NASA SP-7011 (429)
December 23, 1996

AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY WITH INDEXES

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Introduction

This issue of *Aerospace Medicine and Biology, A Continuing Bibliography with Indexes* (NASA SP-7011) lists 70 reports, articles, and other documents recently announced in the NASA STI Database.

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

Each entry in the publication consists of a standard bibliographic citation accompanied, in most cases, by an abstract.

Two indexes—subject and author are included.

The NASA CASI price code table, addresses of organizations, and document availability information are located at the back of this issue.

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

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Includes human engineering; biotechnology; and space suits and protective clothing.

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Author Index PA-1

Selecting an index above will link you to that comprehensive listing.

Appendix

Select **Appendix** for important information about NASA Scientific and Technical Information (STI) Program Office products and services, including registration with the NASA Center for Aero-Space Information (CASI) for access to the NASA CASI TRS (Technical Report Server), and availability and pricing information for cited documents.

Typical Report Citation and Abstract

DOCUMENT ID NUMBER → **19960021053** NASA Langley Research Center, Hampton, VA USA. ← **CORPORATE SOURCE**

TITLE → **An Extended Compact Tension Specimen for Fatigue Crack Propagation and Fracture**

AUTHORS → Piascik, R. S., NASA Langley Research Center, USA; Newman, J. C., Jr., NASA Langley Research Center, USA; ← **AUTHORS' AFFILIATION**

PUBLICATION DATE → Mar. 1996, pp. 16; In English

CONTRACTS/GRANTS → Contract(s)/Grant(s): RTOP 538–02–10–01

REPORT NO.(S) → Report No.(s): NASA–TM–110243; NAS 1.15:110243; No Copyright; Avail: CASI A03, Hardcopy; A01, Microfiche ← **AVAILABILITY AND PRICE CODE**

ABSTRACT → An extended compact tension specimen, EC(T) has been developed for fatigue and fracture testing. Documented herein are stress-intensity factor and compliance expressions for the EC(T) specimen.

ABSTRACT AUTHOR → Author

SUBJECT TERMS → *Crack Propagation; Stress Intensity Factors; Fatigue (Materials)*

AEROSPACE MEDICINE AND BIOLOGY

A Continuing Bibliography (Suppl. 429)

DECEMBER 23, 1996

51
LIFE SCIENCES (GENERAL)

19960053135 Search for Extraterrestrial Intelligence Inst., Mountain View, CA USA
The Evolution of Energy-Transducing Systems. Studies with Archaebacteria ***Semiannual Report, Mar. 1996 - Aug. 1996***
Stan-Lotter, Helga, Search for Extraterrestrial Intelligence Inst., USA; Aug. 1996; 7p; In English
Contract(s)/Grant(s): NCC2-578
Report No.(s): NASA-CR-200995; NAS 1.26: 200995; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche

The dicyclohexyl carbodiimide (DCCD)- binding site of the membrane ATPase from Halobacterium saccharovorum was investigated during earlier periods of this Cooperative Agreement and was localized to a cyanogen bromide fragment of subunit 2 from amino acids 379 (Glu) to 442 (Met). Although the exact position of the reactive amino acid (probably a glutamic acid) has not yet been determined, the data, together with recently obtained immuno reactions and sequences of Cyanogen Bromide (CNBr) fragments from E.coli F-ATPase, suggested subunit interactions in the halobacterial ATPase which had not been recognized before. They also provided evidence for the presence of a gamma subunit in the halobacterial ATPase, and for a stretch of a amino acids similar to the 'catch' between beta and gamma in bovine F-ATPase. The evolutionary implications of these findings are twofold: first, halobacterial (or archaebacterial) ATPases appear as complex as those from higher organisms - no simpler versions of these membrane enzymes are known to date; second, a monophyletic origin of the energy-transducing ATPases is becoming more apparent, and - together with other data - the split into V- and F-ATPases may have occurred much later than had been previously thought (i.e., after the split into Archaea and Bacteria). Other work included the characterization of an extremely halophilic isolate (Halococcus salifodinae) from Permian salt sediments. This organism appeared to be an autotrophic halobacterium; its incorporation of C02 was investigated.
Author
Bacteria; Cyanogen; Bromides

19960053205 Japanese Air Self-Defense Force, Aeromedical Lab., Tokyo, Japan
The Reports of Aeromedical Laboratory, Volume 36, No. 4
Dec. 1995; ISSN 0023-2858; 43p; In Japanese; Also announced as 19960053206 through 19960053210; Original contains color illustrations; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

Topics covered include: pathological study of rats exposed to a hypobaric hypoxic environment, evaluation of flightsuit/underwear microclimate by using a sweat thermal manikin, effect of smoking on the pilot hematological data, and grip strength training for pilot recruits.
CASI
High Altitude Environments; Hypoxia; Heart Function; Thrombosis; Microclimatology; Physiological Effects; Skin Temperature (Biology); Flight Clothing; Hematology; Nicotine; Muscular Strength

19960053206 Japanese Air Self-Defense Force, Aeromedical Lab., Tokyo, Japan
Pathologic study of autopsy of rats exposed to a hypobaric hypoxic environments
Nakanishi, Kuniaki, Japanese Air Self-Defense Force, Japan; Tajima, Fumiko, Japanese Air Self-Defense Force, Japan; Nakata, Yasuko, Japanese Air Self-Defense Force, Japan; The Reports of Aeromedical Laboratory; Dec. 1995; vol. 36, no. 4, pp. 97-104; In Japanese; Also announced as 19960053205; Original contains color illustrations; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche

Pathologic features at autopsy were studied in rats exposed to a hypobaric hypoxic environment (HHE) equivalent to 5,500 m for 12 weeks. After 4 weeks exposure to HHE, 103 of 340 rats had become emaciated (35 rats) or were dead (68 rats). At autopsy the ratio of right ventricle to left ventricle plus septum in emaciated or dead rats was almost the same as in acclimatized rats, whereas the ratio of right ventricle to body weight and that of left ventricle to body weight were each higher than in acclimatized rats. These findings indicate failure of both ventricles with a greater hypertrophy of both ventricles in the emaciated or dead rats. In all 103 emaciated or dead rats, the pathologic features at autopsy included pulmonary congestion or edema in 100 %, non-bacterial thrombotic endocarditis in 82%, cardiac infarction in 14%, renal infarction in 14%, disseminated intravascular thrombosis in

6%, brain hemorrhage in 3%, and intestinal infarction in 1%. These results indicate that the main pathologic characteristics at autopsy of rats exposed to HHE are bilateral ventricular heart failure and thrombotic features.
Author
Hypoxia; Heart Function; Thrombosis; Pathology; Cardiac Ventricles; High Altitude Environments

19960053828 Institute of Space Medico, Beijing, China
Space Medicine and Medical Engineering, Volume 9
Wei, Jinhe, Editor, Institute of Space Medico, China; Lu, Yincheng, Editor, Institute of Space Medico, China; Space Medicine and Medical Engineering; Aug. 15, 1996; ISSN 1002-0837; 73p; In English; In Chinese; Also announced as 19960053829 through 19960053841
Report No.(s): CN 11-2774/ R; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche

This issue of the space medicine and medical engineering journal contains articles on: changes in heart rate and blood pressure variables during bed rest and head-up tilt; removal of CO2, moisture, and heat from a ventilated pressure suit under different pressures; changes in brain potentials related to visual acuity during simulated weightlessness; effects of simulated weightlessness on ultrastructure and oxygen consumption of myocardium in rats; relationships between particle fluence and dosage in a recoverable spacecraft; inner ear injuries in Rhesus monkeys after a landing impact in a sitting position; intravascular bubbles and their impact on the microcirculation system of guinea pigs; changes of the visual fatigue index during prolonged visual display terminal operation; effects of frostbite on blood coagulation in rats; the effects of freezing and hypoxia on serum creatine kinase activity in rats; human reliability in manned space flights; combustion under microgravity; and a literature review on a closed ecological biological aquatic system.
CASI
Aerospace Medicine; Closed Ecological Systems; Bed Rest; Manned Space Flight; Pressure Suits; Weightlessness Simulation; Cold Tolerance; Hypoxia; Microgravity

19960053832 Fourth Military Medical Univ., Dept. of Aerospace Physiology, Xi'an, China
Effects of Simulated Weightlessness on Ultrastructures and Oxygen Supply and Consumption of Myocardium in Rats
Yu, Zhibin, Fourth Military Medical Univ., China; Zhang, Lifan, Fourth Military Medical Univ., China; Space Medicine and Medical Engineering; Aug. 15, 1996; vol. Volume 9, no. No. 4, pp. 261-266; In Chinese; Also announced as 19960053828; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche

Weightlessness causes atrophy of myocardium in rats,however, properties of ultrastructural changes and oxygen supply and consumption in myocardium are still unclear. Changes in the ultra-structures of left ventricular myocardium in rats tails suspended for 8W were observed. Qualatative analysis showed that the lysosomes, lipofuscins and degenerate mitochondria increased in myocytes of left ventrical in tail-suspended rats (SUS). The sarcoplasmic reticula were reduced in quantity and shrunken in appearance. The number of extended endothelial projections in the lumen of capillaries increased. Quantitative analysis showed that volume densities of mitochrondria and sarcoplasmic reticulum in SUS were reduced by 14.5% and 22.2% respectively. The number density of mitochondria also had a 12.5% decrease in SUS. The morphometric data - estimated oxygen demand of the myocardium in SUS showed a 16.7% decrese. These results suggt that the feature of the changesis chronic degredation with evidence of acute hypoxia in myocardium. The decrese in oxygen consumption of myocardium in SUS did not cause a reflex reduction in the oxygen supply.
Author
Rats; Sarcoplasmic Reticulum; Weightlessness Simulation; Hypoxia; Atrophy; Oxygen Consumption; Morphology

19960053834 Institute of Space Medico, Beijing, China
Observation of Inner Ear after Landing Impact in Sitting Position in Rhesus Monkeys
Zhang, Xinying, Institute of Space Medico, China; Cheng, Zilong, Institute of Space Medico, China; Wang, Yulan, Institute of Space Medico, China; Wang, Yuqing, Institute of Space Medico, China; Space Medicine and Medical Engineering; Aug. 15, 1996; vol. Volume 9, no. No. 4, pp. 271-275; In Chinese; Also announced as 19960053828; No Copyright; Avail: CASI; A01, Hardcopy; A01, Microfiche

Tolerance limits of different tissues to land impact were studied by doing an experiment in Rhesus monkeys. Ten Rhesus monkeys were divided into three groups, each suffered a different landing load. The monkeys were killed one hour after the experiment, and heart, liver, spleen, lung, and temporal bone were fixed, sliced, and then observed under a microscope. Injuries of the inner ear were also observed The results show that when acceleration measured at the impact platform was less than 25 G, only slight injuries were found in the various organs and no injury was found in the inner ear; when platform acceleration was from 25 to approximately 35 G, intermediate injuries were found in the various internal organs, and slight injury was found in the inner ear, such as detachment of otolith from macula of saccule and separation of epithelium in the ampulla.
Author
Impact Loads; Ear; Bones; Heart; Landing Loads; Lungs; Monkeys; Otolith Organs; Spleen

19960053837 Institute of Space Medico, Beijing, China
Effects of Frostbite on Some Factors of Blood Coagulation System in Rats under Hypoxia
Li, Fengzhi, Institute of Space Medico, China; Liu, Jiaying,

Institute of Space Medico, China; Yang, Zengren, Institute of Space Medico, China; Yan, Peihua, Institute of Space Medico, China; Liu, Youmei, Institute of Space Medico, China; Space Medicine and Medical Engineering; Aug. 15, 1996; vol. Volume 9, no. No. 4, pp. 286-290; In Chinese; Also announced as 19960053828; No Copyright; Avail: CASI; A01, Hardcopy; A01, Microfiche

The changes of some factors of the blood coagulation system in rats following frostbite of both hind feet under hypoxia were investigated. Male Wistar rats weighing 200 plus or minus 20 grams were divided into four groups: normal control (C); frostbite at nomoxia (FN); frostbite during acute hypoxia (FAH) and frostbite during hypoxia after altitude acclimation (FHAC). Bleeding time and clotting time, rate of clot-retraction, plasma content of 6-keto-PGF(1a) and TXB(2) were determined following exposure to cold. The results showed that the bleeding time and clotting time were shortened, and the rate of clot-retraction was decreased, the plasma content of 6-keto-PGF(1a) and the TXB(2) T/P ratio were increased significantly after exposure to cold in all frostbite groups, but these changes were more prominent in FHAC than those in FN and FAH. The results demonstrated that there were changes in the blood coagulation system. Following cold injury blood coagulabilty was increased. These changes were closely related to the degree of frostbite. In addition, the degree of cold injury was aggravated by altitude acclimation and this may play an important rolein the pathological process of dysfunction leading to necrosis of local frostbite tissue.
Author

Frostbite; Hypoxia; Rats; Blood Coagulation; Clotting; Pathology

19960053838 Institute of Space Medico, Beijing, China

Effects of Freezing and Hypoxia on Serum Ceratine Kinase Activity in Rats

Zhang, Zhiyong, Institute of Space Medico, China; Yang, Zengren, Institute of Space Medico, China; Li, Fengzhi, Institute of Space Medico, China; Yan, Peihua, Institute of Space Medico, China; Liu, Youmei, Institute of Space Medico, China; Space Medicine and Medical Engineering; Aug. 15, 1996; vol. Volume 9, no. No. 4, pp. 291-294; In Chinese; Also announced as 19960053828; No Copyright; Avail: CASI; A01, Hardcopy; A01, Microfiche

Serum creatine kinase (CK) activity after cold exposure in rats acclimated to cold, hypoxia, or combined factors (both cold and hypoxia) were observed under normoxie and hypoxic condition in order to study the degree of damage to the tissues. The results showed that resistance to frostbite increase in rats acclimated to cold: resistance to frostbite decreased markedly in rats acclimated to hypoxia, ie. negative cross-acclimation exists between hypoxia and cold. The changes in serum CK activity in rats exposed to both cold and hypoxia for four weeks were essentially the same as those in hypoxia-acclimated rats, and were different significantly from those in cold-acclimated rats. It indicates that the effects of hypoxic exposure were stronger than those of cold exposure; its mechanism remains an area for further study.
Author

