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AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY WITH INDEXES



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Table of Contents

Records are arranged in categories 51 through 55, the Life Sciences division of *STAR*. Selecting a category will link you to the collection of records cited in this issue pertaining to that category.

51	Life Sciences (General)	1
52	Aerospace Medicine Includes physiological factors; biological effects of radiation; and effects of weightlessness on man and animals.	9
53	Behavioral Sciences Includes psychological factors; individual and group behavior; crew training and evaluation; and psychiatric research.	13
54	Man/System Technology and Life Support Includes human engineering; biotechnology; and space suits and protective clothing.	17
55	Space Biology Includes exobiology; planetary biology; and extraterrestrial life.	N.A.

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Two indexes are available. You may use the find command under the tools menu while viewing the PDF file for direct match searching on any text string. You may also view the indexes provided, for searching on *NASA Thesaurus* subject terms and author names.

Subject Term Index	ST-1
Author Index	PA-1

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Typical Report Citation and Abstract

- ❶ **19970001126** NASA Langley Research Center, Hampton, VA USA
- ❷ **Water Tunnel Flow Visualization Study Through Poststall of 12 Novel Planform Shapes**
- ❸ Gatlin, Gregory M., NASA Langley Research Center, USA Neuhart, Dan H., Lockheed Engineering and Sciences Co., USA;
- ❹ Mar. 1996; 130p; In English
- ❺ Contract(s)/Grant(s): RTOP 505-68-70-04
- ❻ Report No(s): NASA-TM-4663; NAS 1.15:4663; L-17418; No Copyright; Avail: CASI; A07, Hardcopy; A02, Microfiche
- ❼ To determine the flow field characteristics of 12 planform geometries, a flow visualization investigation was conducted in the Langley 16- by 24-Inch Water Tunnel. Concepts studied included flat plate representations of diamond wings, twin bodies, double wings, cutout wing configurations, and serrated forebodies. The off-surface flow patterns were identified by injecting colored dyes from the model surface into the free-stream flow. These dyes generally were injected so that the localized vortical flow patterns were visualized. Photographs were obtained for angles of attack ranging from 10° to 50°, and all investigations were conducted at a test section speed of 0.25 ft per sec. Results from the investigation indicate that the formation of strong vortices on highly swept forebodies can improve poststall lift characteristics; however, the asymmetric bursting of these vortices could produce substantial control problems. A wing cutout was found to significantly alter the position of the forebody vortex on the wing by shifting the vortex inboard. Serrated forebodies were found to effectively generate multiple vortices over the configuration. Vortices from 65° swept forebody serrations tended to roll together, while vortices from 40° swept serrations were more effective in generating additional lift caused by their more independent nature.
- ❽ Author
- ❾ *Water Tunnel Tests; Flow Visualization; Flow Distribution; Free Flow; Planforms; Wing Profiles; Aerodynamic Configurations*

Key

1. Document ID Number; Corporate Source
2. Title
3. Author(s) and Affiliation(s)
4. Publication Date
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AEROSPACE MEDICINE AND BIOLOGY

A Continuing Bibliography (Suppl. 444)

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51

LIFE SCIENCES (GENERAL)

19970019305 Lawrence Livermore National Lab., Livermore, CA USA

Elements in biological AMS

Vogel, J.S., Lawrence Livermore National Lab., USA; McAninch, J., Lawrence Livermore National Lab., USA; Freeman, S., Lawrence Livermore National Lab., USA; Aug. 1996; 14p; In English; 7; International Accelerator Mass Spectrometry Conference, 20 - 24 May 1996, Tucson, AZ, USA

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

Report No.(s): UCRL-JC-125170; CONF-9605169-6; DE96-050543; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

AMS (Accelerator Mass Spectrometry) provides high detection sensitivity for isotopes whose half-lives are between 10 years and 100 million years. C-14 is the most developed of such isotopes and is used in tracing natural and anthropogenic organic compounds in the Earth's biosphere. Thirty-three elements in the main periodic table and 17 lanthanides or actinides have long lived isotopes, providing potential tracers for research in elemental biochemistry. Overlap of biologically interesting heavy elements and possible AMS tracers is discussed.

DOE

Mass Spectroscopy; Heavy Elements; Radiative Lifetime; Isotopes; Chemical Elements; Biochemistry

19970019376 Edgewood Research Development and Engineering Center, Aberdeen Proving Ground, MD USA

Performance Decrements in Constant Load Work for Specific Inspiratory and Expiratory Breathing Resistances *Final Report, Aug. 1994 - Mar. 1995*

Caretti, David M., Edgewood Research Development and Engineering Center, USA; Aug. 1996; 20p; In English

Contract(s)/Grant(s): DA Proj. 101-62622-A-553

Report No.(s): AD-A317875; ERDEC-TR-3439; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

This study developed estimates of work performance for specific levels of inspiratory and expiratory resistances. Exercise performance and subjective responses were measured in 5 volunteers during constant load, high intensity work under mask conditions of altered inspiratory resistance (I) and altered inspiratory and expiratory resistance (I+E). Mask performance ratings decreased approximately 17%, 25%, and 42% as inspiratory resistances were increased to 20 mm H₂O, 30 mm H₂O, and 40 mm H₂O from the control mask level of 9 mm H₂O and expiratory resistance was unaltered. When mask expiratory resistance was increased, performance decrements were 5%, 14%, and 34%, respectively. These observations emphasize the fact that even low levels of breathing resistance will impact performance. However, they also suggest that even slight reductions in the inspiratory and expiratory resistances of current negative pressure masks could improve wearer performance under physical stresses similar to the exercise intensity employed in this study.

DTIC

Breathing Apparatus; Physical Exercise; Masks; Stress (Physiology)

19970019397 California Univ., San Diego, La Jolla, CA USA

Skeletal Muscle Ischemia and Heat Shock Proteins *Final Report, 1 Jul. 1993 - 30 Jun. 1996*

Dillmann, Wolfgang H., California Univ., San Diego, USA; Jul. 1996; 35p; In English; 67th; Scientific Session of the American Heart Association, 14-17 Nov. 1994, Dallas, TX, USA

Contract(s)/Grant(s): DAMD17-93-J-3027

Report No.(s): AD-A318826; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Blood loss testing in decreased organ perfusion and subsequent ischemic injury of cardiac and skeletal muscle presents a significant problem for the soldier in combat. Recent findings indicate that different forms of noxious stress including exposure to increased temperature, noxious chemical agents, and ischemia lead to increased expression of heat shock proteins (hsp) which have a protective effect against injury induced by noxious stimuli. We wanted to determine in this proposal if a muscle derived permanent cell line expressing increased amounts of hsp70 will show protection against damage induced by simulated ischemia. To generate cell lines which permanently overexpress the inducible hsp70 (hsp70i) proteins, cells will be transfected with a neomycin resistance gene and the hsp70i gene. Stable lines will be selected by growing L6 cells in the presence of neomycin. Cells which have the neomycin resistance gene and the hsp70 gene incorporated into their DNA will survive. Such stably transfected cell lines will then be exposed to simulated ischemia consisting of hypoxia, absence of glucose, low tonicity, and resultant ischemic damage will be determined by quantitating cell viability measured in colony formation assays, the inhibition of protein synthesis, and the release of cytoplasmic enzymes like creatine kinase. These studies will determine if hsp70i exerts a protective effect against ischemia mediated muscle injury. Demonstrating a protective effect of hsp70 protein will make it a useful agent to reduce ischemic muscle damage in soldiers exposed to muscle injury in combat.

DTIC

Thermal Shock; Proteins; Ischemia; Musculoskeletal System; Cells (Biology)

19970019501 California Univ., San Diego, La Jolla, CA USA

Molecular Recognition of Endocytic Codes in Receptor Tyrosine Kinases *Final Report, 1 Jul. 1994 - 30 Jun. 1996*

Wu, Rui-Yun, California Univ., San Diego, USA; Gill, Gordon, California Univ., San Diego, USA; Jul. 1996; 50p; In English
Contract(s)/Grant(s): DAMD17-94-J-4124

Report No.(s): AD-A315785; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Enigma, isolated based on interaction with the human insulin receptor (InsR) using a yeast two-hybrid system, contains three LIM domains within its carboxyl terminus. The carboxyl LIM domain (LIM3) specifically recognizes the endocytic codes of InsR. Interaction of two random peptide libraries indicates the specific binding of Gly-Pro-Hyr-Gly-Pro-Hyr-Tyr/Phe corresponding to the major endocytic code of InsR. The ability of LIM3 of Enigma to recognize the endocytic codes of InsR fulfills the first property of the endocytic mechanism. In contrast to LIM3 of Enigma binding to InsR, LIM2 of Enigma associates specifically with the tyrosine kinase receptor Ret. Mutational analysis indicated that Tyr(586) at the carboxyl terminus of Ret is essential for the Ret and Enigma interaction. Mutations of Ret/ptc2 which fail to interact with Enigma also lose their ability to stimulate mitogenic signaling. Co-expression of LIM domains of Enigma blocked Ret/ptc2 stimulated DNA synthesis, indicating that Enigma is involved in the mitogenic signaling of Ret. These studies have indicated that two LIM domains of Enigma can interact with two receptor tyrosine kinases through tyrosine-based motifs with specificity residing in both the LIM domains and in the target structures.

DTIC

Deoxyribonucleic Acid; Carboxyl Group; Tyrosine

19970019522 Wake Forest Univ., Bowman Gray School of Medicine, Winston-Salem, NC USA

Effect of Hormone Replacement Therapies and Dietary Phytoestrogens on the Mammary Gland of Macaques *Annual Report, 1 Jul. 1995 - 30 Jun. 1996*

Cline, J. M., Wake Forest Univ., USA; Jul. 1996; 71p; In English

Contract(s)/Grant(s): DAMD17-94-J-4201

Report No.(s): AD-A315786; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche

The purpose of this study was to use histomorphometric and immunohistochemical techniques to study the incidence and characteristics of mammary gland hyperplasia, dysplasia and other possible indicators of breast cancer risk, in cynomolgus macaques given long-term hormonal treatments. Treatments evaluated to date include conjugated estrogens (CEE), medroxyprogesterone acetate (MPA), the combination of CEE and MPA, tamoxifen, estradiol (E2), 17 alpha-dihydroequilenin (DHEN), soybean phytoestrogens (SBE), and SBE + E2. Pathologic evaluation, histomorphometric evaluations, and staining for estrogen receptor, progesterone receptor, and the proliferation marker Ki-67 MIB were done. Results are as follows: The addition of MPA to CEE therapy increases, rather than decreases, mammary gland proliferation. Tamoxifen treatment does not induce mammary gland proliferation beyond that seen in controls; this is in contrast to a marked uterotrophic effect. DHEN does not induce mammary gland or endometrial proliferation, relative to controls and in contrast to E2. Soybean estrogens do not induce mammary or endometrial proliferation when given alone, and exert an antagonistic effect on E2-induced proliferation in both sites. New work in-

cludes dietary modulation of-hormonal effects on mammary gland, identification of p53 expression in CEE-treated macaque mammary gland, and development of whole-mount techniques.

DTIC

Hormones; Therapy; Cancer; Estrogens; Females; Mammary Glands

19970019528 Louisiana State Univ., Medical Center, Shreveport, LA USA

Brucella HTRA Protein and Pathogenesis: Brucella HTRA Strains as Vaccines *Annual Report, 1 Aug. 1995 - 31 Jul. 1986*

Roop, Roy M., Louisiana State Univ., USA; Aug. 1996; 26p; In English

Contract(s)/Grant(s): DAMD17-94-C-4054

Report No.(s): AD-A317300; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Bacterial stress response proteases of the high temperature requirement A (HtrA) family are thought to be an important component of cellular defense against oxidative damage through their capacity to degrade oxidatively damaged proteins. The results of studies described in a previous report confirmed that the Brucella HtrA contributes to the resistance of these intracellular pathogens to killing by host neutrophils and macrophages. Unfortunately, the attenuation of Brucella HtrA mutants is limited to the early stages of infection in the mouse model, and this residual virulence prevents their use as vaccine candidates. Our current research is directed at introducing secondary mutations into the *B. abortus* and *B. melitensis* htrA mutants PHE1 and RWP5, respectively, which will both enhance and stabilize their attenuation in mice. Several mutations which offer promise in this regard have been identified, and the corresponding HtrA-based double mutants are presently being evaluated for biologically relevant in vitro phenotypes, virulence in BALB/c mice, and where appropriate, resistance to killing by cultured murine neutrophils and macrophages. Double mutants showing significant and stable attenuation in mice will be evaluated for their capacity to elicit protective immunity against challenge with the virulent *B. abortus* and *B. melitensis* parental strains.

