-2003)

Report No.(s): (AD-A298498; AL/CF-TR-1994-0040)
Avail: CASI HC A08/MF A02

NASA is conducting a series of space shuttle launches to enable scientists to study the effects of microgravity. The Sustained Operations Branch of the USAF Armstrong Laboratory (AL/CFTO) has primary responsibility for studying the effects of microgravity on astronaut cognitive performance ability. To accurately identify performance decrements caused by microgravity in space, it is essential to collect preflight baseline data. Two studies were conducted to determine the impact on baseline performance stability of less than optimal practice schedules. In the first study, 21 subjects at Brooks AFB were trained on the NASA Performance Assessment Workstation (PAWS) and then assigned to one of five practice schedules. The study confirmed the overriding importance of providing an adequate number of practice sessions to achieve performance stability. Practice schedule interruptions had little impact on ultimate performance at the end of practice, provided the total number of sessions was maintained. An additional 80 subjects were tested using additional testing schedule alternatives. With few exceptions, the data showed remarkable consistency across the two studies. The data from both studies confirmed the high differential stability and reliability for the task measures and provided evidence for high software reliability. A database has been generated for classifying astronaut performance.

DTIC

Mental Performance; Microgravity; Weightlessness;

N96-15102# Naval Health Research Center, San Diego, CA.

A comparison of the effects of sleep deprivation on synthetic work performance and a conventional performance assessment battery Interim Report, 1 Oct. 1993 - 30 Sep. 1994

Elsmore, Timothy F.; Hegge, Frederick W.; Naitoh, Paul; Kelly, Tamsin; and Schlangen, Karen; Feb. 1995 25 p

Report No.(s): (AD-A298110; NHRC-95-6) Avail: CASI HC A03/MF A01

Techniques for assessment of human cognitive performance span a broad range, from questionnaires, paper-and-pencil tests, computerized tests of cognitive and motor abilities, to simulators and field exercises. Due to the availability of powerful personal computers, recent years have seen a concentration of interest on the middle of this continuum, computerized testing in the form of performance assessment batteries or PAB's (Anger, 1990; Englund, Reeves, Shingledecker, Thorne, Wilson, & Hegge, 1985; Kennedy et. al, 1981, Thorne et. al 1985). These batteries consist of tests that are each designed to measure a limited subset of abilities, in relative isolation from one another (Anger, 1990; Perez, Ramsey, Masline, & Urban, 1987). While performance on PAB's is sensitive to a wide range of variables, the relationship between such effects and performance under operational conditions is sometimes difficult to characterize. At best, it can be said that if a given variable produces a decrement on PAB performance, it may degrade performance under certain operational conditions.

DTIC

Applications Programs (computers); Circadian Rhythms; Cognitive Psychology; Human Performance; Mental Performance; Physiological Effects; Physiological Tests; Sleep Deprivation;

N96-15131# Walter Reed Army Inst. of Research, Washington, DC.

Responsibility, stress, and health: Testing the triangle model of responsibility

Britt, Thomas W.; Moore, Margaret A.; Adler, Amy B.; and Bartone, Paul T.; 1 Jul. 1995 25 p

Report No.(s): (AD-A298900; WRAIR/TR-95-00/0) Avail: CASI HC A03/MF A01

The present research tested the utility of the Triangle Model of Responsibility (Schienker, Britt, Pennington, Murphy, & Doherty, 1994) in accounting for soldiers' feelings of responsibility for and commitment to an upcoming mission. The extent to which high responsibility engages the self-system was also examined. In support of the model, simultaneous multiple regression revealed that responsibility and commitment to the mission were greatest when the prescriptions for performance were clear, when the mission was perceived as relevant to the soldier's training, and when the soldier felt personal control over his or her job performance. The relationship between job stress and health symptomatology was much stronger when soldiers felt responsible for their job performance, indicating a greater engagement of the self-system. The results indicate the importance of responsibility for self-regulation, and suggest that responsibility can have potentially beneficial or detrimental effects depending on job stress.

