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AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY WITH INDEXES



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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)
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AEROSPACE MEDICINE AND BIOLOGY

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LIFE SCIENCES (GENERAL)

19970020641 Michigan Univ., Ann Arbor, MI USA

Function of the Stroma-Derived Metalloproteinase, Stromelysin-3, in Invasive Breast Carcinomas *Annual Report, 27 Jun. 1995 - 26 Jun 1996*

Weiss, Stephen J., Michigan Univ., USA; Jul. 1996; 30p; In English; Original contains color plates

Contract(s)/Grant(s): DAMD17-94-J-4322

Report No.(s): AD-A315715; No Copyright; Avail: CASI; A03, Harcopy; A01, Microfiche

Stromelysin-3, a new member of the matrix metalloproteinase family, is specifically expressed in stromal cells surrounding invasive breast carcinoma cells where it undergoes processing to its active form by a proprotein convertase-dependent pathway. We now report that stromelysin-3 does not exert direct matrix-degrading activities or alter the expression of an invasive phenotype in vitro. However, following targeted expression of the ST-3 transgene to the lactating mammary gland in vivo, a premature involution program appear to be initiated. Given the fact that matrix remodeling programs induced by breast cancer cells appears similar to those observed during mammary gland involution, these data suggest that ST-3 may play an important, but indirect, role in regulating tissue integrity in vivo. Furthermore, we demonstrate that the proprotein convertase-dependent activation mechanism used for ST-3 processing can be extended to a second breast cancer-associated matrix metalloproteinase, the membrane-type matrix metalloproteinase. Together, these data indicate that proprotein convertases may regulate a series of matrix metalloproteinases whose expression can exert complex effects on matrix remodeling programs associated with carcinoma invasion and metastasis in vivo.

DTIC

Mammary Glands; Cancer; Proteins

19970020671 Duke Univ., Medical Center, Durham, NC USA

The Roles of TGF-Beta and TGF-Beta Signaling Receptors in Breast Carcinogenesis *Annual Report, 1 Jul. 1995 - 30 Jun. 1996*

Wang, Xiao-Fan, Duke Univ., USA; Jul. 1996; 24p; In English

Contract(s)/Grant(s): DAMD17-94-J-4065

Report No.(s): AD-A315705; No Copyright; Avail: CASI; A03, Harcopy; A01, Microfiche

The overall goal of this research project is to explore the roles of TGF- β 3 and components of its signaling pathways in the initiation, progression and metastasis of breast adenocarcinomas through an investigation of the dysregulation of TGF- β signal transduction. We have identified and isolated two cDNAs encoding members of the Dwarfins family and studied the TGF- β induced phosphorylation of these two molecules in a normal mammary epithelial cell line. Further studies are underway to address the functional significance of the induced phosphorylation in the mediation of the TGF- β growth inhibitory signal. We have also investigated the importance of a paracrine loop involving the interactions between mammary epithelial and fibroblast cells. We specifically studied the regulation of IGFBP3 expression in the presence of TGF- β . The results indicated that, in addition to its direct effect on the cell cycle progression, TGF- β may have a broader role in affecting the epithelial cell proliferation through its induction of IGFBP3 in fibroblast, consequently blocking the action of mitogenic factors, such as IGF, in breast tissues. Results from further analysis in this action will not only significantly contribute to an understanding of the molecular events leading to breast carcinogenesis, but also aid in the development of new therapeutics for breast cancer.

DTIC

Mammary Glands; Cancer; Cells (Biology); Receptors (Physiology)

19970020679 Georgia Univ., Dept. of Psychology, Athens, GA USA

Can Monkeys (*Macaca mulatta*) Represent Invisible Displacement?

Filion, Christine M., Georgia Univ., USA; Washburn, David A., Georgia State Univ., USA; Gulledge, Jonathan P., Georgia State Univ., USA; Journal of Comparative Psychology; May 17, 1996; ISSN 0735-7036; Volume 110, No. 4, pp. 386-395; In English
Contract(s)/Grant(s): NAG2-438; NIH-HD-06016

Report No.(s): NASA-CR-204759; NAS 1.26:204759; Copyright Waived (NASA); Avail: CASI; A03, Harcopy; A01, Microfiche

Four experiments were conducted to assess whether or not rhesus macaques (*Macaca mulatta*) could represent the unperceived movements of a stimulus. Subjects were tested on 2 computerized tasks, HOLE (monkeys) and LASER (humans and monkeys), in which subjects needed to chase or shoot at, respectively, a moving target that either remained visible or became invisible for a portion of its path of movement. Response patterns were analyzed and compared between target-visible and target-invisible conditions. Results of Experiments 1, 2, and 3 demonstrated that the monkeys are capable of extrapolating movement. That this extrapolation involved internal representation of the target's invisible movement was suggested but not confirmed. Experiment 4, however, demonstrated that the monkeys are capable of representing the invisible displacements of a stimulus.

Author

Displacement; Monkeys; Lasers; Extrapolation

19970020722 Wisconsin Univ., Madison, WI USA

Identification of *Brucella Melitensis* Antigens by T Lymphocytes and Oral Immunization Potential of the Antigens Final Report, 1 Jun. 1994 - 31 May 1996

Splitter, Gary, Wisconsin Univ., USA; Jul. 1996; 84p; In English; Sponsored in part by the College of Agriculture and Life Sciences.

Contract(s)/Grant(s): DAMD17-94-C-4019; USDA-92-3720-4-8114; BARD I-1434-89

Report No.(s): AD-A317023; No Copyright; Avail: CASI; A05, Harcopy; A01, Microfiche

Acquired immunity against intracellular bacteria is T cell dependent. T cells play a major role in protection against intracellular bacteria, but bacterial antigens recognized by T cells have been studied less extensively than bacterial antigens recognized by B cells. Using T lymphocytes from *Brucella abortus* immunized animals, we have screened a bacterial genomic library for genes encoding antigens recognized by T cells. Lymphocytes that proliferated to *B. abortus* proteins were characterized for phenotype and cytokine activity. Lymphocytes recognizing bacterial antigens possessed type 1 cytokine profiles, i.e., IFN-gamma and IL-2 but not IL-4 production. Lymphocytes necessary for In vivo protection were examined using gene knockout mice. MHC class I and class II gene knockout animals infected with *B. abortus* demonstrated that protection to *B. abortus* is especially dependent on CD8+ T cells. Knowing the cells required for protection, vaccines can be designed to elicit the protective subset of lymphocytes. Several recombinant *B. abortus* proteins were tested using different immunization strategies.

DTIC

Lymphocytes; Immunity; Cells (Biology); Immunology; Antigens

19970020723 Georgia State Univ., Depts. of Psychology and Biology, Atlanta, GA USA

Toward a New Outlook on Primate Learning and Behavior: Complex Learning and Emergent Processes in Comparative Perspective

Rumbaugh, Duane M., Georgia State Univ., USA; Savage-Rumbaugh, E. Sue, Georgia State Univ., USA; Washburn, David A., Georgia State Univ., USA; Japanese Psychological Research- Special Issue: Cognition and behavior of nonhuman primates; 1996; Volume 38, No. 3, pp. 113-125; In English

Contract(s)/Grant(s): NAG2-438; HD-06016

Report No.(s): NASA-CR-204760; NAS 1.26:204760; Copyright Waived (NASA); Avail: CASI; A03, Harcopy; A01, Microfiche

Primate research of the 20th century has established the validity of Darwin's postulation of psychological as well as biological continuity between humans and other primates, notably the great apes. Its data make clear that Descartes' view of animals as unfeeling 'beast-machines' is invalid and should be discarded. Traditional behavioristic frameworks, that emphasize the concepts of stimulus, response, and reinforcement and an 'empty-organism' psychology, are in need of major revisions. Revised frameworks should incorporate the fact that, in contrast to the lifeless databases of the 'hard' sciences, the database of psychology entails properties novel to life and its attendant phenomena. The contributions of research this century, achieved by field and laboratory researchers from around the world, have been substantial, indeed revolutionary. It is time to celebrate the progress of our field, to anticipate its significance, and to emphasize conservation of primates in their natural habitats.

Author

Primates; Learning; Psychology; Languages

19970020744 North Carolina Univ., Chapel Hill, NC USA

Mapping of a Breast Carcinoma Tumor Suppressor Gene to Chromosome 11p15.5 Annual Report, 1 Jul. 1995 - 30 Jun. 1996

Moore, Tracy, North Carolina Univ., USA; Jul. 1996; 9p; In English

Contract(s)/Grant(s): DAMD17-94-J-4175

Report No.(s): AD-A315709; No Copyright; Avail: CASI; A02, Harcopy; A01, Microfiche

Loss of heterozygosity (LOH) on the short arm of chromosome 11 has been demonstrated in many cancers, suggesting the presence of a tumor suppressor gene. A number of studies have narrowed the region showing LOH in breast tumors to 11p15.5. The technical objectives of this study are: to screen breast tumor samples for LOH in the 11p15.5 region using markers in the region exhibiting the greatest LOH to further resolve the location of the putative tumor suppressor gene; and to screen candidate genes for abnormal expression in breast tumor samples. In the three months since reactivation of the fellowship, the collection of breast tumor DNA samples has been expanded. We have used these samples to begin our candidate gene analysis. Currently, we are working with p57/KIP2, NAP2, and TAPA1. Following our candidate gene analysis, we plan to study the region of interest using polymorphic markers to look for LOH in the breast tumor DNA. We have selected marker which fall near the contig map that has been constructed in our laboratory. We will start with existing markers to define the area exhibiting LOH and then further delineate the region with new markers.

