2004 NASA CELL SCIENCE CONFERENCE

- Annual Investigators Working Group Meeting -

February 26 - 28, 2004

The Crowne Plaza Cabana
4290 El Camino Real, Palo Alto, CA
Tel: 650.857.0787 Fax: 650.628.0195

Sponsored by the Cellular Biotechnology Program, NASA Johnson Space Center (JSC), and the Fundamental Biology Program, NASA Ames Research Center (ARC), in cooperation with the Physical Sciences Division and the Fundamental Space Biology Division of the Office of Biological and Physical Research, NASA Headquarters.

Program – Overview

Wednesday, February 25, 2004	**Thursday, February 26, 2004**	**Friday, February 27, 2004**	**Saturday, February 28, 2004**
5:00 – 6:00 pm Registration	7:00 – 8:15 am Registration/Continental Breakfast	7:00 – 8:00 am Continental Breakfast	7:00 – 8:00 am Continental Breakfast
6:00 – 7:00 pm Exhibit Setup	8:15 – 8:30 am Welcome	8:00 – 9:45 am Signal Transduction Session #5	8:00 – 9:30 am Cell Culture Technology Session #8
	8:30 – 11:15 am Gravity & Mechanical Sensing Session #1	10:00 am – 12:00 pm Tissue Engineering Session #6A	9:45 – 11:45 am Sensors & Analytical Equipment Session #9
	11:15 am – 12:30 pm Lunch	12:00 – 1:00 pm Lunch	11:45 am – 12:45 pm Lunch
	12:30 – 1:00 pm Speaker – Dr. Jeffrey P. Sutton, National Space Biomedical Research Institute	1:00 – 2:30 pm Tissue Engineering Session #6B	12:45 am – 1:15 pm Speaker – Dr. Lyudmila Buravkova, Institute of Biomedical Problems, Russia
	1:00 - 1:45 pm Cytoskeleton Session #2	2:45 – 5:00 pm Hardware Development & Testing Concurrent – Session #7A - Rotating Bioreactor - Stationary Culture Systems Concurrent - Session #7B - Perfusing Culture Systems - *In Situ* Genetics Experiments on Nanosatellites (ISGEN)	1:15 – 3:30 pm Proliferation & Differentiation Session #10
	2:00 – 3:15 pm Immune Response Session #3	5:00 – 6:00 pm Business Meeting	3:45 – 5:30 pm Neoplastic Disease Session #11
	3:30 – 4:45 pm Microorganisms Session #4		
	6:00 – 7:00 pm Reception		
	7:00 – 9:00 pm Dinner & Plenary Speaker – Dr. Jeffrey R. Davis, University of Texas Medical Branch and NASA Johnson Space Center		

2004 NASA CELL SCIENCE CONFERENCE
Annual Investigators Working Group Meeting –
Final Program

Day 1 - Thursday, February 26, 2004

8:15 – 8:30 **Welcome**

8:30 – 11:15 GRAVITY & MECHANICAL SENSING - Session #1
Co-chairs: E. Almeida and C. Klinge

8:30 –8:45 *MECHANOTRANSDUCTION THROUGH INTEGRIN-DEPENDENT ACTIVATION OF HETEROTRIMERIC G PROTEINS WITHIN FOCAL ADHESIONS*
A.J. Derrien[1], F.J. Alenghat[1], D.E. Ingber[1]
[1]Vascular Biology Program, Depts. of Pathology and Surgery, Children's Hospital and Harvard Medical School, Boston, MA

8:45 – 9:00 *EFFECT OF HYPERGRAVITY ON ENDOTHELIAL CELL RESPONSES*
E.L. Noisin[1], S. Bhatnagar[1], D.M. Brey[2], R.S. Keynton[2], C.M. Klinge[1]
[1]Dept. Biochemistry and Molecular Biology School of Medicine University of Louisville, Louisville, KY, [2]Dept. Mechanical Engineering Speed School of Engineering University of Louisville, Louisville, KY

9:00 – 9:15 *HYPERGRAVITY MECHANOSTIMULATION PROMOTES OSTEOBLAST PROLIFERATION VIA A COLLAGEN I MATRIX AND BETA 1 INTEGRIN SIGNALING PATHWAY*
W. Vercoutere[1], M. Parra[1], G. Kadambi[1], C. Roden[3], M. DaCosta[3], C. Damsky[2], E. Holton[3], N. Searby[1], R. Globus[1], E. Almeida[1]
[1]NASA Ames Research Center, Moffett Field, CA, [2]University of San Francisco, San Francisco, CA, [3]National Space Grant Foundation

9:15 – 9:30 *THE DETERMINATION OF THE MECHANOTRANSDUCTION PATHWAY OF MARROW STROMAL CELLS EXPOSED TO OSCILLATORY FLUID FLOW*
A.M. Malone[1], N.N. Batra[2], C.T. Li[1], J.J. Rodriguez[1], C.R. Jacobs[1]
[1]Stanford University, Mechanical Engineering Dept., Palo Alto, CA, [2]VA Medical Center Rehabilitation R&D Center, Palo Alto, CA

9:30 – 9:45 *BETA 1 INTEGRIN SIGNALING AND FUNCTION IN MLO-Y4 OSTEOCYTE-LIKE CELLS*
N.D. Searby[1], M.C.H. van der Meulen[2], J. Dovi[1], C. Roden[1], I. Banerjee[1], C.D. Damsky[3], E.A.C. Almeida[1], R.K. Globus[1]
[1]NASA Ames Research Center, Moffett Field, CA, [2]Cornell University, Utica, NY, [3]University of California, San Francisco, CA

9:45 – 10:00 *EFFECT OF SHEAR STRESS ON MAPK ACTIVATION AND OCCLUDIN EXPRESSION IN HUMAN ENDOTHELIAL CELLS.*
D.M. Brey[1] , S. Bhatnagar[2] , E.L. Noisin[2] , R.S. Keynton[1] , C.M. Klinge[1]
[1]Dept. Mechanical Engineering Speed, School of Engineering, University of Louisville, Louisville, KY
[2]Dept. Biochemistry and Molecular Biology, School of Medicine, University of Louisville, Louisville, KY