Creatine; Hypoxia; Rats; Cold Tolerance; Frostbite; Acclimatization

19960053841 Institute of Space Medico, Beijing, China

Review of Research Works in Closed Equilibrated Biological Aquatic System

Tao, Yongtao, Institute of Space Medico, China; Space Medicine and Medical Engineering; Aug. 15, 1996; vol. Volume 9, no. No. 4, pp. 308-312; In Chinese; Also announced as 19960053828; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche

This literature review describes recent works in the area of a closed equilibrium biological aquatic system CEBAS-AQUARACK. he system uses recycled oxygen, nitrogen, and carbon dioxide to maintain a bio-regenerative life support system for combined production of fish and higher plant biomass suitable for integration into a lunar or planetary base.
Author

Carbon Dioxide; Biomass; Fishes; Nitrogen Dioxide; Oxygen; Closed Ecological Systems

19960054136 Neuchatel Univ., Institute of Microtechnology, Switzerland

Development of a Space Bioreactor using Microtechnology

Arquint, Philippe, Neuchatel Univ., Switzerland; Boillat, Marc A., Neuchatel Univ., Switzerland; deRooij, Nico F., Neuchatel Univ., Switzerland; Jeanneret, Sylvain, Neuchatel Univ., Switzerland; vanderSchoot, Bart H., Neuchatel Univ., Switzerland; Bechler, Birgitt, Eidgenoessische Technische Hochschule, Switzerland; Cogoli, Augusto, Eidgenoessische Technische Hochschule, Switzerland; Walther, Isabelle, Eidgenoessische Technische Hochschule, Switzerland; Gass, Volker, Mecanex, Switzerland; Ivorra, Marie-Therese, Mecanex, Switzerland; 1995; 4p; In English; Also announced as 19960054083; No Copyright; Avail: CASI; A01, Hardcopy; A04, Microfiche

A miniature bio-reactor for the cultivation of cells aboard Spacelab is presented. Yeast cells are grown in a 3 milliliter reactor chamber. A supply of fresh nutrient medium is provided by a piezo-electric silicon micro-pump. In the reactor, pH, temperature, and redox potential are monitored and the pH is regulated at a constant value. The complete instrument is fitted in a standard experiment container of 63 x 63 x 85 mm. The bioreactor was used on the IML-2 mission in July 1994 and is being refurbished for a reflight in the spring of 1996.
Author

Bioreactors; Miniaturization; Oxidation-Reduction Reactions; Spaceborne Experiments; Spacelab; Space Process-

ing; Gravitational Effects; Microgravity Applications; Cells (Biology)

19960054137 Technische Hochschule, Dept. of Microsystemtechnology, Ilmenau, German Democratic Republic
Integrated Microreactor for Chemical and Biochemical Applications
Schwesinger, N., Technische Hochschule, German Democratic Republic; Dressler, L., Technische Hochschule, German Democratic Republic; Frank, Th., Technische Hochschule, German Democratic Republic; Wurmus, H., Technische Hochschule, German Democratic Republic; 1995; 12p; In English; Also announced as 19960054083; No Copyright; Avail: CASI; A03, Hardcopy; A04, Microfiche

A completely integrated microreactor was developed that allows for the processing of very small amounts of chemical solutions. The entire system comprises several pumps and valves arranged in different branches as well as a mixing unit and a reaction chamber. The streaming path of each branch contains two valves and one pump each. The pumps are driven by piezoelectric elements mounted on thin glass membranes. Each pump is about 3.5 mm x 3.5 mm x 0.7 mm. A pumping rate up to 25 microliters per hour can be achieved. The operational voltage ranges between 40 and 200 V. A volume stroke up to 1.5 millimeter is achievable from the membrane structures. The valves are designed as passive valves. Sealing is by thin metal films. The dimension of a valve unit is 0.8 x 0.8. 07 mm. The ends of the separate streaming branches are arranged to meet in one point. This point acts as the beginning of a mixer unit which contains several fork-shaped channels. The arrangement of these channels allows for the division of the whole liquid stream into partial streams and their reuniting. A homogeneous mixing of solutions and/or gases can be observed after having passed about 10 of the fork elements. A reaction chamber is arranged behind the mixing unit to support the chemical reaction of special fluids. This unit contains heating elements placed outside of the chamber. The complete system is arranged in a modular structure and is built up of silicon. It comprises three silicon wafers bonded together by applying the silicon direct bonding technology. The silicon structures are made only by wet chemical etching processes. The fluid connections to the outside are realized using standard injection needles glued into v-shaped structures on the silicon wafers. It is possible to integrate other components, like sensors or electronic circuits using silicon as the basic material.
Author
Bioreactors; Chemical Reactions; Membrane Structures; Pumps; Silicon; Valves; Microminiaturization; Microbiology

19960055067 Hubbs-Sea World Research Inst., San Diego, CA USA
Effects of Sonic Booms on Marine Mammals: Problem Review and Recommended Research
Bowles, Ann E., Hubbs-Sea World Research Inst., USA; The 1995 NASA High-Speed Research Program Sonic Boom Workshop; Jul. 1996; vol. Volume 1, pp. 359-382; In English; Also announced as 19960055049; No Copyright; Avail: CASI; A03, Hardcopy; A04, Microfiche

By flying the High-Speed Civil Transport (HSCT) exclusively over uninhabited areas and mo over water, human annoyance will be reduced to acceptable levels. However, this strategy will for HSCT proponents to contend with the potential effects of sonic booms on animals, particularly ma mammals. What follows is a summary of the environmental regulations that must be addressed, the scientific community's concerns about the potential effects of the HSCT, and recommendations fox research to address the most important concerns. The recommendations included herein are based both on existing scientific evidence and regulatory needs. One cannot over-emphasize the importance of obtaining the appropriate information prior to substantial public exposure. Recent controversies over other human-made acoustic sources in the ocean suggest that the HSCT will receive intense scrutiny. It seems certain that an Environmental Impact Statement (EIS) and Incidental Harassment Authorization (IHA) under the Marine Mammal Protection Act (MMPA) or its equivalent will be necessary.
Derived from text
Sonic Booms; Marine Mammals; Environmental Surveys; Exposure

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AEROSPACE MEDICINE

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

19960053004 Department of Energy, Assistant Secretary for Environment, Safety and Health; Office of Human Radiation Experiments, Washington, DC USA
Human radiation studies: Remembering the early years: Oral history of pathologist Clarence Lushbaugh, M.D., conducted October 5, 1994
Apr. 1995; 53p; In English
Report No.(s): DOE/EH-0453; DE96-009839; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche

This report provides a transcript of an interview with Dr. Clarance Lushbaugh by representatives of the DOE Office of Human Radiation Experiments. Dr. Lushbaugh was chosen for this interview because of his research involving experimental use of irradiation with human beings at Los Alamos and at the Oak Ridge Institute of Nuclear Science (ORINS). After a brief biographical sketch Dr. Lushbaugh and his assistant Mrs. Ann Swipe defend their use of total body irradiation using the LETBI (Low Exposure Total Body Irradiation) and the METBI (Medium Energy Total Body Irradiator). Dr. Lushbaugh also discusses his earlier experiments involving

use of nitrogen mustards in chemotherapy application, his early interest in the LD50 for man, his early impressions of low-level spray radiation as introduced by Heubline, anedotal information for his duties a pathologist for Los Alamos, and his developing interest in establishing safer radiation limits for human exposure.
DOE
Irradiation; Chemotherapy; Human Beings; Radiation Dosage; Exposure; Gamma Rays

19960053041 Defence and Civil Inst. of Environmental Medicine, Downsview, Ontario Canada
Prediction of Cold Sea Survival Time
Tikuisis, Peter, Defence and Civil Inst. of Environmental Medicine, Canada; Feb. 1996; 28p; In English
Report No.(s): AD-A305730; DCIEM-96-R-12; Copyright; Avail: Issuing Activity (Defence and Civil Inst. of Environmental Medicine, P.O. Box 2000, 1133 Sheppard Ave. West, North York, Ontario, Canada M3M 3B9), Microfiche

Despite advances in personal protective equipment and locator technologies, circumstances can lead to life-threatening exposures at sea. Of particular concern is the survival time (ST) when a human is immersed in cold water. Estimations of ST is difficult since reliable controlled data are not available. However, studies on accidental immersion are sufficient to begin the construction and calibration of a predictive ST model. The model is based on the cylindrical core-shell concept of heat conduction with internal heat production augmented by shivering. Variables include ambient temperature, clothing protection (with and without leakage), subject characteristics, sea state, and level of immersion. If heat loss exceeds one's maximal rate of heat production, then ST is largely determined by the body's rate of cooling. Conversely, if a heat balance can be established, then ST is dependent on the depletion flame of one's energy capacity based on glycogen stores. ST is defined by the deep core temperature reaching 30 deg C. As an example, the predicted ST for a healthy normal sedentary individual immersed in a heavy sea condition at 5 C are 1.9, 2.3, 4.8, 12.6, and 24.2 h for nude, shirt + sweater, shirt + anti-exposure suit, shirt + dry immersion suit, and 4 mm neoprene wet suit conditions, respectively. While the model predictions must be considered speculative, it can potentially serve as a valuable resource and decision aid. At present, it would be prudent to apply the predictions in a relative vs absolute sense; i.e., for comparative purposes.
DTIC
Cold Water; Survival; Clothing; Conductive Heat Transfer; Exposure; Estimates; Glycogens; Heat Balance; Predictions; Shivering

19960053209 Japanese Air Self-Defense Force, Aeromedical Lab., Tokyo, Japan
Effect of Smoking Habit on the Hematological Data of JASDF Pilots
Tomoda, Masami, Japanese Air Self-Defense Force, Japan; Yoneda, Ikuo, Japanese Air Self-Defense Force, Japan; The Reports of Aeromedical Laboratory; Dec. 1995; vol. 36, no. 4, pp. 123-129; In Japanese; Also announced as 19960053205; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche

We have investigated the relationship between cigarette smoking, red blood cell count, hemoglobin (Hb), and hematocrit (Ht) in 584 JASDF pilots (40-45 years of age). The white blood cell count was significantly higher in smokers than in non-smokers, and it was increased with the number of cigarettes smoked per day. The smokers who smoke over 20 cigarettes per day showed significantly higher levels of Hb and Ht, compared with those in non-smokers.
Author
Physiological Effects; Nicotine; Tobacco; Hematology; Aircraft Pilots

19960053210 Japanese Air Self-Defense Force, Aeromedical Lab., Tokyo, Japan
Grip Strength Training on WAF Recruit
Nomiyama, Takenori, Japanese Air Self-Defense Force, Japan; Takeuchi, Yoshiniori, Japanese Air Self-Defense Force, Japan; Kadoo, Atsushi, Japanese Air Self-Defense Force, Japan; Mizumoto, Chieko, Japanese Air Self-Defense Force, Japan; Takeuchi, Akihiko, Japanese Air Self-Defense Force, Japan; Utsuki, Narisuke, Japanese Air Self-Defense Force, Japan; The Reports of Aeromedical Laboratory; Dec. 1995; vol. 36, no. 4, pp. 131-136; In Japanese; Also announced as 19960053205; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche

Twenty three right-handed WAF recruits were studied regarding the effects of muscular training on the hand grip strength during their three-month initial training course. The half of the subjects participated in hand grip training every evening and their grip strength data were compared to that of the other subjects who did not participate in this practicing. Average grip strength increased by 4 kg in the training group and 2 kg in the non-training group. The between group difference was statistically significant for the left hand.
Author
Hand (Anatomy); Muscular Strength

19960053795 Advisory Group for Aerospace Research and Development, Aerospace Medical Panel, Neuilly-Sur-Seine, France
Neurological Limitations of Aircraft Operations: Human Performance Implications *Les Limitations Neurologiques des Operations Aeriennes: Les Consequences pour les Performances des Equipages*
Neurological Limitations of Aircraft Operations: Human Performance Implications; Apr. 1996; 316p; In English; In French, 9-12 Oct. 1995, Cologne, Germany; Sponsored by Advisory Group for Aerospace Research and Development,

France; Also announced as 19960053796 through 19960053827
Report No.(s): AGARD-CP-579; ISBN-92-836-0027-4; No Copyright; Avail: CASI; A14, Hardcopy; A03, Microfiche

These proceedings include the Technical Evaluation Report, three Keynote Addresses, 33 solicited papers and four special session papers of the Symposium sponsored by the AGARD Aerospace Medical Panel and held at the Deutsche Forschunosanstalt fur Luft- und Raumfahrt, Linder Hohe, Cologne, GE from 9-12 October 1995. NATO air operations in the future will have improved capabilities for mobility, flexibility, rapid augmentation and situation awareness, The rapid changes and sophisticated innovations taking place in technology imply that air warfare will become more knowledge intensive and, accordingly, more dependent on a well conditioned nervous system. Advancements in technology are also driving air and the concomitant support operations into the outer limits of human mental and physical endurance. There is also the requirement of doing more work with fewer resources. The purpose of this Symposium was to address some of the factors that impose limitations on the nervous system, and to consider the practical challenges for enhancing neurological performance in such operational conditions as described above. The papers addressed neurological limitations imposed by: (1) the Gz environment; (2) the hypoxia environment; (3) disease and trauma; (4) neurosensory limitations; (5) fatigue and sleepiness in workload; (6) stress effects; and (7) sustained operations. The practical challenges in enhancing neurological performance were addressed for: (1) heavy jet operations; (2) rotary wing operations; (3) air traffic control operations; and (4) ground and support operations. These proceedings will be of interest to those concerned with the health and safety of personnel in air and support operations, and the aerospace scientist wanting a review of relevant research in the field of air operations neuroscience.
Author
Warfare; Aerospace Medicine; Conferences; Flight Operations; Human Performance; Hypoxia; Nervous System; Neurology; Physical Fitness; Workloads (Psychophysiology)