DTIC

Health; Human Performance; Military Psychology; Physiological Tests; Stress (physiology); Tasks;

N96-15396# Armstrong Lab., Brooks AFB, TX. Human Resources Directorate.

Correlation of general cognitive ability and psychomotor tracking tests Interim Paper, Oct. 1994 - Mar. 1995

Ree, Malcolm J.; and Carretta, Thomas R.; Aug. 1995 19 p

Contract(s)/Grant(s): (AF PROJ. 7719)

Report No.(s): (AD-A297608; AL/HR-TP-1995-0009)

Avail: CASI HC A03/MF A01

A study was conducted to investigate the nexus of cognitive and psychomotor tests as might be used for personnel selection and assessment. These domains are frequently seen as independent. A multiple aptitude cognitive test battery and a psychomotor test battery were administered to 354 United States Air Force recruits. The average multiple correlation of the cognitive tests and each psychomotor score as a criterion was 0.34, corrected for range restriction. Confirmatory factor analyses disclosed general cognitive and general psychomotor factors, three lower-order psychomotors, and two lower-order cognitive factors. The general cognitive factor accounted for 39 percent of the variance and the general psychomotor factor accounted for 29 percent of the variance. Residualized, the lower-order factors accounted for between 10 percent and 3 percent of the variance. The average g saturations (loadings) of the cognitive and psychomotor tests were 0.82 and 0.34, respectively. An implication for personnel selection is that the incremental validity of psychomotor tracking tests beyond the validity of cognitive tests will be small due to the commonality of measurement. A further implication of findings is the need to study the validity of the general and specific psychomotor factors.

DTIC

Cognition; Factor Analysis; Performance Tests; Personnel Selection; Psychomotor Performance; Variance (statistics);

N96-15412# Colorado Univ., Boulder, CO. Center for Research on Judgment and Policy.

The effects of stress on judgement and decision making: An overview and arguments for a new approach Interim Report, Jan. 1986 - Jan. 1991

Hammond, Kenneth R.; Jan. 1995 82 p

Contract(s)/Grant(s): (MDA903-86-C0142)

Report No.(s): (AD-A298615; ARI-RN-95-14) Avail: CASI HC A05/MF A01

This monograph consists of an overview of four principal literatures on the effects of stress on human performance, with specific reference to studies of the effects of stress on human judgement and decision making. The four literatures are: Clinical/social/personality (Literature 1), ergonomics/human factors (Literature 2), psychophysiology (Literature 3), and judgement and decision making (Literature 4).

DTIC

Decision Making; Human Performance; Psychological Effects; Stress (psychology);

N96-15535# Sandia National Labs., Albuquerque, NM.

Population dynamics of minimally cognitive individuals. Part 1: Introducing knowledge into the dynamics

Schmieder, R. W.; Jul. 1995 49 p

Contract(s)/Grant(s): (DE-AC04-94AL-85000)

Report No.(s): (DE95-017520; SAND-95-8505) Avail: CASI HC A03/MF A01

The author presents a new approach for modeling the dynamics of collections of objects with internal structure. Based on the fact that the behavior of an individual in a population is modified by its knowledge of other individuals, a procedure for accounting for knowledge in a population of interacting objects is presented. It is assumed that each object has partial (or complete) knowledge of some (or all) other objects in the population. The dynamical equations for the objects are then modified to include the effects of this pairwise knowledge. This procedure has the effect of projecting out what the population will do from the much larger space of what it could do, i.e., filtering or smoothing the dynamics by replacing the complex detailed physical model with an effective model that produces the behavior of interest. The procedure therefore provides a minimalist approach for obtaining emergent collective behavior. The use of knowledge as a dynamical quantity, and its relationship to statistical mechanics, thermodynamics, information theory, and cognition microstructure are discussed.

