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AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY WITH INDEXES

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Typical Report Citation and Abstract

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

Key

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AEROSPACE MEDICINE AND BIOLOGY

A Continuing Bibliography (Suppl. 451)

NOVEMBER 3, 1997

51
LIFE SCIENCES (GENERAL)

19970028663 Tuskegee Inst., NASA Center for Food Production, Processing and Waste Management for Controlled Ecological Life Support Systems, AL USA

Development of Plant Gene Vectors for Tissue-Specific Expression Using GFP as a Reporter Gene

Jackson, Jacquelyn, Tuskegee Inst., USA; Egnin, Marceline, Tuskegee Inst., USA; Xue, Qi-Han, Tuskegee Inst., USA; Prakash, C. S., Tuskegee Inst., USA; The First National Student Conference: NASA University Research Centers at Minority Institutions; 1997, pp. 74-78; In English; Also announced as 19970028662

Contract(s)/Grant(s): NAGw-2940; Copyright Waived (NASA); Avail: CASI; A01, Hardcopy; A04, Microfiche

Reporter genes are widely employed in plant molecular biology research to analyze gene expression and to identify promoters. Gus (UidA) is currently the most popular reporter gene but its detection requires a destructive assay. The use of jellyfish green fluorescent protein (GFP) gene from Aequorea Victoria holds promise for noninvasive detection of in vivo gene expression. to study how various plant promoters are expressed in sweet potato (Ipomoea batatas), we are transcriptionally fusing the intron-modified (mGFP) or synthetic (modified for codon-USAge) GFP coding regions to these promoters: double cauliflower mosaic virus 35S (CaMV 35S) with AMV translational enhancer, ubiquitin7-intron-ubiquitin coding region (ubi7-intron-UQ) and sporaminA. A few of these vectors have been constructed and introduced into E. coli DH5a and Agrobacterium tumefaciens EHA105. Transient expression studies are underway using protoplast-electroporation and particle bombardment of leaf tissues.

Author

Molecular Biology; Genes; Gene Expression; Fluorescence; Proteins; Assaying; Coding; Potatoes; Plants (Botany)

19970028664 Tuskegee Inst., NASA Center for Food Production, Processing and Waste Management for Controlled Ecological Life Support Systems, AL USA

Studies on Somatic Embryogenesis in Sweetpotato

Bennett, J. Rasheed, Tuskegee Inst., USA; Prakash, C. S., Tuskegee Inst., USA; The First National Student Conference: NASA University Research Centers at Minority Institutions; 1997, pp. 79-81; In English; Also announced as 19970028662

Contract(s)/Grant(s): NAGw-2940; Copyright Waived (NASA); Avail: CASI; A01, Hardcopy; A04, Microfiche

The purpose of this study was to improve the somatic embryo (SE) system for plant production of sweetpotato Ipomoea batatas L.(Lam)l. Explants isolated from SE-derived sweet potato plants were compared with control (non SE-derived) plants for their competency for SE production. Leaf explants were cultured on Murashige-Skoog (MS) medium with 2,4-dichlorophenoxy acetic acid (0.2 mg/L) and 6-benzylaminopurine (2.5 mg/L) for 2 weeks in darkness and transferred to MS medium with abscisic acid (2.5 Explants isolated from those plants developed through somatic embryo-genesis produced new somatic embryos rapidly and in higher frequency than those isolated from control plants. They also appeared to grow faster in tissue culture than the control plants. Current studies in the laboratory are examining whether plants derived from a cyclical embryogenesis system (five cycles) would have any further positive impact on the rapidity and frequency of somatic embryo development. More detailed studies using electron microscopy are expected to show the point of origin of the embryos and to allow determination of their quality throughout the cyclical process. This study may facilitate improved plant micropropagation, gene transfer and germplasm conservation in sweet potato.

Author

Embryology; Potatoes; Embryos; Culture Techniques; Electron Microscopy; Plants (Botany)

19970028665 Tuskegee Inst., NASA Center for Food Production, Processing and Waste Management for Controlled Ecological Life Support Systems, AL USA

Automated Liquid-Level Control of a Nutrient Reservoir for a Hydroponic System

Smith, Boris, Tuskegee Inst., USA; Asumadu, Johnson A., Tuskegee Inst., USA; Dogan, Numan S., Tuskegee Inst., USA; The First National Student Conference: NASA University Research Centers at Minority Institutions; 1997, pp. 82-85; In English; Also announced as 19970028662

Contract(s)/Grant(s): NAGw-2940; Copyright Waived (NASA); Avail: CASI; A01, Hardcopy; A04, Microfiche

A microprocessor-based system for control of the liquid level of a nutrient reservoir for a plant hydroponic growing system has been developed. The system uses an ultrasonic transducer to sense the liquid level or height. A National Instruments' Multifunction Analog and Digital Input/Output PC Kit includes NI-DAQ DOS/Windows driver software for an IBM 486 personal computer. A Labview Full Development system for Windows is the graphical programming system being used. The system allows liquid level control to within 0.1 cm for all levels tried between 8 and 36 cm in the hydroponic system application. The detailed algorithms have been developed and a fully automated microprocessor based nutrient replenishment system has been described for this hydroponic system.

Author

Automatic Control; Hydroponics; Reservoirs; Microprocessors; Liquid Levels; Data Acquisition

19970028667 Tuskegee Inst., NASA Center for Food Production, Processing and Waste Management for Controlled Ecological Life Support Systems, AL USA

Characterization of Proteins in Filtrate from Biodegradation of Crop Residue

Horton, Wileatha, Tuskegee Inst., USA; Trotman, A. A., Tuskegee Inst., USA; The First National Student Conference: NASA University Research Centers at Minority Institutions; 1997, pp. 90-92; In English; Also announced as 19970028662

Contract(s)/Grant(s): NAGw-2940; Copyright Waived (NASA); Avail: CASI; A01, Hardcopy; A04, Microfiche

Biodegradation of plant biomass is a feasible path for transformation of crop residue and recycling of nutrients for crop growth. The need to model the effects of factors associated with recycling of plant biomass resulting from hydroponic sweet potato production has led to investigation of natural soil isolates with the capacity for starch hydrolysis. This study sought to use nondenaturing gel electrophoresis to characterize the proteins present in filtered effluent from bioreactors seeded with starch hydrolyzing bacterial culture used in the biodegradation of senesced sweet potato biomass. The study determined the relative molecular weight of proteins in sampled effluent and the protein banding pattern was characterized. The protein profiles of effluent were similar for samples taken from independent runs under similar conditions of starch hydrolysis. The method can be used as a quality control tool for confirmation of starch hydrolysis of crop biomass. In addition, this method will allow monitoring for presence of contaminants within the system-protein profiles indicative of new enzymes in the bioreactors.

Author

Biodegradation; Biomass; Plants (Botany); Crop Growth; Residues; Starches; Hydroponics; Hydrolysis; Potatoes; Bioreactors

19970028668 Tuskegee Inst., NASA Center for Food Production, Processing and Waste Management for Controlled Ecological Life Support Systems, AL USA

Studies for Somatic Embryogenesis in Sweet Potato

Bennett, J. Rasheed, Tuskegee Inst., USA; Prakash, C. S., Tuskegee Inst., USA; The First National Student Conference: NASA University Research Centers at Minority Institutions; 1997, pp. 93-95; In English; Also announced as 19970028662

Contract(s)/Grant(s): NAGw-2940; Copyright Waived (NASA); Avail: CASI; A01, Hardcopy; A04, Microfiche

The purpose of this study was to improve the somatic embryo (SE) system for plant production of sweet potato (Ipomoea batatas L(Lam)). Explants isolated from SE-derived sweet potato plants were compared with control (non SE-derived) plants for their competency for SE production. Leaf explants were cultured on Murashige-Skoog (MS) medium with 2,4-dichlorophenoxy acetic acid (0.2 mg/L) and 6-benzylaminopurine (2.5 mg/L) for 2 weeks in darkness and transferred to MS medium with abscisic acid (2.5 mg/L). Explants isolated from those plants developed through somatic embryogenesis produced new somatic embryos rapidly and in higher frequency than those isolated from control plants They also appeared to grow faster in tissue culture than the control plants. Current studies in the laboratory are examining whether plants derived from a cyclical embryogenesis system (five cycles) would have any further positive impact on the rapidity and frequency of somatic embryo development. More detailed studies using electron microscopy are expected to show the point of origin of the embryos and to allow determination of their quality throughout the cyclical process. This study may facilitate improved plant micropropagation, gene transfer and germplasm conservation in sweet potato.

