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July 12, 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
7. Abstract
8. Abstract Author
9. Subject Terms

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# AEROSPACE MEDICINE AND BIOLOGY

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*A Continuing Bibliography (Suppl. 495)*

JULY 12, 1999

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## LIFE SCIENCES (GENERAL)

**19990043997** Department of Energy, Assistant Secretary for Management and Administration, Washington, DC USA

**Competency development in antibody production in cancer cell biology**

Park, M. S.; Dec. 31, 1998; 7p; In English

Report No.(s): DE99-001118; LA-UR-98-1884; 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 Los Alamos National Laboratory (LANL). The main objective of this project was to develop a rapid recombinant antibody production technology. To achieve the objective, the authors employed (1) production of recombinant antigens that are important for cell cycle regulation and DNA repair, (2) immunization and specific selection of antibody-producing lymphocytes using the flow cytometry and magnetic bead capturing procedure, (3) construction of single chain antibody library, (4) development of recombinant vectors that target, express, and regulate the expression of intracellular antibodies, and (5) specific inhibition of tumor cell growth in tissue culture. The authors have accomplished (1) optimization of a selection procedure to isolate antigen-specific lymphocytes, (2) optimization of the construction of a single-chain antibody library, and (3) development of a new antibody expression vector for intracellular immunization. The future direction of this research is to continue to test the potential use of the intracellular immunization procedure as a tool to study functions of biological molecules and as an immuno-cancer therapy procedure to inhibit the growth of cancer cells.

NTIS

*Antibodies; Cancer; Cells (Biology); Life Sciences; Physiological Effects; Biological Effects*

**19990044056** Prins Maurits Lab. TNO, Rijswijk, Netherlands

**Set-up of a System to Reliably Measure the Startle Response in Marmoset Monkeys; Application in Animal Models of Anxiety and Psychosis Final Report**

Melchers, B. P. C., Prins Maurits Lab. TNO, Netherlands; Groen, B., Prins Maurits Lab. TNO, Netherlands; Vanwersch, R. A. P., Prins Maurits Lab. TNO, Netherlands; Philippens, I. H. C. H. M., Prins Maurits Lab. TNO, Netherlands; Bruijnzeel, P. L. B., Prins Maurits Lab. TNO, Netherlands; July 1998; 26p; In English

Contract(s)/Grant(s): TNO Proj. 215896404

Report No.(s): PML-1998-B42; TD98-0082; Copyright; Avail: Issuing Activity (TNO Prins Maurits Lab., Lange Kleiweg 137, P.O. Box 45, 2280 AA Rijswijk, The Netherlands), Hardcopy, Microfiche

The acoustic startle response is a reflex motor response elicited by a sudden loud sound. In two psychiatric disorders, the startle reflex is altered. Normally, the startle response is decreased appreciably when a low intensity sound stimulus is given shortly before the startle eliciting stimulus. This prepulse inhibition of the startle is nearly absent in patients suffering from schizophrenia. In addition, the startle response is increased during periods of anxiety. In this study, a system is described by which the acoustic startle response in marmoset monkeys may be recorded in a reliable way. In using this system, it could be shown that marmosets possess a pre-pulse inhibition (PPI) of the ASR, similar as in other species. Furthermore, it was shown that a fear potentiation of the startle response may be elicited in the marmoset. Potentially, this system may be used for testing anti-psychotic or anxiolytic activity of drugs in primates. In this study, a series of drugs with a known activity on PPI or fear potentiation of the ASR was tested to validate the system. The effects of Buspiron and Diazepam were tested as examples of drugs with a known anxiolytic effect. In addition, Fluvoxamine and Haloperidol were used in these experiments. Amphetamine, Ketamine and Haloperidol were used as drugs to affect the PPI; in these experiments Diazepam was used as a negative control. These experiments were performed in a randomized, cross-over design. In the fear potentiated startle experiments, four animals were used. They received, following a training period to establish a stable baseline fear potentiation, three dose levels of each of the drugs. In addition, the animals

were injected with saline 5 times spread evenly over the total duration of the experiment to test the stability of the baseline fear potentiation. The four animals used in the PPI group were subjected to a similar dosing schedule. Buspiron, Haloperidol and possibly Quinpirol had an effect on the control startle response. Although none of the effects of the drugs on either FPS, or PPI were statistically significant, Diazepam and to a lesser degree Fluvoxamine tended to decrease the FPS. Buspiron seemed to have a biphasic effect on the FPS whereas Haloperidol had no effect. Ketamine and Quinpirol seemed to reduce the PPI and Diazepam had no effect. Amphetamine probably was given at too low a dose to affect PPI.

Author

*Acoustic Emission; Anxiety; Monkeys; Psychoses; Physiological Tests; Schizophrenia*

**19990044102** New Hampshire Univ., Durham, NH USA

**Mesoscale Structure of Zooplankton In the California Current**

Bucklin, Ann; Olson, Donald B.; Clarke, M. E.; Wiebe, Peter H.; Jan. 1999; 8p; In English

Contract(s)/Grant(s): NON00014-1-96-0302(UNH); N00014-1-96-0421(RSMAS)

Report No.(s): AD-A361709; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche

We are examining how populations of euphausiids maintain high concentrations in coastal regions of the California Current despite the highly advective field. We are testing the hypothesis that mesoscale eddies and coastal counter currents create retention cells, where growth and reproduction are rapid and mortality is reduced. The immediate objective is to produce a data set on the biomass, population genetics, and physiological condition of the targeted euphausiids across the boundary between the eutrophic inshore of the California current and the oligotrophic central gyre waters. This work is supported by ONR Biological Oceanography.

DTIC

*Marine Biology; Bioacoustics; Zooplankton*

**19990045981** Los Alamos National Lab., Theoretical Div., NM USA

**Correlated mutations in protein sequences: Phylogenetic and structural effects**

Lapedes, A. S.; Giraud, B. G.; Liu, L. C.; Stormo, G. D.; Dec. 31, 1998; 22p; In English; AMS/SIAM conference on statistics in molecular biology

Report No.(s): DE99-000640; LA-UR-98-1091; No Copyright; Avail: Department of Energy Information Bridge, Microfiche

Covariation analysis of sets of aligned sequences for RNA molecules is relatively successful in elucidating RNA secondary structure, as well as some aspects of tertiary structure. Covariation analysis of sets of aligned sequences for protein molecules is successful in certain instances in elucidating certain structural and functional links, but in general, pairs of sites displaying highly covarying mutations in protein sequences do not necessarily correspond to sites that are spatially close in the protein structure. In this paper the authors identify two reasons why naive use of covariation analysis for protein sequences fails to reliably indicate sequence positions that are spatially proximate. The first reason involves the bias introduced in calculation of covariation measures due to the fact that biological sequences are generally related by a non-trivial phylogenetic tree. The authors present a null-model approach to solve this problem. The second reason involves linked chains of covariation which can result in pairs of sites displaying significant covariation even though they are not spatially proximate. They present a maximum entropy solution to this classic problem of causation versus correlation. The methodologies are validated in simulation.

