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# IAA 13th Humans In Space Symposium

**Fira, Santorini, GREECE  
May 20-25, 2000**

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**SESSIONS**

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[Session B1](#): Future Challenges

[Session C1](#): Neuro 1: Posture Control and Eye-Head Coordination

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[Session C2](#): Neuro 2: Arm Movement and Manual Control

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[Session A7](#): Performance/Human Factors 3

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[Session A8](#): Operational Medicine

[Session B8](#): Technology

[Session C8](#): Muscle 2: Countermeasures to Muscle Atrophy of Space Flight

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**Session A1 : CARDIOVASCULAR FUNCTION I: HEAD-DOWN BEDREST, A GROUND-BASED MODEL OF SPACE FLIGHT**

Co-Chairs

A. Pavy-Le Traon, Toulouse, France  
R. Hughson, Ontario, Canada  
Rapporteur  
F. Baisch, Cologne, Germany

**Clinical Effects of Thigh Cuffs During A 7 Day 60 Head-Down Bed Rest**

Anne Pavy-Le Traon, Alain Maillet, Pascale Vasseur-Clausen, Marc-Antoine Custaud, Irina Alferova, Claude Ghariv, Jacques-Olivier Fortrat

**Effect of the Thigh Cuffs on the Carotid Diameter, Jugular Vein Section, and Facial Skin Edema. HDT Study**

P. Arbeille, S. Diridillou, S. Herault, G. Fomina, J. Roumy, I. Alferova

**Gender Differences in Central Vein Pressure-Volume and Cardiac Function After 4-Hours Head Down Tilt**

R.L. Hughson, J.K. Shoemaker, M.J. MacDonald, A. Gelb, M.S. Kassam, R.L. Bondar

**Effect of a Venotonic agent on the main arteries and veins during a 5 day HDT**

J. Roumy, S. Herault, N. Tobal, S. Besnard, Ph. Arbeille

**Central Venous Pressure During Microgravity: Phenomena, Paradoxes, and Hypotheses**

V.M. Baranov, A.N. Kotov, M.A. Tikhonov, Zh.A. Donina, I.N. Lavrova, M.A. Pogodin

**A device for Workload Measurement during Extravehicular Activity**

Philip C. Njemanze

**Session B1: FUTURE CHALLENGES**

Co-Chairs

M. Dudley-Rowley, Fairbanks, Alaska

J. Arnould, Paris, France

Rapporteur

M. Reichert, Cologne, Germany

**Reflexions on Human Presence in Space**

Jacques Arnould

**The Long-Duration Mission: Not Just Duration**

M. Dudley-Rowley, S. Bishop, K. Farry, T. Gangale

**How we Might Succeed in a Mars Venture Prior to Genetic Engineering**

William J. Rowe

**The Future of Manned Spaceflight**

Michael Reichert

**Volcanic Hot Springs as Clues to the Precipitation of Precambrian Iron Formation, Origin of Life, and Terraforming Mars**

E.I. Robbins, C. Kourtidou-Papadeli, H.H. Hanert, Motoaki Sato, A.S. Iberall, E.T. Slonecker

**Session C1: NEURO-1: POSTURE CONTROL AND EYE-HEAD COORDINATION**

Co-Chairs

F. Black, Portland, OR

G. Clement, Toulouse, France

Rapporteur

G. Baroni, Milan, Italy

**Unimpaired Neuro-Adaptive Plasticity in an Elderly Astronaut**

William Paloski, F. Owen Black, E. Jeffrey Metter

**Motor Coordination in Weightless Conditions Revealed by Long-Term Microgravity Adaptation**

Guido Baroni, Alessandra Pedrocchi, Giancarlo Ferrigno, Jean Massion, Antonio Pedotti

**Postural Control Responses Sitting on Unstable Board During Visual Stimulation**

Y. Mizuno, M. Shindo, S. Kuno, T. Kawakita, S. Watanabe

**Invariant Aspects of Human Locomotion in Different Gravitational Environments**

Alberto Minetti

**Behavioral Evidence that Neural Strategies Evolve During Space Flight for the Maintenance of Gaze Stability and Ocular-Motor Per-Forman**