DTIC

Bacteria; Infectious Diseases; Vaccines; Pathogenesis; Proteins

19970019540 Michigan State Univ., Dept. of Crop and SOil Sciences, East Lansing, MI USA

Attenuating Organic Contaminant Mobility by SOil Modification: Towards a Biologically Integrated Technology *Final Report, 5 Jun. 1991 - 4 Jun. 1994*

Boyd, Stephen A., Michigan State Univ., USA; Crocker, Fiona H., Michigan State Univ., USA; Mueller, Sherry A., Michigan State Univ., USA; Xu, Shi-He, Michigan State Univ., USA; Nye, Jeffrey V., Michigan State Univ., USA; Dec. 13, 1995; 158p; In English
Contract(s)/Grant(s): F08635-91-C-0173

Report No.(s): AD-A317184; AL/EQ-TR-1996-0002; No Copyright; Avail: CASI; A08, Hardcopy; A02, Microfiche

Coupling the enhanced retention of Nonionic Organic Contaminants (NOCs) in quaternary ammonium (QUAT)-amended subsoils with bioremediation of the immobilized NOCs is being studied as a comprehensive soil restoration technology. Four areas were investigated: (1) QUAT binding to soils and subsoils, (2) QUAT biocompatibility with NOC-degrading microorganisms, (3) biostability of QUATs exchanged onto natural soils and clays, and (4) NOC bioavailability to indigenous microorganisms. HDTMA-clay complexes are chemically stable when hydrophobic HDTMA bonding is limited by lowering the ionic strength and controlling companion ions. HDTMA biostability can be increased by: (1) binding to clay exchange sites, (2) introduction to subsoils rather than surface soils and (3) maintaining saturated soil conditions. Although HDTMA is toxic to axenic cultures of bacteria, its toxicity is virtually eliminated by binding to clay minerals. Repopulation of the treated zone should occur once HDTMA is bound to soil.

DTIC

Organic Materials; Ions; Mobility; SOils; Activity (Biology)

19970019566 Rochester Univ., Dept. of Chemistry, NY USA

New Multilabel Fluorescent Groups for Increased Sensitivity of DNA Detection *Final Report, 1993 - 1996*

Kool, Eric T., Rochester Univ., USA; Oct. 01, 1996; 8p; In English

Report No.(s): AD-A316448; ARO-31507.10-LS-YIP; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche

The long-term goals of this project are to use oligonucleotides tagged with multiple fluorescent labels as hybridization probes of specific nucleic acid sequences. We have developed novel modes of binding between designed DNA probes and target DNA or RNA sequences, and we are investigating the combination of these new binding modes with dual (or more) fluorescent labels to raise signal intensity and signal-to-noise ratios. Such probes may be useful in detection and identification of pathogen nucleic acids as well as disease-related nucleic acid sequences in humans.

DTIC

Deoxyribonucleic Acid; Nucleotides; Oligomers; Fluorescence

19970019615 Wisconsin Univ., Madison, WI USA

Mapping Mammary Carcinoma Suppressor Genes in the Laboratory Rat Annual Report, 1 Jul. 1995 - 30 Jun. 1996

Gould, Michael, Wisconsin Univ., USA; Lan, Hong, Wisconsin Univ., USA; Jul. 1996; 48p; In English

Contract(s)/Grant(s): DAMD17-94-J-4040

Report No.(s): AD-A315688; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Inbred strains of rats differ in their susceptibility to both spontaneous and chemically-induced mammary carcinoma formation. We are currently using molecular biology techniques combined with classical genetic breeding studies to try to identify the mammary carcinoma suppressor (MCS) gene(s) responsible for the mammary carcinoma resistance trait in inbred Copenhagen (Cop) and Wistar Kyoto (WKy) rats. Simple sequence repeat (SSR) markers from the literature as well as from our chromosome specific libraries were used to map the rat genome and fine-map the regions that involved in the resistance phenotype. Previous data identified a quantitative trait locus (QTL) on rat chromosome 2 which is linked to the resistance phenotype (the gene is termed Mcs-1), and a marker on rat chromosome 7 which also appeared linked to the resistance phenotype (the gene is termed Mcs-2). Since the last progress report, 27 additional markers have been placed on the chromosome 2 map. One marker, CA2.F1, increased the LOD score to 4.154, further confirming the QTL at Mcs-1. Thirteen additional markers have been placed on the chromosome 7 map, and Mcs-2 is localized near a region on chromosome 7q13. Moreover, we found two other regions which show suggestive linkage to the resistance phenotype, one each on chromosomes 1 and 7.

DTIC

Cancer; Chromosomes; Genes; Rats; Molecular Biology

19970019623 California Univ., San Diego, La Jolla, CA USA

Alternative Splicing in Normal Development and in Breast Cancer Final Report, 1 Jul. 1994 - 30 Jun. 1996

Birmingham, John R., California Univ., San Diego, USA; Jul. 1996; 20p; In English

Contract(s)/Grant(s): DAMD17-94-J-4106

Report No.(s): AD-A315689; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Alterations in the splicing patterns of key regulatory genes are likely to play an important role in oncogenesis. The ASF/SF2 protein is one of a family of SR splicing factors that have been shown to regulate splice site choice in vitro. We have mapped the ASF/SF2 gene to 17q21.3-q22 in humans, and close to the Ovum mutant locus on chromosome 11 in mice. Our current objective is to examine the role of the ASF/SF2 gene in development and oncogenesis by observing the effects of disrupting the gene in mice. We were unable to achieve germ line transmission using embryonic stem cells that were heterozygous for an ASF/SF2 deletion. Highly chimeric mice were runted, possessed hypotrophic testes, and were sterile. Because of the possibility that this result is due to haploinsufficiency of the ASF/SF2 gene, and in light of new data that suggest that ASF/SF2 may be required for cell viability, we are constructing an inducible knockout vector for the ASF/SF2 gene.

DTIC

Mammary Glands; Cancer; Tumors

19970019624 Baylor Coll. of Medicine, Houston, TX USA

Regulation of Agonist-- and Antagonist--Mediated Activation of Human Progesterone Receptors by Phosphorylation Annual Report, 1 Jul. 1995 - 30 Jun. 1996

Zhang, Yi-Xian, Baylor Coll. of Medicine, USA; Jul. 1996; 20p; In English

Contract(s)/Grant(s): DAMD17-94-J-4202

Report No.(s): AD-A315692; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The human progesterone receptor (hPR) in breast cancer cells (T47D) is phosphorylated on multiple serine residues. I have previously reported the identification of eight phosphorylation sites. Here I show the identification of a new site, Ser20. This site is hPR-B specific and contains a Ser-Pro consensus sequence. The role of phosphorylation in hPR and RU 486 antagonist/agonist switch has also been investigated. Using a yeast system, the effect of B-specific phosphorylation on AF3 transactivation has been studied. Mutation of Ser102 to Ala nearly depleted the activity of AF3, suggesting that phosphorylation is a specific and an important regulatory step for hPR activity. I have also compared the activity of the mutant Ala400 with the wild type hPR. Surprisingly, the mutant's activity is significantly higher than that of the wild type, implying that regulation of hPR by phosphorylation is complex. Recently, several co-regulators of steroid receptors have been cloned and characterized. I have just begun to study their roles in the RU 486 antagonist/agonist switch. Initial results show that the PKA may potentiate the hPR activity through SRC-1. Whether SRC-1 can mediate the switch is under investigation.

DTIC

Mammary Glands; Cancer; Females; Mutations; Phosphorylation; Steroids

19970019625 National Inst. for Occupational Safety and Health, Cincinnati, OH USA

Breast Cancer Incidence in Occupational Cohorts Exposed to Ethylene Oxide and Polychlorinated Biphenyls Annual Report, 1 Aug. 1995 - 31 Jul. 1996

Ward, Elizabeth M., National Inst. for Occupational Safety and Health, USA; Aug. 1996; 11p; In English

Contract(s)/Grant(s): MIPR-94MM4580

Report No.(s): AD-A315695; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

NIOSH is evaluating breast cancer incidence in two large study cohorts, which have been previously assembled. One of the cohorts includes approximately 10,000 women with exposure to ethylene oxide (ETO), a direct alkylating agent which produces mammary tumors in mice. The other cohort includes over 13,000 women exposed to polychlorinated biphenyls (PCBs), a group of chemicals suspected to be carcinogenic to the breast because of their lipophilic and estrogenic activities. Each cohort represents the largest and best defined female study cohort in the U.S. for the respective exposure. The primary activities for this year have focused on establishing vital status and mailing addresses for individuals in the two study cohorts, and seeking OMB approval for the study questionnaires. Work to accomplish vital status and address identification is proceeding in a timely fashion.

DTIC

Mammary Glands; Tumors; Females; Carcinogens; Cancer

19970019627 Brown Univ., Inst. for Brain and Neural Systems, Providence, RI USA

BCM Network Develops Orientation Selectivity and Ocular Dominance in Natural Scene Environment

Shouval, Harel, Brown Univ., USA; Intrator, Nathan, Brown Univ., USA; Cooper, Leon N., Brown Univ., USA; Oct. 18, 1996; 13p; In English

Contract(s)/Grant(s): N00014-91-J-1316

Report No.(s): AD-A316968; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

A two-eye visual environment is used in training a network of BCM neurons. We study the effect of misalignment, between the synaptic density functions connecting both eyes to each single neuron, on the formation of orientation selectivity and ocular dominance. The visual environment we use is composed of natural images. We show that for the BCM rule a natural image environment with binocular cortical misalignment is sufficient for producing networks with orientation selective cells and ocular dominance columns. This work is an extension of our previous single cell model.

DTIC

Neurons; Eye (Anatomy); Misalignment; Connectors

19970019711 Columbia Univ., New York, NY USA

The Role of Cyclin D1 Overexpression in Breast Cancer Progression Annual Report, 15 Jul. 1995 - 14 Jul. 1996

Weinstein, I. Bernard, Columbia Univ., USA; Aug. 1996; 11p; In English

Contract(s)/Grant(s): DAMD17-94-J-4101

Report No.(s): AD-A317758; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

This project examines the role of cyclin D1, and related genes, in multistage breast carcinogenesis. It may provide new biomarkers and strategies for the prevention and treatment of breast cancer. During the past year two studies were completed and published. The first provides further evidence that increased expression of cyclin D1 can inhibit the growth of mammary epithelial cells. It can also increase the sensitivity of these cells to the induction of apoptosis by various agents. These effects appear to be due to increased levels of the cell cycle inhibitory protein p27kip1. The second study demonstrates that increased expression of cyclin E in mammary epithelial cells can also inhibit growth and that this is also due to increased expression of p27kip1. Breast cancer cell lines with increased expression of cyclins D1 and/or E also have high levels of p27kip1. Thus, mammary epithelial cells have a homeostatic feed-back loop that regulates the G1 to S progression of the cell cycle. Studies are in progress to evaluate the clinical relevance of these findings.