NTIS

*Mutations; Proteins; Structural Analysis*

**19990046070** NASA Johnson Space Center, Houston, TX USA

**Production of Normal Mammalian Organ Culture Using a Medium Containing Mem-Alpha, Leibovitz L 15, Glucose Galactose Fructose**

Goodwin, Thomas J., Inventor, NASA Johnson Space Center, USA; Wolf, David A., Inventor, NASA Johnson Space Center, USA; Spaulding, Glenn F., Inventor, NASA Johnson Space Center, USA; Prewett, Tacey L., Inventor, NASA Johnson Space Center, USA; Jan. 12, 1999; 16p; In English; Division of US-Patent-Appl-SN-66292, filed 25 May 1993

Patent Info.: Filed 1 Mar. 1996; NASA-Case-MS-C-21984-3; US-Patent-5,858,783; US-Patent-Appl-SN-613793; US-Patent-Appl-SN-066292; No Copyright; Avail: US Patent and Trademark Office, Hardcopy, Microfiche

Normal mammalian tissue and the culturing process has been developed for the three groups of organ, structural and blood tissue. The cells are grown in vitro under micro-gravity culture conditions and form three dimensional cells aggregates with normal cell function. The microgravity culture conditions may be microgravity or simulated microgravity created in a horizontal

rotating wall culture vessel. The medium used for culturing the cells, especially a mixture of epithelial and mesenchymal cells contains a mixture of Mem-alpha and Leibovits L15 supplemented with glucose, galactose and fructose.

Official Gazette of the U.S. Patent and Trademark Office

*Culture Techniques; Microgravity; Mammals; Cytology; Organs*

**19990046089** NASA Johnson Space Center, Houston, TX USA

**Media Compositions for Three Dimensional Mammalian Tissue Growth Under Microgravity Culture Conditions**

Goodwin, Thomas J., Inventor, NASA Johnson Space Center, USA; Dec. 08, 1998; 14p; In English; Division of US-Patent-Appl-SN-66292, filed 25 May 1993

Patent Info.: Filed 13 Feb. 1996; NASA-Case-MS-21984-2; US-Patent-5,846,807; US-Patent-Appl-SN-600793; US-Patent Appl-SN-66292; No Copyright; Avail: US Patent and Trademark Office, Hardcopy, Microfiche

Normal mammalian tissue and the culturing process has been developed for the three groups of organ, structural and blood tissue. The cells are grown in vitro under microgravity culture conditions and form three dimensional cells aggregates with normal cell function. The microgravity culture conditions may be microgravity or simulated microgravity created in a horizontal rotating wall culture vessel.

Official Gazette of the U.S. Patent and Trademark Office

*Microgravity; Tissues (Biology); Blood; Cytology; Culture Techniques*

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### AEROSPACE MEDICINE

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

**19990044002** Istituto Superiore di Sanita, Rome, Italy

**Advice of the Italian CCTN on the Toxicity of Cannabis Sativa *Parere della CCTN Sulla Tossicita della Cannabis Sativa***

Camoni, Ivano, Editor, Istituto Superiore di Sanita, Italy; Mucci, Nicolina, Editor, Istituto Superiore per la Prevenzione e la Sicurezza del Lavoro, Italy; Paroli, Eugenio, Editor, La Sapienza Univ., Italy; 1998; ISSN 0394-9311; In English

Report No.(s): ISTISAN-98/2; Copyright; Avail: Issuing Activity (Istituto Superiore di Sanita, Viale Regina Elena, 299-00161 Rome, Italy), Hardcopy, Microfiche

The recommendation of the Italian National Toxicological Committee (CCTN) regards the possible toxic effects of some products derived from Cannabis sativa, indica variety. The CCTN has especially evaluated genotoxic, immunological and toxic reproduction effects of these substances, on the basis of the results from both experimental studies and observations on humans.

Author

*Marijuana; Toxicity; Toxicology*

**19990044003** Istituto Superiore di Sanita, Rome, Italy

**Research Project: Chemical-Physical Properties of Drugs and Their Safety *Progetto di Ricerca: Proprieta Chimico-Fisiche dei Medicamenti e Loro Sicurezza d'Uso***

Cignitti, Maurizio, Editor, Istituto Superiore di Sanita, Italy; 1998; ISSN 1123-3117; In Italian

Report No.(s): ISTISAN-98/13; Copyright; Avail: Issuing Activity (Istituto Superiore di Sanita, Viale Regina Elena, 299-00161 Rome, Italy), Hardcopy, Microfiche

New researches on chirality, phototoxicity and solid state properties might improve the safety of some common registered drugs; specific problems on such issues were studied through the financial support of this project. In conformity with the Italian National Health Plan, the project focused also on 1) the use of gamma-radiation for drug sterilization procedures and 2) the pharmacokinetics behavior of major drugs in aged people.

Author

*Research Projects; Drugs*

**19990044010** Texas Univ. Health Science Center, Houston, TX USA

**MAPS of Cancer *Final Report***

Gray, Lincoln, Texas Univ. Health Science Center, USA; Jun. 30, 1998; 9p; In English

Contract(s)/Grant(s): NCC9-36; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche

Our goal was to produce an interactive visualization from a mathematical model that successfully predicts metastases from head and neck cancer. We met this goal early in the project. The visualization is available for the public to view. Our work appears

to fill a need for more information about this deadly disease. The idea of this project was to make an easily interpretable visualization based on what we call "functional maps" of disease. A functional map is a graphic summary of medical data, where distances between parts of the body are determined by the probability of disease, not by anatomical distances. Functional maps often bear little resemblance to anatomical maps, but they can be used to predict the spread of disease. The idea of modeling the spread of disease in an abstract multidimensional space is difficult for many people. Our goal was to make the important predictions easy to see. NASA must face this problem frequently: how to help laypersons and professionals see important trends in abstract, complex data. We took advantage of concepts perfected in NASA's graphics libraries. As an analogy, consider a functional map of early America. Suppose we choose travel times, rather than miles, as our measures of inter-city distances. For Abraham Lincoln, travel times would have been the more meaningful measure of separation between cities. In such a map New Orleans would be close to Memphis because of the Mississippi River. St. Louis would be close to Portland because of the Oregon Trail. Oklahoma City would be far from Little Rock because of the Cheyenne. Such a map would look puzzling to those of us who have always seen physical maps, but the functional map would be more useful in predicting the probabilities of inter-site transit. Continuing the analogy, we could predict the spread of social diseases such as gambling along the rivers and cattle rustling along the trails. We could simply print the functional map of America, but it would be more interesting to show meaningful patterns of dispersal. We had previously published the functional map of the head and neck, but it was difficult to explain to either patients or surgeons because that view of our body did not resemble anatomy. This discrepancy between functional and physical maps is just a mathematical restatement of the well-known fact that some diseases, such as head and neck cancer, spread in complex patterns, not always to the next nearest site. We had discovered that a computer could re-arrange anatomy so that this particular disease spreads to the next nearest site. The functional map explains over 95% of the metastases in 1400 patients. In a sense, we had graphed what our body "looks like" to a tumor. The tumor readily travels between adjacent areas in the functional map. The functional map is a succinct visual display of trends that are not easily appreciated in tables of probabilities.