Author

Embryology; Reproduction (Biology); Culture Techniques; Potatoes; Embryos; Conservation

19970028669 Morehouse School of Medicine, Dept. of Anatomy and Neuroscience, Atlanta, GA USA

Light-Induced Alterations in Basil Ganglia Kynurenic Acid Levels

Sroufe, Angela E., Morehouse School of Medicine, USA; Whittaker, J. A., Morehouse School of Medicine, USA; Patrickson, J. W., Morehouse School of Medicine, USA; Orr, M. C., Morehouse School of Medicine, USA; The First National Student Conference: NASA University Research Centers at Minority Institutions; 1997, pp. 96-99; In English; Also announced as 19970028662
Contract(s)/Grant(s): NCCw-83; NIH-GM-08248; NIH-RR-03034; NIH-NS-34194; Copyright Waived (NASA); Avail: CASI; A01, Hardcopy; A04, Microfiche

The metabolic synthesis, release and breakdown of several known CNS neurotransmitters have been shown to follow a circadian pattern entrained to the environmental light/dark cycle. The levels of excitatory amino acid (EAA) transmitters such as glutamate, have been shown to vary with environmental lighting conditions. Kynurenic Acid (KA), an endogenous tryptophan metabolite and glutamate receptor antagonist, has been reported to have neuroprotective effects against EAA-induced excitotoxic cell damage. Changes in KA's activity within the mammalian basal ganglia has been proposed as being contributory to neurotoxicity in Huntington's Disease. It is not known whether CNS KA levels follow a circadian pattern or exhibit light-induced fluctuations. However, because the symptoms of certain degenerative motor disorders seem to fluctuate with daily 24 hour rhythm, we initiated studies to determine if basal ganglia KA were influenced by the daily light/dark cycle and could influence motor function. Therefore in this study, HPLC-EC was utilized to determine if basal ganglia KA levels in tissue extracts from adult male Long-Evans rats (200-250g) entrained to 24 and 48 hours constant light and dark conditions, respectively. Samples were taken one hour before the onset of the subjective day and one hour prior to the onset of the subjective night in order to detect possible phase differences in KA levels and to allow for accumulation of factors expressed in association with the light or dark phase. Data analysis revealed that KA levels in the basal ganglia vary with environmental lighting conditions; being elevated generally during the dark. Circadian phase differences in KA levels were also evident during the subjective night and subjective day, respectively. Results from these studies are discussed with respect to potential cyclic changes in neuronal susceptibility to excitotoxic damage during the daily 24 hour cycle and its possible relevance to future therapeutic approaches in treating neurodegenerative disorders.
Author

Neurotransmitters; Circadian Rhythms; Amino Acids; Glutamates; Illuminating; Metabolites; Ganglia; Diseases

19970028670 Morehouse School of Medicine, Dept. of Biochemistry, Atlanta, GA USA

Endothelial Cell Morphology and Migration are Altered by Changes in Gravitational Fields

Melhado, Caroline, Morehouse School of Medicine, USA; Sanford, Gary, Morehouse School of Medicine, USA; Harris-Hooker, Sandra, Morehouse School of Medicine, USA; The First National Student Conference: NASA University Research Centers at Minority Institutions; 1997, pp. 100-103; In English; Also announced as 19970028662
Contract(s)/Grant(s): NAG9-644; NIH-RR-03034; Copyright Waived (NASA); Avail: CASI; A01, Hardcopy; A04, Microfiche

Endothelial cell migration is important to vascular wall regeneration following injury or stress. However, the mechanism(s) governing this response is not well understood. The microgravity environment of space may complicate the response of these cells to injury. to date, there are no reports in this area. We examined how bovine aortic (BAEC) and pulmonary (BPEC) endothelial cells respond to denudation injury under hypergravity (HGrav) and simulated microgravity (MGrav), using image analysis. In 10% FBS, the migration of confluent BAEC and BPEC into the denuded area was not affected by HGrav or MGrav. However, in low FBS (0.5%), signficantly retarded migration under MGrav, and increased migration under HGrav was found. MGrav also decreased the migration of postconfluent BPEC while HGrav showed no difference. Both MGrav and HGrav strongly decreased the migration of postconfluent BAEC. Also, both cell lines showed significant morphological changes by scanning electron microscopy. These studies indicate that endothelial cell function is affected by changes in gravity.
Author

Gravitational Fields; Cells (Biology); Microgravity; Morphology; Migration; Injuries; Image Analysis; High Gravity Environments; Cardiovascular System

19970028671 Clark-Atlanta Univ., Dept. of Biological Sciences, GA USA

Galaptin Mediates the Effect of Hypergravity on Vascular Smooth Muscle cell (SMC) Adhesion to Laminin Containing Matrices

Enahora, Fatisha T., Clark-Atlanta Univ., USA; Bosah, Francis N., Clark-Atlanta Univ., USA; Harris-Hooker, Sandra, Morehouse School of Medicine, USA; Sanford, Gary L., Morehouse School of Medicine, USA; The First National Student Conference: NASA University Research Centers at Minority Institutions; 1997, pp. 104-106; In English; Also announced as 19970028662
Contract(s)/Grant(s): NAG9-852; NIGMS S-066-GM-08248; Copyright Waived (NASA); Avail: CASI; A01, Hardcopy; A04, Microfiche

Galaptin, an endogenous beta-galactoside specific lectin, has been reported to bind to laminin and subsequently decrease the binding of SMC. Cellular function depend on cell:matrix interactions. Hypergravity (HGrav) affect a number of cellular functions, yet little is known about its affect on cell adhesion. We examined the possibility that galaptin mediates the effects of hypergravity on SMC adherence. Confluent primate aorta SMC cultures were subjected to Hgrav (centrifuged at 6G) for 24 and 48 hr. Cells were non-enzymatically dispersed, pretreated with antisense (AS-oligo) or control sense (SS-oligo) oligonucleotides to galaptin mRNA (0.01 micro g/ml), then seeded in uncoated or ECL-matrix coated plates. Adhesion of cells were monitored after 6 hr. HGrav increased adhesion by 100-300% compared to controls. AS-oligo decreased adhesion for both HGrav and control cells. SS-oligo did not affect adhesion for either HGrav or control cells. These studies show that HGrav affects cell adhesion and that galaptin expression is required for this effect.
Author
Cells (Biology); Muscles; Cardiovascular System; Adhesion; High Gravity Environments

19970028672 Georgia State Univ., Atlanta, GA USA
Simulated Hypergravity Alters Vascular Smooth Muscle Cell Proliferation and Motility
Hunt, Shameka, Georgia State Univ., USA; Bettis, Barika, Georgia State Univ., USA; Harris-Hooker, Sandra, Morehouse School of Medicine, USA; Sanford, Gary L., Morehouse School of Medicine, USA; The First National Student Conference: NASA University Research Centers at Minority Institutions; 1997, pp. 107-110; In English; Also announced as 19970028662
Contract(s)/Grant(s): NCCw-83; NAG9-64499; Copyright Waived (NASA); Avail: CASI; A01, Hardcopy; A04, Microfiche