M.F. Reschke

**Effect of Cosmonauts Vestibular Training on Motion Sickness Susceptibility and Vestibulo-Ocular Reflex**

G. Clement, M. Parant, O. Deguine, M.C. Costes-Salon, P. Vasseur-Clausen, A. Pavy-Le Traon

**Session A2: CARDIOVASCULAR FUNCTION II: FLIGHT EXPERIMENTS AND LABORATORY STUDIES**

Co-Chairs

O. Atkov, Moscow, Russia

I. Biaggioni, Nashville, Tennessee

Rapporteur

P. Arbeille, Tours, France

**Noninvasive Examination of Cardiovascular System During Parabolic Flights**

O. Atkov, P. Vaida, B. Cholley, T. Sakhnova, M. Saltykova, A. Capderou, L. Titomir, V. Trunov, E. Blinova, O. Bailliart, I. Desormes

**Adaptation of the Autonomic Nervous System to Spaceflight. Relevance to Orthostatic Intolerance**

Andrew Ertl, Andre Diedrich, Italo Biaggioni, David Robertson

**Vascular Hemodynamics and Orthostatic Tolerance in Cosmonauts of the French-Russian Flight EO-25 on Board the MIR Station**

F. Louisy, G. Fomina, I. Alferova, N. Boudarine, L. Eyharts, A. Kotovskaia

**Body fluid distribution under LBNP**

Friedhelm J. Baisch

**Vestibular Otoliths Modulate Sympathetic Outflow According to the Direction of Tilt of the Gravito-inertial Vector**

Horacio Kaufmann, Italo Biaggioni, Andrei Voustaniuk, Andre Diedrich, Fernando Costa, Martin Gizzi, Robert Clark, Bernard Cohen

**System Identification of Dynamic Closed-Loop Control of Total Peri-Pheral Resistance by Arterial and Cardiopulmonary Baroreceptors**