19960053796 Defence and Civil Inst. of Environmental Medicine, North York, Ontario Canada
Neurological Influence in Push-Pull Effect
Banks, R. D., Defence and Civil Inst. of Environmental Medicine, Canada; Goodman, Len S., Defence and Civil Inst. of Environmental Medicine, Canada; Apr. 1996; 10p; In English; Also announced as 19960053795; No Copyright; Avail: CASI; A02, Hardcopy; A03, Microfiche

During straight and level flight, aircraft occupants are exposed to the normal acceleration force of gravity, that is +1 Gz. Evolutionary development of homeostatic control of blood pressure (BP) via neurological and cardiovascular mechanisms occurred under the continuing influence of +1 Gz during walking or sitting. Thus, humans have not yet evolved mechanisms to compensate for significant excursions from +1 Gz. Aircraft occupants are frequently exposed to short duration accelerations other than +1 Gz. Air turbulence, for example, exposes occupants to short (up to O.5s) exposures to Gz. Coordinated banked turns in jet aircraft expose occupants to sustained increases in +Gz. Nose-down, or 'bunt' maneuvers expose occupants to relative -Gz (that is, Gz that is less than +1 Gz). Understanding of the effects of exposures to variations in Gz is incomplete. Because sustained increases in +Gz occur commonly in flight and can be studied in laboratories with the use of human centrifuges, much work has been accomplished. However, research conducted on human centrifuges commonly suffers from the bias of a starting baseline of +1.4 Gz, a condition that seldom exists in actual flight. Much less is known of the effects of increased +Gz when the starting condition is less than +1.4 Gz. The few studies that report on Gtolerance when +Gz baseline varies are preliminary, but have demonstrated that tolerance to +Gz decreases more when preceding Gz is relatively more negative. This effect, termed the 'push-pull effect', increases with increased time of exposure to preceding relative -Gz. In-flight studies have shown that a proper anti-g straining maneuver (AGSM) and/or g-suit inflation only partially counters push-pull effect. The recent fatal crash of a Canadian Forces CF-18 due to push-pull effect has highlighted the inadequacies of current protection strategies. Prevention of similar accidents requires completing our understanding of acceleration physiology. As a rationale for future research efforts aimed at achieving this understanding, this paper discusses the possible neuro-cardiovascular processes involved in pushpull effect.
Derived from text
Acceleration Tolerance; Exposure; Gravitation; Jet Aircraft; Neurology; Prevention; Protection

19960053797 Defence and Civil Inst. of Environmental Medicine, North York, Ontario Canada
Seizure Associated With G-LOC: A Potentially Fatal Occurence
Gray, G. W., Defence and Civil Inst. of Environmental Medicine, Canada; Paul, M. A., Defence and Civil Inst. of Environmental Medicine, Canada; Neurological Limitations of Aircraft Operations: Human Performance Implications; Apr. 1996; 4p; In English; Also announced as 19960053795; No Copyright; Avail: CASI; A01, Hardcopy; A03, Microfiche

G-induced loss of consciousness (G-LOC) is a potential aeromedical catastrophe. Some pilots live to tell the tale, but over the last 15 years with the deployment of aircraft capable of rapid-onset high sustained +Gz there have been an increasing number of fatal fighter jet accidents which have been attributed to G-LOC. Recognition of unheralded G-LOC with rapid onset/high sustained G as a cause of aircraft accidents has led to G-training programs in many NATO Air Forces which have been successful in reducing but not eliminating

the occurrence of G-LOC accidents. Whether or not a pilot recovers from a G-LOC episode in time to effect a recovery depends on a number of factors; situational including aircraft altitude and attitude when G-LOC occurs, and physiologic - the duration of G-LOC and time to recovery of neural function sufficient to allow recovery of control or ejection. The time to functional recovery following G-LOC has been studied by a number of investigators. Forster and Cammarota found centrifuge subjects who experienced GLOC had incapacitation times averaging about 12 seconds, from G-LOC to recovery sufficient to deactivate warning signals in the centrifuge. Recovery time for more complex behaviour including simulated trimming of aircraft power and acquisition of a target was longer, about 60 seconds. In a later study, Forster, Cammarota and Whinnery found incapacitation times of 15-20 seconds in aircrew participating in a G-training program who experienced G-LOC. Incapacitation times varied somewhat depending on the type of G-exposure (gradual onset or rapid onset). It was found that performance as measured by choice reaction times and anthmetic computation tasks was degraded during the first minute of recovery from G-LOC and progressively improved over the next 2-3 minutes. Although these studies provide information on the time to recovery of consciousness, there have been no studies which have monitored the ability of subjects to integrate the complex behaviour required to fly an aircraft following G-LOC. At DCIEM, Michel Paul has undertaken a study to measure subjects' ability to fly an aircraft simulator through a standard approach and landing immediately following an episode of G-LOC.
Derived from text
Seizures; Aerospace Medicine; Acceleration Stresses (Physiology); Consciousness; Physiological Effects; Unconsciousness; Aircraft Accidents

19960053799 Pennsylvania Univ., Dept. of Bioengineering, Philadelphia, PA USA
Cervical Spinal Cord Injury Tolerance under +Gz Acceleration
Mazuchowski, E. L., II, Pennsylvania Univ., USA; Whitley, P. E., Hahnemann Medical Coll. and Hospital, USA; Thibault, L. E., Hahnemann Medical Coll. and Hospital, USA; Apr. 1996; 6p; In English; Also announced as 19960053795; No Copyright; Avail: CASI; A02, Hardcopy; A03, Microfiche

Experimental manikin ejection data from the U. S. Naval Air Warfare Center was analyzed using a multimodality biomechanical approach to investigate the consequences that helmet mounted devices and improper head positioning have on the cervical spinal cord during ejection from high performance aircraft. Accelerations of the head center of gravity from the manikin studies were compared to a physical model of the head-neck complex run under similar conditions. Strain and strain rates in the cervical spinal cord obtained from this biofidelic physical model were compared to the functional tolerances of isolated myelinated axons, crustacean spinal cords, and isolated neurons. If the strain and strain rate exceed the isolated tissue and cell culture critical threshold levels (greater than 15% and 1s(exp -l), respectively), altered calcium homeostasis and electrophysiological dysfunction occur. Results suggest that moving the combined head-helmet center of gravity forward and positioning of the head improperly during ejection increase the possibility of neurological deficit and that the cervical spinal cord must be considered in evaluating the feasibility of egress procedures.
Derived from text
Spinal Cord; Biodynamics; Electrophysiology; Neurology; Strain Rate; Tissues (Biology); Acceleration Stresses (Physiology); Acceleration Tolerance

19960053800 Armstrong Lab., Neuropsychiatry Branch, Brooks AFB, TX USA
The Use of Finite Element Modeling to Evaluate Diseased Spinal Columns for Aircraft Ejection Safety
Drew, William E., Armstrong Lab., USA; Apr. 1996; 4p; In English; Also announced as 19960053795; No Copyright; Avail: CASI; A01, Hardcopy; A03, Microfiche

A great deal of work has been accomplished analyzing ejection seat acceleration profiles and their effects on normal, non-diseased spinal columns in aviators. Considerably less work has been accomplished on the effects of aircraft ejection on diseased spines, which are, in fact, quite common in the flying community. This study was an attempt to address this concern and specifically to evaluate a particular mathematical model for accuracy in predicting whether specific spinal diseases or geometries will enable safe aircraft ejection without further spinal injury. Pilots ejecting from early aircraft ejection-seat systems had approximately a 12% incidence of vertebral fractures. The newer ejection systems have a lower maximum acceleration force in the Gz+ direction and also a considerably slower G onset and are generally safe for the typical pilot (adult male) without spinal disease when the pilot ejects within the envelope (altitude, speed and attitude limitations). But if a surgical procedure is done on the spine, e.g., a laminectomy, hemilaminectomy or cervical fusion, there may be a decrease in the overall strength of the spinal column, leading to a fracture or dislocation of vertebrae, disk herniation, or even spinal cord injury during ejection . Extensive previous work, including animal modeling and mathematical modeling, much of which has been performed by the Crew Systems Directorate at WrightPatterson AFB, addresses this issue for the nondiseased spine. When a pilot ejects from an aircraft in a typical ejection seat, his vertebral longitudinal axis is approximately in line with the rails on the back of the seat, which is the direction of thrust (Figure 1). Therefore, the direction of forces is essentially in line with the vertebral axis. Also, because the adult spine has a kyphotic and lordotic curvature, there are force vectors other than perpendicular in relation to the vertebrae.
Derived from text

Spinal Cord; Finite Element Method; Back Injuries; Diseases; Ejection Seats; Injuries; Vertebrae

19960053801 Royal Norwegian Air Force, Inst. of Aviation Medicine, Oslo, Norway

Hypoxia Induced Impairment of Granulocyte Function

Neslein, I. L., Royal Norwegian Air Force, Norway; Myhre, K., Royal Norwegian Air Force, Norway; Bjerknes, R., Royal Norwegian Air Force, Norway; Apr. 1996; 10p; In English; Also announced as 19960053795; No Copyright; Avail: CASI; A02, Hardcopy; A03, Microfiche

Adequate resistance to infections depend upon, among other factors, the phagocytic capacity of polymorphonuclear neutrophilic granulocytes (PMNL). It is well documented that hypoxia stimulates the formation of red blood cells. But this study, together with some early works, indicate that hypoxia might stimulate the hematopoietic system in general, not only the eythropoietic cell lines. Hypoxia may interfere with ATP-dependent cell function. Intermittent or chronic exposure to hypoxia could therefore adversely affect resistance to infections. Rats were exposed to repeated hypobaric hypoxia (0,5 atm) for 17 hours per day for 0-7 days. This induced a significant reduction of the phagocytic capacity of the neutrophil granulocytes in addition to an increase in hematocrit, haemoglobin, thrombocyte, and total leukocyte concentrations. Differential counting of peripheral blood cells revealed significant granulocytosis, whereas the fraction of circulating lymphocytes was decreased. Microscopic examination and cell cycle analyses of rat bone marrow revealed stimulated hematopoiesis. An increase in the plasma concentration of corticosterone was observed in the middle of the experimental period, but was similar in the two groups by the end of the period. The reduced PMNL phagocytic capacity observed following repeated hypobaric hypoxia may have consequences for host defence in situations of exposure to hypoxia.

Author

Hypoxia; Leukocytes; Thrombocytes; Bone Marrow; Adenosine Triphosphate; Hematopoietic System; Hematopoiesis

19960053802 Ottawa Univ., Ottawa Civic Hospital, Ontario Canada

Automatic Detection of Cerebral Hypoxia Using Frequency Domain Mapping and Neural Networks

Skinner, C. R., Ottawa Univ., Canada; Gray, Gary, Defence and Civil Inst. of Environmental Medicine, Canada; Apr. 1996; 4p; In English; Also announced as 19960053795; No Copyright; Avail: CASI; A01, Hardcopy; A03, Microfiche

The development of quantified EEG (qEEG) in the form of frequency domain mapping has provided methods of automated analysis to detect normal and abnormal physiological states as well as definite neuropathological states in the brain. There is considerable importance in the various high risk military occupational environments to be able to detect incipient cerebral hypoxia. in order to prevent incapacitation due to hypoxia in real time This paper presents the current data which have been gathered and analysed at DCEM, NDMC and the Ottawa Civic Hospital in the development of automated models of detecting cerebral hypoxia using frequency domain analysis of EEG The basic method of analysis of spectral shifts of frequency domain spectra in epochs of 4 seconds of time. The results obtained show the spectral changes in normal wakeful individuals, normal individuals undergoing hyperventilation and volunteers subjected to levels of graded hypoxia The results from forty eight subjects of average age of 22 years performing hyper-ventilation as part of clinical EEG showed a large spectra shift in keeping with the slowing seen on time domain EEG The results of three subjects exposed to three levels of oxygen saturation showed at 80% saturation an initial decreased peak frequency with increase in amplitude At 70% saturation, there was a decrease in amplitude with a flattening and widening of the spectral pattern.

Author

Cerebrum; Hypoxia; Brain; Electroencephalography; Wakefulness; Physiological Effects; Oxygen; Neural Nets; Detection

19960053803 Institute of Aviation Medicine, Prague, Czechoslovakia

Head Injuries in Military Pilots

Konrad, Z., Institute of Aviation Medicine, Czechoslovakia; Dosel, P., Institute of Aviation Medicine, Czechoslovakia; Apr. 1996; 4p; In English; Also announced as 19960053795; No Copyright; Avail: CASI; A01, Hardcopy; A03, Microfiche

The pilotage of modern military aircraft is highly specific activity which requires a perfect efficiency of the CNS including the coordination between the cortex, subcortical centers and separate effectors. The work of a pilot in the cockpit of current aircraft, typical with a lack of space, large number of controllers and instruments is connected with the necessity of immediate reactions during the information, gravitational and emotional overloads, thus making the demands on pilot's CNS functions enormous. The aim of flight surgeons, assessing the flying ability of the pilots is to admit only the individuals in perfect health condition. The head injury is undoubtedly a serious harm to the delicate brain functions. We should like to share with this competent forum the experience, obtained by the neurological department of the Institut of Aviation Medicine, Prague with the aeromedical assessment of these events in Czech, formerly Czechoslovak Air Force flying personnel during a period 1987 - 1994.

Derived from text

Aerospace Medicine; Brain; Central Nervous System; Neurology; Injuries; Head (Anatomy); Flying Personnel

19960053804 Naval Aerospace Medical Inst., Pensacola, FL USA

CogScreen-Aeromedical Edition in the Assessment of the Head Injured Military Aviator

Moore, J. L., Naval Aerospace Medical Inst., USA; Kay, G. G., Naval Aerospace Medical Inst., USA; Apr. 1996; 6p; In English; Also announced as 19960053795; No Copyright; Avail: CASI; A02, Hardcopy; A03, Microfiche

CogScreen-Aeromedical Edition (CogScreen-AE) is a computer administered and scored cognitive screening instrument designed to rapidly assess deficits or changes in attention, immediate and short-term memory, spatial-perceptual functions, calculation skills, reaction time, simultaneous information processing, and executive functions. The test was designed to detect subtle changes in cognitive functioning, which left un-noticed may result in poor pilot judgment or slow reaction time in critical operational situations. Normative data have been collected on over 800 commercial airline pilots and an equal number of military aviators. This paper will focus on applications of CogScreen-AE in the evaluation of head injured military aviation personnel. The CogScreen test results from a group of 24 mild to severely injured military aviators who were tested up to 90 months following head injury, and five of whom received serial evaluations, are presented. The results of the serial evaluations of five head injured military aviators are also discussed. Results demonstrate the sensitivity of the test to initial injury severity and recovery of function. The combination of conventional neuropsychological instruments and CogScreen-AE may expedite the return of head injured aviators to flying duties and actual control of aircraft.

