

NASA/SP—1999-7011/SUPPL494  
June 28, 1999

# **AEROSPACE MEDICINE AND BIOLOGY**

A CONTINUING BIBLIOGRAPHY WITH INDEXES

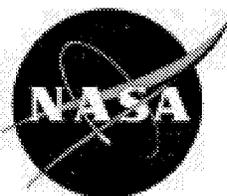
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# Typical Report Citation and Abstract

- 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)
4. Publication Date
5. Contract/Grant Number(s)
6. Report Number(s); Availability and Price Codes
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8. Abstract Author
9. Subject Terms

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# AEROSPACE MEDICINE AND BIOLOGY

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*A Continuing Bibliography (Suppl. 494)*

JUNE 28, 1999

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## LIFE SCIENCES (GENERAL)

19990041707 Kansas State Univ., Div. of Biology, Manhattan, KS USA

*Effects of Microgravity on Embryonic Quail Eye Development Final Report*

Barrett, Joyce E., Kansas State Univ., USA; Wells, Diane C., Kansas State Univ., USA; Paulsen, Avelina Q., Kansas State Univ., USA; Conrad, Gary W., Kansas State Univ., USA; [1997]; 24p; In English

Contract(s)/Grant(s): NAG2-1005; NAGw-2328; NIH-EY-00952; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Immunohistochemical methods were used to stain neurofilament protein in corneal nerves of Embryonic Day 16 (E16) quail eyes that had been fixed in 4% paraformaldehyde at room temperature for several months. Fixation was according to the methods used by the Mir 21/NASA 2 Avian Developmental Biology Flight Experiments for quail embryos incubated on the Mir Space Station. After fixation, corneas were pretreated to improve immunohistochemical visualization of neurofilaments. A sequential combination of three pretreatments [microwave heating in saline G, followed by extraction with sodium dodecyl sulfate (SDS) at 37 C, followed by digestion with hyaluronidase at 37 C], produced increased antibody staining of corneal nerve neurofilament proteins, compared with corneas subjected to no prior pretreatments. Darker nerve staining and increased numbers of fine branches were observed, together with lower background staining after such pretreatments. In contrast, use of any single pretreatment or pair of pretreatments resulted in only slight and inconsistent enhancement of nerve staining. Only the sequential combination of all three pretreatments resulted in consistently better nerve staining.

Author

*Microgravity; Embryos; Eye (Anatomy); Pretreatment; Cornea; Augmentation; Antigens; Antibodies*

19990041841 Marine Biological Lab., Woods Hole, MA USA

*Genetic Regulatory Networks in Embryogenesis and Evolution*

The Biological Bulletin; December 1998; Volume 195, pp. 361-386; In English, 11-14 Jun. 1997, Woods Hole, MA, USA; Sponsored by Marine Biological Lab., USA

Contract(s)/Grant(s): NCC2-896; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The article introduces a series of papers that were originally presented at a workshop titled Genetic Regulatory Network in Embryogenesis and Evaluation. Contents include the following: evolution of cleavage programs in relationship to axial specification and body plan evolution, changes in cell lineage specification elucidate evolutionary relations in spiralia, axial patterning in the leech: developmental mechanisms and evolutionary implications, hox genes in arthropod development and evolution, heterochronic genes in development and evolution, a common theme for LIM homeobox gene function across phylogeny, and mechanisms of specification in ascidian embryos.

CASI

*Concentration; Genetics; Reproduction (Biology); Hydrogen Compounds; Embryology*

19990042045 Pacific Northwest National Lab., Richland, WA USA

*Collective Dose as a Performance Measure for Occupational Radiation Protection Programs: Issues and Recommendations*

Strom, D. J.; Harty, R.; Hickey, E. E.; Martin, J. B.; Peffers, M. S.; Jul. 31, 1998; 60p; In English

Report No.(s): DE98-057943; PNNL-11934; No Copyright; Avail: Department of Energy Information Bridge, Microfiche

Collective dose is one of the performance measures used at many US Department of Energy (DOE) contractor facilities to quantitatively assess the objectives of the radiation protection program. It can also be used as a management tool to improve the program for keeping worker doses as low as reasonably achievable (ALARA). Collective dose is used here to mean the sum of

all total effective dose equivalent values for all workers in a specified group over a specified time. It is often used as a surrogate estimate of radiological risk. In principle, improvements in radiation protection programs and procedures will result in reduction of collective dose, all other things being equal. Within the DOE, most frequently, a single collective dose number, which may or may not be adjusted for workload and other factors, is used as a performance measure for a contractor. The purpose of this report is to evaluate the use of collective dose as a performance measure for ALARA programs at DOE sites.