DTIC

Genes; Chromosomes; Cancer; Mammary Glands

19970020849 Texas A&M Univ., Dept. of Biology, College Station, TX USA

Graduate Student Training in Chronobiology Final Report, 1 Jun. 1992 - 31 May 1996

Cassone, Vincent M., Texas A&M Univ., USA; May 31, 1996; 5p; In English

Contract(s)/Grant(s): F49620-92-J-0238; AF Proj. 3484

Report No.(s): AD-A316935; AFOSR-TR-96-0538; No Copyright; Avail: CASI; A01, Harcopy; A01, Microfiche

Three students were recruited to and supported by this program. Two of these, Drs. David S. Brooks and Wade S. Warren, have graduated with Ph.D. degrees. One Mr. Arjun Natesan, remains in PI Cassone's Lab. David S. Brooks graduated from Eastern Texas Baptist College (B.A. Biology) and received an M.S. in Plant Pathology from Texas A&M. He was an author or co-author on 5 publications which acknowledged AFOSR support. Further, he presented his research at the 1991 SRBR meeting in Amelia Island, FL. He defended his dissertation, entitled 'Regulation of 2-(125 iodomelatonin binding in the chick brain by the circadian clock and development', in 1994 - and is currently an Assistant Professor of Biology at LeTourneau University in Longview TX. Wade S. Warren received a B.S. degree in Biology from Louisiana College. - He was an author or co-author on 5 publications that recognize AFOSR support. He has - presented his research at the 1993 Society for Neurosciences and 1993 Society for Research on Biological Rhythms meetings. He defended his dissertation, entitled 'The Sympathetic nervous system and the pineal gland: important components of the rat circadian systems' in 1995. Following graduation, Dr. Warren moved to Georgia State University for post-doctoral research with Dr. Timothy Bartness. He is currently Assistant Professor of Biology at Louisiana College.

DTIC

Sympathetic Nervous System; Circadian Rhythms; Pineal Gland

19970020850 Shock Society, Augusta, GA USA

Summary of the Scientific Program for the 19th Annual Conference on Shock Final Report, 1 Apr. - 31 Dec. 1996

Reichard, Sherwood M., Shock Society, USA; Holcroft, James W., Shock Society, USA; Nov. 01, 1996; 8p; In English; 19th; Shock, 2-5 Jun. 1996, Grand Traverse, MI, USA

Contract(s)/Grant(s): N00014-96-I-0665

Report No.(s): AD-A316937; No Copyright; Avail: CASI; A02, Harcopy; A01, Microfiche

Summary of Symposia at 19th Annual Conference on Shock held at Grand Traverse, MI, June 2-5, 1996 Summary of Symposia at 4th International Cytokine Conference held in Geneva, Switzerland, October 6-10, 1996 Both Symposia were very successful. The attached summaries describe the state-of-the-art scientific progress being made in these vital areas. Also attached are abstracts of all the papers delivered at the symposia.

DTIC

Abstracts; Science

19970020929 Tennessee Univ., Knoxville, TN USA

Establishment of an Integrated Confocal Microscopy Facility for ONR Biofouling/Biocorrosion Researchers Final Re-

port, 1 Nov. 1995 - 30 Sep. 1996

Palmer, Robert J., Tennessee Univ., USA; Jan. 1996; 2p; In English

Contract(s)/Grant(s): N00014-96-I-0093

Report No.(s): AD-A320172; No Copyright; Avail: CASI; A01, Harcopy; A01, Microfiche

In contrast to the formerly standard techniques that relied upon fixed, dehydrated biofilm samples (electron microscopy, light microscopy of sectioned biofilms), the advent of the CLM has allowed researchers to study living microbial biofilms in situ morphology.

DTIC

Electron Microscopy; Microorganisms; Photons; Bioluminescence; Pitting

19970021296 Texas Univ. Health Science Center, Dept. Otolaryngology-Head & Neck Surgery, San Antonio, TX USA

Development of Gravity-Sensing Organs in Altered Gravity

Wiederhold, M. L., Texas Univ. Health Science Center, USA; Gao, W. Y., Texas Univ. Health Science Center, USA; Harrison, J. L., Texas Univ. Health Science Center, USA; Hejl, R., Texas Univ. Health Science Center, USA; Oct. 16, 1996; 24p; In English

Contract(s)/Grant(s): NAG2-730; NAG2-952

Report No.(s): NASA-CR-204636; NAS 1.26:204636; No Copyright; Avail: CASI; A03, Harcopy; A01, Microfiche

Experiments are described in which the development of the gravity-sensing organs was studied in newt larvae reared in micro-g on the IML-2 mission and in *Aplysia* embryos and larvae reared on a centrifuge at 1 to 5 g. In *Aplysia* embryos, the statolith (single dense mass on which gravity and linear acceleration act) was reduced in size in a graded fashion at increasing g. In early post-metamorphic *Aplysia* or even in isolated statocysts from such animals, the number of statoconia produced is reduced at high gravity. Newt larvae launched before any of the otoconia were formed and reared for 15 days in micro-gravity had nearly adult labyrinths at the end of the IML-2 mission. The otoliths of the saccule and utricle were the same size in flight and ground-reared larvae. However, the system of aragonitic otoconia produced in the endolymphatic sac in amphibians was much larger and developed earlier in the flight-reared larvae. At later developmental stages, the aragonitic otoconia enter and fill the saccule. One flight-reared larva was maintained for nine months post-flight and the size of the saccular otolith, as well as the volume of otoconia within the endolymphatic sac, were considerably larger than in age-matched, ground-reared newts. This suggests that rearing in micro-gravity initiates a process that continues for several months after introduction to 1-g, which greatly increases the volume of otoconia. The flight-reared animal had abnormal posture, pointing its head upward, whereas normal ground-reared newts always keep their head horizontal. This suggests that rearing for even a short period in micro-gravity can have lasting functional consequences in an animal subsequently reared in 1-g conditions on Earth.

Author

Microgravity; Gravireceptors; Metamorphism (Geology); Larvae; Gravitation; Otolith Organs

19970021338 Washington State Univ., Dept. of Plant Molecular Biology and Physiology, Pullman, WA USA

A Potato cDNA Encoding a Homologue of Mammalian Multidrug Resistant P-Glycoprotein

Wang, W., Washington State Univ., USA; Takezawa, D., Washington State Univ., USA; Poovaiah, B. W., Washington State Univ., USA; Plant Molecular Biology; 1996; Volume 31, pp. 683-687; In English

Contract(s)/Grant(s): NAG10-0061; NSF DCB-91-4586

Report No.(s): NASA-CR-204649; NAS 1.26:204649; Copyright Waived (NASA); Avail: CASI; A02, Harcopy; A01, Microfiche

A homologue of the multidrug resistance (MDR) gene was obtained while screening a potato stolon tip cDNA expression library with S-15-labeled calmodulin. The mammalian MDR gene codes for a membrane-bound P-glycoprotein (170-180 kDa) which imparts multidrug resistance to cancerous cells. The potato cDNA (PMDR1) codes for a polypeptide of 1313 amino acid residues (ca. 144 kDa) and its structural features are very similar to the MDR P-glycoprotein. The N-terminal half of the PMDR1-encoded protein shares striking homology with its C-terminal half, and each half contains a conserved ATP-binding site and six putative transmembrane domains. Southern blot analysis indicated that potato has one or two MDR-like genes. PMDR1 mRNA is constitutively expressed in all organs studied with higher expression in the stem and stolon tip. The PMDR1 expression was highest during tuber initiation and decreased during tuber development.

Author

Cancer; Genes; Proteins; Deoxyribonucleic Acid; Calmodulin

19970021386 Washington State Univ., Lab. of Plant Molecular Biology and Physiology, Pullman, WA USA

A Novel Kinesin-Like Protein with a Calmodulin-Binding Domain

Wang, W., Washington State Univ., USA; Takezawa, D., Washington State Univ., USA; Narasimhulu, S. B., Colorado State Univ., USA; Reddy, A. S. N., Colorado State Univ., USA; Poovaiah, B. W., Washington State Univ., USA; Plant Molecular Biology;

1996, No. 31, pp. 87-100; In English

Contract(s)/Grant(s): NAG10-0061; NSF DCB-91-4586

Report No.(s): NASA-CR-204645; NAS 1.26:204645; Copyright Waived (NASA); Avail: CASI; A03, Harcopy; A01, Microfiche

Calcium regulates diverse developmental processes in plants through the action of calmodulin. A cDNA expression library from developing anthers of tobacco was screened with S-35-labeled calmodulin to isolate cDNAs encoding calmodulin-binding proteins. Among several clones isolated, a kinesin-like gene (TCK1) that encodes a calmodulin-binding kinesin-like protein was obtained. The TCK1 cDNA encodes a protein with 1265 amino acid residues. Its structural features are very similar to those of known kinesin heavy chains and kinesin-like proteins from plants and animals, with one distinct exception. Unlike other known kinesin-like proteins, TCK1 contains a calmodulin-binding domain which distinguishes it from all other known kinesin genes. Escherichia coli-expressed TCK1 binds calmodulin in a Ca(2+)-dependent manner. In addition to the presence of a calmodulin-binding domain at the carboxyl terminal, it also has a leucine zipper motif in the stalk region. The amino acid sequence at the carboxyl terminal of TCK1 has striking homology with the mechanochemical motor domain of kinesins. The motor domain has ATPase activity that is stimulated by microtubules. Southern blot analysis revealed that TCK1 is coded by a single gene. Expression studies indicated that TCK1 is expressed in all of the tissues tested. Its expression is highest in the stigma and anther, especially during the early stages of anther development. Our results suggest that Ca(2+)/calmodulin may play an important role in the function of this microtubule-associated motor protein and may be involved in the regulation of microtubule-based intracellular transport.

Author

Calcium; Calmodulin; Proteins; Plants (Botany); Deoxyribonucleic Acid

19970021428 Colorado Univ., Dept. of Chemical Engineering, Boulder, CO USA

Interaction and Aggregation of Colloidal Biological Particles and Droplets in Electrically-Driven Flows Final Report, 1 Feb. 1993 - 31 Jan. 1997

Davis, Robert H., Colorado Univ., USA; Loewenberg, Michael, Colorado Univ., USA; Apr. 29, 1997; 5p; In English

Contract(s)/Grant(s): NAG8-945

Report No.(s): NASA-CR-204281; NAS 1.26:204281; No Copyright; Avail: CASI; A01, Harcopy; A01, Microfiche

The primary objective of this research was to develop a fundamental understanding of aggregation and coalescence processes during electrically-driven migration of cells, particles and droplets. The process by which charged cells, particles, molecules, or drops migrate in a weak electric field is known as electrophoresis. If the migrating species have different charges or surface potentials, they will migrate at different speeds and thus may collide and aggregate or coalesce. Aggregation and coalescence are undesirable, if the goal is to separate the different species on the basis of their different electrophoretic mobilities.