Derived from text

Aerospace Medicine; Aircraft Pilots; Injuries; Head (Anatomy)

19960053805 German Air Force, Medical Academy, Munich, Germany

Carbohydrate Deficient Transferrin: A New Marker to Evaluate Alcohol Consumption in Pilots

Freund, Wolfgang, German Air Force, Germany; Apr. 1996; 8p; In English; Also announced as 19960053795; No Copyright; Avail: CASI; A02, Hardcopy; A03, Microfiche

To test the possible value of new, comercially available test kits for Carbohydrate Deflcient Transferrin (CDT) in an aeromedical setting, a clinical trial followed by an alcohol consumption trial have been conducted at the German Air Force Institute of Aviation Medicine (GAF IAM). The clinical trial with 268 tests showed that CDT is a valuable and accurate new tool in the assessment of alcohol consumption in otherwise healthy persons. The alcohol consumption trial showed that tests for CDT can not detect the difference between abstinency and consumption of 25ml of alcohol / day for three weeks. However, CDTect seems to be more stable than % CDT.

Derived from text

Aerospace Medicine; Alcohols; Carbohydrates; Markers; Detection

19960053807 Army Aeromedical Research Lab., Fort Rucker, AL USA

Extending the Range of Vision Testing: The Small Letter Contrast Test

Rabin, Jeff C., Army Aeromedical Research Lab., USA; Apr. 1996; 8p; In English; Also announced as 19960053795; No Copyright; Avail: CASI; A02, Hardcopy; A03, Microfiche

Recent evidence suggests that small letter contrast sensitivity (CS) is more sensitive than visual acuity (VA) to defocus, luminance, binocular enhancement, and visual differences among pilot trainees. It would be valuable to make this test available for general use. We developed a hard copy (letter chart) version called the Small Letter Contrast Test (SLCT) and evaluated its sensitivity and reliability in comparison to standard vision tests. The SLCT has 14 lines of letters with 10 letters per line. The letters are of constant size (20/25 at 4m), but vary in contrast by line in 0.1 log steps (0.01 log units per letter). Normal room illumination is used. The SLCT was evaluated in 16 subjects under various conditions (spherical and astigmatic blur, low luminance, two eyes vs. one) to determine test sensitivity and reliability, and in patients with clinical conditions. Scores were compared to those obtained with standard tests of VA (Bailey-Lovie) and CS (Pelli-Robson). SLCT scores were similar to previous measures, and retest reliability was one line. The SLCT was more sensitive than VA to spherical and astigmatic blur, low luminance, and vision with two eyes vs. one. Greater sensitivity of the SLCT endured despite correction for variability. The SLCT also was more sensitive than standard tests to visual loss from early cataract, keratoconus, corneal infiltrates, edema, and amblyopia. The SLCT is a powerful approach for revealing subtle visual loss which may be undetected by standard clinical techniques. The SLCT will prove useful for monitoring vision in refractive surgery, cataract, corneal and macular edema, optic neuritis, and for evaluation of candidates for unique occupations like aviation.

Derived from text

Visual Acuity; Visual Perception; Surgery; Patients; Luminance

19960053808 Armstrong Lab., Ophthalmology Branch, Brooks AFB, TX USA

Optic Nerve Head Drusen: An Example of Aeromedical Decisions Regarding Visual Field Loss

Burroughs, John R., Armstrong Lab., USA; Ivan, Douglas J., Armstrong Lab., USA; Thomas, Robert A., Armstrong Lab., USA; Tredici, Thomas J., Armstrong Lab., USA; Gooch, John M., Armstrong Lab., USA; Apr. 1996; 4p; In English;

Also announced as 19960053795; No Copyright; Avail: CASI; A01, Hardcopy; A03, Microfiche

Peripheral vision is a vital function which serves to alert the aviator to a potential target that may deserve closer attention. The confrontation technique for visual field testing is an invaluable tool for use by the flight surgeon to screen for defects without the need for bulky equipment. Yet this technique may miss field defects of potential aeromedical significance. Optic nerve drusen are known to cause progressive visual field disturbances. Formal visual field testing is necessary in order to properly evaluate an aviator with a condition such as optic nerve drusen. We reviewed our experience with 18 aviators at the Aerospace Consultation Service who received the diagnosis of drusen of the optic nerve. The influence of drusen on visual function and on the aeromedical waiver recommendation process is discussed in order to provide insight regarding appropriate aeromedical management.
Derived from text
Aerospace Medicine; Peripheral Vision; Visual Fields; Aircraft Pilots

19960053809 Armstrong Lab., Ophthalmology Branch, Brooks AFB, TX USA
Transient Vision Loss in Aircrew
Burroughs, John R., Armstrong Lab., USA; Ivan, Douglas J., Armstrong Lab., USA; Tredici, Thomas J., Armstrong Lab., USA; Perez-Becerra, Jose, Armstrong Lab., USA; Apr. 1996; 14p; In English; Also announced as 19960053795; No Copyright; Avail: CASI; A03, Hardcopy; A03, Microfiche

Etiologic factors that can result in transient disruptions in vision comprise an extensive differential diagnosis and include both central nervous system and systemic causes. Aircrew are not immune to the majority of these etiologies and their vulnerability expands as they extend their flying careers. Furthermore, the aviation environment may introduce additional pre-disposing factors. This paper concentrates on those etiologies that are felt to be the most common or unique clinical entities potentially responsible for transient visual changes in aircrew and highlights specialized cases that relate directly to the aerospace environment, such as altitude-related phenomena. Management and disposition of aircrew with these problems often times presents a unique occupational dilemma. When applicable, the USAF ACS's experience with specific diagnoses related to transient visual loss or transient visual disturbances in aircrew is discussed.
Derived from text
Aerospace Environments; Flight Crews; Etiology; Central Nervous System

19960053811 Hellenic Air Force General Hospital, Otorhinolaryngology Dept., Athens, Greece
Limitations of CNS Function Imposed by Vibration in Flight
Diamantopoulos, Ioannis I., Hellenic Air Force General Hospital, Greece; Kechagiadakis, Eleutherios, Hellenic Air Force General Hospital, Greece; Apr. 1996; 12p; In English; Also announced as 19960053795; No Copyright; Avail: CASI; A03, Hardcopy; A03, Microfiche

Vibration constitudes any form of motion that repeatedly alternates in direction.It is usually perceived by the senses as a series of sustained, mechanical, oscillatory disturbance. In everyday life as well as in aviation, vibrational energy reaches the body directly, by means of contact with a vibrating surface, or indirectly, by transmission through intervening bodies such as solids or fluids. When transmitted through air and bears characteristics in the audible range is treated as noise.
Derived from text
Central Nervous System; Sensory Perception; Vibration

19960053815 Centro de Instruccion de Medicina Aeroespatial, Hospital del Aire, Madrid, Spain
Effects of Stress on the Immunocellular System in Military Pilots
MedialdeaCruz, J., Centro de Instruccion de Medicina Aeroespatial, Spain; LagunaMartinez, R., Centro de Instruccion de Medicina Aeroespatial, Spain; MartinDelMoral, M., Centro de Instruccion de Medicina Aeroespatial, Spain; Martinez-Hernandez, D., Centro de Instruccion de Medicina Aeroespatial, Spain; RiosTejada, F., Centro de Instruccion de Medicina Aeroespatial, Spain; Apr. 1996; 18p; In English; Also announced as 19960053795; No Copyright; Avail: CASI; A03, Hardcopy; A03, Microfiche

In studies on the CNS and the Immune System,both with a great capacity to receive and respond to any kind of stimulation -exterior as well as interior- it has only recently been considered that both are not completely autonomous,but that the interrelationship is more and more complex as investigations reveal new facts. According to ADER(1,23),all homeostatic defense organic systems are subject in a greater or lesser degree to the influence of environmental circumstances and psycological factors,whose integration evokes an adaptative response which,at the last moment,is regulated by the brain and whose consequences on health are not very well known at present.
Derived from text
Central Nervous System; Stimulation; Brain

19960053822 Army Medical Center, Dept. of Orthopaedics, Lackland AFB, TX USA
Use of Psychostimulants in Extended Flight Operations: A Desert Shield Experiment
Cornum, Kory, Army Medical Center, USA; Cornum, Rhonda, Army Medical Center, USA; Storm, William, Army Medical Center, USA; Apr. 1996; 4p; In English; Also announced as 19960053795; No Copyright; Avail: CASI; A01, Hardcopy; A03, Microfiche

The present study examined the use of dextroamphetamine by F-l5C fighter pilots during Operation Desert Shield,

the five month build up after arrival in Saudi Arabia but before Desert Storm (Persian Gulf War). These pilots were tasked with providing a continuous defensive and deterrent position in front of vulnerable high value assets, and were flown as Combat Air Patrol (CAP) missions. Airborne Warning and Control Squadron (AWACS) jets flew 24 hours a day to monitor Iraqi air activity, and F-15C aircraft flew missions to protect the AWACS and Saudi Arabia from a surprise attack. The missions were typically 4-6 hours in length and were scheduled well in advance. Additionally there were plenty of aircraft and pilots available to fly these missions. Thus, the pilots were well rested before all of these flights.
Derived from text
F-15 Aircraft; Flight Operations; Patrols; Aircraft Pilots

19960053823 Army Aeromedical Research Lab., Fort Rucker, AL USA
Sustaining Helicopter Pilot Alertness With Dexedrine (R) During Sustained Operations
Caldwell, John A., Jr., Army Aeromedical Research Lab., USA; Caldwell, J. Lynn, Army Aeromedical Research Lab., USA; Crowley, John S., Army Aeromedical Research Lab., USA; Apr. 1996; 12p; In English; Also announced as 19960053795; No Copyright; Avail: CASI; A03, Hardcopy; A03, Microfiche

Sustained operations are a tactical necessity on the modem battlefield. However, the strain on personnel from sleep deprivation and fatigue remains problematic. Effective crew work/rest policies may prevent sleep loss and subsequent performance decrements in some situations, but stimulant medications may be the only alternative for sustaining performance in unpredictable combat operations. The present study investigated the efficacy of using dextroamphetamine as a countermeasure to sleep loss during sustained operations. Twelve subjects (6 males and 6 females) were exposed to two, 40-hour periods of contmuous wakefulness during which they flew a helicopter simulator and completed electroencephalographic (EEG) and mood evaluations. During the final 23 hours of one period, subjects were administered 3 separate I 0-mg doses of Dexedriner (at 0000, 0400, and 0800), and during the final hours of the other period, subjects were administered placebo. Test sessions occurred at 0100, 0500, 0900, 1300, and 1700 on both days. Results showed that flight performance was better under Dexedrine than placebo on 7 out of 9 sets of maneuvers. The benefits from Dexedrinet) were particularly apparent during the 0500 and 0900 flights when the combination of fatigue and circadian effects were most severe. Both EEG and mood evaluations were consistent with the performance effects in that Dexedrinet) was found to reduce slow-wave brain activity (associated with fatigue) and improve subjectve ratings of vigor, fatigue, and mental abilities. These data indicate that Dexedrine(R) is a viable countermeasure for sustaining the performance of both male and female pilots when operational demands prevent adequate, restorative sleep.
Derived from text
Helicopters; Sleep Deprivation; Stimulants; Wakefulness; Alertness; Circadian Rhythms; Males; Mental Performance; Moods

19960053824 Defence and Civil Inst. of Environmental Medicine, North York, Ontario Canada
The Effect of Modafinil and Amphetamine on Core Temperature and Cognitive Performance Using Complex Demodulation During 64 Hours of Sustained Work
Pigeau, Ross, Defence and Civil Inst. of Environmental Medicine, Canada; Naitoh, Paul, Applied Psychophysiology Group, USA; Apr. 1996; 12p; In English; Also announced as 19960053795; No Copyright; Avail: CASI; A03, Hardcopy; A03, Microfiche

Modafinil (diphenylmethyl-sulfinyl-2 acetarnide) is an alerting substance that is considered safer than amphetamine with fewer side effects. It appears to produce no feelings of euphoria, does not seem to be addicting, induces no drug tolerance and in large dosages (greater than 4500 mg) does not produce serious medical problems. These features make modafinil a good candidate to reduce or ameliorate the effects of prolonged sleep loss in military operations. The validity of these claims, however, is in question due to the very few number of controlled studies using normal adult subjects. Modafinil has been used primarily in either clinical studies to treat sleeping disorders or in animal studies to investigate its pharmacological properties. Modafinil is described as an alpha-1 adrenergic agonist, but Mignot et al. have recently questioned this interpretation, reporting that modafinil had good selectivity for the dopaminergic transporter. Nevertheless, the relatively benign psycho-pharmacological properties of modafinil make it a good candidate to reduce or ameliorate the cognitive effects of prolonged sleep loss under continuous workload conditions. Presently, use of modafinil in Canada is limited to scientific and/or clinical investigations.
Derived from text
Sympathetic Nervous System; Pharmacology; Neurophysiology; Military Operations; Mental Performance; Drugs; Dosage; Amphetamines

19960053829 Fourth Military Medical Univ., Dept. of Aerospace Physiology., Xi'an, China
Changes in Spectra of Heart Rate and Blood Pressure Variabilities during Bed Rest and Head-up Tilt after Bed Rest
Zheng, Jun, Fourth Military Medical Univ., China; Zhang, Lifan, Fourth Military Medical Univ., China; Wei, Jinhe, Institute of Space Medico, China; Wang, Xingbang, Fourth Military Medical Univ., China; Space Medicine and Medical Engineering; Aug. 15, 1996; vol. Volume 9, no. No. 4, pp. 241-250; In English; Also announced as 19960053828; No

Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche

Changes in the spectra of heart rate (HRV) and systolic blood pressure (SBPV) variables were recorded during head-down bed rest and head-up tilt (HUT) in 15 healthy young men. After bed rest, five subjects failed to complete the HUT test. During bed rest, the low-frequency (LF) and high-frequency (HF) powers of HRV and SBPV spectra were all significantly decreased. The ratio of LF to HF power of the HRV spectrum increased on the 16th day. During the first 6 minutes of HUT after bed rest, the hear rate was faster, but the LF:HF(HRV) and the LF power of SBPV spectrum in all subjects was similar to the data during HUT before bed rest. The diastolic and mean arterial pressures were significantly increased during HUT except in those who failed to complete the HUT test after bed rest. The results suggest that the peripheral vascular sympatheic activity and the cardiac para-sympathetic activity are decreased with a relative increase in the cardiac sympathetic activity during bed rest, but the cardiovascular autonomic responsiveness during HUT after bed rest is basically preserved.