NTIS

*Radiation Protection; Personnel; Radiation Dosage*

19990042097 NASA Ames Research Center, Moffett Field, CA USA

**Effects of Weightlessness on Vestibular Development: Summary of Research on NIH.R1**

Fritzsch, Bernd, Creighton Univ., USA; Bruce, L. L., Creighton Univ., USA; Jun. 01, 1998; 5p; In English

Contract(s)/Grant(s): NCC2-861; No Copyright; Avail: CASI; A01, Hardcopy; A01, Microfiche

In our original application we proposed to investigate the effects of gravity on the formation of connections between the gravity receptors of the ear and the brain in rat pups raised in space beginning at an age before these connections are made until near the time of birth, when they are to some extent functional. We used the neuronal tracer, Dil, which could be applied to tissue obtained immediately after landing of the space shuttle, thus minimizing changes due to the earth's gravity. We hoped to determine whether the vestibular system develops in two phases, as do other sensory systems (such as the visual system). In these other systems the first phase of development is controlled genetically and the second phase is controlled by environmental stimulation. Our data collected strongly supports the idea that the vestibular system has these same two phases of development. The tissue obtained from the NIH.R1 experiment was of exceptionally high quality for our analysis. Therefore, we expanded our investigation into the ultrastructural effects of microgravity on vestibular development. For the sake of clarity we will subdivide our summary into two categories: (1) analysis of the branching pattern of axons between the vestibular nerve and the gravistatic receptors of the ear in flight and control animals, and (2) analysis of the branching pattern of axons between the vestibular nerve and the brain in flight and control animals.

Derived from text

*Vestibules; Experimentation; Spaceborne Experiments; Exobiology; Spacecraft Environments; Weightlessness; Controlled Atmospheres*

19990042278 NASA Marshall Space Flight Center, Huntsville, AL USA

**Effect of Increased Cyclic AMP Concentration on Muscle Protein Synthesis and B-Adrenergic Receptor Expression in Chicken Skeletal Muscle Cells in Culture**

Young, R. B., NASA Marshall Space Flight Center, USA; Vaughn, J. R., NASA Marshall Space Flight Center, USA; Bridge, K. Y., NASA Marshall Space Flight Center, USA; Smith, C. K., Lilly Research Labs., USA; 1998; 1p; In English; 1998 Congress on In Vitro Biology, 30 May - 4 Jun. 1998, Las Vegas, NV, USA; No Copyright; Avail: Issuing Activity, Hardcopy, Microfiche

Analogies of epinephrine are known to cause hypertrophy of skeletal muscle when fed to animals. These compounds presumably exert their physiological action through interaction with the P-adrenergic receptor. Since the intracellular signal generated by the Beta-adrenergic receptor is cyclic AMP (cAMP), experiments were initiated in cell culture to determine if artificial elevation of cAMP by treatment with forskolin would alter muscle protein metabolism and P-adrenergic receptor expression. Chicken skeletal muscle cells after 7 days in culture were treated with 0.2-30 micrometers forskolin for a total of three days. At the end of the treatment period, both the concentration of cAMP and the quantity of myosin heavy chain (MHC) were measured. Concentration of cAMP in forskolin-treated cells increased up to 10-fold in a dose dependent manner. In contrast, the quantity of MHC was increased approximately 50% above control cells at 0.2 micrometers forskolin, but exhibited a gradual decline at higher levels of forskolin so that the quantity of MHC in cells treated with 30 micrometers forskolin was not significantly different from controls. Curiously, the intracellular concentration of cAMP which elicited the maximum increase in the quantity of MHC was only 40% higher than cAMP concentration in control cells.

Author

*Cells (Biology); Epinephrine; Musculoskeletal System; Protein Synthesis; Cyclic Amp; Muscles; Adrenergics; Protein Metabolism*

19990042343 Los Alamos National Lab., NM USA

**Advanced biomolecular materials based on membrane-protein/polymer complexation**

Smith, G. S.; Nowak, A.; Safinya, C.; Dec. 31, 1998; 8p; In English

Report No.(s): DE99-001256; LA-UR-98-2355; No Copyright; Avail: Department of Energy Information Bridge, Microfiche

This is the final report of a three-year, Laboratory Directed Research and Development (LDRD) project at the Los Alamos National Laboratory (LANL). The goal of this project was to apply neutron reflectometry and atomic force microscopy to the study of lipid membranes containing proteins. Standard sample preparation techniques were used to produce thin films of these materials appropriate for these techniques. However, these films were not stable, and a new sample preparation technique was required. Toward this goal, the authors have developed a new capability to produce large, freely suspended films of lipid multi-bilayers appropriate for these studies. This system includes a controlled temperature/humidity oven in which the films 5-cm x 5-cm are remotely drawn. The first neutron scattering experiments were then performed using this oven.