DTIC

Mammary Glands; Cancer; Carcinogens

19970019752 Colorado State Univ., Anatomy and Neurobiology Dept., Fort Collins, CO USA

Alterations in Nerve Terminal Arborization do not Correlate with Increased Synaptic Efficacy in the Lobster Neuromuscular Junction

Schultz, Timothy P., Colorado State Univ., USA; Jan. 09, 1997; 54p; In English

Report No.(s): AD-A320124; AFIT-96-108; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche

Neurotransmitter release is essential for chemical synaptic transmission, and the efficacy of synaptic transmission depends on how much transmitter is released from discrete sites in the axon terminal called active zones. The number and structural orga-

nization of active zones are important for governing synaptic efficacy, and may play a central role in synaptic plasticity. One method to enhance synaptic strength could be to expand the nerve terminal arborization to accommodate an increase in the number of active zones. The possibility that experimentally induced increases in synaptic efficacy correlate with increases in the amount of nerve terminal arborization is tested in this Master of Science Thesis. The lobster Distal Accessory Flexor Muscle (DAFM) is an excellent model for studying the relationship between synaptic efficacy and the structural organization of the presynaptic axon terminal. A single excitatory and inhibitory motor neuron innervate the DAFM, and the amount of transmitter they release is regionally differentiated. Regional differences in both the number and structure of active zones contribute to the regional differences in the amount of transmitter released.

DTIC

Neuromuscular Transmission; Nerves; Correlation Detection

19970019753 Brigham and Women's Hospital, Boston, MA USA

Cellular Proteins Interacting with the Tumor Suppressor Protein p53 *Annual Report, 15 Jul. 1995 - 14 Jul. 1996*

Chen, Jun-Jie, Brigham and Women's Hospital, USA; Aug. 1996; 30p; In English

Contract(s)/Grant(s): DAMD17-94-J-4070

Report No.(s): AD-A316821; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Tumor suppressor protein p53 interacts directly with the DNA replication factor RPA and inhibits its ability to bind single-strand-DNA. We defined the domain of p53 that bound to RPA and constructed p53 mutants that failed to bind RPA, but still functioned as transcriptional activators. We found that while these mutants of p53 lost their ability to bind RPA; they still maintained the growth suppression function of p53. Growth suppression function of p53 is dependent on its transactivation activity, probably by inducing p21 and other cell cycle inhibitors. We have extended our study to the p21 protein, which is induced by p53 and interacts with both the cdk2 kinase and a DNA replication factor PCNA. Here we have demonstrated the importance of PCNA-inhibitory domain of p21 in vivo. We have also shown that p21 has to interact directly with both cyclin subunit and cdk2 subunit of the cyclin-cdk complex in order to inhibit the kinase activity and suppress cell growth in vivo.

DTIC

Tumors; Cell Division; Inhibitors; Mutations

19970019878 AScl Corp., Vicksburg, MS USA

A Simulation Model for Growth of the Submersed Aquatic Macrophyte Hydrilla (Hydrilla Verticillata (L.f.) Royle) *Final Report*

Best, Elly P., AScl Corp., USA; Boyd, William A., Corps of Engineers, USA; Sep. 1996; 96p; In English

Contract(s)/Grant(s): DACW39-90-D-0001

Report No.(s): AD-A317203; WES-TR-A-96-8; No Copyright; Avail: CASI; A05, Hardcopy; A01, Microfiche

A simulation model for the biomass dynamics of the submersed macrophyte *Hydrilla verticillata* (dioecious biotype) is presented. The model HYDRIL is based on carbon flow within a 1-m² water column. It includes several aspects that affect biomass dynamics, such as latitude, seasonal changes in climate, pH and oxygen effects on CO₂ assimilation rate at light saturation, wintering strategies, grazing (removal of above ground and tuber biomass), and mechanical control (removal of above ground biomass). The characteristics of the community and of the site can be easily modified by the user. HYDRIL incorporates insights into the processes affecting the dynamics of a *Hydrilla* community in relatively shallow, hard water (0.1- to 2.5-m depth; DIC concentration greater than 0.8 mmol). It has been calibrated on data pertaining to a *Hydrilla* community in Lake Orange, Florida. At that site, no above ground wintering biomass is present and growth starts from the tuber bank. Peak biomass is reached late in August and tuber formation takes place in autumn, replenishing the tuber bank. HYDRIL simulates the dynamics of plant biomass and tuber bank density at Lake Orange well over a period of 1 to 5 years. It has been used to calculate plant biomass and tuber density for other sites in subtropical (Florida) and tropical (India) areas, where it simulated biomass ranges similar to those measured in the field.

DTIC

Computerized Simulation; Plants (Botany); Aquatic Plants; India

19970020181 Federation of American Societies for Experimental Biology, Bethesda, MD USA

Retinal Neurobiology and Visual Processing *Final Report, 1 May 1996 - 30 Apr. 1997*

Copenhagen, David, Federation of American Societies for Experimental Biology, USA; Oct. 03, 1996; 27p; In English

Contract(s)/Grant(s): F49620-96-I-0128; AF Proj. 2313

Report No.(s): AD-A316945; AFOSR-TR-96-0529; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The sessions were organized as follows: (1) Visual Performance; (2) Signal Transduction and Modulation in ON Bipolar cells; (3) Mechanisms and Functions of Gap Junction Coupling; (4) Tonic Channels to Machines; (5) Synaptic Mechanisms in the Outer Plexiform Layer; (6) 'Potpourri'; (7) CABAC Receptors; (8) Synaptic Processes in the Inner Plexiform Layer; and (9) Ecology of Vision.

DTIC

Visual Perception; Conferences; Neurophysiology; Photoreceptors

19970020198 Brown Univ., Physics Dept., Providence, RI USA

Classification of Underwater Mammals using Feature Extraction Based on Time-Frequency Analysis and BCM Theory

Huynh, Quyen Q., Brown Univ., USA; Cooper, Leon N., Brown Univ., USA; Intrator, Nathan, Brown Univ., USA; Shouval, Harel, Brown Univ., USA; May 1996; 15p; In English

Contract(s)/Grant(s): N00014-91-J-1316

Report No.(s): AD-A316962; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Underwater mammal sounds classification is demonstrated using a novel application of wavelet time/frequency decomposition and feature extraction using the BCM neuron. The system achieves outstanding classification performance even when tested with mammal sounds recorded at very different locations (from training).

DTIC

Wavelet Analysis; Underwater Acoustics; Signal Detection; Neurons; Pattern Recognition

19970020203 Army Medical Research Inst. of Infectious Diseases, Fort Detrick, MD USA

Safety Testing of Venezuelan Equine Encephalitis Virus-Infected Mouse Brains Following Formalin-Fixation

Ludwig, George V., Army Medical Research Inst. of Infectious Diseases, USA; Vogel, Peter, Army Medical Research Inst. of Infectious Diseases, USA; Sep. 16, 1996; 7p; In English

Report No.(s): AD-A316953; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche

Immunocytochemical analysis of viral infections in animal tissues has become an important and necessary component of biomedical research. Use of this and other related techniques requires tissues to be fixed in formalin. The period of time to which tissues must be exposed to formalin must be carefully balanced between ensuring complete inactivation of any infectious agents present in the tissues and maintaining critical protein epitopes necessary for completing the analysis. In this paper we show that Venezuelan equine encephalitis (VEE) virus in mouse brains can be completely inactivated after only 3 days exposure to formalin. This represents a significant savings in time over the standard 21 days exposure currently required before mouse tissues can be removed from biocontainment suites. Studies on the pathogenesis of VEE virus in the mouse model may benefit from shorter formalin-exposure times by increasing the sensitivity of immunocytochemical analysis.

DTIC

Infectious Diseases; Viruses; Encephalitis; Brain

19970020277 Air Force Inst. of Tech., Wright-Patterson AFB, OH USA

High Energy Slit Aperture Spect and Simplified Invitro Methods for the Dosimetry of Positron Emitting Radiotracers

Wrobel, Mark C., Michigan Univ., USA; Jan. 09, 1997; 215p; In English

Report No.(s): AD-A319835; Rept-96-42D; No Copyright; Avail: CASI; A10, Hardcopy; A03, Microfiche

The dosimetry of new positron emitting radiopharmaceuticals is initially estimated using animal tissue and organ biodistributions assessed invitro. Such methods are time and labor intensive and can have limited accuracy. This research investigated two alternative methods by which biodistribution can be obtained from the laboratory rat: invitro organ measurements using a reduced sacrifice technique, and invivo measurements using Single Photon Emission Computed Tomography (SPECT). As an alternative to a four time-point sacrifice method, a two time-point method was evaluated as a means to determine the organ cumulated activity of C labeled radiopharmaceuticals. Residence times calculated using two time-points acquired during the first half-life of C were either equivalent or larger than those resulting from using four sacrifice times. Correction factors were required for the urinary bladder and gallbladder when using this simplified technique due to delayed uptakes. Invivo assessments were performed with SPRINT, a full ring detector SPECT system using a slit aperture to obtain a 3-to-1 object to image magnification ratio. Acceptable resolution for 511 keV photons was achieved using a high energy parallel slice collimator and a novel technique to correct for penetration of the slit aperture by high energy photons. The resulting system resolution was approximately 4.5 mm axially and transaxially. System sensitivity was approx. 55 cpm/micronCi, a consequence of high resolution collimation and poor intrinsic detector efficiency.

DTIC

Dosimeters; Positrons; Emission

19970020278 Massachusetts Univ., Lowell, MA USA

Normal and Ischemic Myocardial Transport Kinetics for Bis(N-ethoxy, N-ethyl Dithiocarbamate) Ditrilo Technetium-99m (NOET)

Harms, Terrance A., Massachusetts Univ., USA; Jan. 09, 1997; 78p; In English

Report No.(s): AD-A320200; AFIT-96-134; No Copyright; Avail: CASI; A05, Hardcopy; A01, Microfiche

Recently a new Tc-99m labeled compound bis(N-ethoxy, N-ethyl dithiocarbamate) nitrido Tc-99m, or NOET, has been designed to evaluate regional myocardial blood flow and cellular viability. Previous studies of NOET indicate that it has the potential for use as a perfusion agent for assessing myocardial viability. These studies however were not designed to evaluate the actual kinetics of this agent. In the present study, Thermoluminescent Dosimeter (TLD) analysis was used in a rabbit model to assess the transport kinetics of NOET in normal and ischemic myocardium. The final rate constants for clearance in the normal and ischemic regions were $7.58E-4 \pm 1.1E-4$ (1 sigma) 1/min and $9.59E-4 \pm 3.6E-4$ (1 sigma) 1/min, respectively. These compare to the arterial clearance rate constant of $4.81E-3 \pm 1.2E-3$ (1 sigma) 1/min. Therefore, findings indicate that NOET has the potential to assess myocardial viability.

DTIC

Ischemia; Arteries; Myocardium; Blood Circulation; Radioactive Isotopes

19970020285 Brown Univ., Dept. of Physics, Providence, RI USA

Time Dependence of Visual Deprivation: A Comparison between Models of Plasticity and Experimental Results

Blais, Brian, Brown Univ., USA; Shouval, Harel, Brown Univ., USA; Cooper, Leon N., Brown Univ., USA; Oct. 07, 1996; 16p; In English

Contract(s)/Grant(s): N00014-91-J-1316

Report No.(s): AD-A316967; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Receptive fields in the visual cortex can be altered by changing the visual environment, as has been shown many times in deprivation experiments. In this paper we simulate this set of experiments using two different models of cortical plasticity, BCM and PCA. The visual environment used is composed of natural images for open eye and of noise for closed eyes. We measure the response of the neurons to oriented stimuli, and use the time course information of the neuronal response to provide a preliminary quantitative comparison between the cortical models and experiment.

DTIC

Vision; Neurons; Eye (Anatomy); Models; Neurophysiology; Physiological Responses

19970020338 Yale Univ., School of Medicine, New Haven, CT USA

Heregulin-Induced Growth Factor Receptor Signaling and Breast Carcinogenesis Annual Report, 1 Jul. 1995 - 30 Jun. 1996

Riese, David J., II, Yale Univ., USA; Stern, David F., Yale Univ., USA; Jul. 1996; 31p; In English

Contract(s)/Grant(s): DAMD17-94-J-4036

Report No.(s): AD-A315700; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

We have engineered a panel of Ba/F3 cell lines that express, singly and in every pairwise combination, the four erbB family receptors. Using this panel of cell lines, we have evaluated hormone-induced erbB family receptor phosphorylation and coupling to downstream signaling proteins and physiologic responses. To date, we have tested six epidermal growth factor (EGF) family hormones: EGF, transforming growth factor alpha (TGF α), heparin-binding EGF-like growth factor (HB-EGF), amphiregulin (AR), betacellulin (BTC), and neuregulin-beta (NRGB), also known as heregulin or neu differentiation factor. EGF, BTC, and NRGB exhibit distinct activities, while EGF, TGF α and HB-EGF are functionally equivalent. Furthermore, the four erbB family receptors exhibit differential coupling to cellular signaling proteins and physiologic responses. This suggests that cellular responses to activation of the EGF family/erbB family signaling network are specified by several hierarchical mechanisms.