Author

Bed Rest; Cardiovascular System; Heart Rate; Autonomic Nervous System; Blood Pressure; Head Movement

19960053831 Institute of Space Medico, Beijing, China

Changes of Brain Potentials Related to Visual Attention during Simulated Weightlessness

Wei, Jinhe, Institute of Space Medico, China; Yan, Gongdong, Institute of Space Medico, China; Zhao, Lun, Institute of Space Medico, China; Duan, Ran, Institute of Space Medico, China; Xiao, Feng, Institute of Space Medico, China; Li, Dachen, Institute of Space Medico, China; Wu, Jianping, Institute of Space Medico, China; Space Medicine and Medical Engineering; Aug. 15, 1996; vol. Volume 9, no. No. 4, pp. 256-260; In Chinese; Also announced as 19960053828; No Copyright; Avail: CASI; A01, Hardcopy; A01, Microfiche

To study the possible effect of simulated weightlessness on brain function state, the brain-related potentials (ERPs) during a simple visual selective response task were compared between head-down tilt (HDT) and head-up tile (HUT) in 9 normal subjects. The results wer: both the target (T) and non-target (NT) flash signals induced significant slow positive potentials which were supposed to be related to the attention activity; the amplitude of the positive potentials in the frontal regions decreased significantly, especially for NT-ERPs during HDT as compared with that during HUT. The data provide new evidence indicating that the ability of brain response declined during simulated weightlessnes and more attention should be paid to the study of brain function during space flight.

Author

Weightlessness Simulation; Physiological Responses; Brain; Visual Tasks; Head Down Tilt; Gravitational Effects

19960053835 Institute of Space Medico, Beijing, China

Relationship between the State of Intravascular Bubbles and Micorcirulation System

Yuan, Jinfu, Institute of Space Medico, China; Pan, Lingsong, Institute of Space Medico, China; Wang, Quan, Institute of Space Medico, China; Ji, Zhiongyi, Institute of Space Medico, China; Gao, Juan, Institute of Space Medico, China; Space Medicine and Medical Engineering; Aug. 15, 1996; vol. Volume 9, no. No. 4, pp. 276-280; In Chinese; Also announced as 19960053828; No Copyright; Avail: CASI; A01, Hardcopy; A01, Microfiche

To confirm the hypothesis that air bubbles were unable to block the blood vessels and that the state of the intravascular bubbles was determined by the function of the circulatory system, 35 guinea pigs were pressurized and then were decompressed to normal pressure. Microscopic observation was made of the bulbar conjuctival, dorsum auricular and subcutaneous vessels in 32 surviving animals. Air bubbles of different amounts , sizes and shapes were found in the dorsum auricular and subcutaneous vein af all the animals and the bulbar conjunctival orirdal artery of 16 animals, and in some cases the vessels were even filled with bubbles. The bubbles ran in the same direction and at the same speed as the blood flow. They could run in a backward, to-and-fro, or sluggish flow. The bubbles looked shapeless and tended to break and divide into branch flows where the vessel branches. The bubbles were motionless at the proximal end of the artery occluded due to spasm or when the blood was stagnated. Under the action of the blood pressure the bubbles could expand the vessel and push forward. The bubbles showed a tendency of flowing iwth ease with the function of the vessel recovered. The results suggest that bubbles of any size in the vessel could easily change their shape under the action of the blood flow and pressure, and pass through vessels of any diamger and circulate with the blood. Only when a vessel was occluded due to spasm or the blood in a vessel was stagnated could the bubbles be motionless, but it was not that the bubbles blocked the vessel.

Author

Guinea Pigs; Intravascular System; Blood Pressure; Blood Flow; Circulatory System; Bubbles; Embolisms

19960053836 Institute of Space Medico, Beijing, China

Study of Changes of Fatigue Index during Prolonged Visual Display Terminal Operation

Liao, Guofeng, Institute of Space Medico, China; Cao, Ping, Institute of Space Medico, China; Zhong, Hao, Institute of Space Medico, China; Space Medicine and Medical Engineering; Aug. 15, 1996; vol. Volume 9, no. No. 4, pp. 281-285; In Chinese; Also announced as 19960053828; No Copyright; Avail: CASI; A01, Hardcopy; A01, Microfiche

Using 25 Arabic numerals lined in a row and displayed in a row on a cathode ray tube (CRT) the subjects were asked to find the one missed number in a row and to press the key corresponding to the number. The work lasted for 3 hours.

Longitudinal-kinetic visual acuity was measured before and at 30, 60, 80, 100, 120, 150, and 180 minutes during the work. The results showed that the longitudinal kinetic visual acuity dropped with working time and recovered after the work quickly at first, and then slowly.
Author
Display Devices; Visual Acuity; Fatigue (Biology); Workloads (Psychophysiology); Physiological Responses

19960055180 Civil Aeromedical Inst., Oklahoma City, OK USA
Survival at High Altitudes: Wheel-Well Passengers ***Final Report***
Veronneau, Stephen J. H., Civil Aeromedical Inst., USA; Mohler, Stanley R., Wright State Univ., USA; Pennybaker, Anthony L., Civil Aeromedical Inst., USA; Wilcox, Bruce C., Civil Aeromedical Inst., USA; Sahiar, Farhad, Wright State Univ., USA; Oct. 1996; 8p; In English
Report No.(s): DOT/FAA/AM-96/25; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche

Ten specific 'wheel-well' passenger stowaway flights (the wheel-well area was entered just before takeoff) are documented in the N.Y. Times, covering the period 1947 to 1993. Five stowaways survived flights encompassing altitudes as high as 39,000 feet, with six dying in the process (one flight had two stowaways: one fatal, one surviving). Three Douglas DC-8 and four Boeing 707 aircraft, plus a Caravelle, an unknown jet, and a piston airliner were utilized. Several of the wheel well flight stowaways were reported to be politically motivated to attempt these international flights. This paper describes the unpressurized flight environment and the physiology that enabled human survival under conditions of extreme hypoxia and cold (inducing a virtual 'hibernative' state). It is likely that similar attempts will continue, and alert airport security preventive measures are indicated.
Author
Survival; Passengers; High Altitude; Hypoxia; Airport Security; Hypothermia

19960055199 Mitsubishi Research Inst., Inc., Tokyo, Japan
Report of Investigation of Manned Space Technology, Space Medicine and Human Science: Vestibular - Neural System
Mar. 25, 1996; 56p; In English
Report No.(s): NASDA-CNT-950070T; Copyright; Avail: Issuing Activity (Natl Space Development Agcy. of Japan (NASDA)), Hardcopy, Microfiche

The purpose of this survey is to identify future research projects to increase our understanding how vestibular-neural system of the human body will be affected in space, by elucidating these mechanisms and in order to develop useful countermeasures. This survey is implemented by using the accumulated scientific knowledge to clarify problems.
Derived from text
Vestibules; Aerospace Medicine; Human Body; Spacecraft Environments; Neurophysiology

53
BEHAVIORAL SCIENCES

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

19960052994 Institute for Human Factors TNO, Soesterberg, Netherlands
Test spatial orientation ability ***Test Ruimtelijk orientatievermogen***
Boer, L. C., Institute for Human Factors TNO, Netherlands; Jun. 10, 1996; 21p; In Dutch
Contract(s)/Grant(s): A93/KM/313
Report No.(s): TM-96-A023; RP 96-0157; Copyright; Avail: Issuing Activity(TNO Human Factors Research Inst., Kampweg 5, 3769 DE Soesterberg, The Netherlands), Hardcopy, Microfiche

This report describes a test of human perception. It studies a person's perception of their spatial orientation after their environment and observation position is changed. The test is described along with its scores and the interpretation of the scores. A manual for the test assistant is included in the report. A table to assist in deciding on the presence of a guessing strategy, and a letter accompanying delivery and installation of the test are included as appendices.
CASI
Space Perception; Human Reactions; Physiological Tests; Human Performance

19960052998 Institute for Human Factors TNO, Soesterberg, Netherlands
The effect of field of view and scene content on the validity of a driving simulator for behavioral research ***Interim Report***
Kaptein, N. A., Institute for Human Factors TNO, Netherlands; vanderHorst, A. R. A., Institute for Human Factors TNO, Netherlands; Hoekstra, W., Institute for Human Factors TNO, Netherlands; Jun. 06, 1996; 24p; In English
Contract(s)/Grant(s): A95/KL/306
Report No.(s): TM-96-A022; RP 96-0156; Copyright; Avail: Issuing Activity(TNO Human Factors Research Inst., Kampweg 5, P.O. Box 23, 3769 ZG Soesterberg, The Netherlands), Hardcopy, Microfiche

Two driving simulation tests were conducted to study the braking behavior of a driver in reaction to changing scenery and fields of view. The results were compared to a field study for validity. The first experiment showed that the scene complexity and field of view did not affect the timing of the start of the braking maneuver, but the coordination of braking was more realistic with an increased field of view. In the driving simulator, drivers took larger safety margins in stopping with

higher approach speeds than those drivers in the field study. The conclusion of this first experiment is that perceptual information at a greater distance was insufficient in the driving simulator. The second experiment investigated the use of visual information after the start of the braking maneuver by occluding the image for half the test subjects immediately after the onset of braking. Results showed that those drivers tended to overshoot the intended stopping position more often when the visual information was taken from them during braking. This indicates drivers use visual information throughout the braking maneuver in order to stop more accurately and timely.
CASI
Field of View; Braking; Human Reactions; Visual Perception; Reaction Time; Simulators; Psychomotor Performance; Simulation

19960053276 Armstrong Lab., Human Engineering Div., Wright-Patterson AFB, OH USA
Workload Related Changes In Eye, Cardiac, Respiratory and Brain Activity During Simulated Air Traffic Control ***Interim Report***
Wilson, Glenn F., Armstrong Lab., USA; Swain, Carolyne R., Logicon Technical Services, Inc., USA; Brookings, Jeffrey B., Wittenberg Univ., USA; Aug. 1995; 44p; In English
Contract(s)/Grant(s): F41624-94-D-6000; AF Proj. 7184
Report No.(s): AD-A306676; AL/CF-TR-1995-0156; No Copyright; Avail: CASI; A03, Hardcopy; A01, Microfiche

In this investigation, eight Air Force air traffic controllers (ATCs) performed three scenarios on TRACON, a computer-based ATC simulation. Two scenarios, each with three levels of difficulty, varied either traffic volume by manipulating the number of aircraft to be handled or varied traffic complexity by manipulating arriving to departing flight ratios, pilot skill and the mixture of aircraft types. The third scenario, referred to as the overload condition, required that controllers handle an extremely high traffic volume in a very limited amount of time. The effects of the manipulations on controller workload were assessed using performance-based, subjective (TLX), and physiological (heart, eye, respiration and EEG) measures. Significant main effects of difficulty were found for TRACON performance, TLX ratings, eye blink rates, respiration rates and EEG measures. Only the EEG data were associated with main effects of traffic pattern. The results provide support for the differential sensitivity of a variety of workload measures in complex tasks, underscore the importance of traffic complexity in ATC workload, and support the utility of TRACON as a tool for studies of ATC workload.
DTIC
Computerized Simulation; Air Traffic Control; Air Traffic Controllers (Personnel); Workloads (Psychophysiology)

19960053798 Armstrong Lab., Combined Stress Branch, Wright-Patterson AFB, OH USA
Task Performance Throughout Prolonged High G Exposure
Chelette, Tamara L., Armstrong Lab., USA; Albery, William B., Armstrong Lab., USA; McCloskey, Kathy A., Armstrong Lab., USA; Goodyear, Charles D., Logicon Technical Services, Inc., USA; Apr. 1996; 4p; In English; Also announced as 19960053795; No Copyright; Avail: CASI; A01, Hardcopy; A03, Microfiche

Some ground-based research has investigated the loss of cognitive function in the extreme conditions of G-induced loss of consciousness (G-LOC), however, little is known about pilots' abilities to maintain cognitive performance throughout prolonged conscious exposure. Described herein is a centrifuge study in which human subjects repeatedly endured prolonged high-G
Derived from text
Acceleration Tolerance; Acceleration Stresses (Physiology); Exposure; Human Beings; Human Performance; Mental Performance

19960053806 NASA Johnson Space Center, Houston, TX USA
The Role of Linear Acceleration in Visual-Vestibular Interactions and Implications in Aircraft Operations
Correia, Manning J., Texas Univ., USA; Luke, Brian L., Naval Aerospace Medical Research Lab., USA; McGrath, Braden J., Naval Aerospace Medical Research Lab., USA; Clark, John B., Naval Aerospace Medical Research Lab., USA; Rupert, Angus H., NASA Johnson Space Center, USA; Apr. 1996; 6p; In English; Also announced as 19960053795; No Copyright; Avail: CASI; A02, Hardcopy; A03, Microfiche

While considerable attention has been given to visual-vestibular interaction (VVI) during angular motion of the head as might occur during an aircraft spin, much less attention has been given to VVI during linear motion of the head. Such interaction might occur, for example, while viewing a stationary or moving display during vertical take-off and landing operations Research into linear VVI, particularly during prolonged periods of linear acceleration, has been hampered by the unavailability of a programmable translator capable of large excursions We collaborated with Otis Elevator Co. and used their research tower and elevator, whose motion could be digitally programmed, to vertically translate human subjects over a distance of 92.3 meters with a peak linear acceleration of 2 meters/sec(exp 2) During pulsatile or sinusoidal translation, the subjects viewed moving stripes (optokinetic stimulus) or a fixed point source (light emitting diode, led, display), respectively and it was generally found that. The direction of linear acceleration relative to the cardinal head axes and the direction of the slow component of optokinetic nystagmus (OKN) determined the extent of VVI during concomitant stripe motion and linear acceleration.