Derived from text

*Mathematical Models; Mapping; Cancer; Visual Observation; Display Devices; Predictions; Probability Theory; Tumors*

**19990044067** Prins Maurits Lab. TNO, Rijswijk, Netherlands

**Validation of an Immunochemical Assay for the Detection of DNA Damage as a Tool for Biological Dosimetry of Human Exposure to Ionizing Radiation Final Report Ocena testu immunochemicznego wykrywania uszkodzen DNA jako metody dozimetrii biologicznej ekspozycji ludzi na promieniowanie joinzujace**

vanderSchans, G. P., Prins Maurits Lab. TNO, Netherlands; Timmerman, A. J., Prins Maurits Lab. TNO, Netherlands; Wojewodzka, M., Institute of Nuclear Chemistry and Technology, Poland; October 1998; 72p; In English

Contract(s)/Grant(s): A96/M/507; TNO Proj. 215096668

Report No.(s): TD98-0090; ICHTJ1997; PML-1998-A50; Copyright; Avail: Issuing Activity (TNO Prins Maurits Lab., Lange Kleiweg 137, P.O. Box 45, 2280 AA Rijswijk, The Netherlands), Hardcopy, Microfiche

A method for biological dosimetry based on the immunochemical detection of DNA damage in human white blood cells has been validated. To this end, the method developed at TNO-PML (Rijswijk, The Netherlands) was also set up at ICHTJ (Warsaw, Poland). Blood samples from 11 individuals were irradiated with 0 or 5 Gy of 170-kV X-rays at ICHTJ and analysed both at ICHTJ and TNO-PML. It appeared that damage can be detected to the same extent at both locations. The average background level of DNA damage amounted to 1.0 Gy-eq, with an inter-individual standard deviation of 0.25 Gy. The contribution of the sample variance to the total variance is only 14%. The radiosensitivity showed only a variation of about 10% and can, therefore, be neglected in estimating the radiation dose from the amount of DNA damage detected. In addition, the kinetics of DNA repair were studied in stimulated human lymphocytes exposed to an adaptive dose of hydrogen peroxide (10 micronM H<sub>2</sub>O<sub>2</sub>, 30 min, 37 C in PBS) followed by a challenge dose of X-rays (5 Gy). There were no differences in the DNA repair rate in non-adapted and adapted cells as measured by the sandwich ELISA.

Author

*Immune Systems; Deoxyribonucleic Acid; Damage; Estimating; Dosimeters; Assaying; Proving*

**19990044090** Maryland Univ., Baltimore, MD USA

**Effects of Endurance and Resistance Training on Cardiovascular Risk in Military Eligible Women Annual Report, 25 Sep. 1997 - 24 Sep. 1998**

Gardner, Andrew W.; Poehlman, Eric T.; Oct. 1998; 40p; In English

Contract(s)/Grant(s): DAMD17-96-1-6299

Report No.(s): AD-A361920; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The overall hypothesis is that the decline in physical activity habits and resultant increase in body fat reduces exercise capacity and muscle mass in military women. These lifestyle changes worsen cardiovascular risk factors. Therefore, continued involve-

ment in resistance and endurance exercise programs which increases or preserves fat-free mass, as well as enhances physical activity will prevent functional declines in military-eligible women. Although exercise is frequently recommended to enhance overall fitness, it is unclear as to whether endurance or resistance exercise is more effective in attenuating functional and cardiovascular declines in women. We will systematically compare the effects of endurance and resistance exercise on physical activity, cardiovascular fitness, and fat metabolism in military eligible women.

DTIC

*Cardiovascular System; Physical Exercise; Females; Human Performance*

**19990045774** Civil Aeromedical Inst., Oklahoma City, OK USA

**Index to FAA Office of Aviation Medicine Reports: 1961 through 1998 Final Report, 1961-1998**

Collins, William E., Civil Aeromedical Inst., USA; Wayda, Michael E., Civil Aeromedical Inst., USA; January 1999; 90p; In English

Report No.(s): DOT/FAA/AM-99/1; No Copyright; Avail: CASI; A05, Hardcopy; A01, Microfiche

An index to Federal Aviation Administration Office of Aviation Medicine Reports (1964-1998) and Civil Aeromedical Institute Reports is presented for those engaged in aviation medicine and related activities. The index lists all FAA aviation medicine reports published from 1961 through 1998: chronologically, alphabetically by author, and alphabetically by subject. A foreword describes aspects of the Civil Aeromedical Institute's 38 years of service, describes the index's sections, and explains how to obtain copies of published Office of Aviation Medicine technical reports.

Author

*Aerospace Medicine; Documents*

**19990046001** Defence and Civil Inst. of Environmental Medicine, Downsview, Ontario Canada

**The Possible Relationship Between Patent Foramen Ovale and Decompression Sickness:**

Saary, M. J.; Gray, G. W.; Jan. 1999; 36p; In English

Report No.(s): AD-A361756; DCIEM-TR-1999-001; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

A patent foramen ovale (PFO) is a small opening between the right and left cardiac atria, a persisting remnant of a physiologic communication present in the fetal heart. This normally closes after birth, but remains patent through to adulthood in up to a third of normal adults. A patent PFO is a potential conduit for blood clot (resulting in a stroke), or venous gas bubbles during decompression, (resulting in type II neurologic decompression sickness). There has been considerable controversy about the significance of a PFO as a possible mechanism for type II decompression sickness. Despite the high prevalence of PFO in the general population and the relatively common occurrence of venous gas bubbles in diving and altitude exposures, the incidence of type II DCS in diving or with altitude exposure is low. This paper reviews the literature with respect to the potential for right-to-left embolization through a PFO, relation of PFO to DCS, screening techniques for PFO, and treatment options. The literature supports a relationship between the presence and size of PFO and cryptogenic stroke (stroke, generally in younger individuals with no other identifiable risk factors). The weight of evidence also favours an increased relative risk of type II DCS with a PFO, although the absolute increase in risk accrued is small. The gold standard for PFO screening is a trans-esophageal echocardiographic (TEE) and colour flow study, but trans-cranial Doppler (TCD) with contrast is a promising technique with good accuracy compared with TEE.