The cellular effects of gravity are poorly understood due to its constancy and nonavailability of altered gravitational models. Such an understanding is crucial for prolonged space flights. In these studies, we assessed the influence of centrifugation at 6G (HGrav) on vascular smooth muscle (SMC) mobility and proliferation. Cells were: (a) plated at low density and subjected to HGrav for 24-72 hr for proliferation studies, or (b) grown to confluency, subjected to HGrav, mechanically denuded and monitored for cell movement into the denuded area. Controls were maintained under normogravity. SMC showed a 50% inhibition of growth under HGrav and 10% serum; HGrav and low serum resulted in greater growth inhibition. The rate of movement of SMC into the denuded area was 2-3-fold higher under HGrav in low serum compared to controls, but similar in 10% serum. These studies show that HGrav has significant effects on SMC growth and mobility, which are dependent on serum levels.
Author
Cells (Biology); High Gravity Environments; Gravitational Effects; Muscles; Mobility; Cardiovascular System; Regeneration (Physiology)

19970028922 University of West Florida, Dept. of Biology, Pensacola, FL USA
Nonrecombinant Genetic Modification of Aquifer Bacteria to Achieve Constitutive Degradation of Trichloroethylene ***Final Report, Jun. 1994 - Aug. 1995***
Shields, Malcolm S., University of West Florida, USA; Dec. 1996; 116p; In English
Contract(s)/Grant(s): DAAL03-91-C-0034
Report No.(s): AD-A327021; AL/EQ-TR-1995-0030; No Copyright; Avail: CASI; A06, Hardcopy; A02, Microfiche

Aquifer bacteria were isolated for their capacity to predominate following nutrient enrichment (field application vectors (FAVs)), and screened as hosts for the Tn5 containing, constitutive toluene ortho-monoxygenase (Tom) expressing plasmid: TOM(31c) (which causes the cooxidation of trichloroethylene (Tc E)). Tom expression during positive selection in native aquifer sediments contaminated with TCE was determined. Three such FAVs were constructed: NFG-2 (TOM3ic), MFI-l (TOM3ic), and MFG-2 (TOM3ic). All stably maintained TOM3ic and constitutively degraded TCE. Like the original TOM31c mutant strain (Burkholderia cepacia G4 PR131), MFG-2 (TOM31c) was unable to significantly degrade TCE in native sediments despite inoculation to high levels (greater than 1 x 10(exp 8) cells/gram), and did not apparently survive well in glucose amended material. NFG-2 (TOM3ic) and MFI-l (TOM3ic) did significantly degrade TCE in glucose and IGEPAL (respectively) amended aquifer sediments. Like PRl31 (TOM31c), Tn5 gene probes indicated that these FAVs also remained above 10(exp 6) cells per cu.cm of sediment during a 20 day feeding and TCE degradation experiment. TOM31c was transferable to these selectable FAVs by non-recombinant mating techniques, and once there encoded constitutive TCE degradation in native sediments untreated save for the addition of a specific carbon and energy sources.
DTIC
Trichloroethylene; Aquifers; Bacteria; Contamination; Degradation; Inoculation; Recombination Reactions

19970028924 ROW Sciences, Inc., Gaithersburg, MD USA

Reproductive Toxicity of Potassium Dichromate (CAS No. 7778-50-9) Administered in Diet to BALB/c Mice ***Final Report***

Feb. 25, 1997; 457p; In English

Contract(s)/Grant(s): NTP/NIEHS NO1-ES-15323

Report No.(s): PB97-144919; No Copyright; Avail: CASI; A20, Hardcopy; A04, Microfiche

The potential reproductive toxicity of potassium dichromate (hexavalent) (K2Cr2O7) in BALB/C mice was evaluated using the Reproductive Assessment by Continuous Breeding (RACB) protocol. Based on slightly decreased body weights and increased feed consumption noted at 400 ppm during a previous 9-week dietary study in BALB/c mice, dose levels for the continuous breeding phase for this study were set at 100, 200, and 400 ppm. Exposure to potassium dichromate in the diet did not affect the reproductive performance of F0 mice (20 mice/sex/group). Mean body weights of the high-dose F0 males and females were generally slightly less than controls. Feed consumption was generally unchanged. The mean calculated doses during Task 2 were 19.4, 38.6, and 85.7 mg/kg/day for the F0 males and females in the 100, 200, and 400 ppm dose groups, respectively. No treatment-related mortality or clinical signs were observed. At necropsy, the mean absolute liver weights were decreased by 17 and 12% in the 400 ppm males and females compared to controls, respectively. No differences were noted in any other absolute or relative organ weights. No treatment-related gross of microscopic lesions were observed in the generally F0 animals. Sperm endpoints were generally comparable among all groups.

NTIS

Toxicity; Potassium; Reproduction (Biology)

19970029019 Ljubljana Univ., Laboratorij za Biokibernetiko, Yugoslavia

Cellular Automata Modelling of Biological and Chemical Systems ***Modeliranje bioloskih in kemijskih sistemov s celicnimi avtomati***

Semrov, Dejan, Ljubljana Univ., Yugoslavia; Kotnik, Tadej, Ljubljana Univ., Yugoslavia; Miklavcic, Damijan, Ljubljana Univ., Yugoslavia; Electrotechnical Review; 1996; Volume 63, No. 4-5, pp. 241-248; In Slovene; Also announced as 19970029014; No Copyright; Avail: CASI; A02, Hardcopy; A02, Microfiche

Cellular automata were used as a tool for natural systems modeling. Four properties characterize a cellular automaton. The first is the geometry of the array of cells. The most frequently used geometries for the two-dimensional cellular automata are regular meshes of equilateral shapes which are shown in Figure 1.

Author

Chemical Composition; Automata Theory; Biological Effects; Population Theory; Systems Engineering

19970029431 California Univ., Davis, CA USA

Effects of Centrifuge Diameter and Operation on Rodent Adaptation to Chronic Centrifugation ***Final Report***

Fuller, Charles A., California Univ., USA; 1992; 49p; In English

Contract(s)/Grant(s): NAG2-795

Report No.(s): NASA-CR-205481; NAS 1.26:205481; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

This study examined the responses of rats to centrifugation in a constant acceleration field (1.5 G). Centrifuge diameter (1.8m, 2.5m or 6.0m) and schedule of operation (Daily or weekly stop) varied between groups. Body mass, food consumption, water consumption and neurovestibular function were measured weekly. Body temperature and activity were continuously monitored using telemetry. A subset of subjects were videotaped (50 minutes per day) to allow for movement analysis. Exposure to a hyperdynamic field of this magnitude did cause the expected depression in the physiological variables monitored. Recovery was accomplished within a relatively rapid time frame; all variables returned to precentrifugation levels. In general, the magnitudes of the changes and the rate of recovery were similar at different centrifuge diameters and stopping frequency. There were cases, however, in which the magnitude of the response and/or the rate of recovery to a new steady-state were altered as a result of centrifuge diameter. In summary, these results indicate that stopping frequency has little, if any, effect on adaptation to chronic centrifugation. However, the angular velocity (omega), and therefore centrifuge diameter is an important consideration in the adaptation of an organism to chronic centrifugation.

Author

Centrifuging; Centrifuges; Rats; Diameters; Body Temperature; Body Fluids; Food Intake; Water Consumption

19970029608

Metallographic investigation of a failed stainless steel orthopaedic implant device

Sivakumar, M., Univ of Madras, India; Rajeswari, S.; Thulasiraman, V.; Journal of Materials Science Letters; December 15 1996; ISSN 0261-8028; 15, 24, pp. 2192-2194; In English; Copyright; Avail: Issuing Activity

An accident victim sustained a fracture around the head of the right femur, and an intertrochanteric nail/plate combination was implanted to provide bone alignment and fixation. Six months later, examination of a radiograph revealed that the device had broken at the fifth countersunk hole from the plate end. The device was subsequently removed and studied. Little dimensional change had occurred at the fractured site, so the fracture was classified macroscopically as brittle fracture. In the defective zone, fracture originated between screws four and seven where the plate was not supported by the bone. The load was transmitted through the fifth countersunk hole of the plate, causing cyclic loading of the implant and fatigue crack initiation.