10:00 - 10:15 **Break**

10:15 - 10:30 *DISTINCT PATTERNS OF GENE EXPRESSION AND SIGNALING PATHWAYS IN HUMAN MICROVASCULAR ENDOTHELIAL CELLS CULTURED IN ROTATING WALL VESSEL BIOREACTORS*
E.M. Troop[1], A. Rezvan[1], H. Jain[1], J.D. Frank[1], R.I. Somiari[2]
[1]School of Biomedical Engineering, Science and Health Systems, Drexel University, Philadelphia, PA, [2]Windber Research Institute, Windber, PA

10:30 –10:45 *A NOVEL METHOD FOR EVALUATING THE EFFECTS OF MICROGRAVITY ON OSTEOBLASTS USING ALGINATE CARRIERS IN A ROTATING-WALL VESSEL*
M.A. Bucaro[1], A.M. Zahm[1], M.V. Risbud[1], P.S. Ayyaswamy[2], K. Mukundakrishnan[2], I.M. Shapiro[1], C.S. Adams[1]
[1]Dept. of Orthopaedic Surgery, Thomas Jefferson University, Philadelphia, PA, [2]School of Engineering and Applied Sciences, University of Pennsylvania, Philadelphia, PA

10:45 –11:00 *MICROSCOPIC ANALYSIS OF LASER-INDUCED STATOLITH MOVEMENTS IN GRAVITY SENSING HIGHER PLANT CELLS*
G. Leitz[1], L.A. Staehelin[1]
[1]MCD Biology, University of Colorado, Boulder, CO

11:00 - 11:15 *C. ELEGANS SURVIVES ATMOSPHERIC BREAKUP OF STS-107*
N.J. Szewczyk[1], W, McLamb[2] ,C.A. Conley[1]
[1]NASA Ames Research Center, Moffett Field, CA, [2]Bionetics Corporation, NASA Kennedy Space Center, FL

11:15 – 12:30 **Lunch**

12:30 – 1:00 **Speaker**
Dr. Jeffrey P. Sutton, National Space Biomedical Research Institute (NSBRI)

1:00 – 1:45 CYTOSKELETON - Session #2
Co-chairs: C. Jacobs and J.-P. Jin

1:00 - 1:15 *DYNAMICS OF F-ACTIN CYTOSKELETAL REORGANIZATION UNDER OSCILLATORY FLUID FLOW IN OSTEOBLASTIC CELLS*
N.N. Batra[1], K. Jair[1], L. You[1], C.R. Jacobs[1]
[1]Stanford University, Dept. of Mechanical Engineering, Biomechanics Division, Stanford, CA, [2]VA Medical Center Palo Alto, RRD Center, Palo Alto, CA

1:15 – 1:30 *PROTEOLYTIC N-TERMINAL TRUNCATION OF CARDIAC TROPONIN I ENHANCES CARDIAC FUNCTION IN SIMULATED MICROGRAVITY*
J.C. Barbato[1], Q.-Q. Huang[1], M.M. Hossain[1], M. Bond[1], J.-P. Jin[1]
[1]Dept. of Physiology and Biophysics, School of Medicine, Case Western Reserve University, Cleveland, OH

1:30 – 1:45 *THE ROLE OF SMALL GTPASES IN REGULATING CYTOSKELETON ORGANIZATION, CELL MECHANICS, AND CELL POLARIZATION*
T.P. Kole[1], J. Lee[1], Y. Tseng[1] , D. Wirtz[1]
[1]Johns Hopkins University, Dept. of Chemical and Biomolecular Engineering, Baltimore, MD

1:45 – 2:00 **Break**

2:00 – 3:15 IMMUNE RESPONSE – Session #3
Co-chairs: M. Hughes-Fulford and A. Sundaresen

2:00 – 2:15 *MICROGRAVITY GENE EXPRESSION IN HUMAN LYMPHOCYTES*
A. Sundaresan[1], N.R. Pellis[2]
[1]Division of Space Life Sciences, Universities Space Research Association, Houston, TX, [2]Biological Sciences and Applications Office, NASA Johnson Space Center, Houston, TX

2:15 – 2:30 *REGULATION OF EARLY T-CELL ACTIVATION AND GENE EXPRESSION*
M. Hughes-Fulford[1,2,3], C.F. Li[1], J. Boonyaratanakornkit[4], A. Cogoli[5]
[1]Northern California Institute for Research and Education, San Francisco, CA, [2]University of California, San Francisco, CA, [3]VAMC, San Francisco, CA, [4]University of California, Berkeley, CA, [5]Space Biology, ETH, Zurich, Switzerland

2:30 – 2:45 *MOLECULAR AND CELLULAR ALTERATIONS INDUCED BY SIMULATED MICROGRAVITY IN LYMPHOCYTES*
B.F. Andruss[1], S.A. Lopez[1], M. Arya[2], B. Anvari[2], B.W. McIntyre[1]
[1]Dept. of Immunology, University of Texas, M.D. Anderson Cancer Center, Houston, TX, [2]Dept. of Bioengineering, Rice University, Houston, TX

2:45 – 3:00 *IMPACT OF MICROGRAVITY CULTURE ON SURVIVAL OF ALLOGENEIC PANCREATIC ISLET TRANSPLANTS*
L. Rutzky[1], S. Bilinski[2], M. Kloc[1], H. Zhang[1], T. Phan[1], S. Stepkowski[1]
[1]University of Texas Medical School at Houston, Dept. of Surgery, Division of Organ Transplantation, Houston, TX, [2]Institute of Zoology, Jagiellonian University Crakow, Poland