DTIC

*Neurology; Decompression Sickness; Neurophysiology; Diving (Underwater); Stress (Physiology)*

**19990046023** Civil Aeromedical Inst., Oklahoma City, OK USA

**Formation of an Interfering Substance, 3, 4-Dimethyl-5-Phenyl-1, 3-Oxazolidine, During A Pseudoephedrine Urinalysis**

Lewis, Russell J., Civil Aeromedical Inst., USA; Huffine, Edwin F., Civil Aeromedical Inst., USA; Chaturvedi, Arvind K., Civil Aeromedical Inst., USA; Canfield, Dennis V., Civil Aeromedical Inst., USA; Mattson, Jerry, Civil Aeromedical Inst., USA; May 1999; 14p; In English

Contract(s)/Grant(s): AM-B-98-TOX-202

Report No.(s): DOT/FAA/AM-99/15; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

During fatal aviation accident investigations, bio-samples from the victims are submitted to the FAA Civil Aeromedical Institute for drug analysis. In the process of one such analysis, an unknown substance was found in a urine sample. Its initial analyses by thin layer chromatography and by liquid-liquid extraction/gas chromatography (GC) disclosed the presence of pseudoephedrine. Subsequent analyses of the reaccessioned sample by solid phase separation/GC Fourier transform infrared/GC mass spectrometry indicated that the retention times of the unknown substance matched with those of pseudoephedrine. However, its infrared and mass spectra were different--the -OH and -NH- groups were missing, a C-O-C group was present, and the molar mass

was 12 atomic mass units (amu) more than that of pseudoephedrine. A subsequent literature search suggested that ephedrine-like amines react with aldehydes to form oxazolidines. Therefore, the 12-amu increase could be accounted for by condensation of pseudoephedrine with formaldehyde. Since this aldehyde is present in various grades of methanol, and methanol was used during the solid phase separation, 3,4-dimethyl-5-phenyl-1,3-oxazolidine was synthesized by using +/- pseudoephedrine.HCl and formaldehyde. The analytical and spectral findings of the synthesized compound were consistent with those of the unknown interfering substance, confirming that it was the oxazolidine. Aldehyde contaminants can transform the drug of interest and may result in misidentification of a compound not originally present in specimens. Therefore, chemicals used in analyses should be of the highest available purity, and a multi-analytical approach should be adopted to maintain a high degree of quality assurance.

Author

*Aircraft Accident Investigation; Aircraft Accidents; Gas Chromatography; Thin Layer Chromatography; Urinalysis*

**19990046068** NASA Johnson Space Center, Houston, TX USA

**Cultured High-Fidelity Three-Dimensional Human Urogenital Tract Carcinomas and Process**

Goodwin, Thomas J., Inventor, NASA Johnson Space Center, USA; Prewett, Tacey L., Inventor, NASA Johnson Space Center, USA; Spaulding, Glenn F., Inventor, NASA Johnson Space Center, USA; Wolf, David A., Inventor, NASA Johnson Space Center, USA; Dec. 22, 1998; 12p; In English; Continuation-in-part of abandoned US-Patent-Appl-SN-939791, filed 3 Sep. 1992 Patent Info.: Filed 27 Dec. 1993; NASA-Case-MS-C-22119-1; US-Patent-5,851,816; US-Patent-Appl-SN-172962; US-Patent-Appl-SN-939791; No Copyright; Avail: US Patent and Trademark Office, Hardcopy, Microfiche

Artificial high-fidelity three-dimensional human urogenital tract carcinomas are propagated under in vitro-microgravity conditions from carcinoma cells. Artificial high-fidelity three-dimensional human urogenital tract carcinomas are also propagated from a coculture of normal urogenital tract cells inoculated with carcinoma cells. The microgravity culture conditions may be microgravity or simulated microgravity created in a horizontal rotating wall culture vessel.

Official Gazette of the U.S. Patent and Trademark Office

*Culture Techniques; Microgravity; Cancer*

**19990046084** NASA Johnson Space Center, Houston, TX USA

**Method and Apparatus for the Collection, Storage, and Real Time Analysis of Blood and Other Bodily Fluids**

Whitson, Peggy A., Inventor, NASA Johnson Space Center, USA; Clift, Vaughan L., Inventor, NASA Johnson Space Center, USA; Feb. 02, 1999; 10p; In English; Continuation-in-part of abandoned US-Patent-Appl-SN-605300, filed 26 Jan. 1996 Patent Info.: Filed 7 Mar. 1997; NASA-Case-MS-C-22463-3; US-Patent-5,866,007; US-Patent-Appl-SN-813570; US-Patent-Appl-SN-605300; No Copyright; Avail: US Patent and Trademark Office, Hardcopy, Microfiche

The present invention provides a method and apparatus for separating a blood sample having a volume of up to about 20 milliliters into cellular and acellular fractions. The apparatus includes a housing divided by a fibrous filter into a blood sample collection chamber having a volume of at least about 1 milliliter and a serum sample collection chamber. The fibrous filter has a pore size of less than about 3 microns, and is coated with a mixture including between about 1-40 wt/vol % mannitol and between about 0.1-15 wt/vol % of plasma fraction protein (or an animal or vegetable equivalent thereof). The coating causes the cellular fraction to be trapped by the small pores, leaving the cellular fraction intact on the fibrous filter while the acellular fraction passes through the filter for collection in unaltered form from the serum sample collection chamber.

Official Gazette of the U.S. Patent and Trademark Office

*Blood; Real Time Operation; Plasmas (Physics)*

**19990046201** NASA Langley Research Center, Hampton, VA USA

**Aerospace Medicine and Biology: A Continuing Bibliography with Indexes, Supplement 493**

Jun. 14, 1999; 37p; In English

Report No.(s): NASA/SP-1998-7011/Suppl493; NAS 1.21:7011/Suppl493; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

This report lists reports, articles and other documents recently announced in the NASA STI Database.

Author

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

**19990046203** NASA Marshall Space Flight Center, Huntsville, AL USA

**Quantitative Method of Measuring Metastatic Activity**

Morrison, Dennis R., Inventor, NASA Marshall Space Flight Center, USA; Feb. 09, 1999; In English; Continuation of abandoned US-Patent-Appl-SN-97186, filed 27 Jul. 1993

Patent Info.: Filed 16 Feb. 1995; NASA-CASE-MSC-21715-2; US-Patent-5,869,238; US-Patent-Appl-SN-390904; No Copyright; Avail: US Patent and Trademark Office, Hardcopy, Microfiche

The metastatic potential of tumors can be evaluated by the quantitative detection of urokinase and DNA. The cell sample selected for examination is analyzed for the presence of high levels of urokinase and abnormal DNA using analytical flow cytometry and digital image analysis. Other factors such as membrane associated uroldnase, increased DNA synthesis rates and certain receptors can be used in the method for detection of potentially invasive tumors.