DTIC

Mammary Glands; Physiological Responses; Cells (Biology); Hormones; Cancer; Carcinogens

52
AEROSPACE MEDICINE

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

19970019295 Agracetus, Inc., Middleton, WI USA

A Novel DNA-Based Vaccine Methodology for AIDS Annual Report, 30 Sep. 1995 - 29 Sep 1996

Haynes, Joel R., Agracetus, Inc., USA; Oct. 1996; 25p; In English

Contract(s)/Grant(s): DAMD17-94-J-4426

Report No.(s): AD-A318232; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Gene gun-based DNA immunization studies in mice using an HIV-1 gp120 expression vector demonstrated that modest effects on the strength and quality of gp120-specific immune responses could be elicited via the codelivery of vectors encoding murine IL-2, IL-7, or IL-12. However, much more dramatic effects on gp120-specific immune responses could be elicited by administering fewer immunizations over a longer time frame. In the nonhuman primate model, synergistic effects on the induction of HIV or SIV gp120-specific antibody titers were observed when gene gun immunizations were boosted with either recombinant subunit or recombinant vaccinia virus vaccines. In addition, a measurable vaccine effect was observed in rhesus macaques, in that lower virus loads and higher CD4 counts were observed in gene gun-vaccinated animals relative to naive controls following a heterologous challenge with SIVB670. Protection was not correlated with the strength of gp120-specific antibody titers. In the swine model, very strong humoral responses were observed in a three dose regimen using as little as 0.5 ug of DNA per immunization. These responses were equivalent to those elicited following administration of a commercial adjuvanted recombinant subunit vaccine.

DTIC

Deoxyribonucleic Acid; Genes; Immune Systems; Human Immunodeficiency Virus; Vaccines; Physiological Responses

19970019405 North Carolina Univ., Dept. of Environmental Sciences and Engineering, Chapel Hill, NC USA

A Model to Estimate A Worker's Exposure to Spray Paint Mists

Carlton, Gary N., North Carolina Univ., USA; 1996; 199p; In English

Report No.(s): AD-A311669; AFIT-96-029D; No Copyright; Avail: CASI; A09, Hardcopy; A03, Microfiche

Although local exhaust ventilation reduces exposure to airborne contaminants, current design methodology is limited because the relationship between exposure and ventilation is seldom known for a specific industrial operation. This research addressed this deficiency by introducing the notion of an empirical-conceptual model. These models relate exposure to ventilation through various process parameters responsible for the generation and transport of contaminants. To illustrate the modeling technique, an empirical-conceptual model of a spray painting task was developed. A conceptual model described three processes that determine the exposure: droplet formation, droplet transfer, and droplet transport. Each process was examined and important factors which characterize the processes identified. These factors were then grouped into four dimensionless variables using dimensional analysis. A laboratory set-up used a mannequin, flat plate and spray nozzle in a wind tunnel to find the functional relationship among these variables. The model indicates worker orientation to the freestream has a significant influence on breathing zone concentrations. The magnitude of the dimensionless quantity consisting of nozzle pressure, worker height, liquid viscosity, and freestream velocity determined in which orientation the concentration was higher. The influence of process parameters on the breathing zone droplet size

DTIC

Wind Tunnel Tests; Sprayers; Paints; Personnel; Exposure

19970019547 Massachusetts Inst. of Tech., Research Lab. of Electronics, Cambridge, MA USA

Mechanisms and Diagnostics of Ultrashort Pulse Laser Ocular Effects Final Report, 14 Apr. 1993 - 14 Apr. 1996

Fujimoto, James G., Massachusetts Inst. of Tech., USA; Aug. 22, 1996; 12p; In English

Contract(s)/Grant(s): F49620-93-I-0301; AF Proj. 2312

Report No.(s): AD-A315376; AFOSR-TR-96-0458; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The objective of our program has been to investigate the mechanisms of short and ultrashort pulse laser retinal injury and to develop and apply new diagnostics for the assessment of retinal injury. A key focus of our effort during this program has been to develop and apply optical coherence tomography (OCT) to investigate the morphology of retinal laser injury. OCT is a new noninvasive optical diagnostic technique for micron scale cross sectional imaging, which can permit the noninvasive imaging of retinal microstructure in situ. Working in collaboration with investigators at Brooks AFB, we have applied OCT to study lesion structure, development, and healing response from laser retinal injury. An increased understanding of the mechanisms of laser

retinal injury is relevant to the development of laser safety standards as well as the development and improvement of clinical laser therapies for ocular disease.

DTIC

Laser Damage; Imaging Techniques; Tomography; Clinical Medicine; Nonlinear Optics; Pulsed Lasers; Morphology; Retina; Diagnosis; Eye (Anatomy)

19970019571 New York Univ. Medical Center, Lab. of Environmental Studies, New York, NY USA

Suppression of Lymphocyte Signal Transduction by Oxygen Intermediates *Annual Report, 30 Sep. 1995 - 29 Sep. 1996*

Flescher, Eliezer, New York Univ. Medical Center, USA; Oct. 1996; 27p; In English

Contract(s)/Grant(s): DAMD17-95-I-5058

Report No.(s): AD-A319847; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Oxidative stress alters the expression of transcription factors in human lymphocytes. Given the critical role these factors play in gene regulation, their abnormal regulation should lead to disturbances in gene expression and these in turn will result in cellular dysfunction. The transcription factor abnormalities may be used to develop an assay for the detection of environmental toxic oxidants. Technical objectives: to study three models of inducing oxidative stress in lymphocytes: 1) PAO activity generating extracellularly low levels of H₂O₂ for two days (mimicking exposures to environmental chemical toxicants); 2) electron irradiation generating both extra and intracellularly mainly OH; and 3) high levels of reagent H₂O₂ generating short but acute stress. The following questions were asked during the first year of work: Do human lymphocytes subjected to oxidative stress: 1) exhibit abnormal cellular function-expression of transcription factors that regulate the interleukin 2 gene (essential for T lymphocyte function); and 2) sustain damage as assessed by an independent and established method.

DTIC

Lymphocytes; Oxygen; Immune Systems

19970019593 Army Medical Research and Materiel Command, Fort Detrick, MD USA

A Genetic Screen for Ligand Binding by the Human Estrogen Receptor *Annual Report, 15 Aug. 1995 - 14 Aug 1996*

Nichols, Mark D., European Molecular Biology Lab., Germany; Sep. 1996; 36p; In English

Contract(s)/Grant(s): DAMD17-94-J-4103

Report No.(s): AD-A318810; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

FLP recombinase-steroid receptor fusion proteins convert ligand binding into DNA recombination. We describe a ligand responsive FLP - estrogen receptor binding domain (FLP-EBD) in yeast that accurately reflects known estrogen receptor agonist affinities. All tested estrogens, whether agonists or antagonists, induce FLP-EBD 251-595 recombination, indicating that all induce EBD release from the Hsp90 complex. Altering the distance between FLP and the EBD domains in the fusion protein affects ligand inducibility. A FLP-EBD 304-595, with 53 fewer amino acids, shows reduced inducibility by agonists, and unexpectedly, complete insensitivity to induction by all antagonists tested. Thus we observe a tethered interference between FLP and the EBD domains that differs depending on the distance between the two domains and the conformations induced by agonists or antagonists, presenting a distinction between estrogen agonists and antagonists in yeast. Combining this distinction with mutagenesis of the EBD has generated numerous mutations with altered ligand specificity, sometimes inverting the activation effects of hormones and antihormones. Further study will define the specific mechanisms leading to antihormone action, especially with respect to the therapeutically important antihormones, tamoxifen and raloxifene.

DTIC

Deoxyribonucleic Acid; Amino Acids; Estrogens; Genetics; Steroids

19970019697 California Univ., Irvine, CA USA

Structure/Function of Recombinant Human Estrogen Receptor *Annual Report, 1 Sep. 1995 - 31 Aug. 1996*

Vickery, Larry E., California Univ., USA; Sep. 1996; 31p; In English

Contract(s)/Grant(s): DAMD17-94-J-4320

Report No.(s): AD-A320055; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Interaction of the estrogen receptor with its ligands is mediated by a C-terminal region of the protein designated the hormone binding domain (HBD) and residues within the HBD are thought to contribute to dimerization. To examine dimer interactions in the isolated HBD, a human estrogen receptor HBD fragment was expressed in high yield as a cleavable fusion protein in *Escherichia coli*. The isolated estrogen receptor HBD dimerizes and undergoes conformational changes associated with cooperative ligand binding in a manner comparable to the full-length protein, that the N-terminus of the HBD contributes to dimer interactions, and that one effect of ligand binding is to alter the dissociation kinetics of the receptor protein dimer. Current progress includes

determination of ligand binding stoichiometry, development of an assay for examining dimer dissociation kinetics in solution, and construction and screening of several mutant proteins.

DTIC

Hormones; Dimerization; Proteins; Assaying; Dissociation; Estrogens; Stoichiometry; Mammary Glands; Cancer

19970019911 Defence and Civil Inst. of Environmental Medicine, Downsview, Ontario Canada

Current Trends in Decompression Development: Statistics and Data Analysis

Nishi, R. Y., Defence and Civil Inst. of Environmental Medicine, Canada; Tikuisis, P., Defence and Civil Inst. of Environmental Medicine, Canada; Dec. 1996; 17p; In English

Report No.(s): AD-A320268; DCIEM-96-R-65; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Defence and Civil Institute of Environmental Medicine (DCIEM) has been involved in decompression research for over 30 years, and has successfully developed and validated a number of decompression tables for use by the Canadian Forces. These include decompression for air diving, surface-supported helium-oxygen diving, and self-contained semi-closed circuit rebreather diving for mine countermeasures. This article is a review of the traditional deterministic approach to decompression modelling and the newer probabilistic approach. The new approach to decompression modelling has the potential for developing safer and more efficient diving procedures and tables for CF diving applications. Since the development of the first decompression tables in 1906 by J.S. Haldane, considerable research and effort have been expended in the development of safer and more rapid decompression procedures and tables. Most models of decompression that have been used to generate decompression tables have taken a deterministic approach where the boundary between 'safe' and 'unsafe' dives is governed by a fixed set of rules, depending on the gas exchange model and 'safe ascent' criterion that are selected. These models are essentially empirical and not physiological models, providing 'safe' decompression only over a limited range of depth and bottom times. Because Decompression Illness (DCI) is considered a binary event, it becomes logistically and financially impossible to conduct enough dives to show that a given dive profile is safe within statistical significance. DCI should actually be considered as a probabilistic event. Decompression profiles are not just a case of being 'safe' or 'unsafe' but should be considered as a time-depth dosage.

DTIC

Decompression Sickness; Statistical Analysis; Data Processing; Breathing Apparatus; Gas Exchange

19970019949 Datamat Systems Research, Inc., McLean, VA USA

Rapid Target Modeling Through Genetic Inheritance Mechanism Genetically Evolved Target Prototypig (GETP) Final Report, 7 May - 10 Dec. 1996

Bala, Jerzy, Datamat Systems Research, Inc., USA; Pachowicz, Peter, Datamat Systems Research, Inc., USA; Gogia, B. K., Datamat Systems Research, Inc., USA; Dec. 10, 1996; 34p; In English

Report No.(s): AD-A320475; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

This report describes a Genetic Evolution Target Prototyping (GETP) methodology for rapid target model development and validation from limited initial sensory and technical data. The Phase I developed methodology generates new target signatures of a given target from an initial signature database by utilizing the power of genetic inheritance. Developed methodology allows for an expansion of the initial signature database and extensive testing of ATR systems over a variety of realistic signatures and situations not seen so far. The methodology utilizes a power of genetic inheritance to generate new signatures of a given target from a limited set of initial signatures. Initial signatures are represented by blob models. They are transformed into a string representation, a representation suitable for the genetic processing. The population of strings obtained from a starting set of signatures is subject to genetic evolution. Crossover and mutation operations are applied during each evolutionary cycle to generate new signatures. New signatures in the population are validated according to closeness to a tuning set of signatures. After a number of evolution cycles, signatures in the current population inherit significant resemblance from the initial and tuning subset of signatures and closely resemble signatures to be interpolated.