A. Nikolai Aljuri, Nenad Bursac, Robert Marini, Richard J. Cohen

**Session B2: ASTROBIOLOGY**

Co-Chairs

R. Gerzer, Cologne, Germany

B. Berry, Moffett Field, California

Rapporteur

P. Stabekis, Washington, DC

**Astrobiology: The Study of Life in the Universe**

Scott Hubbard, William E. Berry, Harry McDonald

**Human Missions to Mars: A Planetary Protection Perspective**

P.D. Stabekis, J.D. Rummel

**Critical Issues in Connection with Human Planetary Missions: Protection of and from the Environment**

G. Horneck, R. Facius, G. Reitz, P. Rettberg, C. Baumstark-Khan, R. Gerzer

**Exobiology in the ESA Life Sciences Programme**

R.D. Schmitt, P. Clancy

**Session C2: NEURO-2: ARM MOVEMENT AND MANUAL CONTROL**

Co-Chairs

J. McIntyre, Paris, France

R. Roll, Marseille, France

Rapporteur

R. Seidler, Tempe, Arizona

**Aimed Arm Movement in Weightlessness**

R. Roll, K. Popov, J.P. Roll

**Arm End-Point Trajectories Under Normal and Micro-Gravity Environments**

C. Papaxanthis, T. Pozzo, J. McIntyre

**Arm Pointing Adaptation and Cue Utilization**

R.D. Seidler, J.J. Bloomberg, G.E. Stelmach

**Changed Visuomotor Transformations During and After Spaceflight**

J. Sangals, H. Heuer, D. Manzey, B. Lorenz

**Internal Models for Ball Catching Revealed in Microgravity**

J. McIntyre, M. Zago, M. Venet, A. Berthoz, F. Lacquaniti

**Changes of the Number-Recall-Related Component in the Event-Related Potentials During Head-Down Tilt**

J.H. Wei, L. Zhao, W. Ren, G.D. Yan, D. Li, M. Yang

### **Session A3: ANALOGOUS ENVIRONMENTS**

Co-Chairs

J. Wood, Houston, Texas

V. Baranov, Moscow, Russia

Rapporteur

S. Bishop, Galveston, Texas

#### **Ground-Based Experiments with Prolonged Isolation as a Model of Space Flight (Advantages and Limitations)**

V.M. Baranov

#### **Efficacy of Flywheel Resistance Exercise as a Countermeasure During 110 Days of Experimental Confinement**

B.A. Alkner, H.E. Berg, D. Sayenko, I.B. Kozlovskaya, P.A. Tesch

#### **Brain Peptides, Stress and Behavior: A Potential Intervention?**

J. Wood, T.M. Phillips, P. Klemes, D.J. Lugg

#### **A One Year Polar Scientific Expedition as an Analog to a Mars Mission**

G.R. Leon, D.S. Ones, J. Shelton

#### **The Effects of Size and Heterogeneity of Crew and Mission Duration on the Deviant Behavior and Performance of Team Personnel in Space and Polar Environments**

P. Nolan, M. Dudley-Rowley

#### **Relationship of Psychological and Physiological Parameters During a 350KM Arctic Ski Expedition: A Case Study**

S.L. Bishop, L.C. Gobler, O. Scholl

### **Session B3: FROM THE MIR/SPACEHAB TO ISS**

Co-Chairs

G. Ruyters, Bonn, Germany

A. Guell, Toulouse, France

Rapporteur

T. Russomano, Porto Alegre, Brazil

#### **17 Years in Space Physiology research on board of Sailout 7 and Mir Stations: an example of French/Soviet-Russian cooperation**

Antonio Guell, Adilya Kotovskaia, Claudie Andre-Deshays

#### **Crew Training and Operations of Physiology Payloads Aboard Spacelab Missions**

Robert Thirsk, Daffyd Williams, Richard Linnehan

#### **The German Space Life Sciences Program: "Best Science" and Application-Oriented Research in International Competition and Cooperation**

G. Ruyters, P. Graf

#### **Microgravity Laboratory the Brazilian Space Life Science Research Center**

T. Russomano, Dario Francisco Guimaraes de Azevedo

### **The Experiment Implementation Process**

L. Miller, C. Haven, S. McCollum, A. Lee, M. Kamman, D. Baumann, M. Anderson, M. Buderer

### **The Human Space Life Sciences Critical Path Roadmap Project**

C.F. Sawin, J.B. Charles, R. White, L. Leveton

## **Session C3: NEURO-3: CANAL-OTOLITH INTERACTIONS AND PERCEPTION**

Co-Chairs

D. Angelaki, St. Louis, Missouri

J. McIntyre, Paris, France

Rapporteur

S. Watanabe, Daido, Japan

### **Neural Discrimination of Gravity and Translational Accelerations**

D.E. Angelaki, J.D. Dickman, B.J.M. Hess

### **Central Vestibular Neuron Processing of Gravity-Dependent and Gravity-Independent Receptor Signals**

J.D. Dickman, D.E. Angelaki

### **The Internal Reference Frames for Representation and Storage of Visual Information: The Role of Gravity**

J. McIntyre, M. Lipshits, M. Zaoui, A. Berthoz, V. Gurfinkel

### **Does Gravity Play an Essential Role in the Asymmetrical Visual Perception of Vertical and Horizontal Line Length?**

