

RESEARCH PROBLEMS

199-01 Cardiovascular

A. Mechanisms of Cardiovascular Effects

- 1 - Endocrine and Fluid/Electrolyte Factors
- 2 - Cardiac Output, Stroke Volume, Contractility, Circulatory Distribution & Reflex Control
- 3 - Heart Size
- 4 - Venous Compliance
- 5 - Arrhythmias
- 6 - Coronary Effects
- 7 - Myocardial Tissue Effects
- 8 - Vascular Tissue Effects
- 9 - Computer Modeling

B. Amplify Interpretation of Skylab Data

- 1 - Ground Based Correlative Data
- 2 - Correlate LBNP, Tilt Table, and Centrifuge Responses
- 3 - Factors Influencing LBNP Response
- 4 - VCG Changes
- 5 - Improve Ground Based Simulation Techniques

C. Shuttle Reentry G Tolerance

D. Shuttle Scientist Passenger Selection (C-V Factors)

- 1 - Shuttle G Profile/Orthostatic Tolerances of Passenger Types
- 2 - Indices of Susceptibility to Orthostatic Changes

E. Prognostic Indices of C-V Changes In-Flight

(Cont'd)

F. Countermeasures

G. Bioinstrumentation & Methodology Advancements (Plethysmography, Cardiac Output Methodology, Blood Flow, Venous Pressure, Heart Size, Animal Implants, Data Management)

H. Preparation of Flight Experiments

RESEARCH PROBLEMS

199-05 Space Motion Sickness

- A. Etiology and Mechanisms of Space Motion Sickness
 - 1 - Evaluation of Fluid Shift Theory of Etiology
 - 2 - Anatomical and Microelectrical Studies
 - 3 - Functional Studies
 - 4 - Mathematical Modeling
- B. Determination of Individual Predisposition (Selection)
- C. Development of Training Techniques to Diminish Susceptibility
- D. Improved Countermeasures
 - 1 - Drugs
 - 2 - Identification (and Prevention) of Modifying Factors
 - 3 - Other
- E. Bioinstrumentation and Methodology Development
- F. Preparation of Flight Experiments

RESEARCH PROBLEMS

199-07 Bone & Muscle Alterations

- A. Mechanisms of Musculoskeletal Changes
 - 1 - Bone
 - 2 - Muscle
- B. Amplify Interpretation of Skylab Data (Ground Based Correlative Data)
- C. Develop Predictive Indices of Susceptibility to Musculoskeletal Deterioration (Selection)
 - 1 - Bone
 - 2 - Muscle
- D. Develop In-Flight Capability for Predicting Skeletal Change Rates
- E. Musculoskeletal Countermeasures
 - 1 - Bone
 - 2 - Muscle
- F. Bioinstrumentation and Methodology Advancements
 - 1 - Bone
 - 2 - Muscle
- G. Preparation of Flight Experiments

®

RESEARCH PROBLEMS

199-09 Blood Alterations

- A. Mechanisms & Etiology of Red Cell Mass Loss & Blood Volume Decrease
 - 1 - Histological & Cytochemical Studies (E.M., Scanning E.M., Light Microscopy) (Membrane & Intracellular Chemistry)
 - 2 - Physiological & Isotope Studies
 - 3 - Computer Modeling
- B. Amplification of Space Flight Findings (Event and Time Course Data and Significance)
 - 1 - Red Cell Mass & Blood Volume
 - 2 - Immunological Changes
 - 3 - Other
- C. Prediction of Special Predisposition to Blood Changes
 - 1 - Red Cell Mass Loss
 - 2 - Plasma Volume Loss
 - 3 - Other
- D. Countermeasures Against Blood and Blood Volume Changes
- E. Bioinstrumentation and Methodology Development
- F. Preparation of Flight Experiments

RESEARCH PROBLEMS

199-11 Preflight Detection of Disease

(No further breakdown required)



RESEARCH PROBLEMS

199-13 Fluid & Electrolyte Changes

- A. Mechanisms of Space Flight Fluid & Electrolyte Changes
 - 1 - Physiological Studies
 - 2 - Computer Modeling
- B. Amplification of Space Flight Findings (Event & Time Course Data & Significance)
 - 1 - Fluid & Electrolyte and Associated Endocrine Responses
 - 2 - Other Endocrine Responses
 - 3 - Other Metabolic Responses
- C. Prediction of Special Predispositions (Selection)
 - 1 - Fluid & Electrolyte Changes
 - 2 - Other Endocrine
- D. Prognostic Indices of Fluid & Electrolytic Changes in Flight
- E. Countermeasures
- F. Bioinstrumentation & Methodology Development
- G. Preparation of Flight Experiments

RESEARCH PROBLEMS

199-15 Maintenance of Crew Health

(Metabolic Effects)

- A. Mechanisms of Exercise Response Changes**
- B. Amplify Interpretation of Skylab Data**
- C. Shuttle Scientist Passenger Selection Criteria
 (Exercise Response)**
- D. Development of Training Techniques (Exercise)**
- E. Prognostic Indicators of Status in Flight**
- F. Countermeasures**
- G. Instrumentation & Technique Development**
- H. Preparation of Flight Experiments**



RESEARCH PROBLEMS

199-17 Human Behavior & Performance

A. Develop Behavioral Selection Criteria

1 - Individual

2 - Group

B. Develop Training Techniques

1 - Individual

2 - Group

C. Studies of Small Group Dynamics in Social Isolation

D. Influence of Specific Factors on (Determinates of) Behavior and Performance

1 - Circadian & Work-Rest-Sleep Patterns

2 - Other

E. Develop Means for Early Detection of Impending Behavioral & Performance Decrement In-Flight (Monitoring Criteria & Techniques)

F. Countermeasures

1 - Preventive

2 - Corrective

G. Instrumentation & Methodology Development

H. Preparation of Flight Experiments

RESEARCH AREAS

199-19 Definition of Physiological Design Requirements (Human Standards and Requirements for Life Support Design)

- A. Gaseous Atmospheres - Pressure & Composition
- B. Food & Nutrition
- C. Thermal Standards & Requirements
- D. Toxicology
- E. Microbial Standards
- F. Other Hazards (Protective Requirements)
- G. Instrumentation & Technique Development
- H. Preparation of Flight Experiments



RESEARCH AREAS

199-27 Clinical Medical Support Systems

- A. Prophylaxis
- B. Diagnosis
- C. Therapy
- D. Medical Data Management
- E. Medical Monitoring
- F. Training Methods & Material
- G. Bioinstrumentation & Equipment Development
- F. Preparation of Flight Experiments

®

RESEARCH PROBLEMS

199-45

Radiation Effects and Protection

- A. Determination of Acceptable Levels of Radiation Exposure (Responses of Living Systems & Mechanisms)
 - 1 - HZE
 - 2 - Other
- B. Dosimetry of Space Environments for Living Systems
 - 1 - Measurement
 - 2 - Technique & Instrumentation Development
- C. Identification of Human Susceptibility Factors (Selection)
- D. In-Flight (Real Time) Prognostication Techniques
- E. Countermeasures
 - 1 - Preventive
 - 2 - Protective
- F. Preparation of Flight Experiments