DTIC

Genetic Engineering; Mutations; Prototypes

19970020114 Minnesota Univ., Minneapolis, MN USA

Morphological Manifestations of Parvovirus B19 Infection in the Bone Marrow

More, Lucia Ellen, Minnesota Univ., USA; Jan. 09, 1997; 62p; In English

Report No.(s): AD-A320226; AFIT-96-116; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche

Parvovirus B19 (PV B19) preferentially infects erythroid progenitor cells in the bone marrow, frequently causing anemia along with transient aplastic crisis and pure red cell aplasia. The giant normoblast, previously described as the classic marrow finding, is not a highly sensitive indicator of infection. We devised a highly sensitive two-round, nested PCR procedure to detect

PV B19. Eight of 78 clinical specimens from individuals with unexplained cytopenias which tested positive by this method, were studied to define the effects of this virus. Examination of the bone marrow of these patients revealed a spectrum of morphological manifestations including: the giant normoblast, hypocellular marrow, hypercellular marrow, interstitial depletion, red cell aplasia, erythroid hyperplasia and evidence of erythroid dysplasia. The heterogeneity of these findings may reflect atypical immune responses leading to a prolonged course in some patients.

DTIC

Bone Marrow; Anemias; Erythrocytes; Infectious Diseases

19970020225 Air Force Inst. of Tech., National Air Intelligence Center, Wright-Patterson AFB, OH USA

Injury Threshold of Cornea to CO₂ Laser Light Exposure,

Xu, Jie-Min, Academia Sinica, China; Hu, Fu-Gen, Academia Sinica, China; Zhou, Shu-Ying, Academia Sinica, China; Cao, Wei-Qun, Academia Sinica, China; Qian, Huan-Wen, Academia Sinica, China; Laser Journal; Oct. 02, 1996, pp. 739-741; In English; Translated into English by Leo Kanner Associates

Contract(s)/Grant(s): F33657-88-D-2188

Report No.(s): AD-A316938; NAIC-ID(RS)T-0498-96; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche

The minimum visible lesion in the corneal epithelium resulting from exposure to sq cm laser light is carefully determined. The dose causing 50% probability of damage (ED50) varied with time of exposure. For 1.03 seconds it was 7.52 W/sq cm (95% CL 5.8-5.85 W/sq cm) and for 0.12 seconds it was 10.7 W/sq cm (95% CL 10.4-10.9 W/sq cm)

DTIC

Carbon Dioxide Lasers; Exposure; Cornea; Time Dependence; Physiological Effects

19970020314 Empirical Technologies Corp., Charlottesville, VA USA

Biological Sensors and Multiorgan Diagnostic Screening Physiographic Personnel Monitor. Phase 1 Final Report, 28 Mar. - 27 Sep. 1996

Baruch, Martin C., Empirical Technologies Corp., USA; Adkins, Charles M., Empirical Technologies Corp., USA; Gerdt, David W., Empirical Technologies Corp., USA; Oct. 1996; 26p; In English

Contract(s)/Grant(s): DAMD17-96-C-6035

Report No.(s): AD-A317282; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The Phase I effort has established the feasibility of a heartbeat and respiration sensor with high sensitivity, based on a fiber optic coupler that will fit within the dimensions of a wrist watch. Radio frequency transmission tests have demonstrated the feasibility of using a custom designed IC with on-board antenna and driver circuitry to transmit the sensor's low frequency signal to a receiver unit over a distance of one meter or more at frequencies of 220 - 420 Mhz. Electronic interface units were constructed that contain the circuitry necessary for opto-electronic conversion as well as to perform the sum and difference calculations to isolate the heartbeat-related changes in the sensor's output signal. A laptop-based AID data acquisition system was implemented.

DTIC

Feasibility; Heart Rate; Fiber Optics

19970020350 Virginia Univ., Virginia Neurological Inst., Charlottesville, VA USA

Integrated Remote Neurosurgical System Annual Report, 14 Aug. 1995 - 13 Aug 1996

Kassell, Neal F., Virginia Univ., USA; Downs, J. Hunter, III, Virginia Univ., USA; Sep. 1996; 14p; In English

Contract(s)/Grant(s): DAMD17-95-1-5060

Report No.(s): AD-A317024; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The Neurovisualization Lab at the University of Virginia is currently developing the Integrated Remote Neurosurgical System (IRNS) to allow remote neurosurgical procedures for access to underserved localities. The system allows a remote neurosurgeon to control a robotic microscope through the use of 3-D input devices, communicate through live audio and video over an ATM switch, and view presurgical imagery. The surgical team in the operating room will also have access to the same images and communication facilities. The system will also serve as a training tool through the use of a complete robotic simulation we have developed. We have also instituted safety precautions in the form of restriction of robot motion, monitoring of robot joints, and protocol of system use. We have developed a registration system to assist in the implementation of these guidelines. A task analysis has led to development of a prototype user interface, and the preliminary integration of available components has been completed. We report on the current state of the system and ongoing development with respect to the user interface and intergrations

DTIC

Remote Control; Robotics; Medical Equipment; Robots; Robot Dynamics; Computer Techniques; Computer Programs

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

19970019330 Rutgers - The State Univ., Piscataway, NJ USA

Space Perception with Normal and Prosthetic Vision *Final Report, 1 May 1994 - 30 Apr. 1996*

Hadani, Itzhak, Rutgers - The State Univ., USA; Julesz, Bela, Rutgers - The State Univ., USA; Dec. 23, 1996; 204p; In English
Contract(s)/Grant(s): F49620-94-I-0262; AF Proj. 2313

Report No.(s): AD-A320014; SR-4-26395; AFOSR-TR-97-0048; No Copyright; Avail: CASI; A10, Hardcopy; A03, Microfiche

This report encompasses: (1) A unique and metric solution for the differential equations that specify the optic-flow of monocularly navigating observer; (2) A report on a correlation between individual differences in interocular distance and registered depth in random dot stereogram with and without pedestal disparities; (3) Expansion on a navigational approach to space perception - SPIN theory - which suggests that object constancy is obtained during fixations by pure passive navigation computations, and across saccades by a combination of ocular and vestibular signals. It is suggested that the VOR constraints the rotational and velocity components of the eye to be perpendicular; (4) Analysis of the degree of uncertainty offered by the inferential, direct, and computational approaches in cognitive psychology as illustrated by their window metaphors. Visual stability in normal and prosthetic vision is examined and leads to newly stated magnification and distance paradoxes. A telescope metaphor, which is a modified Mach-Gibson visual-ego metaphor with a zooming feature, is suggested as a model that can resolve the paradoxes; and (5) A computer system which simultaneously displays motion parallax yoked to head movement and binocular disparity, with measurements of the virtual parallax evoked by head movements in static RDS.

DTIC

Space Perception; Computer Vision; Image Processing; Head Movement; Motion Perception

19970019602 Illinois Univ. at Urbana-Champaign, Inst. of Aviation, Savoy, IL USA

Transfer of Training Effectiveness of Personal Computer-Based Aviation Training Devices *Final Report*

Taylor, Henry L., Illinois Univ. at Urbana-Champaign, USA; Lintern, Gavan, Illinois Univ. at Urbana-Champaign, USA; Hulin, Charles L., Illinois Univ. at Urbana-Champaign, USA; Talleur, Donald, Illinois Univ. at Urbana-Champaign, USA; Emanuel, Tom, Illinois Univ. at Urbana-Champaign, USA; Phillips, Sybil, Illinois Univ. at Urbana-Champaign, USA; May 1997; 28p; In English

Contract(s)/Grant(s): DTFA-94-G-044

Report No.(s): DOT/FAA/AM-97/11; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The training effectiveness of Personal Computer-Based Aviation Training Devices (PCATD's) has received only limited testing. In the experiment reported here, a commercially available PCATD was evaluated in a transfer of training experiment for its effectiveness in supporting instrument flight training. The data show levels of savings in airplane flight time that varied from 15% to over 40% for certain training exercises. However, there were also cases in which savings were essentially zero or even showed decrements as high as 25%. In general, transfer savings were positive and substantial when new tasks were introduced. The data indicate that a PCATD can provide training benefit for certain tasks but, in addition, use of the PCATD in some areas is not expected to result in savings and will erode the overall potential to reduce costs.

Author

Transfer of Training; Training Devices; Computer Assisted Instruction; Flight Training

19970019606 Armstrong Lab., Williams AFB, AZ USA

Reasons for Implementing Modeling and Simulation Technologies in Specialized Undergraduate Pilot Training *Final Report, Mar. - Sep. 1995*

Mattoon, Joseph S., Armstrong Lab., USA; Dec. 1995; 29p; In English

Contract(s)/Grant(s): AF Proj. 1123

Report No.(s): AD-A316977; AL/HR-TR-1995-0078; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

An investigation of Specialized Undergraduate Pilot Training (SUPT) within the U.S. Air Force's Air Education and Training Command (AETC) revealed some major challenges to effective and efficient pilot training. The implementation of modeling and simulation technologies and associated training methods were proposed as potential solutions to address these challenges. Solutions included a proficiency-tracking system that advances students as a function of individual performance; desktop simulation trainers to improve dynamic cognitive skills, high-fidelity flight simulators with stand-alone, network, and full visual field-of-view capabilities; and the installation of a flight recording system that can record training events during aircraft sorties and reproduce the events in a simulated format for subsequent debriefing and simulator training. The proposed methods and technologies

are discussed in the context of theoretical principles and empirical findings of human factors, cognitive psychology, and educational technology research.

DTIC

Human Factors Engineering; Training Simulators; Pilot Training; Cognitive Psychology

19970019611 Armstrong Lab., Wright-Patterson AFB, OH USA

Optimal Personnel Assignment: An Application to Air Force Pilots *Interim Report, Feb. - Dec. 1993*

Siem, Frederick M., Armstrong Lab., USA; Alley, William E., Armstrong Lab., USA; Mar. 1996; 17p; In English

Contract(s)/Grant(s): AF Proj. 7719; AF Proj. 1123

Report No.(s): AD-A316975; AL/HR-TP-1996-0003; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

A study was conducted to examine the potential utility of optimally assigning Air Force pilots to training tracks without benefit of actual training outcomes. The resulting assignment solution indicated that (a) there was sufficient agreement among pilots to form coherent selection policies that differed across types of aircraft, and (b) mean predicted performance could be improved about one-third standard deviation relative to random allocation. Follow-up research is discussed.

DTIC

Aircraft Pilots; Flight Crews

19970019618 Advanced Scientific Concepts, Inc., Pittsburgh, PA USA

A Conceptual Model of Metacognitive Skills *Final Report, 11 Jun. 1993 - 11 Apr. 1994*

Geiwitz, James, Advanced Scientific Concepts, Inc., USA; Jun. 1996; 22p; In English

Contract(s)/Grant(s): MDA03-93-C-0109

Report No.(s): AD-A317176; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Little is known about the cognitive skills used by high-level commanders and executives in problem solving. 'Metacognitive' skills are abilities to monitor and direct the operation of cognitive skills. The author offers a summary of theories of metacognitive skills, including theories of intelligence, intellectual development in children and adults, and metamemory. Metacognitive skills that have been identified in the context of problem solving are discussed. A conceptual model is presented, starting with a model of problem solving and moving on to aspects of monitoring and control (technical, temporal, social, organizational). Implications for training and assessment are discussed, as well as issues of level of abstraction and how to represent the influence of metacognitive skills on human performance (flowchart vs. layered model).