M. Lipshits, J. McIntyre, M. Zaoui, V. Gurfinkel, A. Berthoz

### **Does the Endolymph Pass Through the Base of the Cupula ?**

H. Jijiwa, N. Watanabe, T. Hattori, F. Matsuda, M. Hasiba, Y. Mizuno, M. Shindo, S. Watanabe

### **Effects of Vestibular Nerve Transection on Fish Otolith Growth**

R. Anken, E. Edelman, H. Rahmann

## **Session D1: EDUCATION AND OUTREACH FOR HUMANS IN SPACE**

Co-Chairs

M. MacLeish, Atlanta, Georgia

R. Phillips, Fort Collins, Colorado

Rapporteur

B. J. McClain, Washington, DC

### **The International Space University Experience in Space Education and Studies**

Oleg Atkov, Francois Becker, Nikolai Tolyarenko

### **The Mirman School of Gifted Students**

Richard Boolootian

**National Space Biomedical Research Institute Education and Outreach Program**

M. MacLeish, N. Moreno, B. Tharp, G. Jessup, M. Clipper

**Research is not Complete Until the Public is Informed**

K.L. Wilmoth, G.R. Coulter, B.J. McClain, R.W. Phillips

**The Living Universe, An Adventure in Learning**

R.A. Grymes, K.L. Wilmoth

**Session A4: METABOLISM**

Co-Chairs

L. Putcha, Houston, Texas

V. Polyakov, Moscow, Russia

Rapporteur

A. Maillet, Toulouse, France

**Human Thermohomeostasis Onboard "MIR" and in Simulated Microgravity Studies**

V.V. Polyakov, N.G. Lacota, A. Gundel

**Intestinal Absorptive Capacity and Permeability in Microgravity**

S. Somasundaram, M. Stelzner

**Effects of Simulated Microgravity on Hepatic Metabolism**

C.A. Rivera, L. Putcha

**Effect of Various Stress-Tests on Plasma Catecholamine Levels During Space Flight of the First Slovak Cosmonaut on Station MIR**

R. Kvetnansky, J. Koska, K. Pacak, T. Hoff, L. Ksinantova, E. Kobzev, V.B. Noskov, L. Macho, A.I. Grigoriev, M. Vigas

**Investigation of Human Metabolic Shifts Due to Simulated Microgravity During Physical Load Test**

L. Buravkova, I. Popova, I. Zabolotskaya, I. Larina

**Session B4: BIOLOGY**

Co-Chairs

H. Schatten, Columbia, Missouri

E. Horn, Ulm, Germany

Rapporteur

M. Ross, Albuquerque, New Mexico

Lymphocyte Locomotion and Signal Transduction in Modeled Microgravity Is Affected By Differential Expression of Calcium Independent Protein Kinase C Isoforms

A. Sundaresan, D. Risin, N.R. Pellis

**The Effects of Altered Gravity Conditions on Cytoskeletal Organization and Mitochondria in Cultured Cells**

H. Schatten, A. Chakrabarti

**Crickets In Space**

E. Horn, H. Agricola, S. Forster, G. Kamper, P. Riewe, C. Sebastian



**Vestibular Macular Sensory Hair Cell Plasticity in Space: A possible Role for Backpropagation and Feedback Microcircuits in Neuronal Adaptation to Weightlessness**

Muriel Ross

**Proposal for the Development of a New Ground-Based Goldfish Model to Evaluate Phamacodynamic and Pharmacokinetic Effects of Drugs for Motion Sickness in Different Gravity**

Claire Lathers, Chiaki Mukai, Cedric M. Smith, Paul L. Schraeder

**The Role of the Calpain-System in Skeletal Muscle Myogibrillar Protein Composition During Exercise-Induced Muscle Damage**

A.N. Belcastro, C. G. Ball

**Session C4: MICROGRAVITY - RELATED BONE LOSS**

Co-Chairs

V. Schneider, Washington, DC

Y. Kumei, Tokyo, Japan

Rapporteur

C. Mukai, Houston, Texas

**Effects of Sciatic/Femoral Neurectomy on the Bone Mineral Density of Femora and Tibiae in Young Growing Rats: A Model of Mechanical Unloading**

H. Nakamura, S. Morita, Y. Kumei, H. Shimokawa, K. Shinomiya

**The Tetraplegic Patient as a Model of Microgravity-Related Bone Loss**

M.M. Daphtary, J.R. Shapiro, J.N. Caminis, J.T. Toerge, K. Burman, V. Schneider, L. Shultheis

**Sex Steroids Improve Anchoring of Human Bone Cells to the Organic Bone Matrix**

C. Kasperk, U. Sommer, R. Ziegler, A. Lieder, B. Bundschuh

**Bone Architecture Assessment with Measures of Complexity**

W. Gowin, P. Saporin, J. Kurths, D. Felsenberg

**Effects of Partial Weightbearing, Dynamic Loading and Ibandronate as Countermeasures to Bone Loss in the Suspended Rat**