Derived from text

Colloids; Migration; Bioassay; Electrophoresis

19970021546 Scripps Institution of Oceanography, Marine Physical Lab., San Diego, CA USA

Predator/Prey Relationships Between Phytoplankton and Zooplankton Final Report

Jaffe, Jules S., Scripps Institution of Oceanography, USA; Sep. 1996; 7p; In English

Contract(s)/Grant(s): N00014-94-I-0218

Report No.(s): AD-A320795; MPL-U-10/96; No Copyright; Avail: CASI; A02, Harcopy; A01, Microfiche

This project studies the fundamental relationships between predator macrozooplankton (i.e. euphausiids and copepods) and prey (i.e. phytoplankton) and their inter-relationship via a combination of optical serial sectioning and acoustic tracking. This program is an augmentation of our other ocean optics support from ONR and is aimed at making a practical realizable, system to measure multispectral image scatter from underwater serial section images.

DTIC

Zooplankton; Phytoplankton; Approximation

19970021688 Washington State Univ., Lab. of Plant Molecular Biology and Physiology, Pullman, WA USA

Calcium-Dependent Protein Kinase Genes in Corn Roots

Takezawa, D., Washington State Univ., USA; Patil, S., Washington State Univ., USA; Bhatia, A., Washington State Univ., USA; Poovaiah, B. W., Washington State Univ., USA; Journal of Plant Physiology; 1996; Volume 149, pp. 329-335; In English; Sponsored in part by Agricultural Experimental Station, Proj. 0321

Contract(s)/Grant(s): NAG10-0061; NSF DCB 91-04586; AES Proj. 0321

Report No.(s): NASA-CR-204646; NAS 1.26:204646; Copyright Waived (NASA); Avail: CASI; A02, Harcopy; A01, Microfiche

Two cDNAs encoding Ca-2(+) - Dependent Protein Kinases (CDPKs), Corn Root Protein Kinase 1 and 2 (CRPK 1, CRPK 2) were isolated from the root tip library of corn (*Zea mays* L., cv. Merit) and their nucleotide sequences were determined. Deduced amino acid sequences of both the clones have features characteristic of plant CDPKS, including all 11 conserved serine/threonine kinase subdomains, a junction domain and a calmodulin-like domain with four Ca-2(+), -binding sites. Northern analysis revealed that CRPK1 mRNA is preferentially expressed in roots, especially in the root tip; whereas, the expression of CRPK2 mRNA was very low in all the tissues tested. In situ hybridization experiments revealed that CRPK1 mRNA is highly expressed in the root apex, as compared to other parts of the root. Partially purified CDPK from the root tip phosphorylates syntide-2, a common peptide substrate for plant CDPKS, and the phosphorylation was stimulated 7-fold by the addition of Ca-2(+). Our results show that two CDPK isoforms are expressed in corn roots and they may be involved in the Ca-2(+)-dependent signal transduction process.

Author

Calcium; Proteins; Genes; Corn; Plant Roots

19970021699 Washington State Univ., Lab. of Plant Molecular Biology and Physiology, Pullman, WA USA

Chimeric Plant Calcium/Calmodulin-Dependent Protein Kinase Gene with a Neural Visinin-Like Calcium-Binding Domain

Patil, Shameekumar, Washington State Univ., USA; Takezawa, D., Washington State Univ., USA; Poovaiah, B. W., Washington State Univ., USA; Proceedings of the National Academy of Sciences; May 1995; Volume 92, pp. 4897-4901; In English; Sponsored in part by the Agricultural Experimental Station and The Rotary Foundation Scholarship

Contract(s)/Grant(s): NAG10-61; NSF DCB-91-04586; AES Proj. 0321

Report No.(s): NASA-CR-204647; NAS 1.26:204647; Copyright Waived (NASA); Avail: CASI; A02, Harcopy; A01, Microfiche

Calcium, a universal second messenger, regulates diverse cellular processes in eukaryotes. Ca-2(+) and Ca-2(+)/calmodulin-regulated protein phosphorylation play a pivotal role in amplifying and diversifying the action of Ca-2(+)- mediated signals. A chimeric Ca-2(+)/calmodulin-dependent protein kinase (CCaMK) gene with a visinin-like Ca-2(+)- binding domain was cloned and characterized from lily. The cDNA clone contains an open reading frame coding for a protein of 520 amino acids. The predicted structure of CCaMK contains a catalytic domain followed by two regulatory domains, a calmodulin-binding domain and a visinin-like Ca-2(+)-binding domain. The amino-terminal region of CCaMK contains all 11 conserved subdomains characteristic of serine/threonine protein kinases. The calmodulin-binding region of CCaMK has high homology (79%) to alpha subunit of mammalian Ca-2(+)/calmodulin-dependent protein kinase. The calmodulin-binding region is fused to a neural visinin-like domain that contains three Ca-2(+)-binding EF-hand motifs and a biotin-binding site. The *Escherichia coli*-expressed protein (approx. 56 kDa) binds calmodulin in a Ca-2(+)-dependent manner. Furthermore, Ca-45-binding assays revealed that CCaMK directly binds Ca-2(+). The CCaMK gene is preferentially expressed in developing anthers. Southern blot analysis revealed that CCaMK is encoded by a single gene. The structural features of the gene suggest that it has multiple regulatory controls and could play a unique role in Ca-2(+) signaling in plants.

Author

Plants (Botany); Calcium; Calmodulin; Proteins; Genes; Domains

19970021719 Stanford Univ., Hopkins Marine Station, Pacific Grove, CA USA

Molecular Marine Biology Research Training Final Report, 1 Jun. 1993 - 31 May 1996

Epel, David, Stanford Univ., USA; Jan. 29, 1997; 11p; In English

Contract(s)/Grant(s): N00014-93-I-0901

Report No.(s): AD-A320682; No Copyright; Avail: CASI; A03, Harcopy; A01, Microfiche

This grant provided training in developmental biology of embryos of marine organisms, particularly their defense mechanisms. Students were exposed to the patterns of development of a variety of marine organisms, and then trained in the use of cellular, immunological and molecular approaches for studying these embryos and their defense mechanisms. We focused on the defense mechanisms of embryos since this is a poorly studied but important area. Thus we understand a lot about adult defenses, but little about how these develop and more importantly whether the mechanisms in early embryos are different than those of the adult. Also, knowing how the embryo defends itself is critical to predicting the effects of environmental stress, since the embryonic phases are the most vulnerable part of the life history of the organism. The training also included a brief research project, which provided the students an opportunity to use their newly-acquired skills to attain new knowledge about these defense mechanisms. In conclusion, molecular and cellular information about this critical stage in the life history of the organism is lacking, and the training in this new research area will thus importantly impact the marine sciences.

DTIC

Molecular Biology; Embryos; Marine Biology; Research

19970021746 Maryland Univ., Dept. of Zoology, College Park, MD USA

Damage and Recovery of Hair Cells in Fish Canal (But Not Superficial) Neuromasts after Gentamicin Exposure

Song, Jiakun, Maryland Univ., USA; Yan, Hong Young, Maryland Univ., USA; Popper, Arthur N., Maryland Univ., USA; Hearing Research; Jul. 24, 1995; ISSN 0378-5955; Volume 91, pp. 63-71; In English

Contract(s)/Grant(s): N00014-92-J-1114; NAG2-787; NIH-DC-01986

Report No.(s): NASA-CR-204739; NAS 1.26:204739; LBU-Contrib-68; Copyright Waived (NASA); Avail: CASI; A03, Harcopy; A01, Microfiche

Recent evidence demonstrating the presence of two types of sensory hair cells in the ear of a teleost fish (*Astronotus ocellatus*, the oscar) indicates that hair cell heterogeneity may exist not only in amniotic vertebrates but also in anamniotes. Here we report that a similar heterogeneity between hair cell types may also occur in the other mechanosensory organ of the oscar, the lateral line. We exposed oscars to the aminoglycoside (ototoxic) antibiotic gentamicin sulfate and found damaged sensory hair cells in one class of the lateral line receptors, the canal neuromasts, but not in the other class, the superficial neuromasts. This effect was not due to the canal environment. Moreover, new ciliary bundles on hair cells of the canal neuromasts were found after, and during, gentamicin exposure. The pattern of hair cell destruction and recovery in canal neuromasts is similar to that of type 1-like hair cells found in the striolar region of the utricle and lagena of the oscar after gentamicin treatment. These results suggest that the hair cells in the canal and superficial neuromasts may be similar to type 1-like and type 2 hair cells, respectively, in the fish ear.

Author

Hair; Fishes; Cells (Biology); Vertebrates; Ear; Canals; Utricle

19970022099 University of West Florida, Center for Environmental Diagnostics and Bioremediation, Pensacola, FL USA

Effect of Metals on the Biotransformation of Chlorinated and Non-Chlorinated Aromatic Compounds by Anaerobic Bacterial Consortia Final Report, 1 Oct. 1993 - 31 Dec. 1996

Genthner, Barbara R., University of West Florida, USA; Dec. 31, 1996; 6p; In English

Contract(s)/Grant(s): N00014-93-I-1222

Report No.(s): AD-A321222; No Copyright; Avail: CASI; A02, Harcopy; A01, Microfiche

Heavy METAL Pollution often co-occurs with aromatic pollution. Therefore, we investigated the effect of added Cd(II), Cr(VI), Cu(II) and Hg(II) on biodegradation of 3-chlorobenzoate (3CB), 2-chlorophenol (2CP), phenol, and benzoate. Cr(VI) was abiotically reduced to Cr(III) in our anaerobic medium, and Cu(II) partially reduced to Cu(I). Complete anaerobic biodegradation of 3CB and 2CP is performed by an interdependent cooperation of anaerobic bacterial strains via 3CB benzoate acetate/H₂/CO₂ methane; and 2CP phenol benzoate acetate/H₂/CO₂ methane. Target compounds were not degraded at >5 - 100ppm, while less than 0.1ppm Cd(II), Cu(II), or Cr(III) had no effect. 0.1ppm Hg(II) inhibited 2CP and phenol, but not 3CB or benzoate, biodegradation. Cd(II) and Cr(III) inhibited 3CB dechlorination most strongly. Cu(II) and Hg(II), respectively, inhibited benzoate and phenol biodegradation most strongly. Utilization of acetate was most sensitive to Cu(II) and Hg(II). Methane production was most sensitive to Hg(II). No correlation existed between the initial Eh created by adding metal salts to anaerobic medium and observed inhibition of target compound biodegradation. 2CP and 3CB biodegradation became resistant to Hg(II) by an inducible, transferable, biological activity which is under further investigation.