Official Gazette of the U.S. Patent and Trademark Office

*Deoxyribonucleic Acid; Tumors; Detection; Cancer; Enzymes*

**19990046304** MetaWorks, Inc., Boston, MA USA

**Systematic Review of the Literature Regarding the Diagnosis of Sleep Apnea. Evidence Report/Technology Assessment, Number 1**

Ross, S. D.; Allen, I. E.; Harrison, K. J.; Kvasz, M.; Connelly, J.; Feb. 1999; 170p; In English  
Report No.(s): PB99-134645; No Copyright; Avail: CASI; A08, Hardcopy; A02, Microfiche

The objective was to establish the evidence base for diagnosing sleep apnea (SA) in adult patients using systematic review methods. Tests covered were sleep monitoring devices, radiologic imaging, laboratory assays, and clinical signs and symptoms posited for use in screening or diagnosing SA. The standard sleep lab polysomnogram (PSG) was the gold standard. Literature published from 1980 through November 1, 1997 (cutoff) was searched using Medline and Current Contents, supplemented by a manual review of the bibliographies of all accepted papers. Studies of at least 10 adults suspected of or diagnosed with SA had to report the results of any test to establish or support a diagnosis of SA, relative to a standard PSG-derived apnea index (AI, the number of apneic episodes/hour sleep); apnea-hypopnea index (AHI, the total apneas plus hypopneas during total time asleep, divided by the number of hours asleep); or respiratory distress index (RDI). Eligible languages were English, German, French, Spanish, or Italian. Diagnostic papers reporting prevalence or clinical comorbidities of SA were also accepted.

NTIS

*Sleep; Diagnosis; Signs and Symptoms; Technology Assessment; Assaying; Respiration*

**19990046433** Cincinnati Univ., OH USA

**Female Reproductive Effects of Exposure to Jet Fuel at U.S. Air Force Bases Annual Report, 15 Oct. 1997 - 14 Oct. 1998**

Lemasters, Grace K.; Nov. 1998; 38p; In English

Contract(s)/Grant(s): DAMD17-96-2-6015

Report No.(s): AD-A361885; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

One of the most prevalent exposures at all Air Force (AF) bases is to jet fuel. Total consumption ranks in the billions of gallons. Jet fuel is composed of aliphatic/aromatic hydrocarbons and traces of metals that have potential adverse effects on health including menstrual disorders, infertility, spontaneous abortions, and fetal effects. The mean age of active enlisted female Air Force personnel is 27.6. This study addresses whether or not women are experiencing menstrual systems related to their work place from fuel exposures. This study evaluates environmental and internal dose measurements of jet fuel components during the course of each woman's usual work activities. Great strides have been made thus far. The number of women in pertinent job activities at each base has been identified and base commanders have received letters of request. Ten bases, thus far, have agreed to participate and have been visited. We have enrolled 165 women into the study. This team also developed and refined a new technique to measure internal dose levels. Specifically, the breath data indicates concentrations of toluene and the xylenes to range in concentrations between 10 and over 100 ppb.

DTIC

*Exposure; Females; Personnel; Jet Engine Fuels; Menstruation; Reproduction*

**19990046489** Brown Univ., Dept. of Pathology, Providence, RI USA

**Growth Factors and Tension-Induced Skeletal Muscle Growth Final Report**

Vandenburgh, Herman H., Brown Univ., USA; 1994; 8p; In English

Contract(s)/Grant(s): NAG2-914; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche

The project investigated biochemical mechanisms to enhance skeletal muscle growth, and developed a computer based mechanical cell stimulator system. The biochemicals investigated in this study were insulin/(Insulin like Growth Factor) IGF-1 and Steroids. In order to analyze which growth factors are essential for stretch-induced muscle growth in vitro, we developed a defined, serum-free medium in which the differentiated, cultured avian muscle fibers could be maintained for extended periods of time. The defined medium (muscle maintenance medium, MM medium) maintains the nitrogen balance of the myofibers for 3 to 7 days, based on myofiber diameter measurements and myosin heavy chain content. Insulin and IGF-1, but not IGF-2, induced

pronounced myofiber hypertrophy when added to this medium. In 5 to 7 days, muscle fiber diameters increase by 71 % to 98% compared to untreated controls. Mechanical stimulation of the avian muscle fibers in MM medium increased the sensitivity of the cells to insulin and IGF-1, based on a leftward shift of the insulin dose/response curve for protein synthesis rates. (54). We developed a ligand binding assay for IGF-1 binding proteins and found that the avian skeletal muscle cultures produced three major species of 31, 36 and 43 kD molecular weight (54) Stretch of the myofibers was found to have no significant effect on the efflux of IGF-1 binding proteins, but addition of exogenous collagen stimulated IGF-1 binding protein production 1.5 to 5 fold. Steroid hormones have a profound effect on muscle protein turnover rates in vivo, with the stress-related glucocorticoids inducing rapid skeletal muscle atrophy while androgenic steroids induce skeletal muscle growth. Exercise in humans and animals reduces the catabolic effects of glucocorticoids and may enhance the anabolic effects of androgenic steroids on skeletal muscle. In our continuing work on the involvement of exogenous growth factors in stretch-induced avian skeletal muscle growth, we have performed experiments to determine whether mechanical stimulation of cultured avian muscle cells alters their response to anabolic steroids or glucocorticoids. In static cultures, testosterone had no effect on muscle cell growth, but 5 $\alpha$ -dihydrotestosterone and the synthetic steroid stanozolol increased cell growth by up to 18% and 30%, respectively, after a three day exposure. We completed development of a new IBM-based mechanical cell stimulator system to provide greater flexibility in operating and monitoring our experiments. Our previous long term studies on myofiber growth were designed around a perfusion system of our own design. We have recently changed to performing these studies using a modified CELLCO cartridge bioreactor system Z since it has been certified as the ground-based model for the Shuttle's Space Tissue Loss (STL) F= Cell Culture Module. The current goals of this aspect of the project are three fold: 1) to design a Z cell culture system for studying avian skeletal myofiber atrophy on the Shuttle and Space Station; 0 2) to expand the use of bioreactors to cells which do not grow in either suspension or attached to the hollow fibers; and 3) to combine the bioreactor system with our computerized mechanical cell stimulator to have a better in vitro model to study tension/gravity/stretch regulation of skeletal muscle size. Preliminary studies also reported on involved : (1) how release of tension can induce rapid atrophy of tissues cultured avian skeletal muscle cells, and (2) a mechanism to transfer and maintain avian skeletal muscle organoids in modified cartridges in the Space Tissue Loss Module.