NTIS

*Molecular Structure; Membrane Structures; Proteins*

19990042361 Lawrence Livermore National Lab., Livermore, CA USA

**Automatic Generation of Warehouse Mediators Using an Ontology Engine**

Critchlow, T.; Mar. 04, 1998; 11p; In English; International workshop on knowledge representation meets databases

Report No.(s): DE98-058754; UCRL-JC-129930; No Copyright; Avail: Department of Energy Information Bridge, Microfiche

The Data Foundry research project at LLNL is investigating data warehousing in highly dynamic scientific environments. Specifically, we are developing a data warehouse to aid structural biologists in genetics research. Upon completion, this warehouse will present a uniform view of data obtained from several heterogeneous data sources containing distinct but related data from various genetics domains. Our warehouse uses a mediated data warehouse architecture in which only some data is represented explicitly in the warehouse; remote access is required to obtain the non-materialized data. Mediators are used to convert data from the data source representation to the warehouse representation and make it available to the warehouse. The major challenge we face is reducing the impact of source schema changes on warehouse availability and reliability: based upon previous efforts, we anticipate one source schema modification every 2-4 weeks once all of the desired sources have been integrated. Incorporating these modifications into the mediators using brute force results in an unacceptable amount of warehouse down-time. We believe that extensive use of a carefully designed ontology will allow us to overcome this problem, while providing a useful knowledge base for other applications. In addition to automatically generating the transformation between the data sources and the warehouse, the ontology will be used to guide automatic schema evolution, and provide a high level interface to the warehouse. This paper focuses on the use of the ontology to automatically generate mediators, because reducing the effect of source changes is a critical step in providing reliable access to heterogeneous data sources.

NTIS

*Genetics; Biological Evolution; Evolution (Development); Research and Development*

19990042427 Department of Energy, Washington, DC USA

**Similarity landscapes: An improved method for scientific visualization of information from protein and DNA database searches**

Dogget, N.; Myers, G.; Wills, C. J.; Dec. 31, 1998; 6p; In English

Report No.(s): DE99-001172; LA-UR-98-2619; No Copyright; Avail: Department of Energy Information Bridge, Microfiche

This is the final report of a three-year, Laboratory Directed Research and Development (LDRD) project at the Los Alamos National Laboratory (LANL). The authors have used computer simulations and examination of a variety of databases to answer questions about a wide range of evolutionary questions. The authors have found that there is a clear distinction in the evolution of HIV-1 and HIV-2, with the former and more virulent virus evolving more rapidly at a functional level. The authors have discovered highly non-random patterns in the evolution of HIV-1 that can be attributed to a variety of selective pressures. In the course of examination of microsatellite DNA (short repeat regions) in microorganisms, the authors have found clear differences between prokaryotes and eukaryotes in their distribution, differences that can be tied to different selective pressures. They have developed a new method (topiary pruning) for enhancing the phylogenetic information contained in DNA sequences. Most recently, the authors have discovered effects in complex rainforest ecosystems that indicate strong frequency-dependent interactions between host species and their parasites, leading to the maintenance of ecosystem variability.

NTIS

*Scientific Visualization; Proteins; Deoxyribonucleic Acid; Data Bases*

52  
**AEROSPACE MEDICINE**

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

19990041438 Texas Univ., M. D. Anderson Cancer Center, Houston, TX USA  
**Targeting HER-2/neu Overexpression by Suicide Ribozyme In Breast Cancer *Final Report, 1 Sep. 1996 - 31 Aug. 1998***  
Hung, Mien-Chie; Sep. 1998; 53p; In English  
Contract(s)/Grant(s): DAMD17-96-1-6253  
Report No.(s): AD-A362035; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche

Breast cancer represents a major cause of death for women in the United States. Overexpression of HER-2/neu oncogene was found in approximately 30% of breast tumor tissues and shown to be a marker indicating poor prognosis for breast cancer patients. HER-2/neu overexpression in cancer cells is also known to enhance cancer metastasis and to induce chemoresistance to certain anti-cancer drugs and repression of HER-2/neu expression reduces malignancy of the cancer cells. Therefore, HER-2/neu overexpression serves as an excellent target for development of breast cancer therapy. Ribozymes have been successfully used to control gene expression. We have designed a novel suicide ribozyme that will allow a gene of interest (such as a toxin gene) to be expressed specifically in the HER-2/neu-overexpressing breast cancer cells, and therefore, will kill only the HER-2/neu-overexpressing cells. This final report describes the progress in the following specific aims: 1) Design of the suicide ribozyme and proof of concept in vitro; 2) Proof of concept in vivo: a reporter gene regulated by the suicide ribozyme will be expressed only in cells overexpressing HER-2/neu mRNA. 3) Application of concept in vivo: a toxin gene regulated by the suicide ribozyme will preferentially inhibit the growth of breast cancer cells that overexpress HER-2/neu. During the last funding period (9/1/97 - 8/31/98), we have tested our suicide ribozymes in breast cancer cell lines that express either high or low level of HER-2/neu mRNA. Although we have not obtained the optimal suicide ribozyme that would consistently show a preferential expression in HER-2/neu overexpressors, our alternative approach using a HER-2/neu antisense iron responsive element has yielded an encouraging result which may lead to a potential gene therapy treatment against HER-2/neu-overexpressing breast cancer cells.