DTIC

Bacteria; Chlorination; Aromatic Compounds; Metals; Anaerobes; Pollution; Biodegradation

19970022128 Brown Univ., Dept. of Pathology, Providence, RI USA

Tissue-Engineered Skeletal Muscle Organoids for Reversible Gene Therapy

Vandenburgh, Herman, Brown Univ., USA; DelTatto, Michael, Brown Univ., USA; Shansky, Janet, Brown Univ., USA; Lemaire, Julie, Brown Univ., USA; Chang, Albert, Brown Univ., USA; Payumo, Francis, Brown Univ., USA; Lee, Peter, Brown Univ., USA; Goodyear, Amy, Brown Univ., USA; Raven, Latasha, Brown Univ., USA; Human Gene Therapy; Nov. 10, 1996; Volume 7, pp. 2195-2200; In English; Original contains color illustrations

Contract(s)/Grant(s): NAGw-4674; NAG2-914

Report No.(s): NASA-CR-204714; NAS 1.26:204714; No Copyright; Avail: CASI; A02, Harcopy; A01, Microfiche

Genetically modified murine skeletal myoblasts were tissue engineered in vitro into organ-like structures (organoids) containing only postmitotic myofibers secreting pharmacological levels of recombinant human growth hormone (rhGH). Subcutaneous organoid implantation under tension led to the rapid and stable appearance of physiological sera levels of rhGH for up to 12 weeks, whereas surgical removal led to its rapid disappearance. Reversible delivery of bioactive compounds from postmitotic cells in tissue engineered organs has several advantages over other forms of muscle gene therapy.

Author

Cells (Biology); Organs; Musculoskeletal System; Genetics; Growth; Pituitary Hormones; Tissues (Biology)

19970022146 Salk Inst. for Biological Studies, San Diego, CA USA

Presentation of Ligands on Hydroxylapatite

Chu, Barbara C. F., Salk Inst. for Biological Studies, USA; Orgel, Leslie E., Salk Inst. for Biological Studies, USA; Bioconjugate Chemistry; 1997; ISSN 1043-1802; Volume 8, No. 2, pp. 103-105; In English; Supported in part from the National Institute for Allergy and Infectious Diseases

Contract(s)/Grant(s): NAGw-1660; NIAID-GM-33023

Report No.(s): NASA-CR-204813; NAS 1.26:204813; Copyright Waived (NASA); Avail: CASI; A01, Harcopy; A01, Microfiche

Conjugates of biotin with the decamer of glutamic acid (glu(sub 10)) and the trimer of D,L-2-amino-5-phosphonovaleric acid (I) have been synthesized, and it has been shown that they mediate the binding of avidin to hydroxylapatite. In a similar way a conjugate of methotrexate with glu(sub 10) mediates the binding of dihydrofolate reductase to the mineral. The presentation of ligands on the hydroxylapatite component of bone may find applications in clinical medicine.

Author

Ligands; Biotin; Conjugates; Glutamic Acid; Biochemistry; Synthesis (Chemistry)

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AEROSPACE MEDICINE

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

19970020930 Kent State Univ., OH USA

Study of SCN Neurochemistry using in Vivo Microdialysis in the Conscious Brain: Correlation with Circadian Activity Rhythms Final Report, Dec. 1992 - Jul. 1996

Glass, J. David, Kent State Univ., USA; Sep. 1996; 50p; In English

Contract(s)/Grant(s): F49620-93-I-0086; AF Proj. 2312

Report No.(s): AD-A320181; AFOSR-TR-97-0039; No Copyright; Avail: CASI; A03, Harcopy; A01, Microfiche

In recent studies we demonstrated that pretreatment of hamsters with specific 5-HT receptor agonists, or the serotonin (5-HT) precursor, tryptophan, markedly attenuated a variety of light-induced responses of the SCN clock. These included immediate-early gene (Fos) activation in SCN cells, light-mediated SCN field potentials, phase-shifts of the free-running circadian activity rhythm and phase advances of the light-entrained activity rhythm. Based upon these clear and repeatable effects of 5-HT in the SCN, it was hypothesized that 5-HT modulates the effect of light on the timing of circadian physiological and behavioral rhythms. The central findings of the funded studies were that endogenous 5-HT released from terminals within the SCN has physiological roles in: (1) modulating the strength of the photic entraining signal relayed to the SCN from the retina; and (2) eliciting phase-shifts in the activity of the circadian clock. These results point to a potentially powerful means of pharmacologically manipulating the human circadian system as a strategy for ameliorating circadian-related disfunctions.

DTIC

Circadian Rhythms; Biochemistry; Activity (Biology); Brain; Neurology

19970020949 Barnard Coll., New York, NY USA

Diffusible and Driving Signals of Htebiological Clock Final Report, 15 May 1994 - 27 Aug. 1995

Silver, Rae, Barnard Coll., USA; Aug. 27, 1995; 8p; In English

Contract(s)/Grant(s): F49620-94-I-0294; AF Proj. 2312

Report No.(s): AD-A320180; AFOSR-TR-97-0050; No Copyright; Avail: CASI; A02, Harcopy; A01, Microfiche

While it is well established that the SCN is the site of an endogenous circadian pacemaker that drives many behavioral and physiological rhythms, the output or coupling mechanisms(s) for signaling the brain and the rest of the body is not known. We used an encapsulation technique to physically isolate the grafted neurons from the host brain. Because the donor period (about 24 hours) is easily distinguishable from the freerunning period (about 20 hours) of the host hamster, restored rhythms can be attributed unambiguously to the SCN of the donor tissue. Encapsulated SCN grafts (N = 4) implanted into the 3rd ventricle of SCN-lesioned hamsters rescues wild-type locomotor behavior in (and only in) animals in which tissue survives within the capsule. This provides definitive evidence of diffusible output signals from the SCN in controlling locomotor rhythmicity.

DTIC

Circadian Rhythms; Diffusion; Brain; Encapsulating; Physiology; Rhythm (Biology)

19970021163 Institute for Human Factors TNO, Soesterberg, Netherlands

A Vestibular-Based Motion Sickness Incidence Model Interim Report Een bewegingsziektemodel op vestibulaire grondslag

Bos, J. E., Institute for Human Factors TNO, Netherlands; Bles, W., Institute for Human Factors TNO, Netherlands; Apr. 18, 1997; 26p; In English

Contract(s)/Grant(s): A95/KM/358

Report No.(s): TM-97-A032; TD-97-0195; Copyright; Avail: Issuing Activity (TNO Human Factors Research Inst., Kampweg 5, 3769 De Soesterberg, The Netherlands), Harcopy, Microfiche

Based on a mathematical description of experimental data, today a model exists that predicts the percentage of seasick people. In this report the author redefines a general vestibular conflict model onto a model in which the subjective vertical plays a crucial role. This gives the marked result that for one dimension (the vertical motion) the known experimental data are predicted qualitatively well. by a proper parameter choice and by taking a transfer function for individual and/or group behavior, this model also fits the experimental data quantitatively well, with similar accuracy as the present descriptive models. Two descriptive models from the literature are reviewed.

Derived from text

Motion Sickness; Mathematical Models; Vestibules

19970021253 Naval Aerospace Medical Research Lab., Pensacola, FL USA

Human Vestibulo-Ocular Response During 3-G(z) Centrifuge Stimulation Final Report

McGrath, B. J., Massachusetts Inst. of Tech., USA; Oman, C. M., Massachusetts Inst. of Tech., USA; Guedry, F. E., University of West Florida, USA; Rupert, A. H., Naval Aerospace Medical Research Lab., USA; Dec. 1996; 26p; In English

Report No.(s): AD-A320689; NAMRL-1388; No Copyright; Avail: CASI; A03, Harcopy; A01, Microfiche

The Vestibulo-Ocular Reflex (VOR) and spatial orientation perceptions were recorded in 15 subjects during a 3-Gz centrifuge run. These data were obtained to study two issues; first, to gain insight into reports of asymmetrical disorientation and disturbance during acceleration and deceleration of G-induced loss of consciousness (G-LOC) training centrifuges. Secondly, to study the effects of sustained vertical linear acceleration on the vestibular system. The centrifuge run consisted of an acceleration to 3-Gz in 19 s, sustained 3-Gz for 5 min, and a deceleration to 1 Gz in 19 s. The runs were repeated three times with the subject facing the motion, and three times with the subject's back to the motion. The VOR and spatial orientation perceptions from the eight subjects who completed all six runs were analyzed. The total VOR response during acceleration and deceleration of a centrifuge run is composed of interacting angular and linear VOR components. However, the VOR response did not correspond to reported asymmetries in pitch orientation perception between centrifuge acceleration and deceleration. During the constant velocity high G phase of a centrifuge run, a sustained up-beating ("Lz") nystagmus was observed in 14 of the 15 subjects. For the eight subjects analyzed, Lz nystagmus was shown to be an individual subject characteristic, and displayed a range of mean magnitudes from 0 to 10 deg/s at 90 s. Assuming a normal visual suppression ratio of the VOR, the magnitudes of the Lz nystagmus in our subject sample did not appear sufficient to degrade visual acuity.

DTIC

Vestibules; Human Reactions; Centrifuges; Stimulation; Spatial Distribution; Visual Acuity; Oculomotor Nerves

19970021309 Army Research Inst. of Environmental Medicine, Thermal and Mountain Medicine Div., Natick, MA USA

Exercise Responses Associated with Altitude Acclimatization Are Retained During Reintroduction to 4,300 M

Beidleman, Beth A., Army Research Inst. of Environmental Medicine, USA; Muza, Stephen R., Army Research Inst. of Environmental Medicine, USA; Rock, Paul B., Army Research Inst. of Environmental Medicine, USA; Fulco, Charles S., Army Research Inst. of Environmental Medicine, USA; Lyons, Timothy P., Army Research Inst. of Environmental Medicine, USA; Jan. 1996; 28p; In English

Report No.(s): AD-A320729; No Copyright; Avail: CASI; A03, Harcopy; A01, Microfiche

Following 2-3 wk of altitude acclimatization, ventilation is increased and Heart Rate (HR), Plasma Volume (PV) and Lactate accumulation (La) are decreased during submaximal exercise. We hypothesized that some degree of exercise responses associated with acclimatization would be retained upon reintroduction to altitude (RA) after 8 d at sea level (SL). Six male lowlanders EXercised to EXHhaustion (EXH) at the same relative percentages of peak oxygen uptake at SL, on Acute Altitude (AA) exposure, after a 16-d Chronic Altitude (CA) exposure on Pikes Peak (4,300 m), and during a 3-4-h RA after 8 d at SL. The EXH time was the same at SL (66.0 +/- 1.6 min), AA (67.7 +/- 7.3 min), CA (79.9 +/- 6.2 min) and RA (67.9 +/- 1.9 min). At 75% VO(2peak): (1) arterial oxygen saturation (SaO2) increased from AA to CA (67.0 +/- 1.5 vs. 78.5 +/- 1.8%; P<0.05) and remained increased at RA (77.0 +/- 2.0%); (2) HR decreased from SL to CA (171 +/- 6 vs. 152 +/- 9) remained increased at RA (77.0 +/- 2.0%); (2) HR decreased from SL to CA (171 +/- 6 vs. 152 +/- 9 bpm; P<(0.05) and remained decrease at RA (157 +/- 5 bpm); (3) calculated PV decreased 6.9 +/- 10.0% at AA, 21.3 +/- 11.1% at CA, and 16.7 +/- 5.4% at RA from SL baseline values, and (4) La decreased from

AA to CA (5.1 +/- 0.9 vs. 1.9 +/- 0.4 mmol-l(-1); P<0.05) and remained decreased to RA (2.6 +/- 0.6 mmol-l(-1)). For each individual, percent retention of acclimatization response was calculated as (RA-AA)/(CA-AA) - 100. Upon RA after 8 d at SL, the acclimatization responses were retained 92 +/- 9% for SaO(2), 74 +/- 8% for PV and 58 +/- 3% for La at 75% VO(1peak).