Derived from text

*Biochemistry; Cells (Biology); Culture Techniques; Growth; Hormones; Insulin; Muscles; Musculoskeletal System; Proteins; Steroids; Aerospace Medicine*

**19990046722** NASA Ames Research Center, Moffett Field, CA USA

### **The Effect of Spaceflight on Bone Cell Cultures**

Landis, William J., NASA Ames Research Center, USA; Apr. 19, 1999; 3p; In English

Contract(s)/Grant(s): NAG2-538; No Copyright; Avail: CASI; A01, Hardcopy; A01, Microfiche

Understanding the response of bone to mechanical loading (unloading) is extremely important in defining the means of adaptation of the body to a variety of environmental conditions such as during heightened physical activity or in extended explorations of space or the sea floor. The mechanisms of the adaptive response of bone are not well defined, but undoubtedly they involve changes occurring at the cellular level of bone structure. This proposal has intended to examine the hypothesis that the loading (unloading) response of bone is mediated by specific cells through modifications of their activity cytoskeletal elements, and/or elaboration of their extracellular matrices. For this purpose, this laboratory has utilized the results of a number of previous studies defining molecular biological, biochemical, morphological, and ultrastructural events of the reproducible mineralization of a primary bone cell (osteoblast) culture system under normal loading (1G gravity level). These data and the culture system then were examined following the use of the cultures in two NASA shuttle flights, STS-59 and STS-63. The cells collected from each of the flights were compared to respective synchronous ground (1G) control cells examined as the flight samples were simultaneously analyzed and to other control cells maintained at 1G until the time of shuttle launch, at which point they were terminated and studied (defined as basal cells). Each of the cell cultures was assayed in terms of metabolic markers- gene expression; synthesis and secretion of collagen and non-collagenous proteins, including certain cytoskeletal components; assembly of collagen into macrostructural arrays- formation of mineral; and interaction of collagen and mineral crystals during calcification of the cultures. The work has utilized a combination of biochemical techniques (radiolabeling, electrophoresis, fluorography, Western and Northern Blotting, and light microscopic immunofluorescence) and structural methods (conventional and high voltage electron microscopy, immunocytochemistry, stereomicroscopy, and 3D image reconstruction). The studies have provided new knowledge of aspects of bone cell development and structural regulation, extracellular matrix assembly, and mineralization during spaceflight and under normal gravity. The information has contributed to insights into the means in general by which cells respond and adapt to different conditions of gravity (loading). The data may as well have suggested an underlying basis for the observed loss of bone

by vertebrates, including man, in microgravity; and these scientific results may have implications for understanding bone loss following fracture healing and extended periods of inactivity such as during long-term bedrest.

Author

*Biochemistry; Bone Demineralization; Bones; Collagens; Aerospace Medicine; Bioastronautics; Biological Effects; Long Duration Space Flight; Physiological Effects; Weightlessness; Osteoporosis*

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### BEHAVIORAL SCIENCES

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

**19990044057** Institute for Human Factors TNO, Soesterberg, Netherlands

**Perception of Vibro-Tactile Asynchronies** *Interim Report* **Perceptie van vibro-tactiele asynchroniteiten**

Werkhoven, P. J., Institute for Human Factors TNO, Netherlands; vanErp, J. B. F., Institute for Human Factors TNO, Netherlands; Oct. 20, 1998; 33p; In English

Contract(s)/Grant(s): B97-031; TNO Proj. 788.1

Report No.(s): TM-98-B013; TD98-0270; Copyright; Avail: Issuing Activity (TNO Human Factors Research Inst., Kampweg 5, P.O. Box 23, 3769 ZG Soesterberg, The Netherlands), Hardcopy, Microfiche

Tactually presented information can potentially support operators in control tasks (tele-manipulation) and steering tasks (pilot's situation awareness). The success of tactile displays critically depends on how well their design is tuned to human tactile information processing characteristics. This study investigated the temporal sensitivity (duration discrimination) of the tactile channel and the consistency between tactually and visually perceived information. In a forced-choice discrimination task (Experiment 1) participants judged which of two empty intervals (a comparison and a standard interval, each defined by two pulses) was the longest. Standard interval lengths ranged from 100 to 400 ms. Intervals could be presented tactually (T: vibro-tactile pulses on finger tip; B: on the back) or visually (V: intensity pulses of a foveally presented square). Five conditions were examined: uni-modal discrimination (V-V, B-B and T-T) and cross-modal discrimination (V-T and V-B). In various experiments additional parameters were manipulated: uncertainty or the variation of standard intervals during sessions (Experiment 2) and the number of sessions (Experiment 3). In Experiment 4, a larger range of standard intervals was tested (56 ms ... 2000 ms) for the B-B condition. The dependent measures were the discrimination threshold and the point of subjective equivalence (PSE). In all (uni- and multi-modal) conditions thresholds increased substantially with uncertainty about the standard interval and with the number of sessions (though performance did not vary in time). Tactile thresholds varied between 19% (single session, constant standard) and 140% (multiple sessions, varying standard). Effects of condition only show a trend (performance in the V-V condition is better than in the V-B condition). Overall, multi-modal discrimination shows higher thresholds than predicted by uni-modal discrimination, suggesting that additional noise enters multi-modal interval discrimination. Furthermore, the length of tactile intervals is systematically overestimated compared to visually presented intervals (24% for the finger tip and 10% for the back). Tactile discrimination performance (B-B) improves with interval length up to the maximum duration tested (2 s) for which the Weber-fractions are 19%.

Author

*Display Devices; Human Performance; Selection; Sensitivity; Tactile Discrimination*

**19990046024** Civil Aeromedical Inst., Oklahoma City, OK USA

**Differential Prediction of FAA Academy Performance on the Basis of Race and Written Air Traffic Control Specialist Aptitude Test Scores**

Broach, Dana, Civil Aeromedical Inst., USA; Farmer, William L., Civil Aeromedical Inst., USA; Young, Willie C., Civil Aeromedical Inst., USA; May 1999; 30p; In English

Contract(s)/Grant(s): AM-98-B-HRR-509

Report No.(s): DOT/FAA/AM-99/16; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The written air traffic control specialist (ATCS) aptitude test battery was evaluated for evidence of predictive bias within the framework of the Uniform Guidelines on Employee Selection Procedures (29 CFR 1607) in a retrospective analysis. Step-down hierarchical regression analysis (Lautenschlager & Mendoza, 1986) was used to investigate differential prediction of performance in initial ATCS training at the Federal Aviation Administration (FAA) Academy in a sample of 282 African-American and 8,542 white first-time competitive entrants. Analysis based on correlations without corrections for restriction in range found significant differences in the intercepts, but not slopes, for African Americans and whites. Analysis based on correlations, corrected for explicit and implicit restriction in range, found significant differences in slopes and intercepts by race, suggesting that separate

regression equations were appropriate to predict Academy performance for the groups. The two analyses indicated that the composite score on the written ATCS test battery exhibited predictive bias as defined by the Uniform Guidelines on Employee Selection Procedures (29 CFR 1607) and Cleary (1968). Specifically, the composite score TMC over-predicted the performance of African Americans in initial training at the FAA Academy. As a consequence of the over-prediction, significantly more of the African Americans that were accepted into training for the ATCS occupation on the basis of their aptitude test scores went on to fail training than would have been expected on the basis of the common or majority (white) regression line. An alternative explanation is considered that the observed differential prediction reflected criterion bias or other group differences in factors such as educational achievement and age. A path analytic approach is outlined for investigating the complex interactions between test score, the criterion, race, education, and age. Additional research on the consequences of over-prediction for African Americans in the FAA Academy is recommended in closing.