DOE

Collection; Degrees of Freedom; Microstructure; Populations; Statistical Mechanics; Thermodynamics;

N96-15650# Walter Reed Army Inst. of Research, Washington, DC.

A short hardiness scale

Bartone, Paul T.; 17 Aug. 1995 10 p Presented at the July 1995 Annual Convention of the American Psychological Society, New York, NY

Report No.(s): (AD-A298548; WRAIR/TR-95-0009)

Avail: CASI HC A02/MF A01

This paper presents a short, 15-item scale for measuring personality hardiness. Personality hardiness has been found to be a stress/health moderator in a wide range of studies. Still, there are problems with its measurement. The present 15-item scale has excellent psychometric properties, and has demonstrated validity with several samples including soldiers exposed to combat stressors, and Army Special Forces candidates.

DTIC

Health; Psychometrics; Scale; Stress (psychology);

N96-15729# Naval Health Research Center, San Diego, CA.

The effects of pemoline on performance and mood during sleep deprivation

Kelly, T. L.; Gomez, S. A.; (Commander Naval Surface

Force US Pacific Fleet, San Diego, CA.) Ryman, D. H.; Schlagen, K.; and Elsmore, T.; (Walter Reed Army Inst. of Research, Washington, DC.) 7 Apr. 1995 24 p
Report No.(s): (AD-A298087; NHRC-95-14) Avail: CASI HC A03/MF A01

A number of previous studies have administered stimulants to try to improve various aspects of performance and/or mood. Historically, the German armed forces during World War 2 experimented with various stimulants (e.g., caffeine, phenylmethyamines, and benzedrine) in controlled sleep-deprivation studies (Graf, 1971). Those studies found that subjects experienced decreased fatigue and sleepiness, increased alertness, enhanced imagination, and euphoria. However, they also showed loss of inhibitions and decreased ability to concentrate. Laboratory studies of amphetamines have demonstrated improved performance in fatigued subjects (e.g., Holliday & Devery, 1962; Newhouse, Belenky, Thomas, Thorne, Sing, & Fertig, 1989). Stimulants have been used to try to maintain performance during military operations. U.S. soldiers in Vietnam on reconnaissance patrols requiring long range or sustained activity were sometimes issued methylphenidate (RitalinTM) or dextroamphetamine (Jones, 1985). During the period between 1966 and 1969, the U.S. military consumed more amphetamines than the entire British and American armed forces during World War 2 (Mendleson, 1985). This trend has continued into the late 1980s and the 90s. Some pilots as well as support crews were reportedly using amphetamines to maintain alertness and performance during combat and support missions in both the Desert Shield and Desert Storm operations (Emonson & Vanderbeek, 1995).

DTIC

Alertness; Amphetamines; Caffeine; Fatigue (biology); Human Performance; Human Tolerances; Moods; Physiological Responses; Sleep Deprivation; Stress (physiology); Work-rest Cycle;

54 MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT

Includes human engineering; biotechnology; and space suits and protective clothing. For related information see also 16 Space Transportation.

N96-14195# Navy Clothing and Textile Research Facility, Natick, MA.

Alternate configurations for tethered air microclimate cooling systems Final Report, Oct. 1988 - Sep. 1989

Teal, Jr., Walter B.; 1995 31 p

Report No.(s): (AD-A297294; NCTRF-207) Avail: CASI HC A03/MF A01

At the request of the Naval Sea Systems Command, The Navy Clothing and Textile Research Facility conducted a laboratory evaluation of alternate hose configurations for

use with air microclimate cooling systems (MCS). The configurations were evaluated for their effectiveness in improving user acceptance of the tether hose without adversely affecting cooling capacity or user performance. Four alternate configurations plus a standard configuration were tested in benchtop and simulated shipboard tests. The results of the benchtop tests indicated that the maximum flow rate difference between any two configurations was 1.0 standard cubic feet per minute at 90 psi feed pressure. This difference is not considered large enough to eliminate any particular configuration from further consideration. The simulated shipboard tests indicated that there were no differences between configurations in terms of the time required to complete the course.