M. M. Daphtary, J.R. Shapiro, C. R. Ruff, J. Ruiz, S. A. Bloomfield, L. Schultheis

**Real Time Analysis of Bone Demineralization/Calcium Metabolism Biomarkers Using a Miniature TOF Mass Spectrometer**

Richard S. Potember, Wayne A. Bryden

**Session A5: PERFORMANCE/HUMAN FACTORS - 1**

Co-Chairs

N. Kanas, San Francisco, California

D. Manzey, Hamburg, Germany

Rapporteur

D. Newman, Cambridge, Massachusetts

**Visuo-Motor Tracking Performance During Spaceflight**

D. Manzey, B. Lorenz, H. Heuer, J. Sangals

**Face to Face Communications in Space**

Malcolm M. Cohen

**Astronaut Adaptation Across the Spectrum of Gravity**

D.J. Newman, R.H. Wu

**Noninvasive Video Motion Capture and Optimal Control Methods for Quantifying IVA and EVA Activities**

D. Metaxas, D. Newman, N. Badler

**Session B5: RADIATION - 1**

Co-Chairs

J. Wilson, Hampton, Virginia

G. Reitz, Cologne, Germany

Rapporteur

P. Denkins, Houston, Texas

**Issues in Deep Space Radiation Protection**

J.W. Wilson, J. L. Shinn, R.K. Tripathi, R.C. Singleterry, M.S. Cloudsley, W. Schimmerling, F.A. Cucinotta, G.D. Badhwar, M.Y. Kim, F.F. Badavi, J.H. Heinbockel, J. Miller, C. Zeitlin, L. Heilbronn

**Radiation Measurements in Near Earth Orbit**

G. Reitz, R. Beaujean, J. Kopp

**LIULIN-4 Type Systems and their Use on Board of ISS for the purpose of the Radiation Risk Assessment**

Ts. Dachev, B. Tomov, Yu. Matviichuk, Pl. Dimitrov, J. Lemaire, Gh. Gregoire, M. Cyamukungu, H. Schmitz, G. Reitz, R. Beaujean, V. Petrov, V. Shurshakov

**Radiation Transport Modeling and Assessment to Better Predict Radiation Exposure, Dose, and Toxicological Effects to Human Organs on Long Duration Space Flights**

P. Denkins, G. Badhwar, V. Obot

**Intensity/Frequency Indicator for Detection in Space The High Values of the Incident Solar or Laser Optical Radiation in Comparison with the Appropriate Maximum Permissible Exposure**

S. Tsitomeneas, B. Petropoulos

**Session C5: ARTIFICIAL GRAVITY - 1**

Co-Chairs

L. Young, Cambridge, Massachusetts

K. Yajima, Tokyo, Japan

Rapporteur

S. R. Simonson, Moffett Field, California

**The Effect of +GZ Acceleration on Monkey Cardiac Rhythm Autonomic Regulation During Head-Down Bedrest**

A.M. Badakva, N.V. Miller, S.N. Riazanski

**Effective of Periodical Centrifugation of the Monkeys During the 4-Week Head-Down Tilt**

V.I. Korolkov, I.B. Kozlovskaya, A.R. Kotovskaya, V.P. Krotov, V.I. Lobachik

**Usefulness of Daily +2Gz Load as a Countermeasure Against Physiological Problems During Weightlessness**  
Ken-ichi Iwasaki, Tsuyoshi Sasaki, Kaname Hirayanagi, Kazuyoshi Yajima

**The Influence of Passive Acceleration and Exercise +Acceleration on Work Capacity and Orthostasis**  
S.R. Simonson, S.A. Cowell, J.M. Stocks, H.W. Biagini, J.M. Vener, S.N. Evetts, K.N. Bailey, J. Evans, C. Knapp, J.E. Greenleaf