Acceleration along the z head axis (A(sub z)) produced the largest VVI, particularly when the slow component of OKN was in the same direction as eye movements produced by the linear acceleration and Eye movements produced by linear acceleration are suppressed by viewing a fixed target at frequencies below 10 Hz But, above this frequency the suppression produced by VVI is removed. Finally, as demonstrated in non-human primates, vergence of the eyes appears to modulate the vertical eye movement response to linear acceleration in humans.
Derived from text
Acceleration; Aircraft Spin; Flight Operations; Human Beings; Nystagmus; Operations Research; Takeoff; Translating; Vertical Landing; Vestibules

19960053810 Dortmund Univ., Inst. fuer Arbeitsphysiologie, Germany
Spatial Visuo-Motor Compatibility in a Tracking Task
Cavonius, C. R., Dortmund Univ., Germany; Ehrenstein, W. H., Dortmund Univ., Germany; Lewke, E., Dortmund Univ., Germany; Apr. 1996; 4p; In English; Also announced as 19960053795; No Copyright; Avail: CASI; A01, Hardcopy; A03, Microfiche

Two logically-related areas of study are discussed here: stimulus-response compatibility, which has to do with whether a signal and an operator's response to it are perceptually related - for example, whether both are located in similar parts of the operator's visual field and manual tracking, in which an operator uses a control device to follow a moving signal. In our experiments, subjects moved a stylus that was constrained to move along a straight path, to track a target that also moved in a straight line. Either the stylus track or the trajectory of the target could be rotated so that they were either parallel, or so that they were at an angle to one other. Performance, measured either by time-on-target or by the RMS error between the subject's track and the desired track, was best when the target and tracking movements were parallel and in phase, or nearly so; and worst when they in, or close to, counterphase. Earlier work has shown that when both the signal and the location of the response are stationary, performance is best when their positions are compatible. The present results show that this holds for moving targets as well.
Derived from text
Root-Mean-Square Errors; Visual Fields; Tracking (Position); Manual Control; Control Equipment

19960053812 Institute of Aviation Medicine, Fuerstenfeldbruck, Germany
The Flight Orientation Trainer (FOT) as a Means of Evaluation and Validation of Psycho-Physical Load on Flying Personnel
Pongratz, H., Institute of Aviation Medicine, Germany; Amendt, R. O., Institute of Aviation Medicine, Germany; Lichtschlaeger, A., Institute of Aviation Medicine, Germany; Frank, P., Institute of Aviation Medicine, Germany; Vitz, H., Institute of Aviation Medicine, Germany; Scherb, W. H., Institute of Aviation Medicine, Germany; Heinz, G., Institute of Aviation Medicine, Germany; Apr. 1996; 6p; In English; Also announced as 19960053795; No Copyright; Avail: CASI; A02, Hardcopy; A03, Microfiche

Spatial Disorientation (SD) is a dangerous threat in aviation. In order to improve its training programs for SD, the German Air Force (GAF) procured the so called Flight Orientation Trainer (FOT). The system is described and first experiences based on a troop trial in 1994 with 22 experienced pilots evaluating profiles are presented.
Derived from text
Aircraft Pilots; Disorientation; Training Devices

19960053813 Simon Fraser Univ., Brain Behaviour Lab., Burnaby, British Columbia Canada
MEG and EEG Recorded in Complex Multitasking Environments for the Classification of Human Performance
Weinberg, H., Simon Fraser Univ., Canada; Cheyne, D., Simon Fraser Univ., Canada; Jantzen, K. J., Simon Fraser Univ., Canada; Apr. 1996; 6p; In English; Also announced as 19960053795; No Copyright; Avail: CASI; A02, Hardcopy; A03, Microfiche

One of the most important observations that William James made is that consciousness- the awareness of information - is comprised of continuous and successive processes, that consciousssness is a stream of events, and as such, the time domain of this stream must be understood. It is now clear that although the processing of information may be observed within some discrete interval of time, it necessarily depends on the previous processing of similar or identical input-memory always plays a role. Identical or similar input, to that previously experienced, does not necessarily mean that the processing of that input is similar or identical. Insofar as the brain is concerned the processing of each input includes not only the memory of previous inputs, but also those endogenous modifications imposed by the brain that are necessary for the final product, i.e., the conscious event, 'make sense', that is, to make the product consistent with the context in which it occurs, both historically and in the present. Memory is always a construction of the past, the present, and predictions of the future. Furthermore, it is now obvious that the brain of each person is an individual brain. The same brain may process the same input differently at different times, depending in part on previous experience, but also in part on its inherent capability do so - that is the inherent capability of the brain for variability - what characterises brains is not central tendency but variability.
Derived from text
Electroencephalography; Human Performance; Data Processing

19960053814 Defence and Civil Inst. of Environmental Medicine, North York, Ontario Canada

Response Latencies to Aircraft Detection Among NORAD Surveillance Operators

Pigeau, R. A., Defence and Civil Inst. of Environmental Medicine, Canada; Angus, R. G., Defence and Civil Inst. of Environmental Medicine, Canada; ONeill, P., Operational Research and Analysis Establishment, Canada; Apr. 1996; 18p; In English; Also announced as 19960053795; No Copyright; Avail: CASI; A03, Hardcopy; A03, Microfiche

A function of North American Aerospace Defence (NORAD) in North Bay, Ontario is to identify all aircraft entering Canadian air space. The first step in performing this task is to detect visually the presence of aircraft from either radar or transponder information presented on display consoles. This challenging, real-world vigilance task was used in two experiments to investigate factors affecting detection latencies. Taken as a whole, the experiments revealed that 1) transponder tracks, with their unique symbology, were more easily detected than radar tracks; 2) performance varied as a function of geographic area of coverage; 3) the midnight shift was particularly sensitive to vigilance decrements; and 4) a 'vigilance decrement' effect can occur in a real world task, but this effect is not as strong as those reported in laboratory studies.

Derived from text

Aircraft Detection; Airspace; Alertness; Human Performance; Surveillance; Tasks

19960053816 Institute of Aviation Medicine, Oslo, Norway

An Analysis of Stress and Coping Factors on Air Crew During Emergency Medical Service (EMS) Helicopter Operations

Fonne, V. M., Institute of Aviation Medicine, Norway; Myhre, G., Institute of Aviation Medicine, Norway; Apr. 1996; 6p; In English; Also announced as 19960053795; No Copyright; Avail: CASI; A02, Hardcopy; A03, Microfiche

Summary: The air ambulance service represents a field of operations where the crewmembers encounter situations which demand quick decisions and immediate action and where time limitations are frequent. Missions flown include diverse tasks such as inter - hospital transportation of patients as well as search and rescue operations. The operational stresses of this kind of service are plentifold and include both physical and psychological factors. Additional stressors include mission type, weather conditions and harsh terrain. Previous studies on stress and performance indicate that risk prone situations have a tendency to increase the crew's level of activation and will ultimately influence their performance. The purpose of the current study was to see whether one can observe differences in the crewmembers' physiological activation relative to mission type, crewmember's area of responsibility and individual psychological coping strategies and use of defense mechanisms. The initial study consisted of 31 male crewmembers from the Norwegian Air Ambulance Service distributed among helicopter pilots, medical doctors and rescue men. to assess physiological activation, plasma consentrations of cortisol were measured directly after mission completion as well as 24 hours later for controlling purposes. In addition, a psychological assessment was administered for an evaluation of general anxiety levels, coping strategies and defense mechanisms as well as subjective evaluations of the mission flown.

Derived from text

Ambulances; Medical Services; Emergencies; Helicopters; Patients; Physiology; Psychological Factors; Rescue Operations; Stress Analysis; Transportation

19960053817 Italian Air Force Pratica di Mare, Div. Aerea Studi Ricerche e Sperimentazioni, Rome, Italy

Fatigue: Operational and Clinical Issues

Porcu, S., Italian Air Force Pratica di Mare, Italy; Bellatreccia, A., Italian Air Force Pratica di Mare, Italy; Mambro, G., Italian Air Force Pratica di Mare, Italy; Napolitani, I., Italian Air Force Pratica di Mare, Italy; Apr. 1996; 8p; In English; Also announced as 19960053795; No Copyright; Avail: CASI; A02, Hardcopy; A03, Microfiche

Despite the great number of papers existing in the literature about the issue of fatigue - both in the clinical medicine and in the human factors field - it actually remains a controversial matter. This difficulty depends on the complexity of defining, recognizing. and measuring the phenomenon of fatigue and of evaluating its effects on performance Regarding operational contexts. fatigue may be seen as the objective workload imposed by the task (input load), as the operator effort, or as the level of performance (work output). It is important, moreover, to divide the physical (central, peripheral-muscular) from the psychological fatigue. In general terms, physical exhaustion and performance impairments are not necessarily perceived as fatigue; psychological fatigue, instead, has a higher subjective component, a lower correlation with performance decrements, and is less dependent on the level of energy expenditure. Other distinctions may be done between acute, cumulative, and chronic fatigue. Several attempts have been made to model psychological fatigue and to explain the mechanisms involved in its generation and development. The activation theory, for instance which takes into account the level of arousal and performance considers fatigue as the result of functioning long time at an inadequate level. too high or too low. of information processing. A complex relationship actually exists among the level of arousal, objective measures of performance, the effort assessed using special probes (e.g.. cognitive evoked potentials during dual task. increasing complexity tasks), and subjective fatigue. The relationship between fatigue and performance is also complicated by the many interacting variables such as individual motivation and coping capability. In air operations. finally. fatigue may be related. in a reciprocal way. to 'auto-

mated' and 'controlled' tasks. with relevant effects on flight safety. Further efforts of the aeromedical community therefore should be directed to both identify early indicators of fatigue and to detect the different types (clinical syndrome or not) of fatigue. This paper is a review of the current knowledge about operational and clinical fatigue. taking into particular account a recent clinical entity. the chronic fatigue syndrome.
Derived from text
Aerospace Medicine; Clinical Medicine; Evoked Response (Psychophysiology); Exhaustion; Flight Safety; Human Factors Engineering; Muscular Fatigue; Task Complexity

19960053818 Italian Air Force Pratica di Mare, Rome, Italy
Sleepiness During an Acurate Night Shift: Neurophysiological Correlates and Effects on Performance
Porcu, S., Italian Air Force Pratica di Mare, Italy; Bellatreccia, A., Italian Air Force Pratica di Mare, Italy; Casagrande, M., Italian Air Force Pratica di Mare, Italy; Ferrara, M., Italian Air Force Pratica di Mare, Italy; Tricarico, A., Italian Air Force Medical Service HQ, Italy; Apr. 1996; 8p; In English; Also announced as 19960053795; No Copyright; Avail: CASI; A02, Hardcopy; A03, Microfiche

Nocturnal sleepiness is a common complaint suffered from night shift workers. especially in condition of abrupt shift of the wake-sleep cycle. It is evident. therefore, that monitoring the presence of sleepiness and its effects on performance is of primary importance to the aeromedical community. In this study we evaluated the effects of a laboratory simulation of acute night shift on sleepiness. vigilance and performance, using Maintenance of Wakefullness Test. Multiple Sleep Latency Test and three pencil and paper tests: Digit Symbol Substitution Test Deux Barrage Test and Letter Cancellation Task. Results showed that the ability to maintain wakefulness and to perform visuo-attentive tasks is substantially spared during the night. despite Multiple Sleep Latency Test and performance on Letter Cancellation Task reveal, respectively, increasing sleepiness and degrading performance on more complex and monotonous task.
Derived from text
Aerospace Medicine; Sleep; Neurophysiology; Simulation; Wakefulness

19960053819 Italian Air Force Pratica di Mare, Rome, Italy
Prospective and Retrospective Time Estimation During an Acute Night Shift
DellErba, G., Italian Air Force Pratica di Mare, Italy; Bellatreccia, A., Italian Air Force Pratica di Mare, Italy; Tricarico, M., Italian Air Force Pratica di Mare, Italy; Porcu, S., Italian Air Force Pratica di Mare, Italy; Apr. 1996; 4p; In English; Also announced as 19960053795; No Copyright; Avail: CASI; A01, Hardcopy; A03, Microfiche

Prospective and retrospective time perception of six healthy subjects was analysed during an acute shift of the sleep-wake rhythm. Aim of the study was to verify possible detrimental effects of time of the night and side effects of temazepam, taken during the day, on internal time processing. within a double-blind balanced study. Our findings show that retrospective and prospective time perception are not significantly influenced by time of the night or by temazepam intake. However, there is a trend toward significance indicating that subjects underestimate time in the pure prospective condition the night following drug assumption.
Derived from text
Night; Perception

19960053820 Paris V Univ., Lab. d'Anthropologie Appliquee, France
Fatigue in Aeronautics: The Basis for a Model *La Fatigue en Aeronautique: Les Bases d'un Modele*
Mollard, R., Paris V Univ., France; Cabon, P., Paris V Univ., France; Bougrine, S., Paris V Univ., France; Mourey, F., Paris V Univ., France; Coblentz, A., Paris V Univ., France; Apr. 1996; 10p; In French; Also announced as 19960053795; No Copyright; Avail: CASI; A02, Hardcopy; A03, Microfiche

