
This report summarizes the accomplishments made as a result of the research collaboration supported by the above Cooperative Agreement. We have addressed each of the projects as outlined in the original proposal's table of contents, section IV. Projected Research. Attachments include published papers, NASA Technical Memorandum; papers in press and abstracts of papers accepted for presentation at National and International research meetings.

Projected Research

Part A: Laboratory Investigations: Ground Based Research


This work was funded in part by the RTOP: Extended Data Analyses: 199-70-12-14, entitled: A Database of Human Psychophysiological Responses.

a. Objectives: (1) To establish a relational data base containing human psychophysiological data obtained from Shuttle flight experiments and ground-based research over a 20 year period. (2) Enable multi-user access and retrieval of these data for subsequent analyses and for possible inclusion in the proposed Life Sciences Data Archive. (3) Enable/conduct statistical analyses across several experiments on large subject populations which can thereby provide definitive answers to questions on human autonomic and behavioral responses and adaptation to environmental stressors on Earth and in space.

b. Accomplishments: (1) Installed Ingress relational database management system. (2) Initiated installation of ground-based data into Ingress; (3) Installed 500 hours of human biomedical data obtained in micro-g (Spacelab-3 and Spacelab-J); (4) initiated statistical analyses of flight data, (time series, spectral and coherence analyses of heart and respiration rates; etc.); (5) Completed installation of local network for PC's, Macintoshes, Sun Work Station and mainframe; (6) purchased optical scanner for input of meta-data into the database.
c. Publications/Reports/Abstracts Enclosed:


Project 2: Research on Motion Sickness.

This work as funded by the Flight Projects Office and was conducted in support of Spacelab-J. Note: The study described in the paper by Kellar et al. was not funded, but was conducted as a no-cost exploratory collaboration. The NASA and University collaborators provided U.S. Army and Coast-Guard investigators with information on AFT procedures, experimental design, data analysis, and participated in the preparation of this publication.

a. Objectives: (1) To test/develop hardware and procedures to be incorporated into preflight training of crewmembers of Spacelab-J. (2) To examine “spin-off” applications of AFT.

b. Accomplishments: (1) AFS-2 flight hardware met all investigator specifications for signal quality, ease of operation, and crew acceptance. (2) preflight and inflight procedures were developed and documented.

c. Publications/Reports/Abstracts Enclosed:


Project 3: Research on Orthostatic Intolerance.

The studies outlined in this section were submitted to the Space Physiology and Countermeasures RTOP but were not funded. A modified version of this work will be re-reviewed in August of this year. This work was funded in part by Director's Discretionary Funding.

a. Objectives: (1) To test the feasibility of applying Autogenic-Feedback Training as a potential treatment for postflight orthostatic intolerance.

b. Accomplishments: (1) Built prototype computer-controlled blood pressure tracking system, (2) Successfully trained Spacelab-J crewmembers (prime and alternates) to voluntarily increase their own blood pressure in the presence of a gravitational stimulus.

c. Publications/Reports/Abstracts Enclosed:


PART B. Shuttle Flight Experiment

Title: Autogenic Feedback Training as a Preventive Method for Space Motion Sickness.

a. Objectives: (1) To evaluate the effectiveness of Autogenic-Feedback Training as a countermeasure for space motion sickness. (2) To compare physiological data and inflight symptom reports to ground-based motion sickness data. (3) To predict susceptibility to space motion sickness based on preflight data of each treatment group crewmember.

b. Accomplishments: This experiment (AFTE) was successfully conducted on Spacelab-J, launched September, 1992. Aboard were two mission specialists who supported this investigation, (one who received AFT and one who served as a no-treatment control subject). Also aboard was a Japanese Payload Specialist who served as an operational test-subject (did not have access to AFTE flight hardware). All objectives were met.

c. Publications/Reports/Abstracts Enclosed:


be submitted to *Psychophysiology*.

Cowings, P.S., Toscano, W.B., & Miller, N.E. (1993) A Behavioral Medicine Alternative: Autogenic Feedback Training as a Treatment for Motion and Space Motion Sickness; paper to be submitted to *Biofeedback and Self-Regulation*.


We trust this fulfills your requirements for a final technical report. If you require any additional information, please feel free to contact us.

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