## **Session D2: PRE AND POST INVESTIGATIONS BEFORE AND AFTER LONG TERM SPACE-FLIGHTS**

Co-Chairs

A. Güell, Toulouse, France

L. Voronin, Star City, Moscow

**Stretch Reflex and Ankle Joint Stiffness After Long Term Spaceflight**

D. Lambertz, Ch. Perot, R. Kaspranski, F. Goubel

**Posturo Kinetic Activities Before and After Long Term Space Flight**

Ph. Dupui, R. Kaspranski, R. Montoya, M.Cl. Costes-Salon

**Mental Representation of Gravity During a Locomotor Task**

Th. Pozzo, P. Stapley, A. Berthoz, R. Kaspranski

**Syncope After Long-Term Spaceflights**

A. Maillet, D. Sigaudou-Roussel, J.O. Fortrat, M.A. Custaud, A. Guell, R. Kaspranski, R.L. Hughson, Cl. Gharib

**Bone Densitometry After Long Term Space Flight**

Ch. Alexandre, Ph. Collet, L. Vico

## **Session A6: PERFORMANCE/HUMAN FACTORS - 2**

Co-Chairs

N. Kanas, San Francisco, California

D. Manzey, Hamburg, Germany

Rapporteur

D. Newman, Cambridge, Massachusetts

**Human Interactions in Space: Results from Shuttle/MIR**

N. Kanas, V. Salnitsky, E.M. Grund, D.S. Weiss, V. Gushin, O. Kozerenko, A. Sled, C.R. Marmar

**Work and Rest Planning as the way of Crew Members Errors Management**

A.P. Nechaev, S.I. Stepanova

**Team Training for the SFINCSS Long Duration Isolation**

R. Kass, J. Kass

**Interior Design Implications for NASA's Transit Habitat on Long Term Space Missions**

N. Kwallek, H. Woodson, G. Schira

**Human Factors in Space and Spaceport Operations**

Tim Barth, Donna Blankmann-Alexander

**Session B6: RADIATION - 2**

## Co-Chairs

J. Wilson, Hampton, Virginia

G. Reitz, Cologne, Germany

## Rapporteur

L. Narici, Rome, Italy

**Multiparameter Analysis of Single Cell By Confocal Microscopy and Recording of Single Cell Exposure with Passive Dosimeters**

P. Van Oostveldt, P. Baert, G. Meesen, S. Vangestel, A. Poofijn

**"SILEYE-2" Experiment Results**

V. Bidoli, M. Cassolino, M.P. DePascale, G. Furano, A. Morselli, L. Narici, P. Picozza, E. Reali, R. Sparvoli, E. Traversa, W.G. Sannita, A. Galper, A. Khodarovich, A. Popov, N. Vavilov, S. Avdeev, M. Boezio, W. Bonvicini, A. Vacchi, N. Zampa, R. Battiston, S. Bartalucci, G. Mazzenga, M. Ricci, O. Adriani, P. Spillantini, G. Castellini, P. Carlson, C. Fuglesang

**The Altea Project**

V. Bidoli, M. Cassolino, M.P. DePascale, G. Furano, A. Morseeli, L. Narici, P. Picozza, E. Reali, R. Sparvoli, E. Traversa, W.G. Sannita, A. Loizzo, A. Galper, A. Khodarovich, A. Popov, N. Vavilov, S. Avdeev, V.P. Salnitskii, O.I. Shevchenko, V.P. Petrov, K.A. Trukhanov, W. Bonvicini, A. Vacchi, N. Zampa, R. Battiston, S. Bartalucci, G. Mazzenga, M. Ricci, O. Adriani, P. Spillantini, G. Castellini, M. Boezio, P. Carlson, C. Fuglesang

**Radiation-Induced Cataract - Quantification Using Digital Scheimpflug Imaging and Impact on Human Space Missions**

Z.N. Rastegar, P.Eckart, M. Froemel, A.M. Kellerer, H. Roos

**Session C6: ARTIFICIAL GRAVITY - 2**

## Co-Chairs

V. Baranov, Moscow, Russia

M. Lacour, Marseille, France

## Rapporteur

Y. Kumei, Tokyo, Japan

**Artificial Gravity as a Countermeasure to Prolonged Weightlessness**

Laurence Young, Heiko Hecht, Kathleen Sienko, Lisette Lyne, Carol Cheung, Jessica Kavelaars

