

# Table of Contents

<b>CONTENTS</b> .....	1
<b>COLLABORATING DEPARTMENTS AND INSTITUTIONS</b> .....	4
<b>ACKNOWLEDGEMENT OF SUPPORT</b> .....	4
<b>RELATED WEB SITES</b> .....	4
<b>INTRODUCTION</b> .....	5
<b>STAFF NEWS</b> .....	6
<b>COLUMBIA COLLOQUIUM AND LABORATORY SEMINARS</b> .....	7
<b>STAFF LISTING</b> .....	8
<b>STAFF PHOTO</b> .....	9
<b>RESEARCH REPORTS</b>	
<u><b>MICROBEAM DEVELOPMENT STUDIES</b></u>	
<b>The Permanent Magnet Microbeam at Columbia University</b>	
Guy Garty, Andrew Harken, Gerhard Randers-Pehrson and David J. Brenner .....	10
<b>Multiphoton Microscopy: Available Imaging Technique at RARAF</b>	
Alan W. Bigelow, Gerhard Randers-Pehrson and David J. Brenner .....	11
<b>Under-Dish Detector for the Microbeam at Columbia University</b>	
Guy Garty, Chaitanya Medicherla, Gerhard Randers-Pehrson and David J. Brenner.....	12
<b>X-Ray Microbeam Development at RARAF</b>	
Andrew Harken, Gerhard Randers-Pehrson and David J. Brenner .....	14
<u><b>BYSTANDER STUDIES</b></u>	
<b>Mitochondrial Function and NF-<math>\kappa</math>B Mediated Signaling in Radiation-Induced Bystander Effects</b>	
Hongning Zhou, Vladimir N. Ivanov, Yu-Chin Lien, Mercy Davidson and Tom K. Hei .....	16
<b>Improved Isolation of RNA for Microarray Analysis from Thin Slices of Human Skin Tissue</b>	
Sunirmal Paul and Sally A. Amundson .....	21
<b>Ionizing Radiation-Induced Bystander Effect Activates Protein Kinase C-<math>\epsilon</math> Expression</b>	
Burong Hu, Yanrong Su, Peter Grabham, Adayabalam S. Balajee and Charles R. Geard.....	24
<b>Micronucleus Formation in Primary Human Small Airway Epithelial Cells in Response to 0.5Gy <math>\alpha</math>-Particles</b>	
Shanaz A. Ghandhi and Sally A. Amundson.....	26
<b>Improved Preparation of Keratinocytes from 250<math>\mu</math>m-Thin Tissue Slices for Binucleate Micronucleus Analysis</b>	
Alexandre V. Mezentsev and Sally A. Amundson .....	27
<b>Bystander Responses of p53 and c-JUN Proteins in Artificial Epithelial Tissues</b>	
Bharat Patel, Brian Ponnaiya, Stephen Marino and Charles R. Geard .....	30
<b>Biophysical Model of Spatial Patterns of Radiation-Induced Bystander Effects in Three-Dimensional Tissues</b>	
Igor Shuryak, Rainer K. Sachs and David J. Brenner .....	32
<u><b>MOLECULAR STUDIES</b></u>	
<b>Methylation Screening of <i>Betaig-H3</i> Promoter in Human Lung and Prostate Cancer by Methylation-specific PCR Method</b>	
Jinesh N. Shah, Genze Shao, Tom K. Hei and Yongliang Zhao.....	34
<b>HRAD9 is Associated with Tumor Formation in Nude Mice</b>	
Aiping Zhu, Xiangyuan Wang and Howard B. Lieberman .....	37
<b>Comparison between <i>Mrad9</i> and <i>Mrad9B</i></b>	
Corinne Leloup, Kevin M. Hopkins, Xiangyuan Wang, Aiping Zhu, Debra J. Wolgemuth and Howard B. Lieberman...	40
<b>Alterations in Human Rad9 Protein that Modulate Gamma-Ray and Hydroxyurea Resistance</b>	
Kevin M. Hopkins, Xiaojian Wang and Howard B. Lieberman.....	43
<b>Human RAD9 Binds <i>In Vitro</i> and <i>In Vivo</i> to a Palindrome Motif in the <i>Cox-2</i> Promoter</b>	
Xiaojian Wang, Kevin M. Hopkins, Yuxin Yin and Howard B. Lieberman .....	45