DTIC

Problem Solving; Intelligence; Human Beings; Children

19970019628 Galaxy Scientific Corp., Lackland AFB, TX USA

An Experimental Approach to Teaching and Learning Probability: Stat Lady *Interim Report, Feb. - Dec. 1993*

Shute, Valerie J., Galaxy Scientific Corp., USA; Gawlick-Grendell, Lisa A., Galaxy Scientific Corp., USA; Apr. 1996; 18p; In English

Contract(s)/Grant(s): F41622-92-D-0006; AF Proj. 2313

Report No.(s): AD-A316969; AL/HR-TP-1996-0004; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

This paper describes Stat Lady -- an experimental approach to teaching and learning probability based on the postulate that learning is a constructive process, fostered by an experimental learning environment that is anchored in real-world problems. Two experiments are discussed, comparing learning from Stat Lady vs. more traditional approaches -- classroom lecture, and paper-and-pencil workbook. Findings showed that Stat Lady learners performed at least as well on the outcome tests as the Lecture and Workbook groups despite the presence of many factors strongly favoring the traditional conditions. In some cases, Stat Lady subjects greatly exceeded the performance of the other groups.

DTIC

Education; Instructors; Knowledge; Learning

19970019877 Department of Defense Polygraph Inst., Fort McClellan, AL USA

Event-Related Potentials: The P300 and Self-Referent Stimuli *Final Report, Aug. 1993 - Oct. 1995*

Ingram, Eben M., Department of Defense Polygraph Inst., USA; Oct. 1995; 37p; In English

Report No.(s): AD-A317251; DODPI94-P-0001; DODPI94-R-0006; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

This was an exploratory study designed to assess the effect of self-referent stimuli on the P300 component of the electroencephalogram (EEG). The stimuli were self-referent phrases. Self-referent phrases are phrases that are personally descriptive, and

are, therefore, considered to be personally relevant. Personal relevance was manipulated through the truthfulness of the self-referent phrases. The EEG was examined for the occurrence of the P300 wave of the human event-related brain potential. The P300 is a positive wave of the EEG that occurs 300 milliseconds after the onset of an eliciting stimulus. The P300 was examined for any effects on its amplitude having to do with the truthfulness of the stimuli. The EEG activity was recorded from 20 male subjects who were presented visual stimuli on a computer monitor. The stimuli consisted of five true and five false self-referent phrases. The two-word phrases were repeatedly presented in random order for a total of 300 presentations (150 presentations of the true and 150 of the false). The probability of occurrence of each of the two classes of stimuli was 0.50. The subjects were required to do nothing except read the stimuli. Results indicate that both true and false self-referent stimuli elicited clearly identifiable P300s. The difference between P300 amplitudes elicited by true and false stimuli, however, was not significant (p greater than .05).

DTIC

Electroencephalography; Psychophysiology; Neural Nets; Stress (Psychology); Psychological Tests; Neurophysiology; Deception

19970019956 Civil Aeromedical Inst., Oklahoma City, OK USA

The Use of Task-Specific Lenses by Presbyopic Air Traffic Controllers at the En Route Radar Console *Final Report*

Nakagawara, Van B., Civil Aeromedical Inst., USA; Wood, Kathryn J., Civil Aeromedical Inst., USA; Dec. 1996; 23p; In English Report No.(s): AD-A320284; DOT/FAA/AM-96/27; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The configuration of the radar console to control aircraft traffic has similar features to a Visual Display Terminal (VDT) workstation. Task-specific lenses have been found in clinical studies to reduce visual symptoms while working at the VDT. The American Optical Corporation TruVision Technica, a task-specific lens design, was evaluated to see if visual benefits from such a lens could be transferred from the VDT environment to the radar console work environment. Presbyopic Air Traffic Control Specialists (ATCSs) at the Houston Air Route Traffic Control Center were fitted with two prescription spectacles, using their current and Technica lens designs, in similar ophthalmic frames. Each ATCS used both lens designs at the radar console and provided subjective evaluations of their appropriateness in that environment. Thirteen (13) subjects (45.6 +/- 5.9 years of age, range 36-55 years) completed the study. Subjects who used larger near viewing area (single vision and executive) lens designs generally preferred their current lens design. The Technica was preferred by mature presbyopes (add power of greater than or equal to 1.25 diopters) and those using smaller near viewing area (FT-25, FT-28 and general progressive addition) lens designs. The primary complaints reported by ATCSs with the Technica were peripheral distortion and limited field of view. Task-specific lens designs are an alternative for presbyopic ATCS who work at a radar console. However, distortion and limited field of view from the lens may require prolonged adaptation times before such designs are acceptable to ATCS on the job, especially for those accustomed to lens designs with larger viewing areas.

DTIC

Air Traffic Controllers (Personnel); Cathode Ray Tubes; Lenses; Display Devices

19970020224 Pennsylvania Univ., Dept. of Neuroscience, Philadelphia, PA USA

Modeling Neural Mechanisms of the Control of Respiration *Progress Report, 1 Apr. 1993 - 31 Mar. 1996*

Schwaber, James S., Pennsylvania Univ., USA; Mar. 31, 1996; 4p; In English

Contract(s)/Grant(s): AF Proj. 2304

Report No.(s): AD-A316930; AFOSR-TR-96-0541; No Copyright; Avail: CASI; A01, Hardcopy; A01, Microfiche

We have developed computational models of biological neural mechanisms that provide the genesis and control of network oscillations, specific patterns of oscillation, and the control of different phases in the patterns. These models are built up across several levels of biological complexity theory, beginning with individual ionic channel kinetics and ending in whole system behavior, and are grounded in accurate biological detail at every level. A major contribution of these models in the area of complexity theory, since it is possible to observe in simulation by which the interactions in these biological nonlinear dynamic systems produce emergent properties which are greater than the sum of their parts. The understanding of the interactions is leading to the ability to manipulate the behavior of these nonlinear dynamics systems. In some models each neuron class is represented by a population 25 neurons, and manipulation of these networks is leading to important insights in the area of biological parallel processing. All of these results are finding interest for applications within process technology and process control, as algorithms or as inspiration for novel approaches to nonlinear control problems.

DTIC

Mathematical Models; Neural Nets; Nervous System; Respiration

19970020283 Armstrong Lab., Manpower and Personnel Research Div., Brooks AFB, TX USA

A Path Model of U.S. Air Force Pilot Training and its Antecedents *Interim Report, Oct. - Jul. 1995*

Ree, Malcolm J., Armstrong Lab., USA; Carretta, Thomas R., Armstrong Lab., USA; Teachout, Mark S., Armstrong Lab., USA; Journal of Applied Psychology; Dec. 1995; Volume 80, No. 6; 24p; In English

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

Report No.(s): AD-A317514; AL/HR-TP-1995-0034; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

A causal model of the role of general cognitive ability and prior job knowledge in subsequent job knowledge acquisition and work sample performance during training was developed. Participants were 3,428 Air Force officers in pilot training. The measures of ability and prior job knowledge came from the Air Force Officer Qualifying Test. The measures of job knowledge acquired during training were derived from classroom grades. Work sample measures came from check flight ratings. The causal model showed that ability directly influenced the acquisition of job knowledge. General cognitive ability influenced work samples through job knowledge. Prior job knowledge had almost no influence on subsequent job knowledge, but directly influenced the early work sample. Early training job knowledge influenced subsequent job knowledge and work sample performance. Finally, early work sample performance strongly influenced subsequent work sample performance.

DTIC

Pilot Training; Cognitive Psychology; Knowledge; Mental Performance

19970020305 Air Force Inst. of Tech., Wright-Patterson AFB, OH USA

Procrastination as a Predictor of Job Performance

Dutschmann, Steven L., Air Force Inst. of Tech., USA; Sep. 1996; 109p; In English

Report No.(s): AD-A319395; AFIT/GTM/LAR/96S-5; No Copyright; Avail: CASI; A06, Hardcopy; A02, Microfiche

It is generally accepted that everyone puts off or delays doing tasks to some extent; however, little is known about how different styles affect job performance. Individual differences in goal orientation (tendency to set goals and objectives), conscientiousness (thoroughness and carefulness in performing a task), autonomy (freedom, independence, and discretion in scheduling work), and temperament (manner of thinking, behaving, and reacting) may have an influence on how efficiently and effectively people prioritize their tasks (or avoid tasks), and thus have an effect on job performance. This study examined the possible importance of procrastination in the workplace, and its effect on job performance. A measure of work-related procrastination was designed and a model was developed that proposed a linkage between individual differences and job performance. Two hypotheses were developed to test the implications of the model. The first hypothesis was supported - goal orientation, conscientiousness, autonomy, and temperament were significant predictors of work procrastination (task-avoidant behavior) in this study. The second hypothesis was not supported - results of analyses showed that procrastination was not a predictor of job performance in this study.

DTIC

Human Performance; Productivity; Motivation

19970020333 State Univ. of New York, Dept. of Psychology, Stony Brook, NY USA

AASERT93. Listener Based Factors in Perception *Final Report, 1 Sep. 1993 - 31 Aug. 1996*

Samuel, Arthur G., State Univ. of New York, USA; Sep. 1996; 2p; In English

Contract(s)/Grant(s): F49620-93-I-0517; AF Proj. 3484

Report No.(s): AD-A317136; AFOSR-96-0525TR; No Copyright; Avail: CASI; A01, Hardcopy; A01, Microfiche

Work was completed on Lee Wurm's dissertation. This project examined the auditory processing of prefixed English words in order to test competing models. One group of models states that morphologically complex words must be decomposed prior to lexical access, while another states that they need not be. Mixed models have also been proposed. In Experiment 1 potential stimulus items were rated along various continua by approximately 120 subjects. These ratings were used in regression analyses in two subsequent experiments. In Experiments 2-3 recognition performance data were collected using a gating paradigm and a lexical decision paradigm (38 and 110 subjects, respectively). Overall, uniqueness points and frequency measures corresponding to full form prefixed words were much better predictors of performance than were measures corresponding to work roots. These results support a continuous processing strategy.

DTIC

Auditory Perception; Signal Processing; Regression Analysis; Semantics; Auditory Signals; Words (Language)

19970020432 Institute for Human Factors TNO, Soesterberg, Netherlands

Visual Illusions: Various Examples *Final Report Visuele Zinsbegoocheling: Een Aantal Voorbeelden*

Wertheim, A. H., Institute for Human Factors TNO, Netherlands; Apr. 15, 1997; 20p; In Dutch

Contract(s)/Grant(s): A92/KLu/331

Report No.(s): TD97-0191; TM-97-A029; Copyright; Avail: Issuing Activity (TNO, Human Factors Research Inst., Kampweg 5, 3769 De Soesterberg, The Netherlands), Hardcopy, Microfiche

A number of illusions is listed, related to the unreliability of visual perceptual processes involved in proper situation awareness and spatial orientation of pilots in flight. In addition many relatively simple demonstrations are proposed to illustrate these illusions and visual problems. They can be added as a module to the disorientation demonstration program which is already available to air force flying personnel.

Author

Visual Observation; Illusions

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.

19970019327 Armstrong Lab., Systems Research Branch, Brooks AFB, TX USA

Relationship Between Selected Measures of Physical Fitness and Performance of a Simulated Fire Fighting Emergency Task Interim Report, Jan. 1984 - Sep. 1996

Myhre, Loren G., Armstrong Lab., USA; Tucker, Donald M., Armstrong Lab., USA; Bauer, Daniel H., Armstrong Lab., USA; Fisher, Joseph R., Jr., Armstrong Lab., USA; Grimm, Wade H., Air Force Civil Engineering Support Agency, USA; Tattersfield, Charles R., Exeter Univ., UK; Jan. 1997; 22p; In English

Contract(s)/Grant(s): AF Proj-7184

Report No.(s): AD-A319915; AL/CF-TR-1996--143; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Two hundred and seventy-nine (males, n=272; females, n=7) career fire fighters between the ages of 19 and 58 volunteered for this study to determine the relationship between selected measures of physical fitness and performance of a standardized, strenuous task simulating fire fighting emergency activities. This task required the fire fighter to enter a military dormitory, proceed to the third floor, crawl 38.5 yds to reach a 170-lb victim, and drag him back to safety (the stairwell); time (min:sec) to completion was the performance criterion. Measures of cardiorespiratory fitness (VO₂ max), muscular strength, and body composition were analyzed in an attempt to identify the fitness factors which contributed most to successful task performance. Age and all measures of fitness were found to be significantly correlated with performance. The time required to complete this task vs. VO₂ max (n=222) averaged 6:17 and 39.4 ml/kg/min, respectively. The top 25 percent (n=56) and the bottom 25 percent (n=55) performer's times and VO₂ max averaged 3:15 and 45.5 ml/kg/min, and 11:42 and 34.1 ml/kg/min, respectively. A regression model was presented which provides a reasonably good prediction of task performance as a function of percent body fat, strength, and VO₂ max.