Author (EI)

Brittle Materials; Fatigue (Materials); Fractures (Materials); Implantation; Metallography; Orthopedics; Stainless Steels; Surgery

19970029747

Microdamage simulation in a bone tissue using finite element analysis

Pidaparti, R. M. V., Purdue Univ, USA; Computers and Structures; February 1997; ISSN 0045-7949; 62, 3, pp. 463-466; In English; Copyright; Avail: Issuing Activity

The effect of microcracks in a rat tibia under torsional loading was investigated using a finite element analysis. A global damage parameter (stiffness loss) and a local damage parameter (reduction in tresca stress) were used to estimate the severity of the damage due to circumferential and radial type microcracks. Results show the varying amounts of damage caused by isotropic and transversely isotropic properties of both types of microcracks. The present damage model can be used for finite element simulation of microdamage in a bone tissue.

Author (EI)

Bones; Finite Element Method; Microcracks; Stiffness

19970030624

Sampling strategy and direct solid sampling electrothermal atomization atomic absorption spectrometric analysis of trace elements in animal tissue

Luecker, Ernst, Justus-Liebig Univ, Germany; Applied Spectroscopy; July 1997; ISSN 0003-7028; 51, 7, pp. 1031-1036; In English; Copyright; Avail: Issuing Activity

The influence of analyte distribution on analytical results of direct solid sampling and electrothermal atomization atomic absorption spectrometry with direct Zeeman-effect background correction (SS-ZAAS) was studied with the use of nonhomogenized livers of mallards and fallow deer and hierarchic sampling schemes. Significant differences were observed by means of the analysis of variance in lead content of left and right lobes as well as of randomly distributed sampling sites of a deer liver. For the first time SS-ZAAS distribution analysis gave variances dominated by analyte distribution. The distribution analyses of mercury in livers of mallards gave significant effects of sampling sites in 6 out of 10 livers; however, in all cases variance as caused by analyte distribution was observed to be lower than residual variance. Allowing for heterogeneity, the minimal total variance is reached for a given number of replicates when each test sample is taken from a different site of the organ. Despite increased imprecision, the uncertainty of direct solid sampling is thus minimized effectively.

Author (EI)

Atomic Spectra; Spectroscopy; Tissues (Biology); Trace Elements; Zeeman Effect

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AEROSPACE MEDICINE

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

19970029000 Jackson (Henry M.) Foundation, Rockville, MD USA

Heat Tolerance and Exertional Heat Illness in Female Military Recruits ***Annual Report, 18 Sep. 1995 - 17 Sep. 1996***

Wenger, Bruce C., Jackson (Henry M.) Foundation, USA; Oct. 1996; 102p; In English

Contract(s)/Grant(s): DAMD17-95-I-5052

Report No.(s): AD-A327205; No Copyright; Avail: CASI; A06, Hardcopy; A02, Microfiche

We studied healthy Marine recruits (controls), and recruits with exertional heat illness (EHI) or dilutional hyponatremia (patients) during basic training. With swallowed telemetry devices, we recorded core-temperature (T(core)) of 380 male and 350 female recruits during training events with high incidence of EHI, to define norms for comparison with presenting T(core) of EHI patients. With a computerized cognitive assessment battery we established norms for controls, and demonstrated acute impairment in 14 patients, showing that the battery distinguishes patients from controls. We collected baseline blood samples from 30 female and 35 male controls, and serial samples from 4 EHI patients for a pilot study of inflammatory responses in EHI. We collected copies of clinical records and pertinent training records on all identified EHI episodes in 1995-1996 (126 cases), and constructed a new computerized database which is congruent with clinical data forms in the patient records. These cases increase the total number of cases in the databases for epidemiological analyses and, particularly, the much smaller numbers of cases (only since 1993) for which published recruit training schedules are available to verify the training event during which each EHI episode occurred; and of female cases whose menstrual cycle phase was recorded.
DTIC
Heat Tolerance; Clinical Medicine; Sicknesses; Physiological Tests; Physiological Effects

19970029018 Ljubljana Univ., Inst. of Mathematics, Physics, and Mechanics, Yugoslavia
Regularizing the Discrete Ill-Posed Inverse Problem of Electrocardiography ***Regularizacija Diskretnega Slabo Pogojenega Inverznega Problema v Elektrokardiografiji***
Hren, Rok, Ljubljana Univ., Yugoslavia; Electrotechnical Review; 1996; Volume 63, No. 4-5, pp. 234-240; In English; Also announced as 19970029014; No Copyright; Avail: CASI; A02, Hardcopy; A02, Microfiche

In this study, the generalized singular value decomposition was used to derive the L-curve method in combination with the Tikhonov regularization for solving the discrete ill-posed inverse problem in electrocardiography. We used a boundary element model of the torso and epicardial surfaces. We validated the inverse solution for a single dipolar source and for the oblique dipoles generated by an anatomically accurate model of the human ventricular myocardium. We have demonstrated that our inverse solution can be used for accurately localizing the preexcitation sites in patients suffering from Wolff-Parkinson-White syndrome.
Author
Electrocardiography; Myocardium; Signs and Symptoms; Boundaries

19970029115 Texas Univ. Health Science Center, School of Public Health, Houston, TX USA
Evaluation of the Risk for Work-Related Upper Extremity Musculoskeletal Symptoms in USAF Air Traffic Controllers: A Pilot Feasibility Study
Kapp, Evan Z., Texas Univ. Health Science Center, USA; Jul. 11, 1997; 72p; In English
Report No.(s): AD-A327464; AFIT-97-086; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche

The relationship between work and painful musculoskeletal disorders was first described over 200 years ago. This relationship has become increasingly important in the past few decades to a point where Repetitive Strain Injuries or Cumulative Trauma Disorders (which will be referred to as work-related upper extremity disorders or WRUEDs) have been called the occupational epidemic of the 1990s (19). The actual prevalence of WRUEDs in the working population is uncertain, although it is well documented in some specific fields and occupations often labeled as 'high-risk' for these illnesses. Only recently have ergonomic considerations received emphasis in designing work stations and tools for the worker rather than the task. Understanding the risk factors responsible as well as the amount of that risk is the first step in reducing the problem.
DTIC
Musculoskeletal System; Risk; Feasibility; Signs and Symptoms; Workstations; Air Traffic Controllers (Personnel)

19970029117 Baylor Coll. of Medicine, Houston, TX USA
Immunological Protection Against Botulinum Neurotoxin by a Synthetic Vaccine ***Final Report, 15 Sep. 1993 - 14 Mar. 1997***
Atassi, M. Z., Baylor Coll. of Medicine, USA; Apr. 1997; 50p; In English
Contract(s)/Grant(s): DAMD17-93-C-3159
Report No.(s): AD-A327157; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The studies we have conducted under this contract have resulted in the mapping of the continuous antibody (Ab) binding epitopes on the protective Hc domain of BoNT/A with anti-BoNT/A antisera from several outbred species (including human). We have also mapped the continuous Ab and T cell epitopes that are recognized in two mouse strains (BALB/c and SJL) when each of BoNT/A or the Hc is used as an immunogen. Finally we determined the BoNT/A peptides that, when used as immunogens, give immune (Ab and/or T cell) responses that cross-react with Hc and/or with intact toxin. For BALB/c these are peptides 2, 3,