Author

*Performance Prediction; Personnel Selection; Air Traffic Control; Examination; Education*

## 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.*

**19990044014** Department of Energy, Office of Energy Research, Washington, DC USA

#### **SNS Target Test Facility for Remote Handling Design and Verification**

Spampinato, P. T.; Graves, V. B.; Schrock, S. L.; Dec. 31, 1998; 5p; In English

Report No.(s): DE99-000212; ORNL/CP-99273; No Copyright; Avail: Department of Energy Information Bridge, Microfiche

The Target Test Facility will be a full-scale prototype of the Spallation Neutron Source Target Station. It will be used to demonstrate remote handling operations on various components of the mercury flow loop and for thermal/hydraulic testing. This paper describes the remote handling aspects of the Target Test Facility. Since the facility will contain approximately 1 cubic meter of mercury for the thermal/hydraulic tests, an enclosure will also be constructed that matches the actual Target Test Cell.

NTIS

*Test Facilities; Neutron Sources*

**19990044075** Department of Energy, Washington, DC USA

#### **ARIES NDA Robot operators' manual**

Scheer, N. L.; Nelson, D. C.; May 31, 1998; 39p; In English

Report No.(s): DE99-001128; LA-UR-98-2365; No Copyright; Avail: Department of Energy Information Bridge, Microfiche

The ARIES NDA Robot is an automation device for servicing the material movements for a suite of Non-destructive assay (NDA) instruments. This suite of instruments includes a calorimeter, a gamma isotopic system, a segmented gamma scanner (SGS), and a neutron coincidence counter (NCC). Objects moved by the robot include sample cans, standard cans, and instrument plugs. The robot computer has an RS-232 connection with the NDA Host computer, which coordinates robot movements and instrument measurements. The instruments are expected to perform measurements under the direction of the Host without operator intervention. This user's manual describes system startup, using the main menu, manual operation, and error recovery.

NTIS

*Robots; Assaying; Neutron Counters; Nondestructive Tests; User Manuals (Computer Programs)*

**19990045748** Norwegian Defence Research Establishment, Kjeller, Norway

#### **Permeation Analyses of Protective Suits Against Jet Fuel (JP-8)**

Pedersen, Bjorn, Norwegian Defence Research Establishment, Norway; Fullu, Lars, Norwegian Defence Research Establishment, Norway; Mar. 18, 1999; 26p; In English

Contract(s)/Grant(s): Proj. FFITOX/757/138

Report No.(s): FFI/RAPPORT-99/01305; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Permeation analyses with jet fuel have been carried out on three different protective suits. The analyses were performed with a multiple cell permeation system developed at Norwegian Defence Research Establishment (FFI). A permeation rate of 1 micro g/sq cm min was used as breakthrough limit in these analyses. The analyses showed that the protective suit of standard Tyvek

material had a limited protection against jet fuel based on our test criteria. The poly laminated Tyvek suit and the coated chemical protective garment showed better protection properties.

Author

*Protection; JP-8 Jet Fuel; Research*

**19990045775** Institute for Human Factors TNO, Soesterberg, Netherlands

**The Effect of Acceleration Cuing on Braking Behaviour in a Driving Simulator** *Final Report Het effect van toegevoegde acceleratie-informatie op remgedrag in een rijnsimulator*

deVos, A. P., Institute for Human Factors TNO, Netherlands; Hoekstra, W., Institute for Human Factors TNO, Netherlands; Pieterse, M. T. J., Institute for Human Factors TNO, Netherlands; Dec. 09, 1998; 25p; In English; Original contains color illustrations  
Contract(s)/Grant(s): A95/KL/306; TNO Proj. 730.3

Report No.(s): TM-98-A066; TD98-0278; Copyright; Avail: Issuing Activity (TNO Human Factors Research Inst., Kampweg 5, P.O. Box 23, 3769 ZG Soesterberg, The Netherlands), Hardcopy, Microfiche

In this experiment the effect of additional motion cuing on braking behaviour in a driving simulator was addressed. Four groups of subjects drove the simulator in different motion conditions. As a base-line condition all subjects drove in a fixed base condition with only visual motion in the horizontal plane. The four experimental conditions were: visible pitch of the vehicle with respect to the road, generated by the computer image system, onset translation cues by means of high pass filtered translations generated by the moving base, a combination of visible pitch and onset translations, visible pitch and onset translations combined with simulation of low frequency sustained acceleration by means of tilt coordination of the moving base. When approaching a stationary vehicle, subjects were instructed to brake as late as possible, making a smooth maneuver without causing a collision. The instruction was to either brake normal or to brake hard. Trials were made at approach speeds of 30, 50, 70, and 90 km/h. The results showed no effects of additional motion cuing on the Time to Collision (TTC) at the onset of the braking maneuver, on the minimum TTC during the braking maneuver, on the stopping distance or on the percentage of collisions. The minimum acceleration during the maneuver showed that subjects braked more moderately in case of addition of motion cuing, most distinctly by the addition of visible pitch. Subjective responses showed that subjects felt the simulator was improved through the addition of motion cuing, especially in case of the combination of visible pitch, onset translation and tilt coordination. Further research is recommended involving other motion cuing aspects (vertical and lateral) and different tasks related to speed behaviour and lateral control.

Author

*Acceleration Tolerance; Braking; Experimentation; Cues; Cuing; Lateral Control; Simulation*

**19990045783** Michigan Univ., Medical Center, Ann Arbor, MI USA

**Extracorporeal Life Support in Military Casualties** *Final Report, 31 Dec. 1996 - 1 Oct. 1998*

Barlett, Robert H.; Jan. 1999; 26p; In English

Contract(s)/Grant(s): DAMD17-97-C-7034

Report No.(s): AD-A361657; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The purpose of this contract is to develop a portable extracorporeal life support (ECLS) device and a vascular access system. Part of this project includes the development of a non-thrombogenic surface to allow ECLS with minimal or no system anti-coagulation. During the second year of the contract the prototype device was completed by the subcontractor, animal models were refined, and the non-thrombogenic NO releasing surface was further tested.