**Posturo-Locomotor Adaptations To Modified Gravito-Inertial Forces**

M. Lacour, V. Bouet, F. Harlay, L. Borel, Y. Gahery

**Gravity Stress Elevates the Nociceptive Threshold Level with Immunohistochemical Changes in the Rat Brain**

Y. Kumei, K. Toda, Y. Kawauchi, H. Shimokawa, R. Shimokawa, M. Kimoto, A.K. Makita

**An Overview of Human Centrifugation - How To Reduce the Side Effects of Short-Arm Centrifuge**

K. Yajima, K. Iwasaki, M. Ito, A. Miyamoto, T. Sasaki, K. Hirayanagi

**Session A7: PERFORMANCE/HUMAN FACTORS - 3**

Co-Chairs

N. Kanas, San Francisco, California

D. Manzey, Hamburg, Germany

Rapporteur

D. Newman, Cambridge, Massachusetts

**Transfer Function of the Man-Operator**

V. Prisniakov, L. Prisniakova

**Working Together: A Needs Assessment for Team Optimization on Joint Russian/Non-Russian Space Projects**

M. Dudley-Rowley, J. Kass, T. Gorry, R. Kass, B. Caldwell

**Culture as a Latent Threat in Space Station Operations**

David Musson

**The Effects of Extreme Nutritional Conditions on the Neurochemistry of Reward and Addiction**

E.N. Pothos

**Integrated Design of a Telerobotic Workstation**

Jennifer Rochlis, John-Paul Clarke

**Dynamics of Interpersonal Tension on a Simulated International Space Station**

Gro M. Sandal

**Session B7: LIFE SUPPORT**

Co-Chairs

C. Savage, Noordwijk, The Netherlands

G. Ruyters, Bonn, Germany

Rapporteur

C. Christodoulatos, Hoboken, New Jersey

**ESA Developments in Life Support Technology: Achievements and Future Priorities**

C.J. Savage, G.B.T. Tan, C. Lasseur

**Development of a Biological Gravity Independent Grey Water Treatment System for Carbon Removal and Nitrification**

C. Christodoulatos, M. Nashashibi-Rabah, G.P. Korfiatis

**The C.E.B.A.S. Mini Module: Spaceflight Results as a Base for the Development of Aquatic Bioregenerative Life Support Modules**

V. Bluem, F. Paris

**Session C7: MUSCLE 1 - BIOLOGICAL MECHANISMS OF MUSCLE ATROPHY IN SPACE**

Co-Chairs

R. Thirsk, Houston, Texas

T. Nemirovskaya, Moscow, Russia

Rapporteur  
M. Clarke, Houston, Texas

**Skeletal Muscle Physiology Investigations Aboard the Life and Microgravity Spacelab Mission**  
Robert Thirsk

**Changes of Muscle Coordination Induced by a Prolonged Spaceflight - A Biomechanical and Electromyographical Study**

F. Bodem, G. Antonutto, P. Zamparo, J. Heine, J. Kass, P.E. diPrampo

**The Effects of Long-Term Muscle Unloading on The Contractile and Electrical Properties of the Triceps Surae**

Yuri Koryak, I. Kozlovskaya, S. Siconolfi, J. Gilbert III

**Effect of Long-Term Space Flight on Contractile Properties Human Skeletal Muscle**

Yu. Koryak, I. Kozlovskaya, S. Siconolfi, J. Gilbert

**Effects of Bedrest on Structural and Metabolic Characteristics of Skeletal Muscles in Rhesus Monkey (As Compared to Space Flight)**