DTIC

*Cancer; Death; Physiological Effects*

19990041598 NASA Langley Research Center, Hampton, VA USA  
**Aerospace Medicine and Biology: A Continuing Bibliography with Indexes, Supplement 492**  
May 31, 1999; 29p; In English  
Report No.(s): NASA/SP-1999-7011/SUPPL492; NAS 1.21:7011/SUPPL492; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

This report lists reports, articles and other documents recently announced in the NASA STI Database. In its subject coverage, Aerospace Medicine and Biology concentrates on the biological, physiological, psychological, and environmental effects to which humans are subjected during and following simulated or actual flight in the Earth's atmosphere or in interplanetary space. References describing similar effects on biological organisms of lower order are also included. Such related topics as sanitary problems, pharmacology, toxicology, safety and survival, life support systems, exobiology, and personnel factors receive appropriate attention. Applied research receives the most emphasis, but references to fundamental studies and theoretical principles related to experimental development also qualify for inclusion.

Derived from text

*Aerospace Medicine; Bibliographies; Data Bases; Indexes (Documentation)*

19990041836 Civil Aeromedical Inst., Oklahoma City, OK USA  
**Urinary Genotyping for DQA1 and PM Loci using PCR-Based Amplification: Effects of Volume, Storage Temperature, Preservatives, and Aging on DNA Extraction and Typing *Final Report***  
Vu, Nicole T., Civil Aeromedical Inst., USA; Chaturvedi, Arvind K., Civil Aeromedical Inst., USA; Canfield, Dennis V., Civil Aeromedical Inst., USA; April 1999; 14p; In English  
Contract(s)/Grant(s): FAA-AM-B-97-TOX-202; FAA-AM-B-98-TOX-202  
Report No.(s): DOT/FAA/AM-99/14; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Urine is often the sample of choice for drug screening in aviation/general forensic toxicology and in workplace drug testing. In some instances, the origin of the submitted samples may be challenged because of the medicolegal and socioeconomic consequences of a positive drug test. Methods for individualization of biosamples have reached a new boundary with the application of the polymerase chain reaction (PCR) in DNA profiling, but a successful characterization of the urine specimens depends on the quantity and quality of DNA present in the samples. Therefore, the present study investigated the influence of storage condi-

tions, sample volumes, concentration modes, extraction procedures, and chemical preservations on the quantity of DNA recovered, as well as the success rate of PCR-based urinary genotyping for DQA1 and PM loci. Urine specimens from male and female volunteers were divided and stored at various temperatures for up to 30 days. The results suggested that sample purification by dialfiltration, using 3,000-100,000 molecular weight cut-off filters, did not enhance DNA recovery and typing rate compared with simple centrifugation procedures. Extraction of urinary DNA by the organic method and by the resin method gave comparable typing results. Larger sample volume yielded higher amount of DNA, but the typing rates were not affected for sample volumes between 1 to 5 ml. The quantifiable amounts of DNA present were found to be greater in female (14-200 ng/ml) than in male (4-60 ng/ml) samples and decreased with the elapsed time under both room temperature (RT) and frozen storage. Typing of the male samples also demonstrated that RT storage samples produced significantly higher success rates than that of frozen samples, while there was only marginal difference in the DNA typing rates among the conditions tested using female samples. Successful assignment of DQA1+PM genotype was achieved for all sampling of fresh urine, independent of gender, starting sample volume, or concentration method. Preservation by 0.25% sodium azide was acceptable for sample storage at 4 C during a period of 30 days. For longer storage duration, freezing at -70 C may be more appropriate. Thus, the applicability of the DQA1 +PM typing was clearly demonstrated for individualization of the urine

Author

*Urology; Urine; Sampling; Temperature Effects; Purification; Centrifuging; Preserving*

19990041847 Civil Aeromedical Inst., Oklahoma City, OK USA

*Refractive Surgery in the Civil Airman Population by Class of Medical Certificate and by Aviation Occupation Final Report*

Nakagawara, Van B., Civil Aeromedical Inst., USA; Wood, Kathryn J., Civil Aeromedical Inst., USA; Montgomery, Ronald W., Civil Aeromedical Inst., USA; February 1999; 12p; In English

Contract(s)/Grant(s): FAA-AM-B-98-TOX-203

Report No.(s): DOT/FAA/AM-99/6; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Refractive surgical procedures performed in the USA have increased in recent years and continued growth is projected in the near future. These procedures have been associated with numerous side-effects, including glare, reduced contrast sensitivity, and fluctuating visual acuity. The quality of vision after refractive surgery may be unacceptable in a cockpit environment. This report reviews the aeromedical certification experience with the refractive surgery population.