3:00 – 3:15 *SUPPLEMENTAL NUCLEOTIDES AND IMMUNOSURVEILLANCE IN MICROGRAVITY MODEL*
A. Kulkarni[1], K. Yamauchi[1], M. Sultenfuss[1], C. Savary[2], A. Sundaresan[3], N. Pellis[4]
[1]UT at Houston, Houston, TX, [2]M D Anderson Cancer Center, Houston, TX, [3]Universities Space Research Association, Houston, TX, [4]NASA Johnson Space Center, Houston, TX

3:15 – 3:30 **Break**

3:30 – 4:45 MICROORGANISMS - Session #4
Co-chairs: C. Nickerson and D. Morrison

3:30 – 3:45 *NANOBACTERIA: A UNIQUE/POTENTIAL MODEL FOR STUDYING BIOMINERALIZATION IN ANALOG MICROGRAVITY*
N. Ciftcioglu[1], R.S. Haddad[1], D.R. Morrison[2], D.S. Mckay[2]
[1]Universities Space Research Association, NASA Johnson Space Center, Houston, TX, [2]NASA Johnson Space Center, Houston, TX

3:45 – 4:00 *FITNESS PROFILING OF YEAST GENES WHICH CONVEY SURVIVAL IADVANTAGE N MICROGRAVITY*
T Hammond[1], P Allen[2], K Johansen[2], J Nesbit[2], L Hyman[2]
[1]VA Medical Center, New Orleans, LA, [2]Tulane University Health Sciences Center, New Orleans, LA

4:00 – 4:15 *MORPHOTYPE TRANSITION IN THE REGULATION OF PELAGIC CACO3 FORMATION BY COCCOLITHOPHORES*
M.E. Marsh[1], A.L. Ridall[1], P.J. Duke[1]
[1]University of Texas Health Science Center, Houston, TX

4:15 – 4:30 *TRICHODIENE GENES FROM TEN MEMBERS OF THE GENUS STACHYBOTRYS*
V. Amaku[1], O.Jejelowo[1], T. Torok[2], G. Andersen[2], T. Hazen[2], S. Thomas[3], M. Meyyappan[4], K. Jackson[5], D. Pierson[6], D. Barta[6]
[1]Texas Southern University, Houston, TX, [2]Lawrence Berkeley National Laboratories, Berkeley, CA, [3]Houston Community College, Houston, TX, [4]NASA Ames Research Center, Moffett Field, CA, [5]NAFEO/Ames Research Academy, NASA Ames Research Center, Moffett Field, CA, [6]NASA Johnson Space Center, Houston, TX

4:30 – 4:45 *TAKING INFECTIOUS DISEASE MODELING TO A NEW DIMENSION*
C.A. Nickerson[1], C.M. Ott[2], R. Ramamurthy[1], C. Leblanc[1], K. Honer zu Bentrup[1], K. Emami[2], T. Goodwin[3], B. Uicker[1], M. Schurr[1], A. Carterson[1], B. Sainz[1], M. Nelman[2], D. Pierson[3],
[1]Tulane University, School of Medicine, Program in Molecular Pathogenesis and Immunity, Dept. of Microbiology and Immunology, New Orleans, LA, [2]Wyle Laboratories, NASA Johnson Space Center, Houston, TX, [3]NASA Johnson Space Center, Houston, TX

6:00 – 7:00 **Reception**

7:00 - 9:00 **Dinner and Plenary Speaker - Dr. Jeffrey R. Davis**
Professor and Director, Clinical Preventive Medicine Dept. of Preventive Medicine and Community Health at the University of Texas Medical Branch, and Director, Space and Life Sciences Directorate, NASA Johnson Space Center
"Human Exploration – The Role of Life Sciences"

Day 2 - Friday, February 27, 2004

8:00 – 9:45 SIGNAL TRANSDUCTION - Session #5
Co-chairs: E. Wang and J.M. Jessup

8:00 – 8:15 *COMPREHENSIVE STUDY OF SPACE FLIGHT-DEPENDENT CHANGES IN GENE EXPRESSION IN NORMAL HUMAN FIBROBLASTS BY CDNA LIBRARY SUBTRACTION*
E. Wang[1], S. Xu[1], M. Ma[1], K.C. Falkner[1]
[1]Dept. of Biochemistry and Molecular Biology, School of Medicine, University of Louisville, Louisville, KY

8:15 – 8:30 *EFFECT OF SHORT TERM RECOVERY PERIODS ON FLUID SHEAR INDUCED CALCIUM OSCILLATIONS IN OSTEOBLASTIC CELLS*
N.N. Batra[2] , Y.J. Li[1], L. You[1], C. Tiberio[1], A. Malone[1]
[1]Stanford University, Dept. of Mechanical Engineering, Biomechanics Division, Stanford, CA, [2]VA Medical Center Palo Alto, RRD Center, Palo Alto, CA

8:30 – 8:45 *MICROGRAVITY INDUCED OXIDATIVE STRESS IN BRAIN REGIONS*
K. Wise[1], B. Wilson[1], A. Kulkarni[2], K. Yamauchi[2], N. Pellis[3], G. Ramesh[1]
[1]Dept. of Biology, Texas Southern University, Houston, TX, [2]Dept. of Surgery, The University of Texas, Houston, TX, [3]Cellular Biotechnology Program, NASA Johnson Space Center, Houston, TX

8:45 – 9:00 *MULTIPLE RECEPTORS REGULATE PROTEIN DEGRADATION IN MUSCLE*
N.J. Szewczyk[1], L.A. Jacobson[2]
[1]NASA Ames Research Center, Moffett Field, CA, [2]Dept. of Biological Sciences, University of Pittsburgh, Pittsburgh, PA

9:00 – 9:15 *PROTEIN KINASE C ISOFORM SIGNALING IN HUMAN MONOCYTES*
J.P. Hatton[1], M. Hughes-Fulford[2]
[1]Northern California Institute for Research And Education (NCIRE), San Francisco, CA, [2]Veterans Affairs Medical Center (VAMC), San Francisco, CA