B.S. Shenkman, I.N. Belozeroval, T.L. Nemirovskaya

**Modulation of Sarcoplasmic Reticulum Cholesterol Content During Mechanical Unloading-Induced Muscle Atrophy**

Mark S.F. Clarke, Robert W. Caldwell, Daniel L. Feedback

**Session A8: OPERATIONAL MEDICINE**

Co-Chairs

V. Morgun, Star City, Russia

B. Harris, Houston, Texas

Rapporteur

A. Pavy-LeTraon, Toulouse, France

**Virtual Reality Based Surgical Training for Long Duration Space Missions**

Michael Stephanides, Kevin Montgomery, Joel Brown, Jean-Claude Latombe, Stephen Schendel

**Medicine in Long Duration Space Exploration: The Role of Virtual Reality and High Bandwidth Telecommunications Networks**

Muriel D. Ross

**Biomedical and Telemedical Experiments in Space**

Doris Hamill, Bernard Harris

**In Vivo Identification Sampling Procedure of Air Bubbles using a Miniature Chamber and Selected Specimens and In Vitro Measurement of Air Bubbles by Means of Resonant Frequency Ultrasound**

Angelo Karavolos, Michael Powell, Andrew Anayiotos

**Session B8: TECHNOLOGY**

Co-Chairs

V. Pisacane, Laurel, Maryland

J. McIntyre, Paris, France

Rapporteur

S. Daunert, Lexington, Kentucky

**Precision Bone and Muscle Loss Measurements by Advanced, Multiple Projection DEXA (AMPDEXA) Techniques for Spaceflight Applications**

H.K. Charles Jr., T.J. Beck, H.S. Feldmesser, T.C. Magee, T.S. Spisz, V.L. Pisacane

**Cardiac Tele-Echography by Ultrasound 3D Realtime Acquisition and 2D Reconstruction**

N. Tobal, S. Besnard, J. Roumy, S. Herault, JM Pottier, Ph. Arbielle

**A 6 D.O.F. Tracker Opto-Inertial Tracker For Virtual Reality Experiments in Microgravity**

M. Zaoui, D. Wormell, Y. Altshuler, E. Foxlin, J. McIntyre

**Coupling Genetically Engineered Proteins and Microfluidics: Fluorescence Detection on the LABCD**

Gary Barrett, Phillip M. Douglass, Brett R. Wenner, L. Lyndon, E. Salins, Marc J. Madou, Sylvia Daunert

**Filtering Water Sources for Use in Intravenous Devices (IV) Onboard the Space Shuttle and International Space Stations (ISS)**

J.D. Pounds, A. Twyman, P. Currier, K. DiBiase, C. Cortes-Ramos, R. Sumner, A. Schlunt, C. Slaughter, K. Fong

**Development of an Advanced Rocket Propellant Handler's Suit**

D. Doerr

**Session C8: MUSCLE II - COUNTERMEASURES TO MUSCLE ATROPHY OF SPACE FLIGHT**

Co-Chairs

P. Tesch, Little Rock, Arkansas

I. Larina, Moscow, Russia

Rapporteur

F. Bodem, Mainz, Germany

**Reducing Muscle Deconditioning in Simulated Weightlessness**

J.F. Caruso, J.L. Hamill, M. Yamauchi

**Resistance Training Using Fly-Wheel Technology Ameliorates Muscle Atrophy Induced by Five WK Lowerlimb Unloading**

P.A. Tesch, J.T. Trieschmann, A. Ekberg

**Functional Effects of Plantar Stimulation on the Atrophied Soleus Muscle of Rat During Unloading**

L. De-Doncker, F. Picquet, M. Falempin

**Counteracting Effects of  $\beta_2$ -Agonist Clenbuterol Administration on Biochemical and Contractile Properties of Unloaded Soleus Fibers of Rat**

Laurence Stevens, Carole Ricart-Firinga, Yvonne Mounier

**First Application of Functional Electrostimulation for Muscle Training on Board of MIR Space Station**

G. Freilinger, W. Mayr, R. Rafolt, M. Bijak, W. Girsch, H. Lanmuller, S. Sauermann, E. Unger, Y. Koryak, B. Shenkman, I. Kozlovskaya

**The Content of Growth Hormone and Another Regulators of Protein Turnover in Human Blood in Long Term Space Flight and Head Down Tilt Bed Rest**