DTIC

Altitude Acclimatization; Physical Exercise; Blood Plasma; Fatigue (Biology)

19970021566 Naval Aerospace Medical Research Lab., Pensacola, FL USA

Effect of Pitch Tilt on Vertical Optokinetic Nystagmus

Correia, M. J., Texas Univ., USA; Kolev, O. I., Bulgarian Academy of Sciences, Bulgaria; Rupert, A. H., Naval Aerospace Medical Research Lab., USA; Guedry, F. E., University of West Florida, USA; Sep. 23, 1996; 20p; In English
Report No.(s): AD-A320735; NAMRL-1394; No Copyright; Avail: CASI; A03, Harcopy; A01, Microfiche

Vertical OptoKinetic Nystagmus (VOKN) and VOKN after-responses were measured simultaneously in nine subjects using the Cornen-Retinal Potential (CRP) technique and an infrared video-camera detection apparatus (ISCAN). The ISCAN method produced a much smaller intersubject variability, a higher linear regression coefficient (0.94) when vertical eye position was regressed against vertical target position (6 subjects; +/- 30 deg, 5 deg increments), and VOKN gains comparable to the scleral search coil method. Detected by ISCAN, VOKN responses were measured at three angles of pitch head (and body) tilt: upright (0 deg), supine (90 deg), and declined 45 deg below horizontal (135 deg). Two stripe velocities (40 deg/s and 60 deg/s) were used. In six of the subjects, upward (slow-phase velocity up) VOKN gain (eye velocity/stripe velocity) was greater than downward (slow-phase down) VOKN gain for both stripe velocities at all tilt angles. The gain for both upward and downward VOKN decreased as stripe velocity increased from 40 to 60 deg/s, which suggests that both upward and downward VOKN systems were starting to saturate. Across subjects, a mean up-down asymmetry index (I) increased monotonically as the tilt angle increased. The slope of the monotonic function was greater for 60 deg/s stripe velocity than for 40 deg/s stripe velocity. The mean of all subjects' individual asymmetry ratios (ASYM), also increased as tilt increased. Optokinetic after-responses observed in the present study were of two types: (1) resetting of the eye from a beating field (eye position) that occurred during optokinetic stimulation with nystagmus superimposed, and (2) resetting of the eye without nystagmus superimposed. Upward VOKN produced the greatest number of after-responses.

DTIC

Eye (Anatomy); Eye Movements; Position (Location); Nystagmus; Phase Velocity

19970021712 Naval Aerospace Medical Research Lab., Pensacola, FL USA

Otolith Contribution to Ocular Torsion and Spatial Orientation During Acceleration Final Report

DeGraaf, B., Institute for Human Factors TNO, Netherlands; Bos, J. E., Institute for Human Factors TNO, Netherlands; Tielemans, W., Royal Netherlands Air Force, Netherlands; Rameckers, F., Royal Netherlands Air Force, Netherlands; Rupert, A. H., Naval Aerospace Medical Research Lab., USA; Guedry, F. E., University of West Florida, USA; Sep. 1996; 27p; In English
Report No.(s): AD-A320766; NAMRL-TM-96-3; No Copyright; Avail: CASI; A03, Harcopy; A01, Microfiche

Humans perceive linear acceleration and tilt by the otoliths as a result of shear forces on the maculae. A paradigm was set up to study the influence of forces from different directions on the otoliths, on eye movements and tilt perception. On the Coriolis Acceleration Platform of the Naval Aerospace Medical Research Laboratory (NAMRL), five adult male subjects were oscillated in the lateral direction (Y-axis, subject either sitting 'upright' or 'supine') and in the longitudinal direction (Z-axis, subject 'supine' or on his right side). A fifth condition, in which the subject was oriented 'upright' facing the direction of oscillation (X-axis), served as a control condition. In separate sessions, the same subjects were also rotated in these five orientations. Data were obtained by measuring ocular torsion with video-oculography, and the direction of the subjective vertical was recorded by means of a joystick. The sinusoidal oscillations were at 0.22, 0.3, 0.4, and 0.5 Hz, with maximum amplitude of 0.5 g. Rotations were at 17 feet from center at 57 deg/S, which resulted in a centripetal force of 0.5 G on the head. Ocular torsion appeared in all four main conditions (acceleration in Y and Z), but with a significant difference in amplitude. No torsion was found in the control condition (acceleration in X), as was expected. The subjects experienced tilt under centrifugation, and indicated a so-called 'hilltop illusion' during oscillation. The experience of tilt and ocular torsion were most prominent at the lower oscillation frequencies.

DTIC

Aerospace Medicine; Otolith Organs; Spatial Distribution; Acceleration Stresses (Physiology); Coriolis Effect; Gravitational Physiology; Physiological Acceleration

19970021715 Virginia Polytechnic Inst. and State Univ., Blacksburg, VA USA

Does Vergence Influence the Vestibulo-Ocular Reflex in Human Subjects Rotating in the Dark? Final Report

Fajardo, Ann B., Virginia Polytechnic Inst. and State Univ., USA; Aug. 1996; 114p; In English

Contract(s)/Grant(s): NR Proj. MR0-4101

Report No.(s): AD-A320780; NAMRL-Mono-48; No Copyright; Avail: CASI; A06, Harcopy; A02, Microfiche

In recent experiments involving acceleration stimuli, researchers instructed subjects to focus on a visual target while measuring the vestibulo-ocular reflex (VOR) in one eye. These experiments showed conclusively that the VOR is influenced by target distance. We, on the other hand, were interested in investigating the VOR of subjects accelerated in complete darkness. Specifically, we wished to determine the subject's vergence point, which cannot be accomplished using data obtained from only one eye. Hence, a binocular eye-tracking system that works in the dark was required. In the experiment described in this thesis, the subject was rotated in the dark on NAMRL's Coriolis Acceleration Platform. The position of each pupil center was tracked and recorded by two helmet-mounted infrared cameras connected to a computer-controlled data acquisition system. The position data were used to calculate the angles through which the eyes rotated, and then trigonometric principles were applied to construct the line of sight for each eye for any moment in time; the intersection of these two lines is the vergence point. With the NAMRL binocular eye-tracking system, an accelerating subject's vergence point can accurately be determined if it is less than 1.5 meters away. The vergence data obtained from this experiment suggest that vergence distance does not exclusively drive the VOR in the dark.

DTIC

Reflexes; Eye (Anatomy); Vestibules; Coriolis Effect; Infrared Radiation; Oculomotor Nerves

19970021724 Naval Health Research Center, San Diego, CA USA

Aircraft Type and Diagnosed Back Disorders in U.S. Navy Pilots and Aircrew *Interim Report, 1991 - 1993*

Simon-Arndt, C. M., Naval Health Research Center, USA; Yuan, H., Naval Health Research Center, USA; Hourani, L. L., Naval Health Research Center, USA; Sep. 1996; 29p; In English

Report No.(s): AD-A319230; NHRC-96-27; No Copyright; Avail: CASI; A03, Harcopy; A01, Microfiche

Back disorders have long been recognized as a serious problem within the military aviation community and a possible threat to mission accomplishment. The purpose of the present study was to determine the extent to which type of aircraft flown is associated with diagnosed back problems, and to examine differences in the prevalence of back disorders between pilots and aircrew. A case-control study was conducted in which active-duty pilots and aircrew members with a diagnosed back disorder on their most recent physical exam between 1991 and 1993 were compared with pilots and aircrew without such diagnoses. Data were obtained from the automated physical examination records maintained by the Naval Aerospace and Operational Medical Institute for all naval aviation personnel. Results showed that aircrew members have a higher risk of diagnosed back problems than pilots for both helicopters and fixed-wing aircraft. The study revealed that flight engineers have a higher risk of diagnosed back problems than other aircrew members. Among pilots, no association was found between type of aircraft and diagnosed back problems.

DTIC

Military Aviation; Flying Personnel; Flight Crews; Fixed Wings; Back Injuries

19970022093 California Univ., Davis, CA USA

Genetic Immunization for Lentiviral Immunodeficiency Virus Infection and Disease *Annual Report, 30 Sep. 1995 - 29 Sep 1996*

Gardner, Murray B., California Univ., USA; Oct. 1996; 188p; In English

Contract(s)/Grant(s): DAMD17-94-J-4436

Report No.(s): AD-A321591; No Copyright; Avail: CASI; A09, Harcopy; A02, Microfiche

In year two of this project we have developed and characterized four novel SIV envelope expression vectors and one vector expressing both envelope and core components for genetic immunization of rhesus monkeys. Experiments using test antigens to determine optimum DNA vaccine parameters are near completion. Beginning in January 1997 we will test one or more of these SIV DNA vaccines for protection against SIV challenge infection via systemic (IV) and mucosal (vaginal) routes of administration. As a potential secondary challenge, should the vaccinated monkeys be protected against homologous SIV, we have developed a pathogenic SIV/HIV (SHIV) envelope recombinant. Cytokine profiles of acutely infected monkeys have been characterized and a large number of rhesus cytokine, B-chemokine and chemokine receptor genes have been cloned, sequenced and recombinant molecules prepared for possible use as immune modulators or adjuvants.