9:15 – 9:30 *ROTATIONAL 3-D CULTURES INCREASE APOPTOSIS THROUGH A REACTIVE NITROGEN MECHANISM*
L. Laguinge[1], S. Lin[1], M. Schmidt[1], J.M. Jessup[1]
[1]Georgetown University, Washington, DC

9:30 – 9:45 *SIGNALING MECHANISMS UNDERLYING ENHANCED NITRIC OXIDE PRODUCTION BY ENDOTHELIAL CELLS CULTURED IN A MICROGRAVITY-BASED ROTATING BIOREACTOR*
G.L. Sanford[1], S. Harris-Hooker[1], D. Ellerson[1], N. Davies[1], A.E. Sroufe[1]
[1]Morehouse School of Medicine, Atlanta, GA

9:45 – 10:00 **Break**

10:00 – 12:00 TISSUE ENGINEERING - Session #6A
Co-chairs: G. Vunjak-Novakovic and R. Akins

10: 00 – 10:15 *ELECTRICAL STIMULATION ENHANCES FUNCTIONAL ASSEMBLY OF ENGINEERED MYOCARDIUM*
M. Radisic[1], H. Park[1], H. Shing[2], J. Boublik[1], T. Consi[1], F.Schoen[2], L.E. Freed[1] and G. Vunjak-Novakovic[1]
[1]Massachusetts Institute of Technology, Cambridge MA, [2]Brigham and Women's Hospital, Boston, MA

10:15 – 10:30 *GENE EXPRESSION ANALYSIS OF TISSUE ENGINEERED CARDIAC CONSTRUCTS*
K. Gratton[1], A. Galante[2], P. Soteropoulos[2], R. Akins[1]
[1]A. I. duPont Hospital for Children, Wilmington, DE, [2]Center for Applied Genomics, Newark, NJ

10:30 – 10:45 *ROLE OF HEART DEVELOPMENTAL GENES IN ASSEMBLY OF IN VITRO 3D CARDIAC TISSUE STRUCTURES*
M. Bruner[1], R. Akins[1]
[1]A.I. duPont Children's Hospital, Wilmington, DE

10:45 – 11:00 *HEME OXYGENASE IMPROVES THE ORGANIZATION AND FUNCTION OF CULTURED NEONATAL RAT HEART CELLS*
R. Akins[1], T. McLaughlin[1], R. Boyce[1], L. Gilmour[1], K. Gratton[1]
[1]A. I. duPont Hospital for Children, Wilmington, DE,

11:00 – 11:15 *APPLYING TISSUE ENGINEERING PRINCIPLES TO DEVELOP THREE-DIMENSIONAL IN VIVO LIKE TISSUE MODELS IN VITRO*
L.K. Worrall[1], F.R.A.J. Rose[1], T.D. Bradshaw[2], M.F.G. Stevens[2], K.M. Shakesheff[1]
[1]Tissue Engineering Group, School of Pharmacy, University of Nottingham, University Park, Nottingham, UK, [2]Medicinal Chemistry and Structural Biology, School of Pharmacy, University of Nottingham, University Park, Nottingham, UK

11:15 – 11:30 *BIODEGRADABLE POLYPHOSPHAZENES FOR TISSUE ENGINEERING*
C.T. Laurencin[1], L.S. Nair[1]
[1]University of Virginia, Dept. of Orthopaedics, Charlottesville, VA

11:30 – 11:45 *PHYSICOCHEMICAL AND BIOLOGICAL PROPERTIES OF COLLAGEN-LIKE PROTEINS RATIONALLY ENGINEERED FOR APPLICATIONS IN TISSUE ENGINEERING*
I. Majsterek[1], E. McAdams[1], A. Steplewski[1], H. Ito[1], T. Alabyeva[1], S. Rao[2], F. Ko[1], A. Fertala[1]
[1]Thomas Jefferson University, Dept. of Dermatology and Cutaneous Biology, Philadelphia, PA, [2]Drexel University, Dept. of Materials Engineering, Fibrous Materials Research Laboratory, Philadelphia, PA

11:45 – 12:00 *PRINTING 3D BIOLOGICAL STRUCTURES USING LAYER-BY-LAYER DEPOSITION OF SELF-ASSEMBLING MULTICELLULAR SPHEROIDS AS BIOINK*
K. Jakab[1], A. Neagu[1,2], A. Kachurin[3], V. Mironov[4], W. Warren[3], G. Forgacs [1,5]
[1]University of Missouri, Dept. of Physics, Columbia, MO, [2]Dept. of Biophysics and Medical Informatics, Victor Babes University of Medicine and Pharmacy, Romania, [3]Sciperio, Inc. Stillwater, OK, [4]Dept. of Cell Biology and Anatomy, Medical University of South Carolina, SC, [5]University of Missouri, Dept. of Biology, Columbia, MO

12:00 – 1:00 **Lunch**

1:00 – 2:30 TISSUE ENGINEERING - Session #6B
Co-chairs: S. Saporta and L. Freed

1:00 – 1:15 *RAPID EXPRESSION OF TYROSINE HYDROXYLASE AND DOPAMINE BY SERTOLI-NEURON-AGGREGATED CELLS (SNAC) TISSUE CONSTRUCTS*
S. Saporta[1], A.E. Willing[1], L.O. Colina[1], J. Mallery[1], P. Bickfor[2], D. Paredes[1], P.R. Sanberg[1], D.F.Cameron[1]
[1]University of South Florida, College of Medicine, Tampa, FL, [2]James A. Haley Veterans Administration Hospital, Tampa, FL

1:15 – 1:30 *ROTATING BIOREACTOR STUDIES OF THE MATURATION AND FUNCTIONAL INTEGRATION OF TISSUE ENGINEERED CARTILAGE*
E. Tognana[1], F. Chen[1], R.P. Padera[2], G. Vunjak-Novakovic[1], L.E. Freed[1]
[1]Massachusetts Institute of Technology, Cambridge, MA, [2]Brigham and Women's Hospital, Boston, MA