Author

*Aerospace Medicine; Data Bases; Eye (Anatomy); Surgery*

19990041967 Pennsylvania Univ., Medical Image Processing Group, Philadelphia, PA USA

*Predoctoral Training in Breast Cancer Detection and Training Annual Report, 1 Aug. 1997 - 31 Jul. 1998*

Leigh, John S., Jr; Aug. 1998; 14p; In English

Contract(s)/Grant(s): DAMD17-94-J-4027

Report No.(s): AD-A361568; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Our training program in breast cancer detection and treatment continues to provide an excellent opportunity to train research fellows who demonstrate an interest in pursuing clinical and technical work relating to breast cancer. Through the dual mentorship system that we have adopted, each of the four current trainees is assigned to both a clinical specialist and a theoretical or research specialist. These complementary yet distinct professional perspectives constitute an invaluable resource throughout the program. Trainees also attend related seminars and conferences as part of their training. Trainee research encompasses a broad range of theoretical disciplines genetics, biochemistry, electrical engineering, computer science, physiology, and tumor biology as well as clinical disciplines such as radiology, oncology, pathology, and radiation therapy. The University of Pennsylvania has developed a broadly-based graduate study program designed to apply theory to clinical practice in developing technology and procedures for the detection and treatment of disease. Throughout this year our work focused primarily upon improving methods of detecting breast cancer through magnetic resonance imaging of tissue, with significant attention paid to the characteristics of the disease at various stages. We have also strived to build upon current general knowledge of the metabolic and genetic parameters of the disease.

DTIC

*Clinical Medicine; Diagnosis; Diseases; Biochemistry; Cancer; Computer Assisted Instruction; Education*

19990041976 Air Force Inst. of Tech., School of Engineering, Wright-Patterson AFB, OH USA  
**Visualizing Early-Stage Breast Cancer Tumors in a Mammographic Environment Through a 3-Dimensional Mathematical Model**

Bassham, Christopher B.; Mar. 1999; 112p; In English

Report No.(s): AD-A361639; AFIT/GOA/ENS/99M-01; No Copyright; Avail: CASI; A06, Hardcopy; A02, Microfiche

In response to the insidious and deadly nature of breast cancer and the less-than-perfect detection ability of mammography, we develop a mathematical model as a foundation to the long-term goal of improving early breast cancer detection. By using modeling and simulation to construct an accurate breast cancer tumor model, we hope to solve the problems associated with mammogram misdiagnosis and, perhaps as a by-product, lend insight to tumor development dynamics. The final tumor model, written in MATLAB, provides realistic tumor growth and 2-dimensional visualization of 3-dimensional structures. Earlier modeling attempts capture slices of the tumor in the 2-dimensional growth spaces. The final 3-dimensional model closely mimics the characteristics of theoretical breast cancer development within the female breast by establishing an algorithm that reliably represents the ideal tumor model. The possible impact of this model and its progeny is earlier detection of breast cancer, which leads to an increased chance of survival for those afflicted with the disease.

DTIC

*Mammary Glands; Cancer; Diseases*

19990042034 Texas Univ. Health Science Center, Houston, TX USA

**Application of Rotating Wall Vessel (RWV) Cell Culture for Pancreas Islet Cell Transplantation Final Report**

Rutzky, Lynne P., Texas Univ. Health Science Center, USA; Jun. 30, 1998; 5p; In English

Contract(s)/Grant(s): NCC9-36; No Copyright; Avail: CASI; A01, Hardcopy; A01, Microfiche

Type I insulin-dependent diabetes mellitus (IDDM) remains a major cause of morbidity and mortality in both pediatric and adult populations, despite significant advances in medical management. While insulin therapy treats symptoms of acute diabetes, it fails to prevent chronic complications such as microvascular disease, blindness, neuropathy, and chronic renal failure. Strict control of blood glucose concentrations delays but does not prevent the onset and progression of secondary complications. Although, whole pancreas transplantation restores physiological blood glucose levels, a continuous process of allograft rejection causes vascular and exocrine-related complications. Recent advances in methods for isolation and purification of pancreatic islets make transplantation of islet allografts an attractive alternative to whole pancreas transplantation. However, immunosuppressive drugs are necessary to prevent rejection of islet allografts and many of these drugs are known to be toxic to the islets. Since auto-transplants of isolated islets following total pancreatectomy survive and function in vivo, it is apparent that a major obstacle to successful clinical islet transplantation is the immunogenicity of the islet allografts.

Derived from text

*Pancreas; Transplantation; Insulin; Diabetes Mellitus; Carbohydrate Metabolism; Enzyme Activity*

19990042132 Istituto Superiore di Sanita, Rome, Italy

**Biomarkers for Environmental and Occupational Exposure to Aromatic Mutagens and Carcinogens from Emissions of Oil Shale Petrochemistry: Report of the EC PEO Programme, Project CIPA-CT92-3016 Biomarcatori di Esposizione Ambientale ed Occupazionale a Mutageni e Cancerogeni Nella Lavorazione Degli Scisti Bituminosi: Rapporto del Programma Comunitario PECO, Progetto CIPA-CT92-3016**

Carere, Angelo, Editor, Istituto Superiore di Sanita, Italy; Crebelli, Riccardo, Editor, Istituto Superiore di Sanita, Italy; 1998; ISSN 0394-9311; In English