DTIC

Viral Diseases; Infectious Diseases; Deoxyribonucleic Acid; Immunology; Genetics

19970022119 Pennsylvania Univ., Philadelphia, PA USA

MediSIM: Simulated Medical Corpsmen for Medical Forces Planning and Training *Annual Report, 8 Sep. 1995 - 7 Sep 1996*

Badler, Norma I., Pennsylvania Univ., USA; Ting, Bond-Jay, Pennsylvania Univ., USA; Azuola, Francisco, Pennsylvania Univ.,

USA; Ho, Pei-Hwa, Pennsylvania Univ., USA; Huh, Suejung, Pennsylvania Univ., USA; Oct. 1996; 145p; In English
Contract(s)/Grant(s): DAMD17-94-J-4486

Report No.(s): AD-A321583; No Copyright; Avail: CASI; A07, Harcopy; A02, Microfiche

This document presents the details of the construction of the Jack human figure model. It explains the methods used in putting the model together, the data and references employed, as well as other related topics regarding the application of this model within the interactive 3-D environment of Jack.

DTIC

Computerized Simulation; Military Operations

53

BEHAVIORAL SCIENCES

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

19970020640 Colorado Univ., Psychology Dept., Denver, CO USA

Generalizability Theory as Evidence of the Reliability and Validity of Work Sample Tests and Proficiency Ratings *Interim Report, Sep. 1993 - Jun. 1995*

Kraiger, Kurt, Colorado Univ., USA; Teachout, Mark S., Armstrong Lab., USA; Dec. 1995; 25p; In English

Contract(s)/Grant(s): F41689-84-D-0001; AF Proj. 1121

Report No.(s): AD-A317650; AL/HR-TP-1995-0036; No Copyright; Avail: CASI; A03, Harcopy; A01, Microfiche

This paper uses generalizability (G) theory as a framework to investigate the reliability and construct validity of the Air Force Job Performance Measurement System. G theory was a useful technique for examining the psychometric quality of the measurement system because it permits the specification and estimation of multiple sources of measurement error. G theory was applied to newly developed work sample procedures, Walk-Through performance Tests and to a series of job proficiency ratings comprised of four different rating forms collected from three rating sources. The results provided evidence of strong convergent and discriminant validity of these work sample tests, strong convergent validity across rating forms, and moderate discriminant validity of the rating system. However, ratings did not generalize across self, peer and supervisor rating sources. Results are discussed in terms of their practical and theoretical implications.

DTIC

Psychometrics; Human Performance; Analysis of Variance

19970021142 Institute for Human Factors TNO, Soesterberg, Netherlands

The influence of suppletion of Tyrosine on mental task performance under stress and fatigue *Final Report De invloed van tryosine suppletie op de mentale prestatie bij stress en vermoeidheid*

Wientjes, C. J. E., Institute for Human Factors TNO, Netherlands; Deijen, J. B., Institute for Human Factors TNO, Netherlands; Vullingsh, H. F. M., Institute for Human Factors TNO, Netherlands; Feb. 17, 1997; 31p; In Dutch

Contract(s)/Grant(s): A96/M/340

Report No.(s): TM-97-A010; TD-97-0171; Copyright; Avail: Issuing Activity (TNO Human Factors Research Inst., Kampweg 5, 3769 De Soesterberg, The Netherlands), Harcopy, Microfiche

Authors investigated whether suppletion of the amino-acid tyrosine during a sustained and demanding military combat course would lead to a reduction of the negative effects of stress and fatigue upon the performance of cognitive and perceptual/motor tasks. The effects of tyrosine suppletion upon subjective experience, blood pressure, and a noradrenaline metabolite (MHPG) were also assessed. A double blind pre-post research design was employed. During a measurement session that took place six days after commencement of the combat course, it was found that a group that had been supplied with tyrosine during five consecutive days of the combat course, performed better on a memory comparison task, as well as on a tracking task, than a group that had been supplied with a placebo. Any group differences in performance that had existed before commencement of the combat course had been corrected for. Regarding the subjective and physiological variables, no effects of the tyrosine suppletion were established, with the exception of a fall in systolic blood pressure in the tyrosine group. These findings suggest that suppletion of tyrosine may, under operational circumstances that are characterized by psycho-social and physical stress, contribute to reduce cognitive stress responses. It seems plausible that the positive results were a direct consequence of the fact that suppletion of tyrosine may serve to prevent depletion of noradrenaline in the brain. This research provides a first, and potentially important clue that suppletion of tyrosine under certain operational conditions may contribute to maintaining the operational effectiveness of military personnel.

It is suggested that the results are sufficiently encouraging to warrant a replication. In planning a replication, measures should be taken to avoid these problems.

Author (revised)

Tyrosine; Mental Performance; Stress (Biology); Stress (Psychology); Fatigue (Biology)

19970021417 Louisiana State Univ., School of Medicine, Shreveport, LA USA

Cerebral Neurochemical Mechanisms in Stress and Anxiety Final Report, 1 Feb. 1993 - 30 Jun. 1996

Dunn, Adrian J., Louisiana State Univ., USA; Swiergiel, Arthur H., Louisiana State Univ., USA; Sep. 30, 1996; 21p; In English
Contract(s)/Grant(s): F49620-93-I-0125; AF Proj. 2312

Report No.(s): AD-A320681; AFOSR-TR-97-0068; No Copyright; Avail: CASI; A03, Harcopy; A01, Microfiche

Cerebral noradrenergic systems and their interactions with Corticotropin-Releasing Factor (CRF) in stress-related responses were studied. (1) Microdialysis studies indicated that hypotension and footshock increased release of hypothalamic and cortical NorEpinephrine (NE). (2) A new voltammetric probe was designed to provide voltammetric data that a hypotensive agent, sodium nitroprusside, increases cortical NE secretion. (3) CRF infused into the locus coeruleus (LC) but not into surrounding structures, such as the parabrachial nucleus, increased secretion of cortical NE, supporting the notion that CRF affects the activity of LC-NE neurons. (4) Peripheral administration of InterLeukin-1 (IL-1) known to activate cerebral noradrenergic systems increased extracellular NE in the hypothalamus, and this activation was implicated in the induction of Fos protein in the hypothalamic paraventricular nucleus. (5) Chlordiazepoxide administered systemically or locally decreased the secretion of NE induced by footshock and CRF. (6) Activation of noradrenergic systems by idazoxan or treatment with propranolol attenuated footshock-induced freezing and ultrasonic vocalization. Idazoxan did not alter the acquisition of conditioned fear, but it depressed the expression of that behavior. (7) 6-Hydroxydopamine lesions of the dorsal noradrenergic bundle did not consistently alter stress-induced behavioral patterns.

DTIC

Neurology; Cerebrum; Cardiovascular System; Stress (Biology); Stress (Physiology)

19970021435 Naval Aerospace Medical Research Lab., Pensacola, FL USA

Landing Craft Air Cushion (LCAC) Vehicle Crew Selection: An Overview

Robertson, K. D., Naval Aerospace Medical Research Lab., USA; Nontasak, T., Naval Aerospace Medical Research Lab., USA; Jun. 1996; 18p; In English

Report No.(s): AD-A320739; NAMRL-SR-96-2; No Copyright; Avail: CASI; A03, Harcopy; A01, Microfiche

This report provides an overview of the research conducted at the Naval Aerospace Medical Research Laboratory (NAMRL) to improve Landing Craft Air Cushion (LCAC) crew selection. The report includes background information, crew task analysis procedures, identification of critical skills, and the development of selection tests. In addition, the report provides a description of the test battery, the prediction algorithm, and initial results of the selection system for certain crew members. Prior to the implementation of the selection system, the attrition rate for operators and engineers was unacceptably high, ranging from 35 to 41%. to date, the attrition rate for operators and engineers has declined dramatically to approximately 15% with the use of the LCAC Selection System (LCSS). The LCSS proved to be a cost-effective method of reducing the high costs associated with training attrition and equipment loss. Additionally, the report describes current activities and presents direction for future research. A list of publications related to the LCAC program is also included.

DTIC

Air Cushion Landing Systems; Personnel Selection; Flight Crews; Aerospace Medicine

19970021969 George Mason Univ., Fairfax, VA USA

Proceedings of the Third International Workshop on Multistrategy Learning Final Report, 1 May - 31 Jul. 1996

Michalski, Ryszard S., Editor, George Mason Univ., USA; Wnek, Janusz, Editor, George Mason Univ., USA; Sep. 16, 1996; 333p; In English; 3rd; Multistrategy Learning, 23-25 May 1996, Harpers Ferry, WV, USA; Sponsored by National Science Foundation, USA

Contract(s)/Grant(s): N00014-96-I-0859

Report No.(s): AD-A316878; No Copyright; Avail: CASI; A15, Harcopy; A03, Microfiche

The Third International Workshop on Multistrategy Learning (MSL-96), held in Harpers Ferry, WV, May 23-25, 1996, attracted leading researchers in this area from Australia, Austria, Belgium, France, Germany, Italy, Japan, New Zealand, Poland, and the USA. The workshop covered theoretical and empirical issues in the development of learning systems that employ multiple inferential and/or computational strategies. The study of such systems draws upon the achievements in all subareas of machine learning, and constitutes a major new research direction in the field. Major topics of the workshop included: the study of interrela-

tionships among learning strategies and paradigms, cognitive models of learning processes and their relationships to methods and paradigms of machine learning, the development of multistrategy learning systems, and their practical applications. Among major application areas presented at the workshop were data mining and knowledge discovery in large databases, intelligent text retrieval, flight simulation, robot navigation robot control, planning, stock market analysis, world wide web searches, and molecular biology.