1:30 – 1:45 *VASCULAR TISSUE ENGINEERING: EFFECT OF SCAFFOLD MICROTOPOGRAPHY ON VASCULAR SMOOTH MUSCLE CELL RESPONSE*
J.Y. Wong[1], T.A. Desai[1]
[1]Boston University, Dept. of Biomedical Engineering, Boston, MA

1:45 – 2:00 *CULTURING OF RAT BRAIN ASTROCYTES AND NEURONS IN A THREE-DIMENSIONAL ARCHITECTURE USING NASA-DESIGNED ROTATING WALL VESSEL*
A.C. Shivachar[1]
[1]Texas Southern University, Dept. of Pharmaceutical Sciences, College of Pharmacy, Houston, TX

2:00 – 2:15 *EFFECTS OF MODELED MICROGRAVITY ON GROWTH AND DIFFERENTIATION OF NEURAL STEM AND PROGENITOR CELLS CULTURED IN THREE-DIMENSIONAL COLLAGEN GELS*
W. Ma[1], T.J. O'Shaughnessy[1], J. Kelly[1], D. Maric[2], J.L. Barker[2], W. Fitzgerald[4], S. Chen[3], S. Chen[4], H.J. Lin[1]
[1]Center for Bio/Molecular Science and Engineering, Naval Research Laboratory, Washington, D.C., [2]Lab of Neurophysiology, NINDS, NIH, Bethesda, MD, [3]Wyle Laboratories, Houston, TX, [4]NASA/NIH Center for Three Dimensional Tissue Culture, NICHD, NIH, Bethesda, MD

2:15 – 2:30 *GENERATION OF THREE DIMENSIONAL RETINA-LIKE STRUCTURES FROM HUMAN RETINAL PROGENITORS IN NASA BIOREACTOR*
K. Dutt[1], H. Wang[1], R. Kumar[1]
[1]Morehouse School of Medicine, Atlanta, GA

2:30 – 2:45 Break

2:45 – 5:00 HARDWARE DEVELOPMENT & TESTING (Concurrent Sessions) - Session #7A
Co-chairs: S. Gonda and P. Lelkes

ROTATING BIOREACTORS

2:45 – 3:00 *COMPARISON AND MODELING OF CELLULAR AGGREGATION IN DIFFERENT ROTATING WALL VESSEL BIOREACTORS*
E.M. Troop[1], J.D. Frank[1], J.A. Calverly[1], R.I. Somiari[2], S.R. Gonda[3], P. Lelkes[1]
[1]School of Biomedical Engineering, Science and Health Systems, Drexel University, Philadelphia, PA, [2]Windber Research Institute, Windber, PA, [3]Biotechnology Program, NASA Johnson Space Center, Houston, TX

3:00 – 3:15 *FLOW OF FLUID AND PARTICLE ASSEMBLAGES IN ROTATING SYSTEMS*
J. Kizito[1], D. Hiltner[1], C. Niederhaus[2], S. Kleis[3], E. Hudson[4], S. Gonda[4]
[1]National Center for Microgravity Research at NASA Glenn Research Center, Cleveland, OH, [2]NASA Glenn Research Center, Cleveland, OH, [3]University of Houston, Houston, TX, [4] NASA Johnson Space Center, Houston, TX

3:15 – 3:30 *MICROGRAVITY EXPERIMENTS ON BUBBLE REMOVAL IN THE HYDRODYNAMIC FOCUSING BIOREACTOR SPACE (HFBS)*
C.E. Niederhaus[1] S. Robinson[2], E. Hudson[3], S.K. Geffert[4], P.J. Lupo[5], H.K. Nahra[1], J.P. Kizito[6], S.J. Kleis[4], S.R. Gonda[5]
[1]NASA Glenn Research Center, Cleveland, OH, [2]Wyle Laboratories, Houston, TX, [3]Universities Space Research Associates, Houston, TX, [4]University of Houston, Houston, TX, [5]NASA Johnson Space Center, Houston, TX, [6]National Center for Microgravity Research, Cleveland, OH

3:30 – 3:45 *MODELING THE MOTION OF BUBBLES IN THE HFB-S*
S.K. Geffert[1], S.J. Kleis[1], C.E. Niederhaus[2], S. Robinson[3], E. Hudson[4], H.K. Nahra[6], S.R. Gonda[5]
[1]University of Houston, Houston, TX, [2]NASA Glenn Research Center, Cleveland, OH, [3]Wyle Laboratories, Houston, TX, [4]Universities Space Research Associates, Houston, TX, [5]NASA Johnson Space Center, Houston, TX, [6]National Center for Microgravity Research, Cleveland, OH

3:45 – 4:00 **Break**

4:00 - 4:15 *SELECTIVE EXTRACTION OF BIO-ACTIVE COMPOUNDS FROM PLANT CELL CULTURES IN A MICROGRAVITY-BASED HYDRODYNAMIC FOCUSING BIOREACTOR (HFB)*
J.V.Valluri[1], M.L. Bartholomew[1], S.R. Gonda[2]
[1]Biology Laboratory, Dept. of Biological Sciences, Marshall University, Huntington, WV, [2]NASA Johnson Space Center, Houston, TX

4:15 – 4:30 *INTRACELLULAR RETENTION OF CHONDROITIN SULFATES 4 AND 6 IN HUMAN BONE-FORMING CARTILAGE CULTURED IN THE HYDRODYNAMIC FOCUSING BIOREACTOR*
D. Montufar-Solis[1], J. Hecht[2], P.J. Duke[1]
[1]Dept. of Orthodontics, Dental Branch, University of Texas Health Science Center at Houston, Houston, TX [2]Dept. of Pediatrics, Medical School, University of Texas Health Science Center at Houston, Houston, TX

STATIONARY CULTURE SYSTEMS

4:30 – 4:45 *DEVELOPMENT TESTS VALIDATE BIOTECHNOLOGY FACILITY (BTF) AUTOMATED STATIONARY CULTURE SYSTEM (ASCS) CONCEPT*
J. Tuxhorn[1], J. Chastain[1], S. Langford[1]
[1]Wyle Laboratories, Life Sciences Systems & Services, Houston, TX