Report No.(s): ISTISAN-98/1; Copyright; Avail: Issuing Activity (Istituto Superiore di Sanita, Viale Regina Elena, 299-00161 Rome, Italy), Hardcopy, Microfiche

Oil shale processing for energy supply and further refining for petrochemistry is an important field of industry in Baltic countries. Estonia possesses the largest oil shale mines and oil shale processing plants of the world. Large scale oil shale extraction and processing lead to extensive environmental pollution and to the release of high levels of aromatic carcinogenic substances in processing plants. In the framework of the "PECO" programme, during 1993-1996, the European Commission funded a research project on biomarkers of environmental and occupational exposure in oil shale petrochemistry. The project gave the opportunity to develop and calibrate several biomarkers of exposure to aromatic carcinogens. The results obtained highlighted the role of blood benzene and urinary trans, trans-muconic acid and 1-hydroxypyrene as sensitive biomarkers of occupational exposure to benzene and polycyclic aromatic hydrocarbons. A novel promising approach was developed for the analysis of benzene adducts in haemoglobin. This methodology, as well as the P-32-postlabelling analysis of bulky adducts in DNA of blood cells of oil shale workers, showed high sensitivity and potential utility in human biomonitoring. Molecular cytogenetic methods

based on in situ hybridization showed an exposure-related clastogenic, and possibly aneugenic, effect in oil shale workers, demonstrating the potential advantage of novel molecular approaches in the cytogenetic surveillance of carcinogen exposure.

Author

*Carcinogens; Deoxyribonucleic Acid; Environment Pollution; Extraction; Personnel; Polycyclic Aromatic Hydrocarbons; Shale Oil*

19990042145 Los Alamos National Lab., NM USA

**TeleMed: Wide-area, secure, collaborative object computing with Java and CORBA for healthcare**

Forslund, D. W.; George, J. E.; Gavrilov, E. M.; Dec. 31, 1998; 5p; In English; IEEE international symposium on high performance distributed computing

Report No.(s): DE99-001250; LA-UR-98-2490; No Copyright; Avail: Department of Energy Information Bridge, Microfiche

Distributed computing is becoming commonplace in a variety of industries with healthcare being a particularly important one for society. The authors describe the development and deployment of TeleMed in a few healthcare domains. TeleMed is a 100% Java distributed application build on CORBA and OMG standards enabling the collaboration on the treatment of chronically ill patients in a secure manner over the Internet. These standards enable other systems to work interoperably with TeleMed and provide transparent access to high performance distributed computing to the healthcare domain. The goal of wide scale integration of electronic medical records is a grand-challenge scale problem of global proportions with far-reaching social benefits.

NTIS

*Java (Programming Language); Security; Distributed Processing; Clinical Medicine*

19990042215 Baylor Coll. of Medicine, Houston, TX USA

**Applying a Neural Network to Prostate Cancer Survival Data**

Kattan, Michael W., Baylor Coll. of Medicine, USA; Ishida, Haku, Baylor Coll. of Medicine, USA; Scardino, Peter T., Baylor Coll. of Medicine, USA; Beck, J. Robert, Baylor Coll. of Medicine, USA; Intelligent Data Analysis in Medicine and Pharmacology; 1997, pp. 295-306; In English

Contract(s)/Grant(s): NCC9-36; NCI-CA-58204; Copyright; Avail: Issuing Activity, Hardcopy, Microfiche

Prediction of treatment efficacy for prostate cancer therapies has proven difficult and requires modeling of survival-type data. One reason for the difficulty may be infrequent use of flexible modeling techniques, such as artificial neural networks (ANN). The purpose of this study is to illustrate the use of an ANN to model prostate cancer survival data and compare the ANN to the traditional statistical method, Cox proportional hazards regression. Clinical data and disease follow-up for 983 men were modeled by both an ANN and a Cox model. Repeated sampling of 200 training and testing subsets were supplied to each technique. The concordance index  $c$  was calculated for each testing dataset. As further validation, ANN and Cox models were applied to a totally separate dataset. The ANN outperformed the Cox model in internal validation datasets (ANN  $c = 0.76$ , Cox  $c = 0.74$ ) and on the external validation dataset (ANN  $c = 0.77$ , Cox  $c = 0.74$ ). ANNs were more discriminating than Cox models for predicting cancer recurrence. Calibration of the ANN remains a problem. Once solved, it is expected that an ANN will make the most accurate predictions of prostate cancer recurrence and improve treatment decision making.