DTIC

Air Cooling; Cooling Systems; Hoses; Microclimatology; Performance Tests; Protective Clothing; Tetherlines; Umbilical Connectors;

N96-14289*# Alabama Univ., Tuscaloosa, AL.

Limitations to the study of man in the United States space program

Bishop, Phillip A.; and Greenisen, Mike; (National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, TX.) 17 Jun. 1992 17 p

Report No.(s): (NASA-TM-111129; NAS 1.15:111129) Avail: CASI HC A03/MF A01

Research on humans conducted during space flight is fraught both with great opportunities and great obstacles. The purpose of this paper is to review some of the limitations to United States research in space in the hope that an informed scientific community may lead to more rapid and efficient solution of these problems. Limitations arise because opportunities to study the same astronauts in well-controlled situations on repeated space flights are practically non-existent. Human research opportunities are further limited by the necessity of avoiding simultaneous mutually-interfering experiments. Environmental factors including diet and other physiological perturbations concomitant with space flight also complicates research design and interpretation. Technical limitations to research methods and opportunities further restrict the development of the knowledge base. Finally, earth analogues of space travel all suffer from inadequacies. Though all of these obstacles will eventually be overcome; creativity, diligence, and persistence are required to further our knowledge of humans in space.

Author

Astronauts; Feasibility Analysis; Human Performance; Space Flight; Space Programs; Technological Forecasting; Technology Assessment; United States;

N96-14303* National Aeronautics and Space Administration. Ames Research Center, Moffett Field, CA.

Rehydration beverage Patent

Greenleaf, John E.; inventor. 5 Sep. 1995 10 p Filed 21 Jan. 1992

Report No.(s): (NASA-CASE-ARC-11943-1; US-PATENT-CLASS-424-680; US-PATENT-5,447,730; US-PATENT-APPL-SN-823492; NIPS-95-06013) Avail: US Patent and Trademark Office

A novel rehydration beverage containing sodium chloride, sodium citrate, and aspartame useful for rapid restoration of hydration homeostasis is disclosed. The beverage is particularly useful for restoration of normal body fluid volumes and their intracellular and extracellular distribution during a hypohydration state observed in astronauts and air passengers.

Official Gazette of the U.S. Patent and Trademark
Aerospace Medicine; Beverages; Citrates; Homeostasis; Hydration; Sodium Chlorides;

N96-14449* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, TX.

Control method for prosthetic devices Patent

Bozeman, Jr., Richard J.; inventor. 17 Oct. 1995 11 p Filed 26 Jul. 1994 Division of US-Patent-Appl-SN-937325, filed 31 Aug. 1992 (US-Patent-5,376,128)

Report No.(s): (NASA-CASE-MS-C-21941-3; US-PATENT-CLASS-623-24; US-PATENT-CLASS-623-58; US-PATENT-CLASS-623-63; INT-PATENT-CLASS-A61F-2/54; INT-PATENT-CLASS-A61F-2/70; US-PATENT-5,458,655; US-PATENT-APPL-SN-283474; US-PATENT-APPL-SN-937325; US-PATENT-5,376,128) Avail: US Patent and Trademark Office

A control system and method for prosthetic devices is provided. The control system comprises a transducer for receiving movement from a body part for generating a sensing signal associated with that movement. The sensing signal is processed by a linearizer for linearizing the sensing signal to be a linear function of the magnitude of the distance moved by the body part. The linearized sensing signal is normalized to be a function of the entire range of body part movement from the no-shrug position of the moveable body part. The normalized signal is divided into a plurality of discrete command signals. The discrete command signals are used by typical converter devices which are in operational association with the prosthetic device. The converter device uses the discrete command signals for driving the moveable portions of the prosthetic device and its sub-prosthesis. The method for controlling a prosthetic device associated with the present invention comprises the steps of receiving the movement from the body part, generating a sensing signal in association with the movement of the body part, linearizing the sensing signal to be a linear function of the magnitude of the distance moved by the body part, normalizing the linear signal to be a function of the entire range of the body part movement, dividing the normalized signal into a plurality of discrete command signals, and implementing the plurality of

discrete command signals for driving the respective moveable prosthesis device and its sub-prosthesis.