4:45 – 5:00 *NEAR-TERM SOLUTIONS FOR SPACE ACCESSIBILITY FOR CELL SCIENCE*
P. Todd[1], J.C. Vellinger[1], E.W. Taylor[1], K. Barton[1], D.M. Kennedy[1]
[1]SHOT, Inc., Greenville, IN

2:45 – 5:00 HARDWARE DEVELOPMENT & TESTING (Concurrent Sessions) - Session #7B
Co-chairs: N. Searby and B. Yost

PERFUSION CULTURE SYSTEMS

2:45 – 3:00 *FLIGHT EXPERIMENT DEVELOPMENT FOR CCU USING YEAST AS A CELL MODEL SYSTEM*
L. Sun[1], J. de Luis[1], C. Preda[1], J. Lagaz[1], S. Pretorius[1], D.Vandendriesche[3], P. Larenas[4], F. Donovan[4], J. Parish[1], G. Vunjak-Novakovic[2], N. Searby[3]
[1]Payload Systems Inc., Cambridge, MA, [2]Massachusetts Institute of Technology, Cambridge, MA, [3]NASA Ames Research Center, Moffett Field, CA, [4]Lockheed-Martin, Moffett Field, CA

3:00 – 3:15 *PROLIFERATION AND DIFFERENTIATION OF MYOBLASTS IN PERFUSION*
L. Kundakovic[1], I. Berzin[1], P.Larenas[2], F. Donovan[2], N. Searby[2], G. Vunjak-Novakovic[1]
[1]Massachusetts Institute of Technology, Cambridge MA, [2]NASA Ames Research Center, Moffett Field, CA

3:15 – 3:30 *SUSPENSION CULTURE OF TOBACCO BY2 CELLS IN PERFUSED FLOW*
[1]H. Park, [1]I. Berzin, [2]J. de Luis, P. Larenas, F. Donovan, [3]N. Searby, D. Vandendriesche, [4]R. Cyr, [1]G. Vunjak-Novakovic
[1]Massachusetts Institute of Technology, Cambridge MA, [2]Payload System Inc., Cambridge MA, [3]NASA Ames Research Center, Moffett Field CA [4] Penn State University, PA

***IN SITU* GENETICS EXPERIMENTS ON NANOSATELLITES (ISGEN)**

3:30 – 3:45 Break

3:45 – 4:00 *OVERVIEW OF BIOLOGY-SPECIFIC HARDWARE SYSTEMS AND SPACECRAFT CONCEPTS FOR THE IN SITU GENETICS EXPERIMENTS ON NANOSATELLITES (ISGEN)*
B. Yost [1], J. Hines[2], A. Ricco[1]
[1]Defouw Engineering, NASA Research Park, Moffett Field, CA, [2]NASA Ames Research Center, Moffett Field, CA

4:00 – 4:15 *REMOTE AUTOMATED OSTEOBLAST GENE EXPRESSION ANALYZER USING DUAL PROMOTER-FLUORESCENT REPORTER DNA CONSTRUCTS USING NANOSATELLITE TECHNOLOGY*
W. Krauser[1], A. Wing[1], M. Parra[1], N. Searby[1], E. Almeida[1]
[1]Bone and Signaling Lab, NASA Ames Research Center, Moffett Field, CA

4:15 – 4:30 *REMOTE AUTOMATED SACCHAROMYCES CEREVISIAE YEAST GENE EXPRESSION ANALYZER USING GENE-PROMOTER/LUCIFERASE-REPORTER DNA CONSTRUCTS*
M. Parra[1], W. Krauser[1], E. Almeida[2], N. Searby[2]
[1]EA Program, NASA Ames Research Center, Moffett Field, CA, [2]NASA Ames Research Center, Moffett Field, CA

4:30 – 4:45 *AUTOMATED CHEMILUMINESCENCE GENE MICROARRAY*
G. Kadambi[1], E. Almeida[1]
[1]NASA Ames Research Center, Moffett Field, CA

4:45 – 5:00 *DROSOPHILA MELANOGASTER STUDIES FOR NANOSATELLITES*
R.S. Stowers[1], M.E.Sanchez[1], T.Fahlen[1], S.Bhattacharya[1]
[1]NASA Ames Research Center, Moffett Field, CA

5:00 – 6:00 Business Meeting

Day 3 - Saturday, February 28, 2004

8:00 - 9:30 CELL CULTURE TECHNOLOGY – Session #8
Co-chairs: B. Towe and J. Becker

8:00 – 8:15 *UNDERSTANDING YOUR SYSTEM: THE IMPORTANCE OF GROUND-BASED EXPERIMENTS BEFORE SPACE FLIGHT*
S.K. Chapes[1]
[1]Kansas State University, Manhattan, KS

8:15 – 8:30 *DENSITY MATCHING FOR BETTER GROUND CONTROL EXPERIMENTS*
S.J. Kleis[1], A.K. Rao[1], S.K. Geffert[1], E. Hudson[2], S.R. Gonda[3]
[1]University of Houston, Houston, TX, [2]Universities Space Research Associates, Houston, TX, [3]NASA Johnson Space Center, Houston, TX

8:30 – 8:45 *A MICROCULTURE SYSTEM FOR SPACE BIOTECHNOLOGY*
B.C. Towe[1], C. Cooney, R. Martineau[1], M. Paccini, D. Daydiff, N. Pellis[2]
[1]Arizona State University, Tempe, AZ, [2]NASA Johnson Space Center, Houston, TX