DTIC

Artificial Intelligence; Computer Assisted Instruction; Machine Learning; Conferences

19970022021 Naval Postgraduate School, Dept. of Operations Research, Monterey, CA USA

An Assessment of the Impact of Fused Monochrome and Fused Color Night Vision Displays on Reaction Time and Accuracy in Target Detection

Sampson, Matthew T., Naval Postgraduate School, USA; Sep. 1996; 129p; In English

Report No.(s): AD-A321226; No Copyright; Avail: CASI; A07, Harcopy; A02, Microfiche

Night Vision Devices (NVDs) employed by the military fall into two categories: Image Intensifiers (I2) also known as Night Vision Goggles (NVGs) and Infrared (IR). Each sensor provides unique visual information not available to the unaided human visual system. However, these devices have limitations and they have been listed as a causal factor in many crashes of military aircraft at night. Researchers hypothesize that digitally fusing the output from these sensors into one image and then artificially coloring the image will improve an NVD user's visual performance. The purpose of this thesis was to determine if fusion and coloring of static, natural scene NVG and IR imagery will improve reaction time and accuracy in target detection. Pairs of static images from three different scenes were obtained simultaneously from NVG and IR sensors. The six original images were fused pixel by pixel and then colored using a computer algorithm. A natural target was moved to two other coherent positions in the scene or completely removed, resulting in twenty-four images for each of the three natural scenes. Six subjects viewed the images randomly on a high-resolution monitor, rapidly indicating on a keypad if the target was present (1) or absent (2). Reaction time and accuracy were recorded. An ANOVA on the output and a subsequent review of the images revealed that fusion significantly impacted local (target) contrast and that, coupled with scene content, decreased performance on the task.

DTIC

Human Factors Engineering; Target Acquisition; Night Vision; Goggles; Display Devices; Color Vision; Image Intensifiers; Infrared Detectors; Infrared Imagery; Visual Perception

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.

19970020700 Institute for Human Factors TNO, Soesterberg, Netherlands

Workload among Tactical Coordinators of the Lynx Helicopter: Problem Orientation and Research Proposal Final Report
Werkbelasting bij de Tactical Coördinatoren van de Lynx helikopter: Probleemoriëntatie en onderzoeksvoorstel

Veltman, J. A., Institute for Human Factors TNO, Netherlands; Gaillard, A. W. K., Institute for Human Factors TNO, Netherlands; Jan. 31, 1997; 26p; In Dutch

Contract(s)/Grant(s): A96/KM/328

Report No.(s): TM-97-A008; TD-96-0515; Copyright; Avail: Issuing Activity (Inst. for Human Factors TNO, Soesterberg, Netherlands), Harcopy, Microfiche

By order of the Royal Navy, bottlenecks in the workload of the crew of the Lynx will be explored. The report gives a general overview of mental workload and the available measurement techniques. Based on this, a procedure is outlined that provides information about the bottlenecks in the workload of the crew of the Lynx. It is proposed to perform measurements, among the crew of the Lynx, during sorties in the simulator at the Kooy. Mental effort of the TACCO will be measured with physiological measures during task performance. The sorties will be recorded on video tape and afterwards, the three crew members have to indicate the tasks that are performed, based on the video recordings. A computer program has been developed to do this efficiently. The program presents the tasks on the screen that can appear at each segment of the sortie. The start and the end of a task can simply be indicated with a key press on the keyboard. The program also asks every minute to estimate the effort expenditure during task performance for the last minute. Mental effort will be measured objectively (physiological measures) and subjectively (effort ratings) and this will be related to the tasks that were performed. The results can be used to change the tasks of the operators. Further-

more, this procedure provides information about the tasks and combination of tasks that lead to high levels of workload. This knowledge can be used to make better predictions of the workload in complex systems in the future, for example the NH90.

CASI

Workloads (Psychophysiology); Human Performance; Mental Performance

19970021161 National Academy of Sciences - National Research Council, Subcommittee on Spacecraft Maximum Allowable Concentrations, Washington, DC USA

Spacecraft Maximum Allowable Concentrations for Selected Airborne Contaminants, Volume 3

1996; 362p; In English

Contract(s)/Grant(s): NAGw-2239

Report No.(s): NASA-CR-204302; NAS 1.26:204302; ISBN-0-309-05629-2; Copyright Waived (NASA); Avail: CASI; A16, Harcopy; A03, Microfiche

The National Aeronautics and Space Administration (NASA) is aware of the potential toxicological hazards to humans that might be associated with prolonged spacecraft missions. Despite major engineering advances in controlling the atmosphere within spacecraft, some contamination of the air appears inevitable. NASA has measured numerous airborne contaminants during space missions. As the missions increase in duration and complexity, ensuring the health and well-being of astronauts traveling and working in this unique environment becomes increasingly difficult. As part of its efforts to promote safe conditions aboard spacecraft, NASA requested the National Research Council (NRC) to develop guidelines for establishing Spacecraft Maximum Allowable Concentrations (SMAC's) for contaminants, and to review SMAC's for various spacecraft contaminants to determine whether NASA's recommended exposure limits are consistent with the guidelines recommended by the subcommittee. In response to this request, the NRC first developed criteria and methods for preparing SMAC's for spacecraft contaminants, published in its 1992 report Guidelines for Developing Spacecraft Maximum Allowable Concentrations for Space Station Contaminants. Since then, the Subcommittee on Spacecraft Maximum Allowable Concentrations has been reviewing NASA's documentation of chemical-specific SMAC's as described in the Introduction to this volume. This report is the third volume in the series Spacecraft Maximum Allowable Concentrations for Space Station Contaminants. The first volume was published in 1994 and the second in 1996.

Derived from text

Contamination; Hazardous Materials; Toxic Hazards; Exposure

19970021192 Institute for Human Factors TNO, Soesterberg, Netherlands

Quantifying the Image Quality of the KDC-10 Refueling Vision System Final Report De Beeldkwaliteit van het KDC-10 Bijtank System

Kooi, F. L., Institute for Human Factors TNO, Netherlands; Van Breda, L., Institute for Human Factors TNO, Netherlands; Dec. 04, 1996; 22p; In Dutch

Report No.(s): AD-A320634; TNO-TM-96-A052; TDCK-RP96-0195; No Copyright; Avail: CASI; A03, Harcopy; A01, Microfiche

The image quantity of the KDC-10 refueling vision system has been evaluated in terms of resolution and contrast sensitivity. To this aim a new contrast test was developed. A comparison to other systems shows that the KDC-10 refueling vision system is particularly tracking in its contrast representation. A recent adjustment to the system partially improved its characteristics. Part of the poor contrast representation is due to the incomplete image separation of the stereoscopic screen. On the basis of a quantitative analysis of the image quality recommendations for further improvement are given.

DTIC

Image Resolution; DC 10 Aircraft; Fuel Systems; Flight Operations; Refueling; Human Factors Engineering

19970021252 Army Research Inst. of Environmental Medicine, Natick, MA USA

Thermoregulatory Responses to Cold Transients: Effects of Two Clothing Systems in Resting Women

Gonzalez, Richard R., Army Research Inst. of Environmental Medicine, USA; Blanchard, Laurie A., Army Research Inst. of Environmental Medicine, USA; Allison, William F., III, Army Research Inst. of Environmental Medicine, USA; Gonzalez, Julio A., Army Research Inst. of Environmental Medicine, USA; Dec. 1996; 58p; In English

Report No.(s): AD-A320690; No Copyright; Avail: CASI; A04, Harcopy; A01, Microfiche

This report focuses on development of a thermoregulatory model useful for forecasting heat exchange properties, shivering thermogenesis, and body temperature response in women wearing protective clothing. Six female, nonsmokers (18-29 yr), resting supine, were exposed to a cold ramp ($T_a = T_r = 20\text{ C to } -5\text{ C}$, 0.320 C/min , $V=1\text{ m/s}$) in the follicular phase ($F=\text{days } 2-6$) and in the luteal phase ($L=\text{days } 19-23$) of their menstrual cycle. Subjects were either Battle Dress Uniforms (BDU) or Battle Dress Over-

garment over the BDU with thermal resistances of $R(\text{sub } t) = 0.2$ and 0.4 sq m K/W , respectively. Esophageal temperature ($T(\text{sub } es)$) rose during the cold ramps. Shivering thermogenesis ($\Delta M = M - M(\text{sub } basal)$, $W/\text{sq m}$) was correlated ($r(\text{sup } 2) = 0.9$) with reduced mean weighted skin ($T(\text{sub } sk)$, six sites) and finger temperature ($T(\text{sub } fing)$, under a work glove). Menstrual cycle stage and clothing resistance were significant (P less than equal 0.05) modifiers of the rate of heat debt based on partitioned calorimetry determined from M , body weight, surface area, $T(\text{sub } es)$, and $T(\text{sub } sk)$. Thermal Information from extremities and variations in body heat content during a given menstrual phase, independent from core and $T(\text{sub } sk)$, must be considered in any thermoregulatory model quantifying (ΔM) effects in resting women exposed to cold stress. Several cold-air models which incorporate Body Fat, core and skin temperature inputs were fairly reliable predictors of shivering response over a limited scope of operational and environmental levels.

DTIC

Thermoregulation; Protective Clothing; Temperature Control

19970021275 Life Systems, Inc., Cleveland, OH USA

Low pCO₂ Air-Polarized CO₂ Concentrator Development Final Report, 3 Nov. 1995 - 1 Jun. 1997

Schubert, Franz H., Life Systems, Inc., USA; May 30, 1997; 126p; In English

Contract(s)/Grant(s): NASw-5019

Report No.(s): NASA-CR-204535; NAS 1.26:204535; TR-1739-11; No Copyright; Avail: CASI; A07, Harcopy; A02, Microfiche

Life Systems completed a Ground-based Space Station Experiment Development Study Program which verifies through testing the performance and applicability of the electrochemical Air-Polarized Carbon Dioxide Concentrator (APC) process technology for space missions requiring low (i.e., less than 3 mm Hg) CO₂ partial pressure (pCO₂) in the cabin atmosphere. Required test hardware was developed and testing was accomplished at an approximate one-person capacity CO₂ removal level. Initially, two five-cell electrochemical modules using flight-like 0.5 sq ft cell hardware were tested individually, following by their testing at the integrated APC system level. Testing verified previously projected performance and established a database for sizing of APC systems. A four person capacity APC system was sized and compared with four candidate CO₂ removal systems. At its weight of 252 lb, a volume of 7 cu ft and a power consumption of 566 W while operating at 2.2 mm Hg pCO₂, the APC was surpassed only by an Electrochemical Depolarized CO₂ Concentrator (EDC) (operating with H₂), when compared on a total equivalent basis.