DTIC

Physical Fitness; Human Performance; Fire Fighting; Emergencies

19970019570 Analytic Sciences Corp., San Antonio, TX USA

Scratch Resistance Testing of Pilot Helmet Visors Using a New Scratch Resistance Tester Final Report, Mar. 1994 - Mar. 1995

Maier, Dennis A., Analytic Sciences Corp., USA; Dec. 1996; 38p; In English

Contract(s)/Grant(s): F33615-92-C-0017; AF Proj. 2830

Report No.(s): AD-A320493; AL/OE-TR-1996-0140; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The causes for removing pilot helmet visors from service were investigated as part of the Armstrong Laboratory's Advanced Aircrew Vision Protection (AAVP) program. The purpose of the investigation was to identify the factors which limit visor service life so that better technologies, specifications, or procedures could be developed and applied to the laser eye protection (LEP) visors being transitioned to the Human Systems Center (HSC) under the AAVP program. It was determined that the single cause of visor degradation which resulted in removing it from service was scratches in or delamination of the surface hardcoating (Reference AL/OE-TR-1996-0117, Failure Mechanisms in Pilot Helmet Visors). It was found that no specific scratch resistance requirements or specifications are applied to pilot helmet visors. Abrasion resistance and coating adhesion are specified in MIL-V-43511C and MIL-C-83409 but not scratch resistance. A new apparatus, the Maier Scratch Resistance Tester (MSRT), for testing the scratch resistance of optical coatings was invented and two prototype Maier scratch resistance testers (MSRTs) were fabricated. These testers were used to test the scratch resistance of pilot helmet visors from three different manufacturers. The tests on the visors were performed by two different operators, using two different MSRTs with one type of stylus. The tests described here were the initial tests performed with the new MSRT apparatus and had the following objectives: (1) to investigate the repeat-

ability and consistency of the results obtained by different operators and for different MSRTs; and (2) to establish baseline scratch resistance characteristics, values, and variability for existing hard coatings which are used on Air Force pilot helmet visors.

DTIC

Helmets; Wear Resistance; Antireflection Coatings; Visors; Test Equipment

19970019604 Hughes Training, Training Operations, Inc. Mesa, AZ USA

Image Update Rate Can Affect the Perceived Speed of Simulated Self-Motion *Final Report, Jun. 1992 - May 1995*

Lindholm, Julie M., Hughes Training, USA; Askins, Timothy M., Hughes Training, USA; Sisson, Norwood, Hughes Training, USA; Jun. 1996; 49p; In English

Contract(s)/Grant(s): F41624-95-C-5011; AF Proj. 1123

Report No.(s): AD-A316971; AL/HR-TR-1995-0194; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The update rate of an image generator affects the spatiotemporal representation of a time-varying scene and thus, potentially, an observer's percept during observation of the display image. In the first part of this report, we discuss image generation technology and sampling theory, and we present an analysis of the temporal frequencies in a space-time image representing constant-velocity, constant-altitude flight over a flat, textured terrain. In the second part, we report the results of two experiments in which a two-alternative, forced-choice method of constant stimuli was used to investigate the effects of image update rate (30 Hz vs 60 Hz) on the perceived speed of self motion. We found that perceived speed was higher with the lower update rate when the original image, internal to the computer, contained very high temporal frequencies, and the display image, therefore, contained a large number of spatiotemporal frequencies, within the bandpass of the human visual system, which had the wrong drift direction.

DTIC

Very High Frequencies; Velocity; Terrain

19970019928 Systems Research Labs., Inc., Dayton, OH USA

The Effects of Various Anti-G Suit Pressures and Positive Pressure Breathing on Lung Volumes as Measured by Spirometry at +1 Gz *Final Report, Feb. 1990 - Dec. 1995*

Tripp, Lloyd D., Jr., Systems Research Labs., Inc., USA; Larsen, Robert, Wright State Univ., USA; Jul. 1996; 41p; In English

Contract(s)/Grant(s): AF Proj. ILIR

Report No.(s): AD-A320273; AL/CF-TR-1996-0134; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Anti-G Suits have historically been evaluated using G-tolerance as the primary benchmark of a G-suit's effectiveness. One area which has been overlooked for over fifty years of G-suit design, is the effect of G-suit inflation on lung volumes. Lung inflation to about 75 percent of normal capacity is the key to producing the optimum intrathoracic pressure for performing the anti-G straining maneuver. This study evaluated three separate GH-suit designs, at +1 Gz and looked at the effect positive pressure breathing (PPB) had on maintaining lung volumes during G-suit inflations to 4, 6, and 8 psi. Lung volumes were measured using a micro-processor based spirometer. Results showed that the full pressure suit design (APS) had the smallest effect on inspiration. But in a comparison of the standard G-suit (trousers), the full coverage trousers (ATA0S) proved to be superior in design compared to the standard five bladder suit (CSU-13B/P). At suit pressures of 8 psi, Forced Inspiratory Vital Capacity (FIVC) percent change from baseline values for the APS, ATAGS, and CSU-13B/P were 80, 93, and 60% respectively. When PPB was added, FIVC values were 102, 66, and 46% respectively. These data show that the addition of PPB with anti-G suit trousers becomes a liability to lung function while the full pressure suit condition benefits by the addition of PPB. The use of pulmonary function testing as a means of determining the effect G-suit inflation has on lung volumes may prove to be very useful in designing and evaluating the next generation of anti-G protection ensembles.

DTIC

Flight Clothing; Breathing Apparatus; Spirometers; Pressure Suits

19970019934 Armstrong Lab., Crew Systems Directorate, Wright-Patterson AFB, OH USA

Tactile Feedback for a Force-Reflecting Haptic Display *Final Report, Jan. - Dec. 1995*

Hasser, Christopher J., Armstrong Lab., USA; Dec. 1995; 112p; In English

Contract(s)/Grant(s): AF Proj. 2300

Report No.(s): AD-A320274; AL/CF-SR-1996-0134; No Copyright; Avail: CASI; A06, Hardcopy; A02, Microfiche

This thesis describes the development of custom-built tactile feedback hardware and its integration with an available force-reflecting haptic interface. Design requirements were motivated strongly by the characteristics of the human tactile sense as well as the biomechanical characteristics of the human finger. The work explores the feasibility of various actuators, and selects a small solenoid actuator for application in a closed-loop force control tactile feedback system. An adaptive PI algorithm using continuously variable gain scheduling helps to compensate for nonlinearities in the solenoid actuator. The system demonstrates adequate

closed-loop control, but the mass added to the force-reflecting haptic interface proves less than optimal. Design suggestions for future prototypes may reduce the mass added by the tactile feedback hardware by over 30%. The work concludes with recommendations for psychophysical research that will increase understanding of human performance in tasks using haptic feedback devices.

DTIC

Feedback Control; Hardware; Design Analysis; Fingers; Touch

19970020223 Armstrong Lab., Human Resources Directorate, Mesa, AZ USA

The Future of Selective Fidelity in Training Devices Final Report, Jun. 1994 - Nov. 1995

Andrews, Dee H., Armstrong Lab., USA; Carroll, Lynn A., Armstrong Lab., USA; Bell, Herbert H., Armstrong Lab., USA; Educational Technology; Mar. 1996; Volume 6, No. 35, pp. 32-36; In English; 16th; Interservice/Industry Training Systems and Education, 28 Nov. - 1 Dec. 1994, Orlando, FL, USA

Contract(s)/Grant(s): AF Proj. 2743

Report No.(s): AD-A316902; AL/HR-TR-1995-0195; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Since the inception of modern simulation, the designers and users of training devices have attempted to replicate as many physical and functional stimuli as possible in the training device. There are three primary impediments to this activity: our frequent inability to specify the kinds of stimuli that are required, our technological difficulty in replicating some stimuli, and the cost of replicating stimuli. The constraints cited above have led the training device community to develop the concept of selective fidelity, meaning that we have to be very selective about the stimuli that we choose to replicate. This report presents arguments that our definitions of selective fidelity now need to be altered to fit recent behavioral and engineering developments. Over the years, we have improved our ability through research and analysis to define the important stimuli. Also, our engineering capability to replicate formerly difficult stimuli has improved significantly. Finally, there have been dramatic decreases in the cost of providing high fidelity simulation. In this report, we discuss our belief that while the concept of selective fidelity will remain important to the training device community, the definition of selective fidelity will be more focused on trainee learning requirements than on analytical and technological shortcomings.

DTIC

Human Factors Engineering; Flight Simulators; Training Devices; Flight Training

19970020342 Institute for Human Factors TNO, Soesterberg, Netherlands

Anthropometry of High School Graduates Final Report Antropometrische steekproef onder HAVO/VWO schoolverlaters

Daanen, H. A. M., Institute for Human Factors TNO, Netherlands; Oudenhuijzen, A. J. K., Institute for Human Factors TNO, Netherlands; Werkhoven, P. J., Institute for Human Factors TNO, Netherlands; Jan. 22, 1997; 45p; In Dutch

Contract(s)/Grant(s): A95/KL/370

Report No.(s): TM-97-A007; TD-96-0514; Copyright; Avail: Issuing Activity (Inst. for Human Factors TNO, Soesterberg, Netherlands), Hardcopy, Microfiche

Within the NATO community, in particular the tall North Europeans would benefit from adjustment of the current design criteria. Therefore, the TNO Human Factors Research Institute conducted a survey to measure the body dimensions of high school students in their senior year to update the database of body dimensions for the Royal Netherlands Air Force. The Royal Air Force uses this database to select the population from which their recruits are chosen. Twelve percent of the measured population of 549 students would have been rejected because of the current selection on the lengths of : stature, sitting height and buttock-knee length. Most students were rejected because their stature was less than the selection criterion: about 17 percent of the females measured less than 1630 mm. Forty percent were rejected if at least one parent was of non-Dutch origin. None of the males had a stature of less than 1630 mm, but 9 percent exceeded one of the criteria limits. It is recommended to add minima for sitting height and buttock-knee length since a small sitting height may lead to impaired vision on the instruments and environment and the adjustability range of the chair may be insufficient to accommodate people with a short buttock-knee length. Therefore, there is a good reason to incorporate anthropometry in evaluation of flight decks and flight deck designs and to convince manufacturers that current design criteria are often outdated.