8:45 – 9:00 *DESIGN AND DEVELOPMENT OF A MEMS BIOREACTOR TO CHARACTERIZE SPACE-INDUCED CHANGES IN GENE TRANSCRIPTION IN YEAST*
S.J. Webb[1], J.H. Lake[2], T.J. Barnell[1], M. Crain[2], E. Wang[3], K. Walsh[2], R.A. Prough[1]
[1]Dept. of Biochemistry and Molecular Biology, School of Medicine, University of Louisville, Louisville, KY, [2]Dept. of Electrical Engineering, Speed School, University of Louisville, Louisville, KY, [3]Gheen's Center for Aging, University of Louisville, Louisville, KY

9:00 – 9:15 *MAGNETIC LEVITATION CELL CULTURE*
J.L. Becker[1]
[1]University of South Florida, Depts. of Ob/Gyn and Medical Microbiology and Immunology, Tampa, FL

9:15 – 9:30 *MICRO-ENVIRONMENTAL DIAGNOSTIC CULTURE: MEDIC ASSAY STUDYING THE EFFECTS OF THE PHYSICAL ENVIRONMENT ON OSTEOBLAST-LIKE CELLS*
D.W. Griffin[1], K.L. Barlow[2], J.R. Adamson[2], R.J. Midura[3], J.P. Kizito[2]
[1]NASA Glenn Research Center, Cleveland, OH, [2]National Center for Microgravity Research, Brook Park, OH, [3]Cleveland Clinic Foundation, Dept of Biomedical Engineering, Lerner Research Institute, Cleveland, OH

9:30 – 9:45 **Break**

9:45 – 11:30 SENSORS AND ANALYTICAL EQUIPMENT – Session #9
Co-chairs: J. Hines and A. Jeevarajan

9:45 – 10:00 *CONTINUOUS MONITORING OF DISSOLVED CARBON DIOXIDE IN A CELL CULTURE EXPERIMENT IN A PERFUSED BIOREACTOR USING AN OPTICAL CARBON DIOXIDE SENSOR*
A.S. Jeevarajan[1], F. Gao[2], M.M. Anderson[1]
[1]NASA Johnson Space Center, Biological Systems Office, Houston, TX, [2]Wyle Life Sciences, Houston, TX

10:00 – 10:15 *FIBER OPTIC OXYGEN SENSOR FOR LONG TERM CELL CULTURE STUDY*
Y.D. Tsao[1]
[1]Celdyne Corp, Houston, TX

10:15 – 10:30 *HOW TO ASSEMBLE A TWO-PHOTON MICROSCOPE*
G. Zimmerli[1], D. Fischer[1], M. Asipauskas[2]
[1]NASA Glenn Research Center, Cleveland, OH, [2]National Center for Microgravity Research, Cleveland, OH

10:30 – 10:45 *LONG DURATION PH OPTICAL SENSOR PERFORMANCE IN THE CELL CULTURE UNIT*
F. Martel[1], L. Sun[1], J. Lagaz[1], C. Preda[2], A. Germatsky[1], D.Vandendriesche[3], G. Vunjak-Novakovic[2], J. de Luis[1], J. Parrish[1]
[1]Payload Systems Inc., Cambridge, MA, [2]Massachusetts Institute of Technology, Cambridge, MA, [3]NASA Ames Research Center, Moffett Field, CA

10:45 – 11:00 *MICROFABRICATED OPTICAL BIOSENSORS FOR IN SITU BIOREACTOR MONITORING*
J. Zguris[1], V. Yadavalli[2], W. Koh[2], G. Cote[2], P. O'Neal[2], M. Pishko[2]
[1]Pennsylvania State University, Dept. of Chemical Engineering, University Park, PA, [2]Texas A&M University, Dept. of Biomedical Engineering, College Station, TX

11:00 – 11:15 *GRATING-COUPLED SURFACE PLASMON RESONANCE: CELL AND PROTEIN MICROARRAY MEASUREMENTS OF IMMUNE FUNCTION IN MODELED MICROGRAVITY*
D.W. Unfricht[1], S.M. Fernandez[2], M.A. Lynes[1]
[1]Molecular and Cell Biology, University of Connecticut, Storrs, CT, [2]Ciencia, Inc., East Hartford, CT

11:15 – 11:30 *MICROFLUIDIC DEVICES FOR CHEMICAL AND BIOCHEMICAL ANALYSIS IN MICROGRAVITY*
C.T. Culbertson[1], L.T. Tolley[2], J.M. Ramsey[2], S.R.Gonda[3]
[1]Kansas State University, Dept. of Chemistry, Manhattan, KS, [2]Oak Ridge National Laboratory, Oak Ridge, TN, [3]NASA Johnson Space Center, Biological Systems Office, Houston, TX

11:30 – 11:45 *RADIATION DAMAGE DETECTION USING A BIOLOGICAL NANO-SCALE PORE*
W.A. Vercoutere[1], A. Solbrig[2], V. DeGuzman[2], D. Deamer[2], M. Akeson[2]
[1]NASA Ames Research Center, Gravitational Research Branch, Moffett Field, CA, [2]University of California, Santa Cruz Biophyics Laboratory, Chemistry Department, Santa Cruz, CA

11:45 – 12:45 **Lunch**

12:45 – 1:15 **Speaker**
Dr. Lyudmila Buravkova, Institute of Biomedical Problems, Russia

1:15 – 3:00 PROLIFERATION & DIFFERENTIATION – Session #10
Co-chairs: A. Sytkowski and L. McCabe

1:15 - 1:30 *EFFECTS OF LOADING INDUCED OSCILLATORY FLUID FLOW ON HUMAN MARROW STROMAL CELL PROLIFERATION AND DIFFERENTIATION*
L. You[1], Y.J. Li[1], N.N. Batra[1], S.C. Miere[1], I.A. Coe[1], C.R. Jacobs[1]
[1]Stanford University, Mechanical Engineering Dept., Stanford, CA, [2]Penn State, College of Medicine, Orthopaedics and Rehabilitation, Hershey, PA

1:30 – 1:45 *HYPOXIA SUPPRESSES RUNX2 INDEPENDENTLY FROM MODELED MICROGRAVITY*
C. Ontiveros[1], L.McCabe[1]
[1]Michigan State University, Lansing, MI