Author

Carbon Dioxide; Space Stations; Depolarization; Electrochemistry; Concentrators; Cabin Atmospheres; Pressurized Cabins

19970021276 NASA Johnson Space Center, Houston, TX USA

Development of the Space Operations Incident Reporting Tool (SOIRT)

Minton, Jacquie, Lockheed Martin Engineering and Sciences Co., USA; Jun. 1997; 28p; In English

Contract(s)/Grant(s): NAS9-18800; JE9019-LN-3001

Report No.(s): NASA-TP-3660; NAS 1.60:3660; S-820; No Copyright; Avail: CASI; A03, Harcopy; A01, Microfiche

The space operations incident reporting tool (SOIRT) is an instrument used to record information about an anomaly occurring during flight which may have been due to insufficient and/or inappropriate application of human factors knowledge. We originally developed the SOIRT form after researching other incident reporting systems of this type. We modified the form after performing several in-house reviews and a pilot test to assess usability. Finally, crew members from Space Shuttle flights participated in a usability test of the tool after their missions. Since the National Aeronautics and Space Administration (NASA) currently has no system for continuous collection of this type of information, the SOIRT was developed to report issues such as reach envelope constraints, control operation difficulties, and vision impairments. However, if the SOIRT were to become a formal NASA process, information from crew members could be collected in a database and made available to individuals responsible for improving in-flight safety and productivity. Potential benefits include documentation to justify the redesign or development of new equipment/systems, provide the mission planners with a method for identifying past incidents, justify the development of timelines and mission scenarios, and require the creation of more appropriate work/rest cycles.

Author

Management Information Systems; Anomalies; Human Factors Engineering; Safety; Space Flight; Space Transportation System Flights

19970021375 Naval Postgraduate School, Dept. of Systems Management, Monterey, CA USA

Adaptive Information Systems: Portals to Employment, Targeting the Physically and Mentally Challenged

Tompkins, Bruce A., Naval Postgraduate School, USA; Sep. 1996; 86p; In English

Report No.(s): AD-A320702; No Copyright; Avail: CASI; A05, Harcopy; A01, Microfiche

This thesis assesses and provides a critical evaluation of reasonable accommodations in the telecommunications and information systems technologies for people with disabilities at the Naval Postgraduate School. The Americans with Disabilities Act of 1990 established a clear and comprehensive prohibition of discrimination on the basis of disability. As barriers to access are removed, more people with disabilities are taking their rightful places as contributing members of society. This research has provided an assessment of the Naval Postgraduate School's compliance with the spirit of the Americans with Disabilities Act in providing reasonable accommodations. Areas where information systems and telecommunications products and services are not fully accessible by faculty, staff or students with a disability were identified. This research provided recommendations to assist NPS faculty, staff and managers of Automated Information Systems providing Assistive Technologies Support Services and Devices. Outside resources were identified that can assist the Naval Postgraduate School by providing the expertise, education, and training on the issues dealing with reasonable accommodations in the workplace. The lessons learned are applicable to all Department of Defense activities.

DTIC

Information Systems; Disabilities; Telecommunication; Accommodation

19970021567 Armstrong Lab., Crew Systems Directorate, Wright-Patterson AFB, OH USA

Human Task Performance Throughout Prolonged High G Exposure Final Report, Mar. 1991 - Jun. 1996

Chelette, Tamara L., Armstrong Lab., USA; Albery, William B., Armstrong Lab., USA; Goodyear, Charles D., Logicon Technical Services, Inc., USA; Jul. 1996; 22p; In English

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

Report No.(s): AD-A320796; AL/CF-TR-1996-0135; No Copyright; Avail: CASI; A03, Harcopy; A01, Microfiche

In this research, human subjects repeatedly endured prolonged high-G simulated aerial combat to the point of loss of vision or physical exhaustion. Some profiles included over twenty plateaus at 9 Gz. Measures of cognitive and neuromuscular function, mental workload, and physiologic status were taken throughout the exposures, as well as neuropsychologic examinations after the exposures. Results indicate that more advanced protective systems not only allow longer endurance, but provide adequate support for maintained cognitive performance throughout the extended exposure. Although measures were affected by the type of protective system the subject was wearing as well as individual ability and coping strategies, consistent target tracking task performance, rapid recall decision reaction scores, and sufficient arterial oxygen saturation were maintained throughout extended exposures to a point preceding termination by only a second or two. No neuropsychological decrement was demonstrated post exposure.

DTIC

Breathing Apparatus; Oxygen Supply Equipment; Exposure

19970021638 Lockheed Martin Engineering and Science Services, Houston, TX USA

NASA Space Shuttle Light Weight Seats: The Final Chapter

King, Steven R., Lockheed Martin Engineering and Science Services, USA; Thirty-first Aerospace Mechanisms Symposium; May 1997, pp. 345-360; In English; Also announced as 19970021613; No Copyright; Avail: CASI; A03, Harcopy; A04, Microfiche

This paper completes the lessons learned discussion initiated by the 30th Aerospace Mechanisms Symposium paper titled NASA Space Shuttle Lightweight Seat. That paper covered the design, development, test, & evaluation (DDT&E) behind NASA's new Mission Specialist (MS) Light Weight Seat (LWS); however, two additional flight hardware elements of this program remain to be discussed - the Pilot LWS and a Light Weight Recumbent Seat Kit (LW RSK). These two flight elements are the focus of this paper.

Author

Seats; Space Shuttles; Performance Tests; Design Analysis

19970021730 Institute for Human Factors TNO, Soesterberg, Netherlands

Image Fusion Improves Situational Awareness Final Report Beeldfusie Verbeterd Situatie Inschatting

Toet, A., Institute for Human Factors TNO, Netherlands; Ijspeert, J. K., Institute for Human Factors TNO, Netherlands; vanDorresteijn, M. J., Institute for Human Factors TNO, Netherlands; Oct. 31, 1996; 32p; In English

Report No.(s): AD-A320762; TNO-TM-96-A051; TDCK-RP96-0192; No Copyright; Avail: CASI; A03, Harcopy; A01, Microfiche

Two recently developed false color image fusion techniques, the TNO fusion scheme and the MIT fusion scheme, are applied to visual and thermal images of military relevant scenarios. The scenes represent 3 different scenarios that simulate military surveillance tasks. The images are registered around sunrise. At this time, the contrast in both image modalities is low. However, the

visual images still provide a sufficient amount of detail to perceive the spatial structure of the scene. The thermal images clearly depict objects with large temperature contrast like persons, but they do not correctly represent the spatial context. The composite images produced by both fusion schemes clearly represent all details in their correct spatial context. An observer experiment is performed to test if the increased amount of detail in the fused images can yield an improved observer performance in a task that requires a certain amount of situational awareness. The task that is devised involves the localization of a person in the displayed scene relative to some characteristic details that provide the spatial context. The results show that observers can indeed determine the relative location of a person in a scene with a significantly higher accuracy when they perform with fused images, compared to the individual image modalities. The MIT color fusion scheme yields the best overall performance (i.e. an accuracy that is significantly higher than that obtained with images fused according to the TNO scheme and with the original images). Even the most simple TNO fusion scheme yields an observer performance that is better than that obtained for the individual (thermal and visual) images.

DTIC

Image Processing; Visual Perception; Target Acquisition; Multisensor Fusion

19970022038 Institute for Human Factors TNO, Soesterberg, Netherlands

Extrapolatie van antropometrische gegevens (Extrapolation of Anthropometric Data) Final Report

Werkhoven, P. J., Institute for Human Factors TNO, Netherlands; Nov. 01, 1996; 33p; In Dutch

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

Report No.(s): AD-A321179; TNO-TM-96-A045; TDCK-RP-96-0186; No Copyright; Avail: CASI; A03, Harcopy; A01, Microfiche

By order of the Royal Netherlands Air Force, TNO Human Factors Research Institute has carried out a study on how to infer from anthropometric data available the expected longitudinal changes in body measures of present day high-school graduates. Longitudinal growth is determined by repeatedly measuring the body measures of the same subjects over a longer period of time and can be decomposed into two components: transversal and secondary changes. Transversal changes are the differences between body measures of different age-groups measured in a particular year (a snapshot). Secondary changes are the differences between body measures in different years for a particular age-group. Longitudinal growth of stature can be inferred sufficiently accurately from transversal and secondary changes (direct extrapolation). Most recent transversal studies show that 19.5-year old men are approximately 1.7 cm taller than 17.5-year old men (0.4 cm for women). The secondary growth of full-grown men and women is 0.16 cm per year. From these transversal and secondary changes we infer that the stature of 17.5 year old male Dutch high-school graduates (averaged across region and race) in 1995 will increase by 2.0 cm to 182.9 cm in 1997. The body-length of 17.5-year old female high-school graduates in 1995 will increase by 0.7 cm to 170.2 cm in 1997. Transversal and secondary studies on other body measures than stature do not exist in the Netherlands. The extrapolation of body measures other than body-length, therefore, can be done only through indirect extrapolation (some body measures are approximately linearly related to body length). However, the extrapolation errors are not acceptable (for example, 5-7 cm for sitting height).

DTIC

Human Factors Engineering; Age Factor; Anthropometry

19970022132 NASA Marshall Space Flight Center, Huntsville, AL USA

Rationale and Methods for Archival Sampling and Analysis of Atmospheric Trace Chemical Contaminants On Board Mir and Recommendations for the International Space Station

Perry, J. L., NASA Marshall Space Flight Center, USA; James, J. T., NASA Johnson Space Center, USA; Cole, H. E., Boeing Defense and Space Group, USA; Limero, T. F., Krug Life Sciences, Inc., USA; Beck, S. W., Krug Life Sciences, Inc., USA; Apr. 1997; 56p; In English

Report No.(s): NASA-TM-108534; NAS 1.15:108534; No Copyright; Avail: CASI; A04, Harcopy; A01, Microfiche

Collection and analysis of spacecraft cabin air samples are necessary to assess the cabin air quality with respect to crew health. Both toxicology and engineering disciplines work together to achieve an acceptably clean cabin atmosphere. Toxicology is concerned with limiting the risk to crew health from chemical sources, setting exposure limits, and analyzing air samples to determine how well these limits are met. Engineering provides the means for minimizing the contribution of the various contaminant generating sources by providing active contamination control equipment on board spacecraft and adhering to a rigorous material selection and control program during the design and construction of the spacecraft. A review of the rationale and objectives for sampling spacecraft cabin atmospheres is provided. The presently-available sampling equipment and methods are reviewed along with the analytical chemistry methods employed to determine trace contaminant concentrations. These methods are compared and assessed with respect to actual cabin air quality monitoring needs. Recommendations are presented with respect to the basic sam-

pling program necessary to ensure an acceptably clean spacecraft cabin atmosphere. Also, rationale and recommendations for expanding the scope of the basic monitoring program are discussed.

Author

Air Quality; Spacecraft Cabin Atmospheres; Toxicology; Trace Contaminants; Air Sampling

Subject Term Index

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