<b>TP53-Dependent Radiation Responses in the NCI60 Cell Lines</b>	
Sally A. Amundson.....	47
<b>Histone H2AX is a Critical Factor for Cellular Protection against Genotoxic Agents</b>	
Jarah A. Meador, Munan Zhao, Yanrong Su, Charles R. Geard and Adayabalam S. Balajee .....	49
<b>Environmental Mutagens Induced Transversions but not Transitions in the Regulatory Region of Mitochondrial DNA</b>	
Michael A. Partridge, Sarah Huang, Muhammad G. Kibriya, Habibul Ahsan, Mercy M. Davidson and Tom K. Hei .....	51
<b>BigH3 Protein Expression as a Marker for Breast Cancer</b>	
Gloria M. Calaf, C. Echiburú-Chau, Yongliang Zhao and Tom K. Hei .....	54
<b>The Adaptive Response and Genomic Instability</b>	
Brian Ponnaiya and Charles R. Geard .....	55
<b>High Sensitivity Antigen Detection using Luminescence Substrates in ELISA</b>	
Michael A. Partridge and Tom K Hei.....	57
<b>Nuclear PTEN is a New Guardian of the Genome</b>	
Wenhong Shen, Adayabalam S. Balajee, Jianli Wang and Yuxin Yin.....	59
<b><u>CELLULAR STUDIES</u></b>	
<b>Radiosensitization of Melanoma Cells using Inhibition of Antiapoptotic Protein Regulators COX-2 and AKT</b>	
Geoffrey E. Johnson, Vladimir N. Ivanov and Tom K. Hei .....	62
<b>Increased Susceptibility of Human Small Airway Epithelial Cells to Apoptosis after Long Term Arsenic Treatment</b>	
Gengyun Wen, Michael A Partridge, Gloria M. Calaf, Jarah A. Meador, Burong Hu and Tom K. Hei .....	67
<b>TGFBI Suppresses Malignant Mesothelioma and Breast Cancer by Prolonging G1-S Transition and De-regulating Cell Invasion</b>	
Bingyan Li, Genyun Wen, Jian Tong and Tom K. Hei .....	71
<b>Human Endothelial Cells in 3D Model Vessel Systems; Differential Effects of High and Low LET Space Radiations</b>	
Peter Grabham, Burong Hu, Gloria Jenkins and Charles R. Geard .....	76
<b><u>POPULATION-BASED RADIOLOGY OR RADIOTHERAPY ORIENTED STUDIES</u></b>	
<b>Potential Use of Prophylactic Mammary Irradiation for Reduction of Second Breast Cancers</b>	
David J. Brenner, Igor Shuryak, Sandra Russo and Rainer K. Sachs .....	78
<b>Stochastic Mechanistic Model of Second Cancers after Fractionated Radiotherapy</b>	
Rainer K. Sachs, Igor Shuryak, David J. Brenner, Hatim Fakir, Lynn Hlatky and Philip Hahnfeldt .....	79
<b>Immersion Mirau Interferometry</b>	
Oleksandra Lyulko, Gerhard Randers-Pehrson and David J. Brenner.....	80
<b>A Novel, Rapid Method to Characterize the Human Lymphocyte Concentration Based on Quantitative Light Absorption Analysis</b>	
Yanping Xu, Helen C. Turner, Guy Garty, Gerhard Randers-Pehrson and David J. Brenner .....	81
<b>Investigation of Oxygen/Nitrogen Resonance Explosive Detector (ONRED) for Screening Baggage: Calculational Approach to its Characteristics and Feasibility</b>	
Kenichi Tanaka, Gehard Randers-Pehrson, Yanping Xu, Alan W. Bigelow, Stephen A. Marino and David J. Brenner... 83	
<b>Dosimetry using ATOM Phantoms in the Diagnostic and Therapeutic Regimes</b>	
Carl D. Elliston, Edward L. Nickoloff, Cheng-Shie Wu, Andrew J. Einstein, Sandra Russo and David J. Brenner.....	85
<b><u>CENTER FOR HIGH-THROUGHPUT MINIMALLY-INVASIVE RADIATION BIODOSIMETRY (U19)</u></b>	