Although often used in current terminology, fatigue remains a badly defined concept in scientific works. The absence of a clear definition creates limits, since fatigue has many aspects, which are related to physiological, sensory, and mental. Physical fatigue and sensory fatigue are best understood at this time and can be evaluated by instrumentation. Mental fatigue presently remains a subjective concept, suggested by analogy with physical and sensory fatigue. It is characterized by a diminution of the operator's efficiency which translates into a more important effort to maintain his performance at an equivalent level. by contrast, the mechanisms of accumulation and recuperation remain poorly explored, in spite of the recognition of their importance, especially for stating recommendations concerning the length of missions and the resting of equipment. As a beginning for data in the literature and the present understanding, a rough study model applicable to aeronautics is proposed. This model especially takes a different account of the different components, such as environmental conditions, circadian rhythm, and the nature of the task. It is able to serve in support of experiments in the laboratory and in real situations.
Author
Circadian Rhythms; Physiology

19960053821 Centre d'Etudes et de Recherches de Medecine Aerospatiale, Bretigny sur Orge, France
Simulated Sustained Flight Operations and Effects on Vigilance and Performance
Lagarde, D., Centre d'Etudes et de Recherches de Medecine Aerospatiale, France; Batejat, D., Centre d'Etudes et de Recherches de Medecine Aerospatiale, France; Mourareau, C., Centre d'Etudes et de Recherches de Medecine Aerospatiale, France; Vigneron, J. P., Centre d'Etudes et de

Recherches de Medecine Aerospatiale, France; Walkowiak, P., Centre d'Etudes et de Recherches de Medecine Aerospatiale, France; Apr. 1996; 16p; In English; Also announced as 19960053795; No Copyright; Avail: CASI; A03, Hardcopy; A03, Microfiche

Many hours of work and waiting are necessary to prepare a flight operation. Sometimes, cancellation of mission and new programming can result for pilots in tiredness and drowsiness, especially some military operations as multiple, long range, carrier based, air combat missions (US A6 Intruder), maritim patrols (French Atlantics), observations (AWACS). The general schedule of this simulated sustained flight operation is: planning 1: 9 hours, rest period (without sleep): 4 hours, mission 1: 14 hours, rest period (with sleep): 6 hours, planning 2: 9 hours, rest period (without sleep): 4 hours, mission 2: 14 hours, night sleep recovery: 12 hours. to evaluate the level of vigilance and performance, questionnaires, mood scales, seven computer-administered performance tasks, a computeradministered sensitivity contrast threshold, and multiple sleep latency tests were repeatedly administered to the subjects throughout the experiment. An electroencephologram was also recorded during rest periods. Several physiological measures (heart rate, blood pressure, core temperature) were also obtained at regular intervals. After a training period eight healthy volunteers, military men were included in this study. The results show that the effects of this kind of sleep disturbance is limited. In fact, the most sensitive tasks were the memory search task (p less than 0.05) 2 and 4 letters, the tracking task (p less than 0.05) and the double task (p less than 0.05). The sleep latencies decreased more quickly during the second period of 27 hours sleep deprivation than during the first one. The same phenomenom was observed with the items : clumsiness, drowsiness and tiredness of the analog visual scale. No significant perturbation of temperature, heart rate and blood pressure rhythms was seen. This simulated sustained flight operation show a restricted but real perturbation of vigilance and efficiency. Recovery is observed after the diurnal nap, but it is limited in intensity and duration. These data suggest that the nap is an interesting counter-measure for limited sleep deprivation but also that in case of repeated limited sleep deprivation or a more extensive sleep deprivation others counter-measures, like pharmacological substances, must be used.

Derived from text

Sleep Deprivation; Pharmacology; Physiology; Patrols; Military Operations; Mental Performance; Flight Operations

19960053825 Army Aeromedical Research Lab., Fort Rucker, AL USA

Current Neurological Performance Issues in Army Rotary-Wing Operations

Crowley, John S., Army Aeromedical Research Lab., USA; Apr. 1996; 4p; In English; Also announced as 19960053795; No Copyright; Avail: CASI; A01, Hardcopy; A03, Microfiche

Modern rotary-wing military operations present unique challenges that demand optimal neurological performance of the aviator. Tactics unique to Army aviation can be particularly demanding, but many problems plague rotary-wing aviators in general. Helicopters classically require more attentional resources to control than do fixed wing aircraft; modern helicopters now present the aviator with complex computer systems to simultaneously master. Additionally, the living environment and flight environment inflict unique stresses on rotary-wing aviators--missions are mounted from unimproved field sites, frequently into oppressive thermal conditions that may persist throughout the mission. Nap-of-the-earth flying under night vision devices demands unerring cognitive and sensorimotor performance. Recent downsizing and changing tactics require the distant projection of force--rapid deployment of small and versatile fighting units--with the attendant hazards of sleep deprivation and circadian desynchronosis. It is likely that improving the quality of information presented to the aviator would reduce workload and the number of accidents due to disorientation. These enhancements could take the form of improved night vision systems, better instrument displays, 3D audio systems, etc. However, high priority should be given to developing and fielding guidance for aircrew work/rest cycles in the combat environment. Neurological performance in the face of operational stress would be best maintained via a customized crew endurance plan that competently addresses circadian rhythms, sustained operations, and operational medications.

Derived from text

Sensorimotor Performance; Circadian Rhythms; Combat; Disorientation; Display Devices; Flight Crews; Helicopters; Mental Performance; Military Operations; Rotary Wings; Sleep Deprivation; Workloads (Psychophysiology)

19960053826 Federal Aviation Administration, Human Factors Research Lab., Oklahoma City, OK USA

Fatigue and Performance in the Air Traffic Control Environment

DellaRocco, P. S., Federal Aviation Administration, USA; Cruz, C. E., Federal Aviation Administration, USA; Schroeder, D. J., Federal Aviation Administration, USA; Apr. 1996; 10p; In English; Also announced as 19960053795; No Copyright; Avail: CASI; A02, Hardcopy; A03, Microfiche

Air traffic control (ATC) is a complex system in which controllers are faced with many of the human factors challenges posed to personnel in safety-related occupations. This paper focuses on the Civil Aeromedical Institute's (CAMI's) research on shift work-induced fatigue as one factor influencing controllers' performance. Many FAA controllers work relatively unique counterclockwise, rapidly rotating shift schedules. The research presented here was conducted in both laboratory and operational environments. Representative data

from three studies are presented on characteristic sleep and performance patterns from controllers and noncontrollers working specific rapidly rotating schedules. Problem areas, coping strategy and countermeasures development, and implementation research are discussed.
Derived from text
Aerospace Medicine; Air Traffic Control; Controllers; Sleep; Fatigue (Biology)

19960053827 Naval Aerospace Medical Inst., Pensacola, FL USA
Enhancing Neurological Performance in Naval Aerospace USS Carrier Ground and Support Operations: Practical Challenges
Barker, C. O., Naval Aerospace Medical Inst., USA; Hain, R. E., Naval Aerospace Medical Inst., USA; Apr. 1996; 10p; In English; Also announced as 19960053795; No Copyright; Avail: CASI; A02, Hardcopy; A03, Microfiche

Flight operations aboard an aircraft carrier resemble operations at a busy, land based airport, only compressed into a small space. The flight operational environment is intense, prolonged, and very hazardous. This is especially true for the carrier's flight deck personnel who handle ground and support operations. This paper will discuss the major risk factors affecting flight deck personnel performance, the neurological implications, and practical challenges to enhancing performance. High workload, sustained operations, heat and cold stresses, wind and rain, neurosensory deficiencies, noise and vibration, as well as acute and chronic injury, emotional and interpersonal problems are all risk factors that can lead to neurological limitations affecting flight deck performance. Fatigue, lethargy, sleepiness. headaches, potential head, neck, and back injuries, as well as decreased visual acuity and hearing, peripheral neuropathies, decreased cognitive, motor, and coping functions are among the potential neurologic problems. These conditions will limit flight deck performance. These factors lead one to consider a number of efforts that could potentially enhance flight deck performance. Consideration of these presents a number of challenges. How can we better screen and periodically evaluate flight deck personnel for the 'right stuff'. Would a formal, more quantitative daily risk assessment and management program enhance overall flight deck performance? How should we address current education and training safety programs to enhance performance? How can we better handle morale issues that affect performance? Finally, potential applications of research findings to enhance neurologic performance in flight deck personnel present unique challenges. For example, should performance enhancing drugs be used, and if so, when and how?
Derived from text
Aircraft Carriers; Safety; Neurology; Lethargy; Ground Operational Support System; Emotional Factors

19960053839 Institute of Space Medico, Beijing, China
Human Reliability in Manned Spaceflight
Wang, Dehan, Institute of Space Medico, China; Huang, Weifen, Institute of Space Medico, China; Space Medicine and Medical Engineering; Aug. 15, 1996; vol. Volume 9, no. No. 4, pp. 295-301; In Chinese; Also announced as 19960053828; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche

Human error may threaten the security of manned space flight. This paper discusses the importance of the role played by man and human reliability in spaceflight safety and analyses the reduction of human reliability y errors. The causes of the errors are also analysed in respect to the reduction of risk in astronaut selection, strengthening of training, provision of medical monitoring and supplies, as well as prevention of errors from management factors. Measures to raise human reliability are proposed.
Author
Astronaut Training; Manned Space Flight; Human Performance; Error Analysis; Accident Prevention

19960053872 Georgia Inst. of Tech., GVU Center, Atlanta, GA USA
Using Cognitive Principles to Design Multimedia Training Environments to Support Learning *Semiannual Report, May 1995 - Nov. 1995*
Catrambone, R., Georgia Inst. of Tech., USA; Guzdial, M., Georgia Inst. of Tech., USA; Ram, A., Georgia Inst. of Tech., USA; Stasko, J., Georgia Inst. of Tech., USA; Dec. 15, 1995; 6p; In English
Contract(s)/Grant(s): N00014-95-1-0790
Report No.(s): AD-A306703; GIT-1; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche

Our project focuses on developing multimedia systems to support human learning, based on cognitive principles and guidelines from cognitive science. The question is not so much whether multimedia makes a difference, but rather how can it best be deployed to make a difference? Specifically, what combinations of media and methods of interaction are most effective for learning, and why? Cognitive science has made significant advances in understanding human learning and training issues. Based on these advances, we can make strong hypotheses about how to construct effective interactive multimedia learning environments. We are using these hypotheses as the basis for a principled approach to the development of multimedia training systems and, in turn, further advance our understanding of learning and of media through careful assessment of the systems. In our initial investigations summarized here, our focus has been primarily on whether encouraging learners to interact in different ways with the system affects their learning, learning rate, and or transfer to new problems.
DTIC

Cognition; Multimedia; Decision Making; Human Performance; Transfer of Training

19960054061 Army Aeromedical Research Lab., Fort Rucker, AL USA
Spatial Disorientation: A Survey of US Army Rotary-Wing Aircrew *Final Report*
Durnford, Simon J., Army Aeromedical Research Lab., USA; DeRoche, Shannon L., Army Aeromedical Research Lab., USA; Harper, Jennifer P., Army Aeromedical Research Lab., USA; Trudeau, Lester A., Army Aeromedical Research Lab., USA; Mar. 1996; 107p; In English
Contract(s)/Grant(s): DA Proj. 3M1-62787-A-879
Report No.(s): AD-A307857; USAARL-96-16; No Copyright; Avail: CASI; A06, Hardcopy; A02, Microfiche

A survey of 299 aircrew in current flying practice was performed at five U.S. Army airfields within CONUS. Respondents were asked a number of questions about their worst ever episode of spatial disorientation (SD) and their worst episode in the 4 months prior to the survey. They also were asked to classify episodes as minor, significant, or severe according to the threat to flight safety. Opinions also were sought on various aircraft types and flight conditions. In the final part of the questionnaire, they were asked about their experience of break-off and giant hand phenomena. Analysis of the data showed that 78 percent had suffered SD during their flying career (8 percent had suffered severely enough to put flight safety at risk). Twenty-two percent had suffered in the 4 months prior to completing the questionnaire (2 percent severely enough to put flight safety at risk). In 33 percent of worst ever episodes, the event had affected conduct of the mission while flying accuracy had been affected in 64 percent. (The figures for the 4-month data were 35 percent and 68 percent.) Brownout, whiteout, and inadvertent entry to instrument meteorological conditions (IMC) were th e most easily identifiable source of severe episodes of SD, but they accounted for 13 percent of the worst ever episodes. The leans accounted for 44 percent of episodes. Few other episodes could be linked to well known problems. Aircrew were not initially aware of being disoriented in 43 percent of worst ever episodes (38 percent of episodes when they were looking out of the aircraft cockpit). Experience had no apparent protective effect against either the incidence or severity of episodes. The following factors did appear to increase the perceived severity of the episode: the respondent having been in command of the aircraft, both pilots being disoriented, poor crew coordination, SD related to an item of equipment, desert terrain, wartime, and visual meteorological conditions (VMC). The use of night vision devices (NVDs) did not appear to influence visual cues. Fifteen percent of aircrew reported they have suffered episodes of break-off (6 percent in the 4 months prior to the survey). Fourteen percent had suffered giant hand phenomena (5 percent in the 4-month period). Recommendations include improved training, further improvement to instrument displays, and further research into various areas including NVDs and psychological events such as break-off and giant hand.
DTIC
Spatial Distribution; Flight Control; Flight Crews; Rotary Wing Aircraft; Disorientation; Flight Safety

19960054187 Naval Air Warfare Center, Aircraft Div., Patuxent River, MD USA
Situational Awareness: What Is It? Can It Be Improved?
Garner, Karen T., Naval Air Warfare Center, USA; Mar. 05, 1996; 9p; In English
Report No.(s): AD-A307750; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche

Fleet aviators consistently rank situational awareness (SA) as a critical mission concern. SA, although elusive, must be understood and improved for the sake of mission effectiveness, expansion, survivability, and safety. The essence of SA is the reception, manipulation, and use of information. SA encompasses the physical, mental, psychological, social and physiological capabilities of the human operator. The operator must sense and perceive variables in the environment and then process that information. The information must be filtered and applied to the specific mission phase to maintain SA. Optimizing information formatting and presentation speeds, and meaningfully integrating data to display information elements or 'chunks' that are readily useable to the aircrew can have a positive impact on aircrew SA. Rapidly developing improvements in information processing and transfer technologies, specifically sensor fusion and automation techniques, can provide even more diverse information to the aircrew. Efficient, effective presentation of necessary 'information' to the aircrew is becoming even more important. by taking a closer look at sensor data and investigating advanced technologies, we can present a more comprehensive, focused 'picture' of the environment to the aircrew; enhancing SA. This process, logically, will result in increased threat awareness/avoidance, increased mission effectiveness, improved survivability, and increased safety.
DTIC
Human Factors Engineering; Physiology; Aircraft Pilots; Safety