7, 10, 12, 17, 18, 21, 24 and 31; and for SJL they are peptides 4, 5, 6, 7, 8, 10, 15, 24 and 31. These studies have identified the BoNT/A synthetic peptides that represent potentially protective regions for incorporation into a synthetic vaccine.
DTIC
Toxins and Antitoxins; Immune Systems; Immunology; Clostridium Botulinum; Antibodies; Antigens

19970029118 Naval Health Research Center, San Diego, CA USA
The Epidemiology of Illness, Injury and Attrition Among Select US Military Female Populations ***Final Report, 15 Dec. 1995 - 30 Sep. 1996***
Shaffer, Richard A., Naval Health Research Center, USA; Dec. 1996; 23p; In English
Report No.(s): AD-A327156; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Evidence suggests that female military populations are at greater risk than their male counterparts for certain training and combat-related illnesses and injuries. Precise etiologies, risk factors, and Impact of disease and injury in military women are not available. The objective of this prospective, multisite, epidemiological study was to define the patterns of illness and injury in military women during training. Musculoskeletal Injuries were emphasized due to their high cost in terms of morbidity, lost training time, and attrition. A Computer-based outpatient tracking system for prospective data collection was developed for use at (1) OCS, Quantico (USMC female officers); (2) MCRD, Parris Island (USMC enlisted women); and (3) RTC, Great Lakes (USN enlisted women). The most common reason for a medical encounter at all three sites was musculoskeletal Injury. The percentage of women with at least one medical encounter at OCS (n=303), MCRD (n=2,766), and RTC (n=8,865) was 87.1%, 69.4%, and 95.3%, respectively. The selected general and specific diagnoses were determined with incidence rates for each training site. The databases will be Used to address morbidity and attrition issues and target areas for future preventive intervention.
DTIC
Epidemiology; Injuries; Sicknesses; Females; Data Acquisition; Diseases; Diagnosis; Musculoskeletal System

19970029140 Uniformed Services Univ. of the Health Sciences, Bethesda, MD USA
Stress and Women's Health: Combat, Deployment, Contingency Operations and Trauma ***Final Report, 1 Dec. 1994 - 30 Jun. 1996***
Ursano, Robert J., Uniformed Services Univ. of the Health Sciences, USA; Jul. 1996; 19p; In English
Contract(s)/Grant(s): MIPR-95MM5516
Report No.(s): AD-A327373; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

This multi-study, programmatic project was directed to understanding the effects of the stress of combat, trauma, and extreme environments on women's health and performance. The following deliverables resulted from the study and are attached as appendices: (1-4) Gender Stress and Coping in the U.S. Military (Vol 1- Trauma, Stress, and Health: Military Women in Combat, Deployment, & Contingency Operations; Vol 2- Historical Perspectives on Acculturation, Deployment & Contingency Stresses; Vol 3- Performance; Vol 4- Training, Deployment, and Contingency Stressors); (5) Sex Differences, Stress, and Military Readiness; (6) Stress and Women's Health Computerized Database User's Manual & CD-ROM; (7) Stress, Health & Performance in Military Women; and (8) Recommendations.
DTIC
Females; Physiology; Clinical Medicine; Combat; Health

19970029294 Uniformed Services Univ. of the Health Sciences, Dept. of Psychiatry, Bethesda, MD USA
Stress and Women's Health Computerized Database: Users Manual
Ursano, Robert J., Editor, Uniformed Services Univ. of the Health Sciences, USA; Sutton, Loree K., Editor, Uniformed Services Univ. of the Health Sciences, USA; Fullerton, Carol S., Editor, Uniformed Services Univ. of the Health Sciences, USA; Norwood, Ann E., Editor, Uniformed Services Univ. of the Health Sciences, USA; Mar. 1996; 37p; In English
Report No.(s): AD-A327187; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The database contains articles on the effects of extreme environments, combat, stress, and trauma on women's physical and mental health. It broadly examines the biopsychosocial stressors and responses in women through collecting all English language non-classified epidemiological and stress research in these areas and by examining analogous areas in which relevant conclusions can be drawn. In addition, it includes references and abstracts of articles on stress and women's health, traumatic stress, occupational risk factors, deployment, disaster medicine, humanitarian aid, ethical considerations, and sexual harassment. The articles selected have been screened for relevance, uniqueness of findings and quality.
DTIC
Data Bases; Females; Mental Health; Computer Programs; Physical Fitness; Data Management; User Manuals (Computer Programs)

19970029308 Uniformed Services Univ. of the Health Sciences, Dept. of Psychiatry, Bethesda, MD USA

Trauma, Stress, and Health. Military Women in Combat, Deployment and Contingency Operations: Recommendations

Ursano, Robert J., Editor, Uniformed Services Univ. of the Health Sciences, USA; Norwood, Ann E., Editor, Uniformed Services Univ. of the Health Sciences, USA; Fullerton, Carol S., Editor, Uniformed Services Univ. of the Health Sciences, USA; Sutton, Loree K., Editor, Uniformed Services Univ. of the Health Sciences, USA; Mar. 1996; 33p; In English

Report No.(s): AD-A327189; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

At present, military women are confronted by both direct and indirect combat exposure. Military leaders have long recognized that mission readiness requires both the absence of disease and the presence of mental, physical, and spiritual health. However, little is currently known about how the health of military women may be uniquely affected by extreme environments. Such knowledge is essential to meet the health needs of military women and to sustain fitness for all mission contingencies. Servicewomen are naturally concerned with maintaining their health as an integral part of their readiness to assume any mission they are trained to perform. Research aimed at identifying and understanding overall and gender specific stressors involved with combat stress, trauma, and extreme environments will enhance the ability of individual servicewomen to care for themselves within an institution that is informed of and concerned with their needs. Educational and preventive measures resulting in servicewomen assuming informed responsibility for their health needs within the context of a supportive group system parallels the process of fostering individual initiative and group cohesion that is essential to mission performance on aircraft, ships, and battlefields.

DTIC

Combat; Females; Physical Fitness; Mental Health

19970029312 Armstrong Lab., Brooks AFB, TX USA

Injury and Illness Among Air Force Female Military Recruits ***Final Report, 1 Dec. 1994 - 30 Sep. 1995***

Snedecor, Michael R., Armstrong Lab., USA; Boudreau, Carla F., Armstrong Lab., USA; Ellis, Bruce E., Armstrong Lab., USA; Roth, Laurence M., Armstrong Lab., USA; Schulman, Jane, Armstrong Lab., USA; Hite, Melissa, Armstrong Lab., USA; Chambers, Bill, Armstrong Lab., USA; Apr. 1996; 48p; In English

Contract(s)/Grant(s): MIPR-95MM5531

Report No.(s): AD-A327527; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Morbidity among female Air Force recruits during basic military training is the subject of this study, which was managed and funded by the Office for Prevention and Health Services Assessment (OPHSA). The study paired male and female flight cohorts ('brother/sister' flights) for an eight-month period in 1994/1995 in order to examine any gender differences in injury/illness rates. Among the key results of the study: (1) female recruits are approximately 1.5 to 2.5 times more likely than male recruits to experience an injury or illness during basic training; (2) for both men and women, many of the absolute injury and non-injury rates decreased markedly during the six weeks of basic training; (3) even though the absolute rates for many injuries and non-injuries decreased substantially over time, the relative risks comparing women to men were fairly constant during the six-week training period; (4) the risk of being discharged was significantly less for men than for women; (5) the risk of being recycled did not differ significantly for men compared to women; (6) although the absolute rates were higher for the female recruits, the relative occurrence of specific injuries and non-injuries did not appear to be gender-specific.