Derived from text

Anthropometry; Body Size (Biology); Males; Females; Pilot Selection; Pilots (Personnel)

19970020439 Organisatie voor Toegepast Natuurwetenschappelijk Onderzoek, Inst. for Nutrition and Food Research, Zeist, Netherlands

Feasibility of formulating extended and long storage stable bread for rations Haalbaarheid van het formuleren van ver-

leugd-en lang houdbaar brood voor rantsoenen

Jurgens, A., Organisatie voor Toegepast Natuurwetenschappelijk Onderzoek, Netherlands; Maarschalkerweerd, T. V. P., Organisatie voor Toegepast Natuurwetenschappelijk Onderzoek, Netherlands; Jan. 1997; 28p; In Dutch

Contract(s)/Grant(s): A95/KL/116

Report No.(s): TNO-V96.611; TD97-0051; Copyright; Avail: Issuing Activity (TNO Nutrition and Food Research Inst., Zeist, Netherlands), Hardcopy, Microfiche

The feasibility of the development of loaf with extended (one week) and long (one year) storage stability has been investigated. A literature search revealed the possibility of alternative formulations. Experimental work showed that high fat levels (4 - 8%) together with an emulsifier and a maltodextrine reduced crumb hardening markedly. Sensory perception, however was doughy. A separate sensory evaluation is recommended. With respect to long shelf life loaves, a US military specification for rolls has been examined. A high level of glycerol is used in the formulation to avoid microbiological activity. A high HLB sucrose ester is used to reduce crumb hardening. The formulation needs a high quality flour with about 15% protein. Furthermore a minimum of 35 kJ/kg(dough) of mixing energy is required for dough development. Further optimization of the mixing and dough handling is recommended. The storage properties of the loaves were examined over a period of 9 months while packed in multi layered material under CO₂. No microbiological activity was found. Crumb hardening was highly reduced by the sucrose ester. Compared to a standard Dutch type sensory properties deviate greatly. Formulation costs are 4 times higher.

Author

Feasibility; Storage Stability; Rations; Combat; Food

Subject Term Index

A

ACTIVITY (BIOLOGY), 3
AIR TRAFFIC CONTROLLERS (PERSONNEL), 15
AIRCRAFT PILOTS, 14
AMINO ACIDS, 10
ANEMIAS, 12
ANTHROPOMETRY, 19
ANTIREFLECTION COATINGS, 18
AQUATIC PLANTS, 6
ARTERIES, 8
ASSAYING, 11
AUDITORY PERCEPTION, 16
AUDITORY SIGNALS, 16

B

BACTERIA, 3
BIOCHEMISTRY, 1
BLOOD CIRCULATION, 8
BODY SIZE (BIOLOGY), 19
BONE MARROW, 12
BRAIN, 7
BREATHING APPARATUS, 1, 11, 18

C

CANCER, 3, 4, 5, 8, 11
CARBON DIOXIDE LASERS, 12
CARBOXYL GROUP, 2
CARCINOGENS, 5, 8
CATHODE RAY TUBES, 15
CELL DIVISION, 6
CELLS (BIOLOGY), 2, 8
CHEMICAL ELEMENTS, 1
CHILDREN, 14
CHROMOSOMES, 4
CLINICAL MEDICINE, 10
COGNITIVE PSYCHOLOGY, 14, 16
COMBAT, 20
COMPUTER ASSISTED INSTRUCTION, 13
COMPUTER PROGRAMS, 12
COMPUTER TECHNIQUES, 12
COMPUTER VISION, 13
COMPUTERIZED SIMULATION, 6
CONFERENCES, 7
CONNECTORS, 5
CORNEA, 12

CORRELATION DETECTION, 6

D

DATA PROCESSING, 11
DECEPTION, 15
DECOMPRESSION SICKNESS, 11
DEOXYRIBONUCLEIC ACID, 2, 3, 9, 10
DESIGN ANALYSIS, 19
DIAGNOSIS, 10
DIMERIZATION, 11
DISPLAY DEVICES, 15
DISSOCIATION, 11
DOSIMETERS, 7

E

EDUCATION, 14
ELECTROENCEPHALOGRAPHY, 15
EMERGENCIES, 17
EMISSION, 7
ENCEPHALITIS, 7
ERYTHROCYTES, 12
ESTROGENS, 3, 10, 11
EXPOSURE, 9, 12
EYE (ANATOMY), 5, 8, 10

F

FEASIBILITY, 12, 20
FEEDBACK CONTROL, 19
FEMALES, 3, 4, 5, 19
FIBER OPTICS, 12
FINGERS, 19
FIRE FIGHTING, 17
FLIGHT CLOTHING, 18
FLIGHT CREWS, 14
FLIGHT SIMULATORS, 19
FLIGHT TRAINING, 13, 19
FLUORESCENCE, 3
FOOD, 20

G

GAS EXCHANGE, 11
GENES, 4, 9
GENETIC ENGINEERING, 11
GENETICS, 10

H

HARDWARE, 19
HEAD MOVEMENT, 13
HEART RATE, 12
HEAVY ELEMENTS, 1
HELMETS, 18
HORMONES, 3, 8, 11
HUMAN BEINGS, 14
HUMAN FACTORS ENGINEERING, 14, 19
HUMAN IMMUNODEFICIENCY VIRUS, 9
HUMAN PERFORMANCE, 16, 17

I

ILLUSIONS, 17
IMAGE PROCESSING, 13
IMAGING TECHNIQUES, 10
IMMUNE SYSTEMS, 9, 10
INDIA, 6
INFECTIOUS DISEASES, 3, 7, 12
INHIBITORS, 6
INSTRUCTORS, 14
INTELLIGENCE, 14
IONS, 3
ISCHEMIA, 2, 8
ISOTOPES, 1

K

KNOWLEDGE, 14, 16

L

LASER DAMAGE, 10
LEARNING, 14
LENSES, 15
LYMPHOCYTES, 10

M

MALES, 19
MAMMARY GLANDS, 3, 4, 5, 8, 11
MASKS, 1
MASS SPECTROSCOPY, 1
MATHEMATICAL MODELS, 15
MEDICAL EQUIPMENT, 12
MENTAL PERFORMANCE, 16

MISALIGNMENT, 5
MOBILITY, 3
MODELS, 8
MOLECULAR BIOLOGY, 4
MORPHOLOGY, 10
MOTION PERCEPTION, 13
MOTIVATION, 16
MUSCULOSKELETAL SYSTEM, 2
MUTATIONS, 4, 6, 11
MYOCARDIUM, 8

N

NERVES, 6
NERVOUS SYSTEM, 15
NEURAL NETS, 15
NEUROMUSCULAR TRANSMISSION,
6
NEURONS, 5, 7, 8
NEUROPHYSIOLOGY, 7, 8, 15
NONLINEAR OPTICS, 10
NUCLEOTIDES, 3

O

OLIGOMERS, 3
ORGANIC MATERIALS, 3
OXYGEN, 10

P

PAINTS, 9
PATHOGENESIS, 3
PATTERN RECOGNITION, 7
PERSONNEL, 9
PHOSPHORYLATION, 4
PHOTORECEPTORS, 7
PHYSICAL EXERCISE, 1
PHYSICAL FITNESS, 17
PHYSIOLOGICAL EFFECTS, 12
PHYSIOLOGICAL RESPONSES, 8, 9
PILOT SELECTION, 19
PILOT TRAINING, 14, 16
PILOTS (PERSONNEL), 19
PLANTS (BOTANY), 6
POSITRONS, 7
PRESSURE SUITS, 18
PROBLEM SOLVING, 14
PRODUCTIVITY, 16
PROTEINS, 2, 3, 11
PROTOTYPES, 11
PSYCHOLOGICAL TESTS, 15
PSYCHOPHYSIOLOGY, 15
PULSED LASERS, 10

R

RADIATIVE LIFETIME, 1
RADIOACTIVE ISOTOPES, 8
RATIONS, 20
RATS, 4
REGRESSION ANALYSIS, 16
REMOTE CONTROL, 12
RESPIRATION, 15
RETINA, 10
ROBOT DYNAMICS, 12
ROBOTICS, 12
ROBOTS, 12

S

SEMANTICS, 16
SIGNAL DETECTION, 7
SIGNAL PROCESSING, 16
SOILS, 3
SPACE PERCEPTION, 13
SPIROMETERS, 18
SPRAYERS, 9
STATISTICAL ANALYSIS, 11
STEROIDS, 4, 10
STOICHIOMETRY, 11
STORAGE STABILITY, 20
STRESS (PHYSIOLOGY), 1
STRESS (PSYCHOLOGY), 15

T

TERRAIN, 18
TEST EQUIPMENT, 18
THERAPY, 3
THERMAL SHOCK, 2
TIME DEPENDENCE, 12
TOMOGRAPHY, 10
TOUCH, 19
TRAINING DEVICES, 13, 19
TRAINING SIMULATORS, 14
TRANSFER OF TRAINING, 13
TUMORS, 4, 5, 6
TYROSINE, 2

U

UNDERWATER ACOUSTICS, 7

V

VACCINES, 3, 9
VELOCITY, 18
VERY HIGH FREQUENCIES, 18

VIRUSES, 7
VISION, 8
VISORS, 18
VISUAL OBSERVATION, 17
VISUAL PERCEPTION, 7

W

WAVELET ANALYSIS, 7
WEAR RESISTANCE, 18
WIND TUNNEL TESTS, 9
WORDS (LANGUAGE), 16

Personal Author Index

A

Adkins, Charles M., 12
Alley, William E., 14
Andrews, Dee H., 19
Askins, Timothy M., 18

B

Bala, Jerzy, 11
Baruch, Martin C., 12
Bauer, Daniel H., 17
Bell, Herbert H., 19
Birmingham, John R., 4
Best, Elly P., 6
Blais, Brian, 8
Boyd, Stephen A., 3
Boyd, William A., 6

C

Cao, Wei-Qun, 12
Caretti, David M., 1
Carlton, Gary N., 9
Carretta, Thomas R., 16
Carroll, Lynn A., 19
Chen, Jun-Jie, 6
Cline, J. M., 2
Cooper, Leon N., 5, 7, 8
Copenhagen, David, 6
Crocker, Fiona H., 3

D

Daanen, H. A. M., 19
Dillmann, Wolfgang H., 1
Downs, J. Hunter, III, 12
Dutschmann, Steven L., 16

E

Emanuel, Tom, 13

F

Fisher, Joseph R., Jr., 17
Flescher, Eliezer, 10
Freeman, S., 1
Fujimoto, James G., 9

G

Gawlick-Grendell, Lisa A., 14
Geiwitz, James, 14
Gerdt, David W., 12
Gill, Gordon, 2
Gogia, B. K., 11
Gould, Michael, 4
Grimm, Wade H., 17

H

Hadani, Itzhak, 13
Harms, Terrance A., 8
Hasser, Christopher J., 18
Haynes, Joel R., 9
Hu, Fu-Gen, 12
Hulin, Charles L., 13
Huynh, Quyen Q., 7

I

Ingram, Eben M., 14
Intrator, Nathan, 5, 7

J

Julesz, Bela, 13
Jurgens, A., 20

K

Kassell, Neal F., 12
Kool, Eric T., 3

L

Lan, Hong, 4
Larsen, Robert, 18
Lindholm, Julie M., 18
Lintern, Gavan, 13
Ludwig, George V., 7

M

Maarschalkerweerd, T. V. P., 20
Maier, Dennis A., 17
Mattoon, Joseph S., 13
McAninch, J., 1

More, Lucia Ellen, 11
Mueller, Sherry A., 3
Myhre, Loren G., 17

N

Nakagawara, Van B., 15
Nichols, Mark D., 10
Nishi, R. Y., 11
Nye, Jeffrey V., 3

O

Oudenhuijzen, A. J. K., 19

P

Pachowicz, Peter, 11
Phillips, Sybil, 13

Q

Qian, Huan-Wen, 12

R

Ree, Malcolm J., 16
Riese, David J., II, 8
Roop, Roy M., 3

S

Samuel, Arthur G., 16
Schultz, Timothy P., 5
Schwaber, James S., 15
Shouval, Harel, 5, 7, 8
Shute, Valerie J., 14
Siem, Frederick M., 14
Sisson, Norwood, 18
Stern, David F., 8

T

Talleur, Donald, 13
Tattersfield, Charles R., 17
Taylor, Henry L., 13
Teachout, Mark S., 16
Tikuisis, P., 11

Tripp, Lloyd D., Jr., 18
Tucker, Donald M., 17

V

Vickery, Larry E., 10
Vogel, J.S., 1
Vogel, Peter, 7

W

Ward, Elizabeth M., 5
Weinstein, I. Bernard, 5
Werkhoven, P. J., 19
Wertheim, A. H., 16
Wood, Kathryn J., 15
Wrobel, Mark C., 7
Wu, Rui-Yun, 2

X

Xu, Jie-Min, 12
Xu, Shi-He, 3

Z

Zhang, Yi-Xian, 4
Zhou, Shu-Ying, 12

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