Official Gazette of the U.S. Patent and Trademark
Arm (anatomy); Biocontrol Systems; Control Equipment; Control Systems Design; Dynamic Control; Prosthetic Devices;

N96-14468# Immersion Human Interface Corp., San Jose, CA.

Haptic interface for virtual reality simulation and training. Phase 1 Final Technical Report, 1 Nov. 1994 - 30 Apr. 1995

Rosenberg, Louis B.; Lacey, T. A.; and Stredney, D.; 30 Jun. 1995 78 p

Contract(s)/Grant(s): (F49620-94-C-0081; AF PROJ. 6550) Report No.(s): (AD-A297231; AFOSR-95-0482TR) Avail: CASI HC A05/MF A01

Advances in graphic display technologies have made virtual reality (VR) and scientific visualization applications accessible to a wide user population. Unfortunately, few human interface tools exist to allow users to interact naturally with these powerful graphical environments. To address this need, Immersion Corporation has developed a user interface mechanism to allow natural manual interaction with 3-D environments which provides realistic force feedback to the user. This haptic display methodology combines high fidelity, low cost, and inherent safety to allow force reflection technology to become commercially feasible. The long term objective is to produce a 3-D haptic interface for virtual environments. Phase 1 focused on producing one-dimensional haptic interface hardware and incorporating this technology into a real world VR application. Immersion and the Ohio Supercomputer Center have worked together to produce a virtual simulation of epidural analgesia, a medical procedure that requires delicate needle insertions into the spinal column. The resulting VR simulation is so realistic in look and feel, it can actually be used as a training environment to teach doctors to perform the dexterous manual procedure, allowing them to learn manual technique and explore the associated physical sensations without the risks or costs associated with using real biological specimens.

DTIC

Computer Graphics; Computerized Simulation; Graphical User Interface; Human-computer Interface; Medical Science; Sensory Perception; Virtual Reality;

N96-15038# Army Aeromedical Research Lab., Fort Rucker, AL. Aircrew Health and Performance Div.

Video method of measuring field-of-view of electro-optical devices versus eye clearances Final Report

McLean, William E.; Jul. 1995 24 p

Contract(s)/Grant(s): (DA PROJ. 3M1-62787-A-879)

55 SPACE BIOLOGY

Report No.(s): (AD-A298780; USAARL-95-30) Avail:
CASI HC A03/MF A01

A miniature charged couple device (CCD) video camera was used to determine the fields-of-view (FOV) with changes in viewing distances (vertex distance) for the standard 18-mm eyepiece ANVIS, a 25-mm eyepiece ANVIS, and two different diameter nonoptical apertures. The data were graphed and compared with theoretical and subjective values (Kotulak, 1992) for FOV's vs eye clearance for the standard 18-mm eyepiece ANVIS. The results indicate that the video camera used in this study approximates both the theoretical and subjectively measured FOV vs eye clearance functions with slight deviation. Computer generated ray traces and subjective assessment with the 25-mm eyepiece confirmed that the marginal rays for the maximum viewable FOVs were blocked at the designed eye position by the aperture on the back plate in front of the fiber optic twist of the intensifier tube.

DTIC

Eye (anatomy); Eyepieces; Fiber Optics; Field of View; Helmet Mounted Displays; Image Intensifiers; Images; Night Vision; Optoelectronic Devices; Ray Tracing;

55 SPACE BIOLOGY

Includes exobiology; planetary biology; and extraterrestrial life.

No abstracts in this category.

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