DTIC

Injuries; Sicknesses; Females; Medical Services; Military Operations

19970031117 State Univ. of New York, Buffalo Inst. for Medical Research, Buffalo, NY USA

A Comparison of Cerebral Blood Flow in Migraineurs During Headache-Free Treatment Periods ***Annual Report, 15 Sep. 1995 - 14 Sep. 1996***

Bednarczyk, Edward M., State Univ. of New York, USA; Oct. 1996; 21p; In English

Contract(s)/Grant(s): DAMD17-95-2-5025

Report No.(s): AD-A328296; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The pathophysiology of migraine headache (HA) remains poorly understood as do the mechanisms of action of most anti-migraine drugs. The following is the annual report of a study of cerebral blood flow (CBF) in migraine headavhe compared to values following treatment with the 5HT(1d) agonist sumatriptan and a headache free state.

DTIC

Brain Circulation; Headache

53
BEHAVIORAL SCIENCES

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

19970028719 North Carolina Agricultural and Technical State Univ., Center of Research Excellence, Greensboro, NC USA
Effects of Task Difficulty on Pilot Workload
Watson, Alexandria R., North Carolina Agricultural and Technical State Univ., USA; Ntuen, Celestine, North Carolina Agricultural and Technical State Univ., USA; Park, Eui, North Carolina Agricultural and Technical State Univ., USA; The First National Student Conference: NASA University Research Centers at Minority Institutions; 1997, pp. 354-357; In English; Also announced as 19970028662; Copyright Waived (NASA); Avail: CASI; A01, Hardcopy; A04, Microfiche

In this study, we develop a model of workload as a function of task difficulty. Experiments on compensatory tracking tasks are used to assess the task difficulties. First, second, and third order plants that are controlled under three damping frequencies, no oscillation, critically damped, and overdamped, are investigated. The task difficulty index is defined as the ratio of root means square of path error to the root means square control velocity.
Author
Task Complexity; Tasks; Workloads (Psychophysiology); Compensatory Tracking; Tracking (Position); Damping

19970028800 Naval Submarine Medical Research Lab., Groton, CT USA
Reliability of the SUBSCREEN Psychological Screening Inventory ***Interim Report***
Theriaque, Douglas W., Naval Submarine Medical Research Lab., USA; Schlichting, Christine, Naval Submarine Medical Research Lab., USA; Jun. 06, 1997; 17p; In English
Report No.(s): AD-A326707; NSMRL-1206; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

SUBSCREEN is a psychological screening tool used at the Naval Submarine School (NAVSUBSCOL) to assess the ability of prospective submariners to adjust to both NAVSUBSCOL and subsequent submarine service. Standardized scores are calculated for each student for each of the 27 subscales to determine how the student's scores compare to a group of a large number of previously tested NAVSUBSCOL students. An unpublished reliability analysis suggested low reliabilities of several SUBSCREEN subscales and identified the items that contributed to the low subscale reliabilities. This early work had a relatively small number of test results in the comparison group and the authors realized the need to provide a more definitive analysis of the SUBSCREEN's reliability in order to recommend changes to certain subscales and items.
DTIC
Reliability; Inventories; Computation; Standardization

19970028848 Bell Engineering Consulting, Oviedo, FL USA
Studies and Analyses of Automated Systems for Evidence Accrual ***Interim Report, Apr. 1996 - Mar. 1997***
McCauley-Bell, Pamela, Bell Engineering Consulting, USA; Freeman, Rhonda, Bell Engineering Consulting, USA; Mar. 1997; 43p; In English
Contract(s)/Grant(s): F41624-94-D-6000; AF Proj. 7184
Report No.(s): AD-A327673; AL/CF-TR-1997-0060; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Information warfare presents new challenges to the warfighter. Critical decisions must be made under conditions of severe time stress based on information which may be incomplete, inaccurate, and of uncertain latency. The study explores the possible application of Fuzzy Set Theory to the possible improvement of decision maker performance under these conditions.
DTIC
Decision Making; Fuzzy Sets; Human Performance

19970028923 Armstrong Lab., Brooks AFB, TX USA
Pilot Performance Variables ***Interim Report, Aug. 1996 - Mar. 1997***
King, Raymond E., Armstrong Lab., USA; Siem, Frederick M., Armstrong Lab., USA; Zelenski, Warren E., Armstrong Lab., USA; Bates, Mark J., La Verne Univ., USA; Colwell, Catherine D., La Verne Univ., USA; Mar. 1997; 112p; In English
Contract(s)/Grant(s): AF Proj. 7184
Report No.(s): AD-A326600; AL/CF-TR-1997-0059; No Copyright; Avail: CASI; A06, Hardcopy; A02, Microfiche

This review integrates some of the many studies on pilot performance for selection and screening. Pilot performance studies have come a long way as the aviation systems and the roles of the aviator have evolved. No single construct, or operationalization of variables, fully addresses pilot performance. Rather, a multi-disciplinary and multi-modal approach, using significant developments from recent studies, holds the most promise. Developments in information processing theory, at the individual and group

levels, combined with findings from safety studies offer potential future criteria of operational performance. In the past, the use of these variables was limited by the difficulty of measuring their impact on performance. Inter-disciplinary efforts, longitudinal studies, and technological advances (such as simulators and computers) enable researchers to better measure these variables. (The combination of previous/current pilot training measures, process-oriented intra/inter-personal variables, safety studies, more functionally and process-oriented personality inventories, and advances in technology/research methods provide opportunities for stronger measures and, ultimately, predictors of pilot performance.)
DTIC
Aircraft Pilots; Pilot Performance; Pilot Training; Information Processing (Biology); Performance Prediction

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.

19970028666 Tuskegee Inst., NASA Center for Food Production, Processing and Waste Management for Controlled Ecological Life Support Systems, AL USA
Food System Development for Controlled Ecological Life Support Systems
Wilson, Carla D., Tuskegee Inst., USA; The First National Student Conference: NASA University Research Centers at Minority Institutions; 1997, pp. 86-89; In English; Also announced as 19970028662; Copyright Waived (NASA); Avail: CASI; A01, Hardcopy; A04, Microfiche

The development of a food system for the Human Rated Test Facility (HRTF) based on Controlled Ecological Life Support Systems (CELSS) crops is a critical component of Advanced Life Support (ALS) for extended duration space missions and exploration. The Biomass Production System (BPS) will provide for growth of higher plants for the purpose of supplying food to the CELSS crew and will also account for the planting, harvesting, processing and storage of the biomass prior to preparation for consumption. The human physiological and psychological requirements for food on extended duration missions should be measurable in terms of nutritional requirements and food acceptability. Current objectives at Tuskegee include the development of a vegetarian menu plan utilizing CELSS crop products, with a special emphasis on the sweet potato; recipe modification and sensory evaluation of recipes, and the measurement of nutritional adequacy of the menu. These nutritional requirements will be unique to the CELSS crew. It is vital that this food system meet the nutrient requirements and aesthetic standards of the crew members to maintain good health to endure the challenges of CELSS. Nutrient requirements are based on physiological changes of crew members occurring in space. These changes have already been documented.
Author
Food Production (In Space); Closed Ecological Systems; Life Support Systems; Nutritional Requirements; Space Missions; Biomass; Ecosystems

19970028783 Naval Research Lab., Center for Bio/Molecular Science and Engineering, Washington, DC USA
Certain Properties of Laboratory Greywater and Shipboard Non-Oily Wastewater and Permeates
Zabetakis, Dan, Naval Research Lab., USA; Gaber, Bruce P., Naval Research Lab., USA; May 21, 1997; 56p; In English
Report No.(s): AD-A326092; NRL/MR/6930--97-7931; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche

Waste water samples were collected from experimental greywater treatment filters. Greywater source was from the U.S. Naval Academy, Annapolis, MD; from DD977, USS Hayler, or from CG51, USS Thomas S. Gates, stationed at Norfolk, VA. The waste was analyzed for general and specific properties and constituents. The total dissolved solids ranged from 546 mg/l to 8140 mg/l, and the chemical oxygen demand from 122 mg/l to 1160 mg/l. The concentrations of protein, carbohydrate, surfactant, as well as organic and inorganic ions were highly variable, and showed no correlation between themselves or with the bulk characteristics. The molecular weight range of material passing through the filtration system was determined, revealing that the majority of material is very small, with greater than 50% passing an ultrafilter of 3000 molecular weight cutoff. The efficiency of the filtration process was examined, showing that about 60% of COD was removed, as well as essentially all of total suspended solids.
DTIC
Waste Water; Filtration; Ions; Proteins; Surfactants; Solids

19970028787 Prins Maurits Lab. TNO, Rijswijk, Netherlands

Characteristics of Means for Respiratory Protection, Part 1, Simplified Correlation for Estimation of the Life Time ***Final Report Kenmerken van adembeschermingsmiddelen, Deel 1, Eenvoudige correlatie voor schatting van de gebruiksduur***

Mallens, E. P., Prins Maurits Lab. TNO, Netherlands; Duisterwinkel, A. E., Prins Maurits Lab. TNO, Netherlands; Dankers, H., Prins Maurits Lab. TNO, Netherlands; Jun. 1997; 42p; In Dutch

Contract(s)/Grant(s): A95/KL/430

Report No.(s): AD-A327331; PML-1997-A5; TDCK-TD-97-0005; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Aim of this project is to develop a method to determine whether a filter bed of activated carbon can be of use in the protection against components of high volatility under known conditions. In this report the usefulness of a relatively simple method to estimate the lifetime of a filter bed is discussed. Comparison between the calculated and measured so-called 1% breakthrough time showed that this time interval can be calculated with an accuracy of 15%. This correlation is valid under conditions typical for filter beds used in practice. In case of very volatile components, however, the error in the calculated value of the breakthrough time can increase strongly. Moreover, the correlation is only valid in case both the activated carbon and the air flowing through the filter bed are dry. However, the number of situations in which the breakthrough time can be calculated accurately is too restricted by these boundary conditions. A modification of the correlation presented in this report is possible, but does not show much perspective. Therefore in the continuation of the project a different approach will be applied, based on an advanced adsorption process simulation model, which is currently being developed at TNO-PML.

DTIC

Activated Carbon; Respiratory System; Adsorption; Volatility; Filtration

19970028849 Naval Aerospace Medical Research Lab., Pensacola, FL USA

Development and Implementation of the Aircrew Modified Equipment Leading to Increased Accommodation (AMELIA) Program ***Interim Report, 1994-1996***

Meyer, L. G., Naval Aerospace Medical Research Lab., USA; Pokorski, T. L., Naval Aerospace Medical Research Lab., USA; Smith, D. G., Naval Aerospace Medical Research Lab., USA; Ortel, B. E., Naval Aerospace Medical Research Lab., USA; Oct. 07, 1996; 90p; In English

Report No.(s): AD-A327030; NAMRL-SR-96-3; No Copyright; Avail: CASI; A05, Hardcopy; A01, Microfiche

Current naval aviation life Support equipment (ALSS) was designed to accommodate the 5th through the 95th percentile size of the 1964 U.S. male population. Since a large portion of the present U.S. female population falls outside this range, problems occur in fitting flight clothing and ALSS for female naval aviators. This report on Aircrew Modifications Leading to Increased Accommodation describes a fleet-wide survey of all naval female pilots, flight officers, and enlisted aircrew with regard to ALSS problems. The survey response rate was 67%. ALSS fit problems in naval aviation were identified and recommendations for solving these problems were provided to the Naval Air Systems Command. The top five ALSS problem areas identified b y respondents in order of importance were helmet, urine-collection devices, torso harness, survival vest, and anti-exposure coverall.

DTIC

Flight Crews; Protective Clothing; Life Support Systems; Aircraft Pilots

19970028977 Army Aeromedical Research Lab., Fort Rucker, AL USA

Aircraft Multifunction Display and Control Systems: A New Quantitative Human Factors Design Method for Organizing Functions and Display Contents ***Final Report***

Francis, Gregory, Purdue Univ., USA; Reardon, Matthew J., Army Aeromedical Research Lab., USA; Apr. 1997; 46p; In English

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

Report No.(s): AD-A327332; USARRL-97-18; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

The objectives of this study were to review the current state of aircraft multifunction display and control system (MPDCS) design methods and develop a quantitative method of designing MFDCSs that incorporate important human factors issues. Reports in the literature indicate that MFDCS design can influence flight performance. However, current design methods rely primarily on the designer’s intuition and experience. MFDCSs in aircraft cockpits use computer-generated graphics and symbology that have integrated and largely replaced the myriad discrete electromechanical flight instruments found in older aircraft. While much is known about the physical and visual properties of MFDCSs, less is known about which human factors are important for their design and use. MFDCSs may result in greater workload if the distribution of virtual instruments, graphical and text data, and control functions in an n-dimensional structure of display pages places excessive cognitive and psychomotor demands on pilots during either routine or emergency situations. A quantitative method was developed, involving the derivation of a weighted sum of separate cost functions, each of which incorporates the effects of an arbitrary number of human factors and MFDCS design

guidelines. The method models, using a high level of abstraction, a pilot's search for specific information or functions among alternative hierarchies of MFDCS display pages. An annealing algorithm was proposed as an effective numerical method for finding the display page hierarchy that minimizes the composite cost function.
DTIC
Flight Control; Human Factors Engineering; Display Devices; Control Systems Design; Electromechanical Devices; Flight Instruments

19970028994 Universal Energy Systems, Inc., Dayton, OH USA
'POPCORN' as a Tool for Future Cognitive Workload Assessment: A Conceptual Analysis ***Final Report***
Wen, Shih-Sung, Universal Energy Systems, Inc., USA; Patterson, John C., Armstrong Lab., USA; Jun. 1997; 15p; In English
Contract(s)/Grant(s): F 49620-85-C-0013; AF Proj. 7755
Report No.(s): AD-A326706; AL/AO-TR-1997-0025; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

As weapon systems and their battlefield employment become increasingly complex, the understanding and assessment of the human operator becomes equally important. This project further developed a prototype cognitive workload assessment tool, POPCORN. Starting with a single laboratory, single computer model, a PC based tool that is more widely USAble was developed. In its current form, POPCORN contains multiple independent and dependent variables that can be easily manipulated at numerous levels from familiarization and training levels to virtually impossible. Further, a conceptual analysis was written based upon the authors' experiences with POPCORN as well as comparison of the tool with literature in the area. Based upon this analysis, we conclude that POPCORN is capable of measuring a wide range of cognitive processes relevant to human management of complex systems.
DTIC
Computer Programs; Cognition; Complex Systems; Human Performance; Human Factors Engineering; Man Machine Systems

19970029126 Hughes Training, Training Operations, Inc. Mesa, AZ USA
Effect of Incompatible Light on Modified Class B Night Vision Goggle-Aided Visual Acuity and Contrast Sensitivity ***Final Report, Mar. - Aug. 1996***
Gibb, Randall W., Arizona State Univ., USA; Reising, Jack D., Hughes Training, USA; Feb. 1997; 28p; In English
Contract(s)/Grant(s): F41624-95-C-5011; AF Proj. 1123
Report No.(s): AD-A327089; AL/HR-TR-1996-0149; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