Author

*Statistical Analysis; Mathematical Models; Neural Nets; Cancer; Prostate Gland*

## 53

### BEHAVIORAL SCIENCES

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

19990041609 Institute for Experimental Psychiatry Research Foundation, Merion Station, PA USA

**Crew Alertness Management on the Flight Deck: Cognitive and Vigilance Performance, 1 Feb. 1989 - 31 Oct. 1998**

Dinges, David F., Institute for Experimental Psychiatry Research Foundation, USA; 1998; 10p; In English

Contract(s)/Grant(s): NCC2--599; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche

This project had three broad goals: (1) to identify environmental and organismic risks to performance of long-haul cockpit crews; (2) to assess how cognitive and psychomotor vigilance performance, and subjective measures of alertness, were affected by work-rest schedules typical of long-haul cockpit crews; and (3) to determine the alertness-promoting effectiveness of behavioral and technological countermeasures to fatigue on the flight deck. During the course of the research, a number of studies were completed in cooperation with the NASA Ames Fatigue Countermeasures Program. The publications emerging from this project

are listed in a bibliography in the appendix. Progress toward these goals will be summarized below according to the period in which it was accomplished.

Derived from text

*Psychomotor Performance; Work-Rest Cycle; Fatigue (Biology); Flight Crews; Pilot Performance; Flight Fatigue; Alertness; Circadian Rhythms; Aerospace Medicine*

19990041920 American Transit Association, Trucking Research Inst., Washington, DC USA

*Eye-Activity Measures of Fatigue and Napping as a Fatigue Countermeasure Final Report, Sep. 1997 - Feb. 1998*

Jan. 1999; 164p; In English

Report No.(s): PB99-134900; No Copyright; Avail: CASI; A08, Hardcopy; A02, Microfiche

This study investigated the potential use of an eye tracking system for detecting reduced driver alertness, and the impact of prophylactic napping on driver performance and alertness. The study used traditional behavioral and physiological measures of alertness. In addition, an unobtrusive eye tracker attached to the simulator structure was used to measure eye and eyelid behavior. The results showed clear time-of-day (TOD) and time-on-task (TOT) effects for the following eye closure measures: Partial closures during fixations, speed or slow eyelid closure (SEC), blink duration, and blink frequency.

NTIS

*Sleep; Alertness; Fatigue (Biology); Eye Movements; Physiology*

## 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.*

19990041615 Earth Technology, Inc., San Antonio, TX USA

*Level II Ergonomic Analyses, Dover AFB, DE Final Report, Feb. 1996*

Marcotte, Andrew; Joyce, Marilyn; Miller, Nancy; Feb. 1999; 228p; In English

Contract(s)/Grant(s): F41624-95-D-9016

Report No.(s): AD-A361102; IERA-RS-BR-TR-1999-0002; No Copyright; Avail: CASI; A11, Hardcopy; A03, Microfiche

The results of ten ergonomic evaluations conducted in the EMS ISO Dock, the EMS Structural Maintenance Shop, and the APS Special Handling Shop at Dover AFB are described. The evaluations were performed as part of an Air Mobility Command-sponsored effort to identify, evaluate, and control hazards for work-related musculoskeletal disorders. The report identifies key risk factors associated with various jobs in each shop, the underlying cause of the hazard, control options to reduce or eliminate the hazard, and the expected impacts of each control measure.

DTIC

*Musculoskeletal System; Occupational Diseases*

19990041745 Army Aeromedical Research Lab., Fort Rucker, AL USA

*An Evaluation of Air Warrior Concept Aviator Ensembles With and Without Microclimate Cooling Final Report*

Katz, Lawrence C.; Wildzunas, Robert M.; Cadarete, Bruce S.; Mar. 1999; 25p; In English

Contract(s)/Grant(s): Proj-30162787A879

Report No.(s): AD-A361991; USAARL-99-11; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The Program Manager, U.S. Army Aircrew Integrated Systems (PM-ACIS) requested that the U.S. Army Aeromedical Research Laboratory (USAARL), Fort Rucker, Alabama, assess the physiological and psychological effects of heat stress exposure for aviators wearing encumbered chemical defense level-4 mission oriented protective posture (MOPP4) ensembles. This project was conducted under a joint agreement between USAARL and the U.S. Army Research Institute of Environmental Medicine (USARIEM), Natick, Massachusetts. The methodology for assessing heat stress in an environmentally controlled helicopter simulator was established in previous studies conducted at USAARL (Reardon et al., 1996; Reardon et al., 1997; Reardon et al., 1998).

DTIC

*Aircraft Pilots; Microclimatology; Heat Tolerance; Cooling*

19990041828 Naval Postgraduate School, Dept. of Operations Research, Monterey, CA USA  
Human Factors Analysis and Modeling of U.S. Navy Afloat Electrical Shock Mishaps  
Sciretta, M. S.; Mar. 1999; 116p; In English  
Report No.(s): AD-A361999; No Copyright; Avail: CASI; A06, Hardcopy; A02, Microfiche

Electrical shock mishaps account for 33 percent of all personnel injuries occurring onboard U.S. Navy surface combatants from 1995 to 1997. Clearly this indicates a need to identify the root causes and to develop intervention strategies for preventing electrical shock. Electrical shock root causal factors are identified through the evaluation of Special Case Mishap Reports maintained by the Naval Safety Center. Analysis indicates that over 85 percent of electrical shock mishaps are human factors related. Scenario analysis coupled with categorical data analysis is used to identify human factors patterns that are present in electrical shock mishaps. This human factors approach finds that the failure of two primary human factors related interventions identified in the safety literature, improper tagout of equipment and misuse of personal protective equipment, account for 37 percent of the mishaps. A stochastic model of electrical shock mishaps, including human factors related and non-human factors related mishaps, is constructed to develop an overall impression of the status quo. This model is then used to forecast the impact of correcting the identified failed interventions on future expected mishap frequencies and associated costs.