DTIC

*Life Support Systems; Heart Rate; Cardiovascular System; Lungs*

**19990045792** Civil Aviation Authority, Gatwick, UK

**Human Factors in Maintenance**

Hall, David, Civil Aviation Authority, UK; 1998; In English; See also 19990045788

Report No.(s): Paper-6; Copyright; Avail: Issuing Activity (The Royal Aeronautical Society, 4 Hamilton Place, London, W1V 0BQ, UK), Hardcopy, Microfiche

The aviation maintenance community have been rather late on the scene regarding human factors. Pilots and Air traffic controllers, along with their immediate environment have been subject of ergonomic study since at least World War Two. As far back as then it was established that 70% of aircraft accidents are attributable in some way to human error. This figure has not changed over the years, and could in fact be as high as 80% today. It is now internationally recognized that improvements in aircraft technology are unlikely to provide the necessary improvements in air safety that are being demanded in the face of increasing air traffic. In June 1990 the importance of human factors in maintenance was brought to the fore in the UK when a windscreen blew out of

a BAC1-11 and landed in an Oxfordshire field. Since that time other near fatal accidents have occurred which has brought about the Civil Aviation Authority (CAA)'s and industry's acceptance of the importance of human factors in aircraft maintenance. A number of initiatives are now underway to increase awareness and apply human factors principles in the workplace.

Derived from text

*Aircraft Maintenance; Aircraft Safety; Human Factors Engineering; Human Performance; Flight Safety*

**19990045793** Civil Aviation Authority, Safety Regulation Group, Gatwick, UK

**Human Error Tolerance in Helicopter Cockpit Systems**

Courteney, Hazel, Civil Aviation Authority, UK; Rotorcraft Flight Safety: Proceedings; 1998; In English; See also 19990045788 Report No.(s): Paper-7; Copyright; Avail: Issuing Activity (The Royal Aeronautical Society, 4 Hamilton Place, London, W1V 0BQ, UK), Hardcopy, Microfiche

This paper is aimed at helicopter operators who may be considering new cockpit equipment fits. It is intended to raise awareness of the effect that such systems can have on flight safety, because of their relationship to crew performance, and the possibility of error. One way to approach this is to identify the most important risk areas, then review the effects - positive and negative that the new system could have in these respects. The paper will begin by identifying the main risk areas for UK helicopter operations. An analysis of recent Mandatory Occurrence Reports (MORs) is presented. Comparisons will be made between different categories of operators and between MOR events caused by technical versus human causal factors. It will be suggested that the greater risks currently lie with helicopter operations that are outside the Police / Ambulance (P/A) and other Public Transport (PT) categories, and with those events that arise from human - as opposed to technical - causes, although these are the minority of MORs. New cockpit technologies are likely to be available for helicopters within the next five years, for example, Flight Management Systems (FMS) that are comparable to their fixed wing counterparts. Drawing on the findings of the MOR analysis, and some feedback from fixed wing operators of FMS, suggestions will be made concerning the effects that such systems could have on helicopter flight safety. Finally, CAA activity to address the crew related aspects of light deck design in Type certification will be outlined.

Author

*Cockpits; Helicopters; Human Performance; Aircraft Equipment; Flight Instruments; Human Factors Engineering; Flight Safety; Safety Devices*

**19990045858** National Inst. of Standards and Technology, (BFRL), Gaithersburg, MD USA

**Heat Transfer Model for Fire Fighter's Protective Clothing**

Mell, William E.; Lawson, J. Randall; Jan. 1999; 42p; In English

Report No.(s): PB99-134702; NISTIR-6299; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The paper presents the first stage in the development of a heat transfer model for fire fighter's protective clothing. The protective fabrics are assumed to be dry (e.g., no moisture from perspiration) and the fabric temperatures considered are below the point of thermal degradation (e.g., melting or charring). Many burn injuries to fire fighters occur even when there is no thermal degradation of their protective gear. A planar geometry of the fabric layers is assumed with one-dimensional heat transfer. The forward-reverse model is used for radiative heat transfer. The accuracy of the model is tested by comparing time dependent temperatures from both within and on the surface of a typical fabric assembly to those obtained experimentally.

NTIS

*Protective Clothing; Fire Fighting; Radiative Heat Transfer*

**19990045885** Defence Science and Technology Organisation, Aeronautical and Maritime Research Lab., Melbourne, Australia

**Perspective Displays: A Review of Human Factors Issues**

Naikar, Neelam, Defence Science and Technology Organisation, Australia; February 1998; 35p; In English

Report No.(s): DSTO-TR-0630; DODA-AR-010-466; Copyright; Avail: Issuing Activity (DSTO Aeronautical and Maritime Research Lab., PO Box 4331, Melbourne, Victoria 3001, Australia), Hardcopy, Microfiche

Three-dimensional displays may be a more effective way of presenting spatial information to operators than conventional two-dimensional displays because all three dimensions of space may be represented in a spatial format. Of several three-dimensional computer graphics systems that are currently available, perspective displays may be the most viable option for implementation at the present time. Previous research shows that perspective displays support better performance than plan-view displays on navigation, spatial awareness, and integration tasks. However, several issues need to be carefully considered and understood

before perspective displays may be safely operationalized. This report reviews these issues; monocular cues for depth perception, multiple cue interaction, frame of reference, perspective geometry, and geometric and symbolic enhancement features.

Author

*Human Factors Engineering; Three Dimensional Models; Display Devices; Computer Graphics*

**19990046580** Pacific Environmental Services, Inc., Herndon, VA USA

**Report on Alpha and End-User Testing of the Level I Ergonomics Methodology Guide Supplement for Warehouse and Service Areas *Final Report***

Barker, Richard; Joyce, Marilyn; Nelson, Jeffrey; Crawford, Patricia; DAmato, Victor; Feb. 1999; 207p; In English

Contract(s)/Grant(s): F41624-95-D-9017

Report No.(s): AD-A361847; IERA-RS-BR-TR-1999-0003; No Copyright; Avail: CASI; A10, Hardcopy; A03, Microfiche

This report describes the results of usability, reliability, and validity tests applied to the Level I Ergonomics Methodology Guide Supplement for Warehouse and Service Areas. Testing was performed in two phases. In phase one (Alpha test), five experienced ergonomists used the methodology to evaluate ten representative USA Air Force (USAF) warehouse and service jobs and develop recommendations to eliminate identified ergonomics hazards. The ergonomists also participated in a focus session to recommend enhancements to the guide. In phase two (end-user test), the exercise was repeated by eight USAF bioenvironmental engineering technicians. Inter-rater agreement on the presence/absence of specific ergonomic hazards ranged from slight to fair. Agreement was higher among experienced ergonomists than among USAF technicians. Technicians found the methodology highly usable. The average time to complete and score the hazard identification checklist was 23.0 minutes, and the average time to select corrective actions for identified hazards was 13.6 minutes. The results suggest the methodology can enable relatively inexperienced USAF technicians to develop the same types of solutions for ergonomic hazards that an experienced ergonomist would recommend.

DTIC

*Human Factors Engineering; Musculoskeletal System; Occupational Diseases*

# Subject Term Index

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