1:45 – 2:00 *CIRCADIAN RHYTHM IN HEMATOPOIESIS*
J.-H. Wu[1], C.Y. Chen[1], P.Y. Wang[1], Y.G. Chen[1], A. Mantalaris[1]
[1]Dept. of Chemical Engineering, University of Rochester, Rochester, NY

2:00 - 2:15 *MICROGRAVITY AFFECTS AGGREGATION, DIFFERENTIATION, AND CYTOSKELETAL ORGANIZATION OF ERYTHROID CELLS*
K. Xu[1], K.V. Holubec[2], J. Love[3], T.J. Goodwin[3], A.J. Sytkowski[1]
[1]Beth Israel Deaconess Medical Center, Boston, MA, [2]Wyle Laboratories, Houston, TX, [3]Cellular Biotechnology Program, NASA Johnson Space Center, Houston, TX

2:15 - 2:30 *MODELED MICROGRAVITY ALTERS DIFFERENTIATION OF HUMAN MESENCHYMAL STEM CELLS*
J.M. McDonald[1], M. Zayzafoon[1], V.E. Meyers[1], S.R. Gonda[2], W.E. Gathings[3]
[1]Dept. of Pathology, University of Alabama at Birmingham, Birmingham, AL, [2]Cellular Biotechnology Program, NASA Johnson Space Center, Houston, TX, [3]CMDS, University of Alabama at Huntsville, Huntsville, AL

2:30 –2:45 *MULTIPOTENT POTENTIAL OF HUMAN MESENCHYMAL STEM CELLS UNDER MICROGRAVITY CONDITIONS*
A. Frias[1], J. Chamberlain[1], C. Porada[1], E.D. Zanjani[1], G. Almeida-Porada[1]
[1]University of Nevada Reno, Dept. of Animal Biotechnology, Reno, NV

2:45 – 3:00 *REAL TIME CELL PROFILING TO EVALUATE MEMBRANES OF LIVING CELLS IN SIMULATED MICRO-GRAVITY*
J.C. Andrews[1], S. Winters-Hilt[2]
[1]The Research Institute for Children, Children's Hospital, New Orleans, LA, [2]The Department of Computer Science, The University of New Orleans, New Orleans, LA

3:00 – 3:15 *REDUCED CYCLING, MIGRATION AND PROGENITOR PRODUCTION OF BONE MARROW CD34+ CELLS CULTURED IN MODELED MICROGRAVITY*
P.A. Plett[1], S.M. Frankovitz[1], R. Abonour[1], C.M. Orschell[1]
[1]Indiana University, School of Medicine, Div. of Heme/Onc, Indianapolis, IN

3:15 – 3:30 *STRESS-INDUCED DYSFUNCTION OF NEURAL STEM CELLS*
C. Limoli[1], J. Fike[2]
[1]University of California, San Francisco, Dept. of Radiation Oncology, San Francisco, CA, [2]University of California, San Francisco, Dept. of Neurological Surgery. San Francisco, CA

3:30 – 3:45 **Break**

3:45 – 5:15 NEOPLASTIC DISEASE – Session #11
Co-chairs: C.-Y. Li and V. Chopra

3:45 – 4:00 *HEMATOPOIETIC STEM CELL THERAPY TO COUNTERMEASURE CANCER DURING EXPLORATION OF DEEP SPACE*
S. Ohi[1], B.C. Kim[1], S.R. Gonda[2]
[1]Howard University and Hospital, Washington, D.C., [2]NASA Johnson Space Center, Houston, TX

4:00 – 4:15 *CHARACTERIZATION OF MALIGNANT AND NORMAL HOST CELLS IN MODELED MICROGRAVITY ENVIRONMENT*
V. Chopra[1], T.G. Wood[2], N.R. Pellis[3], and E.V. Hannigan[1]
[1]Division of Gynecologic-Oncology, Dept. of Obstetrics and Gynecology, UTMB, Galveston, TX, [2]Molecular Science Center, UTMB, Galveston, TX, [3]Cellular Biotechnology, NASA Johnson Space Center, Houston, TX

4:15 - 4:30 *EBSELEN AUGMENTSITS PEROXIDASE ACTIVITY BY INDUCING NRF-2 DEPENDENT TRANSCRIPTION*
V. Tamasi[1], G.E. Arteel[2], K.C. Falkner[1]
[1]Dept. Biochemistry & Molecular Biology, University of Louisville, Louisville, KY, [2]Dept. Pharmacology & Toxicology, University of Louisville, Louisville KY

4:30 – 4:45 *DEVELOPMENT OF CONFOCAL MICROSCOPY AND FLUORESCENCE RELOCALIZATION AFTER PHOTOBLEACHING TO EXAMINE THE DYNAMIC PROPERTIES OF PROTEINS THAT MAINTAIN GENOMIC INTEGRITY IN LIVING HUMAN CELLS*
E.W. Nelson[1], N.B. Watson[2], B. Sabbineni[1], B.W. Alphenaar[2], W.G.McGregor[1]
[1]Dept. of Electrical and Computer Engineering, University of Louisville, Louisville, KY, [2]Dept. of Pharmacology and J.G. Brown Cancer Center, University of Louisville, Louisville, KY

4:45 – 5:00 *MULTIPARAMETRIC DETERMINATION OF RADIATION RISK*
R. Richmond[1]
[1]NASA Marshall Space Flight Center, Huntsville, AL

5:00 – 5:15 *THE ROLE OF REACTIVE OXYGEN SPECIES IN HZE PARTICLE INDUCED GENETIC INSTABILITY*
C-Y. Li[1]
[1]Duke University Medical Center, Durham, NC

5:15 – 5:30 *MONTE CARLO SIMULATION OF LNCAP HUMAN PROSTATE CANCER CELL AGGREGATION*
H. Song[1], K. O'Connor[1], D. Lacks[1], R. Enmon[1], S. Jain[1]
[1]Tulane University and School of Medicine, New Orleans, LA