DTIC

*Human Factors Engineering; Accident Investigation; Forecasting*

19990041938 Institute for Human Factors TNO, Soesterberg, Netherlands  
Ergonomic Evaluation of the Fennek *Final Report Ergonomische Evaluatie van de Fennek*  
Oudenhuzen, A. J. K., Institute for Human Factors TNO, Netherlands; Nov. 26, 1998; In English  
Contract(s)/Grant(s): A96/KL/301; TNO Proj. 789.1

Report No.(s): TD98-0276; TNO-TM-98-A064; Copyright; Avail: Issuing Activity, Hardcopy, Microfiche

A prototype of the Fennek, a new patrol vehicle for the Royal Dutch Army, is being tested. TNO Human Factors Research Institute (HFRI) investigated ergonomics of the vehicle as a part of tactical tests that are being performed by the Royal Dutch Army and the German Army. This report is the second in a series about the ergonomics of the Fennek. The first report described an analysis that was performed on a digital mockup of the Fennek using digital 3D human modelling systems, called the digital analysis. This report describes the results of a field trial and compares the results of the field trial and the digital analysis. The Fennek crew gave their ergonomic judgement about the Fennek during the field trial making use of an ergonomic checklist. During the field trial attention was given to: how to enter/exit the Fennek; use of controls and displays; steering wheel and pedals; the crew seats; free space; outside- and inside view; stowage room; noise; ventilation and climate control systems; safety. The results of the overall testing activities are used to improve the design of the Fennek. The improvement of the Fennek is an ongoing process. The results as described in this report are based on tests on the TVM 2. It is possible that certain mentioned ergonomic problems are already solved. The following conclusions can be derived from the study: The crew of the Fennek has a positive general judgement about the ergonomics of the Fennek. They would like to see improvements to several items. These items are: (1) the outside view: the Fennek crew complained about insufficient outside view. The crew will be hampered in performing their task due to the limited amount of available outside view; (2) the controls and displays: various remarks were made concerning the controls and displays; (3) the climate control and ventilation systems: the climate control and ventilation systems did not function sufficiently and will be worse in more severe climates; (4) a high noise level: the high noise level affects the inter cabin communication in the Fennek; (5) the space in the Fennek: various remarks were made concerning the available space in the Fennek. Conclusions for the comparison between the field trial and the digital analysis. Various differences were found between the overlapping results of both mentioned studies. It is concluded that each of the methods used have their specific advantages and disadvantages. The digital analysis will find its application in early studies, when a full-scale mockup is not available. The application of the digital techniques does reduce the need for full-scale mockups or prototypes early in the design process. Task related aspects, such as the outside view, cannot completely be evaluated with digital human modelling techniques. Recommendations: (1) it is recommended to search methods for improvement of the crew outside view; (2) it is recommended to investigate the dangers of the crews exposure to excessive heat load; (3) the use of an intercom system in the Fennek, combined with headsets is recommended; (4) it is recommended to perform a more extensive study on the controls, the displays and the available space in the Fennek. This will be the subject of the third phase of this project; (5) it is recommended to establish anthropometric selection criteria for the Fennek's crew. This will be the subject of the third phase of the project.

Author

*Evaluation; Prototypes; Performance Tests; Armed Forces; Human Factors Engineering; Digital Techniques; Digital Systems; Motor Vehicles*

19990042032 Georgia Inst. of Tech., School of Textile and Fiber Engineering, Atlanta, GA USA  
The Design and Development of a Regenerative Separatory Column Using Calixarenes as a Polymeric Backbone for the Purification of Water from Urine *Final Report*

Polk, M., Georgia Inst. of Tech., USA; 1999; 6p; In English

Contract(s)/Grant(s): NGT10-52603; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche

The objective of this research project is to design calixarenes, cup-shaped molecules, with the specific binding sites to the sodium chloride and nitrogen containing components of urine, such as urea and uric acid, in urine. The following partition of the research accomplishes this objective: (1) functionalization of calixarene, (2) development of a calixarene based medium for the separatory process, (3) design of the column regeneration protocol. Work was also accomplished in the area of temperature sensitive paint (TSP). Research was undertaken to design a TSP with insulating properties. An important part of this research project is to discover the thermal conductivity of polymers for TSP.

Derived from text

*Sodium Chlorides; Water; Urine; Nitrogen; Purification; Thermal Conductivity; Paints*

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