MIL-L-85762A, Lighting, Aircraft, Interior, Night Vision Imaging System (NVIS) Compatible, defines criteria for assessing night vision goggle (NVG) compatibility of cockpit lighting. As part of the assessment procedures, NVG aided visual acuity (VA) is measured using the USAF Tri-Bar Chart. A cockpit light is incompatible if NVG aided VA is degraded. An alternative method of measuring NVG aided VA uses an NVG Chart. This research assessed whether the two NVG aided VA assessment techniques reveal the same levels of degradation in NVG aided VA. NVG aided contrast sensitivity (CS) also was measured to determine its usefulness in assessing the compatibility of a cockpit light. Three NVG CS charts were developed having spatial frequencies of 3, 6, and 12 cycles per degree (cpd). NVG performance was degraded by incompatible light, and the amount of degradation was assessed using the two VA and CS measures. Measurements were made using a modified Class B NVG. Another objective of this research was to assess the compatibility of the modified Class B NVG with compatible cockpit light defined in MIL-L-85762A. The results revealed that NVG aided VA did not differ between the two VA charts. For the green light, NVG aided CS was degraded only for the high spatial frequency (12 cpd). However, for the red light, NVG aided CS was degraded for all three spatial frequencies. NVG aided CS was sensitive to the presence of incompatible light. The modified Class B NVG is compatible with the lighting requirements defined in MIL-L-85762A.
DTIC
Night Vision; Imaging Techniques; Visual Acuity; Contrast; Goggles; Illuminating

19970029143 CHI Systems, Inc., Lower Gwynedd, PA USA
SH-60R Operator Machine Interface Enhancement (SHOMIE) ***Monthly Report, 1 Apr. - 31 May 1997***
Glenn, Floyd, CHI Systems, Inc., USA; Jun. 13, 1997; 4p; In English
Contract(s)/Grant(s): N00421-97-C-1133
Report No.(s): AD-A327221; No Copyright; Avail: CASI; A01, Hardcopy; A01, Microfiche

A systematic approach, designated SH-60R operator Machine Interface Enhancement (SHOMIE), is proposed for developing decision aid enhancements to the SENSO and ATO crewstations of the SH-60R aircraft which is currently under development by the Navy. The methodology begins with determination of functional performance requirements via a technique based primarily, but not exclusively, on cognitive task analysis. Cognitive performance limitations are determined both analytically and empiri-

cally and then used to derive functional requirements for decision aid concepts to overcome the identified limitations. Relevant software and algorithmic techniques for realizing the desired functionality are then derived from an evaluation of viable candidates obtained from a taxonomic analysis of aiding technologies. Finally, the decision aid concepts are specified as structured architectural designs which are then implemented as software prototypes.
DTIC
Computer Programs; Human-Computer Interface; Aircraft Pilots

19970029318 National Academy of Sciences - National Research Council, Committee on Toxicology, Washington, DC USA
Spacecraft Maximum Allowable Concentrations for Selected Airborne Contaminants, Volume 3
1996; 364p; In English
Contract(s)/Grant(s): NAGw-2239
Report No.(s): NASA-CR-203589; NAS 1.26:203589; LC-95-73151; ISBN-0-309-05629-2; Copyright Waived (NASA); Avail: CASI; A16, Hardcopy; A03, Microfiche

This report, prepared by the Committee on Toxicology of the National Research Council's Board on Environmental Studies and Toxicology, is in response to a request from NASA for guidelines to develop spacecraft maximum allowable concentrations (SMACs) for space-station contaminants. SMACs are used to provide guidance on allowable chemical exposures during normal operations and emergency situations. Short-term SMACs refer to concentrations of airborne substances (such as gas, vapor, or aerosol) that will not compromise the performance of specific tasks during emergency conditions lasting up to 24 hours. Long-term SMACs are intended to avoid adverse health effects (either immediate or delayed) and to avoid degradation in crew performance with continuous exposure in a closed space-station environment for as long as 180 days.
Derived from text
Toxicology; Closed Ecological Systems; Spacecraft Environments; Contaminants; Toxicity; Metabolism; Concentration (Composition)

19970029371 Defence Science and Technology Organisation, Air Operations Div., Salisbury, Australia
A Generic Architecture for Crew Assistant Systems
Urlings, Pierre J. M., Defence Science and Technology Organisation, Australia; Zuidgeest, Rene G., National Aerospace Lab., Netherlands; Jul. 1997; 12p; In English; Also announced as 19970029347; Copyright Waived; Avail: CASI; A03, Hardcopy; A03, Microfiche

A crew assistant is an on-board automated system that supports an aircraft crew in performing its tasks. Aircraft crews are currently confronted with numerous displays and complex controls in their cockpit. An overwhelming amount of multi-source data is offered while simultaneously control over the aircraft and its systems has to be maintained. This may Iead to situations of high workload in which non-optimal decisions are made. Crew assistant systems are planned to reduce this problem and hence improve efficiency and flight safety. They are expected to rely heavily on Advanced Information Processing (AIP) technologies to organize data and control flow in such a way that the crew is provided with concise and relevant information. At the same time the crew's control efforts will be considerably reduced. This will enable the crew to concentrate on essentials and to make decisions more effective Several developments exist in this area. Pioneer programmes are the US 'Pilot's Associate' the British 'Mission Management Aid' the French 'Copilote Electronique' and the German 'Cockpit Assistant System.' These programs go by different names but all aim at the automation of routine tasks and the provision of effective aids to the crew problem solving and task management. The architectures developed in these programmes have many elements in common but suggest a more generic architecture. Another common element of these programmes is that they consider AIP as key technology for their successful implementation. AIP provides technologies able to handle the complex interaction between crew, crew assistant, aircraft systems and sensors. This paper focuses in particular on these two aspects: a generic crew assistant architecture and the application of AIP technology. In section 2 the operational environment is described in which a crew assistant is to be embedded. Section 3 introduces a generic crew assistant architecture which is independent of any type of aircraft or operation. Section 4 proposes the application of AIP in general and of multi-agent systems in particular as a key technology for successful implementation of a crew assistant. Throughout the paper, the crew assistant is illustrated by an application of a single-pilot military aircraft, but the concept is also relevant to multi-crew or civil aircraft.
Author
Information Systems; Information Flow; Flight Safety; Flight Operations; Flight Crews; Display Devices; Data Processing; Civil Aviation; Cockpits

19970029372 Elektroniksystem- und Logistik G.m.b.H., Avionics-Fixed Wing Aircraft, Munich, Germany

Perspectives of Crew Assistance in Military Aircraft Through Visualizing, Planning and Decision Aiding Functions

Schulte, Axel, Elektroniksystem- und Logistik G.m.b.H., Germany; Kloeckner, Wolfgang, Elektroniksystem- und Logistik G.m.b.H., Germany; Jul. 1997; 8p; In English; Also announced as 19970029347; Copyright Waived; Avail: CASI; A02, Hardcopy; A03, Microfiche

Due to increasing demands put on crews of military aircraft, effective cockpit systems will be required in order to reduce workload and to improve crew performance. This paper presents various approaches to crew assistance in tactical flight missions. The underlying tasks are tactical decision making, low-level flight planning and flight guidance. The integration of the Tactical Situation System as part of a knowledge based crew assistant and a flight guidance display system incorporating sensor and synthetic vision components offer a promising solution to improve the situational awareness of the crew. Respective prototypes have been successfully tested and evaluated in a simulated environment as well as by flight trials.

Author

Knowledge Based Systems; Human Performance; Guidance Sensors; Flight Plans; Flight Crews; Cockpits

19970030203 National Academy of Sciences - National Research Council, Panel on Human Factors, Washington, DC USA

Report of the Panel on Human Factors

Rouse, William B., Georgia Inst. of Tech., USA; Lauber, John K., NASA Ames Research Center, USA; Aeronautics Technology Possibilities for 2000: Report of a Workshop; 1984, pp. 177-194; In English; Also announced as 19970030196; No Copyright; Avail: CASI; A03, Hardcopy; A03, Microfiche

Human error in the operation of complex systems is the largest single cause of incidents, accidents, and the loss of lives and dollars. Therefore, it is understandable that the focus of human factors research and engineering is on increasing our understanding of the basic mechanisms of human error and on developing techniques for reducing or eliminating the various causes of human error.

Author

Error Analysis; Human Factors Engineering; Human Performance

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