19960054370 Institute for Human Factors TNO, Soesterberg, Netherlands
Effects of Fatigue and Social Environment on Performance: The Role of Feedback *Effecten van Vermoeidheid en Sociale Omgeving op Prestatie: de Rol van Feedback*
vanOrden, C. Y. D., Institute for Human Factors TNO, Netherlands; Gaillard, A. W. K., Institute for Human Factors TNO, Netherlands; Langefeld, J. J., Institute for Human Factors TNO, Netherlands; Aug. 21, 1996; 48p; In Dutch
Contract(s)/Grant(s): A96/KL/303
Report No.(s): RP 96-0172; Copyright; Avail: Issuing

Activity TNO, Kampweg 5, 3769 DE Soesterberg, The Netherlands), Hardcopy, Microfiche

This is the fourth 24-hour experiment on the effects of fatigue and social environment on performance. The extent to which negative effects of fatigue can be compensated by the presence of another person during task performance was studied. In this experiment, we studied whether giving public individual feedback is a remedy for 'social loafing'. People tend to put less effort into a job if they work in a group. identification of the individual contributions to the group result seem to play a role in this. Therefore, half of the subjects were given aggregated group feedback. The other half also received feedback on an individual level. 32 subjects worked during 24 hours on 3 tasks, differing in cognitive complexity: reaction time task (RT-task), memory search task (GZT), and contaminant monitoring task (CMT). All subjects performed the tasks alone as well as in the presence of another subject. It was expected that, based on the 'social facilitation' literature, the RT-task and the GZT especially, would be performed better alone. However, with all tasks, the subjects seemed to profit from working in couples, especially at the end of the night, when one was most tired. The effect was most obvious in the CMT and to a lesser extent in the RT-task. Subjects who received feedback on an individual level outperformed those with group feedback. So the results of the former experiment (Van Orden & Gaillared, 1996) possibly can be explained in terms of social loafing. A comparison of the two experiments shows that performance decrements due to fatigue can be partially prevented by adding at least one individual aspect to the task situation; either individual bonus, or individual feedback.
Author
Human Performance; Mental Performance; Stress (Psychology); Workloads (Psychophysiology); Positive Feedback; Fatigue (Biology); Social Factors; Group Dynamics

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MAN/SYSTEM TECHNOLOGY AND LIFE SUPPORT

Includes human engineering; biotechnology; and space suits and protective clothing. For related information see also 16 Space Transportation.

19960053110 Defence Science and Technology Organisation, Melbourne, Australia
Disposal of garbage aboard RAN Ships: A review of possible options
Roseblade, R. J., Defence Science and Technology Organisation, Australia; Apr. 1996; 29p; In English
Report No.(s): AR-009-672; DSTO-TR-0324; Copyright; Avail: Issuing Activity (DSTO Aeronautical and Maritime Research Lab., P.O. Box 4331, Melbourne, Victoria 3001, Australia), Hardcopy, Microfiche

The Royal Australian Navy (RAN) is implementing procedures to dispose of shipborne waste based on national legislation in order to meet International Maritime Organization (IMO) requirements. The regulations, which only apply to navies when operational commitments allow, cover a number of categories of waste, including garbage. A summary of the RAN disposal regulations applying to various types of garbage and estimates of the amounts generated on the various ships are included. Existing garbage disposal equipment and procedures employed by the RAN and some research conducted by other navies have been reviewed. The processes available for disposal of garbage aboard ships have been studied and the design constraints applying to shipboard installations summarized. A comprehensive survey of garbage processing machinery that included thermal compactors for plastics materials, shredders, compactors, comminuters and incinerators was also conducted. The most promising machines for use by the RAN are discussed and recommendations for future actions by AMRL and the RAN are made.
Author (revised)
Waste Disposal; Wastes; Ships

19960053207 Japanese Air Self-Defense Force, Aeromedical Lab., Tokyo, Japan
Evaluation of flightsuit microclimate by using a sweat thermal manikin (TOM-3(registered mark))
Kurihara, Koichi, Japanese Air Self-Defense Force, Japan; Kikuchi, Isao, Japanese Air Self-Defense Force, Japan; The Reports of Aeromedical Laboratory; Dec. 1995; vol. 36, no. 4, pp. 105-114; In Japanese; Also announced as 19960053205; Original contains color illustrations; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche

The comfortableness of JASDF's flightsuit and USAF's flightsuit (CWU-27/P) using the sweat thermal manikin (TOM-3(registered mark)) is evaluated. The temperature and humidity on the skin surface of the clothed TOM-3(registered mark) were measured during sweat (150 g/h x m(exp 2), 30 min.) in a climate chamber (21.2 C, 50%). Main results are as follows: CWU-27/P is superior to JASDF's flightsuit in the moisture transfer (about 10%), and cotton underwear has considerable influence on the comfort.
Author
Flight Clothing; Microclimatology; Skin Temperature (Biology); Physiological Tests

19960053208 Japanese Air Self-Defense Force, Aeromedical Lab., Tokyo, Japan
Evaluation of Descaled Wool Microclimate by using a Sweat Thermal Manikin (TOM-3(registered mark))
Kurihara, Koichi, Japanese Air Self-Defense Force, Japan; The Reports of Aeromedical Laboratory; Dec. 1995; vol. 36, no. 4, pp. 115-122; In Japanese; Also announced as

19960053205; No Copyright; Avail: CASI; A02, Hardcopy; A01, Microfiche

This paper evaluates the comfortableness of descaled wool underwear comparing with the traditional cotton underwear by using a sweat thermal manikin (TOM-E(registered mark)). The temperature and humidity on the skin surface of the manikin were measured during sweat (150 g/h x m(exp 2) in a climate chamber (21.2 C, 50 %). Evaluation was done with and without JASDF flightsuit (winter type). Main results are as follows: (1) Descaled wool underwear is superior to cotton underwear in the moisture transfer; (2) descaled wool underwear is warmer than cotton underwear when used without a flightsuit, and there is no temperature difference when used with a flightsuit; and (3) descaled wool underwear will be more comfortable than cotton underwear for flight personnel in the heat stress.

Author

Microclimatology; Flight Clothing; Wool; Skin Temperature (Biology); Physiological Tests

19960053830 Institute of Space Medico, Dept. of Engineering., Beijing, China

Removal of CO2, Moisture and Heat from Ventilated Suit under Different Pressures

Xu, Guolin, Institute of Space Medico, China; Space Medicine and Medical Engineering; Aug. 15, 1996; vol. Volume 9, no. No. 4, pp. 251-255; In English; Also announced as 19960053828; No Copyright; Avail: CASI; A01, Hardcopy; A01, Microfiche

The relative equation among CO2 partial pressure in a helmet, ventilating flow, pressure, and CO2 output; the relative equation among ventilating flow, pressure, humidity and rate of moisture removal; and the relative equation among ventilating flow, pressure, humidity and rate of heat removal were derived and analyzed. It was demonstrated that ventilating mass flow for a constant CO2 partial pressure in the helmet decreases linearly as the pressure drops; and the efficiency of heat removal increases as pressure drops due to the increase of moisture removal. The equations can be used for estimating ventilating flow in a ventilated suit and ventilating flow entering the helmet, and also for calculating automatically the quantities of moisture and heat removal by ventilation.

Author

Carbon Dioxide; Helmets; Ventilation; Moisture Content; Partial Pressure; Pressure Effects

19960053833 Institute of Space Medico, Engineering, Beijing, China

Relationship between Particle Fluence and Dose in Cabin of Recoverable Satellite

Qi, Zhang-nian, Institute of Space Medico, China; Chen, Mei, Institute of Space Medico, China; Li, Xianggao, Institute of Space Medico, China; Jia, Xianghong, Institute of Space Medico, China; Space Medicine and Medical Engineering; Aug. 15, 1996; vol. Volume 9, no. No. 4, pp. 267-270; In Chinese; Also announced as 19960053828; No Copyright; Avail: CASI; A01, Hardcopy; A01, Microfiche

Radiation doses in the cabin of a recoverable satellite measured by personal dosimeters and LiF thermoluminescent dosimeters are presented. The relationship between the particle fluence calculated from the instrument display and the measured doses was studied. It shows that the particle fluence can be directly calculated from the measured dose with a transformation coefficient which is not obviously affected by shielding around the measuring site. The estimated average energy of the particles in the cabin is on the level of galactic cosmic radiation.

Author

Cosmic Rays; Dosimeters; Galactic Radiation; Radiation Shielding; Thermoluminescence; Fluence

19960053907 Army Research Lab., Aberdeen Proving Ground, MD USA

Physical Fitness Training to Improve the Manual Material Handling Capability of Women ***Final Report, 23 Jan. - 30 Sep. 1995***

Knapik, Joseph J., Army Research Lab., USA; Gerber, John, Army Research Lab., USA; Apr. 1996; 103p; In English

Contract(s)/Grant(s): MIPR-95MM5590

Report No.(s): AD-A306808; No Copyright; Avail: CASI; A06, Hardcopy; A02, Microfiche

This study examined the influence of a combined resistance and aerobic training program on the manual material handling (MMH) capability and road marching performance of female soldiers. Subjects were 21 healthy women, 13 of which completed all phases of the investigation. They trained for 14 weeks, performing progressive resistance training 3 days per week, and running with interval training 2 days per week. Compared to values obtained before training, soldiers increased the maximum mass they could lift from floor to knuckle height by 19% (68 to 81 kg, p 0.001) and from floor to chest height by 16% (49 to 57 kg, p 0.001). They improved by 17% their ability to lift 15 kg as many times as possible in 10-min (167 to 195 lifts, p 0.001), while perception of effort (measured with the Borg Rating of Perceived Exertion) did not change. They improved by 4% their maximal effort road march time over a 5 km distance, carrying a 19-kg load mass (44.7 to 43.1 min, p=O.02). While total body mass did not change, body fat mass was reduced by 9% (18.8 to 17.2 kg, p=O.036) and fat free mass increased by 6% (48.2 to 51.0 kg, p 0.001). A short term physical fitness program, conducted about 1 hour per day, 5 days per week can substantially improve female soldiers' MMH capability, result in a small improvement in road marching ability, and provide favorable changes in body composition.

DTIC

Physical Fitness; Physical Work; Materials Handling; Females

19960054385 Army Research Inst. for the Behavioral and Social Sciences, Alexandria, VA USA

Task Performance in Virtual Environments: Stereoscopic Versus Monoscopic Displays and Head-Coupling ***Final Report, Jan. 1993 - Sep. 1995***

Singer, Michael J., Army Research Inst. for the Behavioral and Social Sciences, USA; Ehrlich, Jennifer, Army Research Inst. for the Behavioral and Social Sciences, USA; Cinq-Mars, Stephen, Army Research Inst. for the Behavioral and Social Sciences, USA; Papin, Jean-Paul, Centre de Facteurs Humain, France; Dec. 1995; 51p; In English

Contract(s)/Grant(s): ARI Proj. A790

Report No.(s): AD-A306720; ARI-TR-1034; No Copyright; Avail: CASI; A04, Hardcopy; A01, Microfiche

The U.S. Army Research Institute for the Behavioral and Social Sciences has an ongoing program of investigation into the requirements for using Virtual Environments (VE) to train dismounted soldiers. As a part of this program, an experiment was conducted investigating the effects of different parameters of VE in the performance of simple, representative tasks. This report provides background information about VE display problems, head-coupling in VE, presence, field dependence, and simulator sickness. The tasks used in the experiment are generic to performance in VEs and would form the basis both of training programs and general soldier tasks. Visual presentation of the tasks was either through a Stereoscopic Head Mounted Display (HMD) or a Monoscopic HMD, and subjects could either move their Field of View (FOV) by m oving their head (coupled) or could not move the FOV (uncoupled). The five tasks used were: (1) movement through a sequence of rooms and doorways; (2) acquisition of a fixed target; (3) tracking a moving object; (4) manipulation of an object; and (5) distance estimation. In general, performance of all tasks improved over repeated trials. In the distance estimation task the estimations were relatively worse at shorter distances. However, the error was significantly lessened with stereoscopic presentations, and was also significantly improved when coupling was used, although these factors did not interact with one another. Performance in the other tasks was not significantly effected by presentation mode or head-coupling. The distance task errors and the lack of significant differences in performance of the other tasks raise questions on the claimed general gain in task performance through the increased reality of stereoscopic presentations and head-coupling.

DTIC

Virtual Reality; Training Devices; Computer Vision; Visual Tasks; Display Devices; Human Factors Engineering

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Report Documentation Page

1. Report No. NASA SP-7011 (429)	2. Government Accession No.	3. Recipient's Catalog No.
4. Title and Subtitle Aerospace Medicine and Biology A Continuing Bibliography (Supplement 429)		5. Report Date December 23, 1996 6. Performing Organization Code
7. Author(s)		8. Performing Organization Report No. 10. Work Unit No.
9. Performing Organization Name and Address NASA Scientific and Technical Information Program Office		11. Contract or Grant No.
12. Sponsoring Agency Name and Address National Aeronautics and Space Administration Langley Research Center Hampton, VA 23681		13. Type of Report and Period Covered Special Publication 14. Sponsoring Agency Code
15. Supplementary Notes		

16. Abstract

This report lists 70 reports, articles and other documents recently announced in the NASA STI Database.

17. Key Words (Suggested by Author(s)) Aerospace Medicine Bibliographies Biological Effects	18. Distribution Statement Unclassified – Unlimited Subject Category – 52

19. Security Classif. (of this report) Unclassified	20. Security Classif. (of this page) Unclassified	21. No. of Pages 40	22. Price A03/HC

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