<b>Early Radiation-Induced Gene Expression in Human PBL</b>	
Sally A. Amundson and Sunirmal Paul .....	88
<b>Testing High-Throughput Imaging Systems for Biodosimetry</b>	
Guy Garty, Gerhard Randers-Pehrson, Oleksandra V. Lyulko and David J. Brenner.....	90
<b>Automated Robotic System for High-Throughput Radiation Biodosimetry</b>	
Guy Garty, Anubha Bhatla, Jian Zhang, Alessio Salerno, Nabil Simaan, Lawrence Y. Yao and David J. Brenner .....	91

<b>Automation of Biodosimetry Assays: Micronuclei and <math>\gamma</math>-H2AX Foci Formation in Human Lymphocytes</b>	
Helen C. Turner, Guy Garty, Aparajita Dutta and David J. Brenner .....	93
<b>Optimization of Lymphocyte Imaging in Filter Bottomed Plates</b>	
Oleksandra Lyulko, Helen Turner, Guy Garty, Gerhard Randers-pehrson and David J. Brenner .....	95
<b>Radiological Science in the Context of Radiological Terrorism</b>	
Carl Elliston, David J. Brenner and Eric J. Hall .....	97
<b>High Throughput Biodosimetry using Gene Expression</b>	
Muriel Brengues .....	98
<b>DMS-Mass Spec Detection of Biomarkers for Radiation Exposure</b>	
Erkinjon Nazarov .....	99
<b>Radiation Biodosimetry through Metabolomics</b>	
Jeffrey R. Idle, Frank J. Gonzalez, Erkinjon Nazarov and Albert J. Fornace Jr. ....	100
<b>Informatics, Biostatistics and Data Management</b>	
Michael Bittner .....	101
<b>Non-Invasive, High Throughput Cytogenetic Biodosimetry for Ionizing Radiation Exposure</b>	
Angela J. Yoon, Jing Shen, Hui-Chen Wu, Regina Santella .....	102
<b>High-Throughput Antibody-Based Assays to Detect Radiation-Induced Changes in Protein Levels</b>	
Michael A. Partridge and Tom K. Hei .....	103
<b>Personal TLD Dosimeter in the Form of a Button</b>	
Stephen A. Marino, Gary W. Johnson and David J. Brenner .....	107
<b>Protein Phosphorylation Based Assays as Biomarkers for Exposure to Ionizing Radiation</b>	
Brian Ponnaiya .....	108
<b>Radiation-Induced Mitochondrial DNA Damage: A Dosimeter for Radiation Exposure</b>	
Hongning Zhou, Yu-Chin Lien, Michael Partridge, Sarah Huang and Tom K. Hei .....	109
<b>Integrated Microfluidic Visualization on a Microchip for Ultrahigh-Throughput Low-Cost Radiation Biodosimetry</b>	
Daniel Attinger, Chee Wei Wong and Samuel K. Sia .....	110
<b>Phosphoproteome Profiling of Gamma Ray Exposed Lymphocytes</b>	
Yongliang Zhao, Gengyun Wen and Tom K. Hei .....	111
<b>THE RADIOLOGICAL RESEARCH ACCELERATOR FACILITY – an NIH-Supported Resource Center</b>	
<i>Dir., David J. Brenner, PhD, DSc; Assoc. Dir. Gerhard Randers-Pehrson, PhD; Mnger., Stephen A. Marino, MS</i>	
<b>Table of Contents</b> .....	113
<b>RARAF Professional Staff and Picture</b> .....	113
<b>Introduction</b> .....	114
<b>Research using RARAF</b> .....	114
<b>Development of Facilities</b> .....	117
<b>Singletron Utilization and Operation</b> .....	120
<b>Training</b> .....	121
<b>Personnel</b> .....	121
<b>Recent Publications of Work Performed at RARAF</b> .....	122
<b>THE RADIATION SAFETY OFFICE</b>	
<b>Table of Contents</b> .....	123
<b>Radiation Safety Office Staff and Picture</b> .....	123
<b>Introduction</b> .....	125
<b>Overview of Radiation Safety Office Responsibilities</b> .....	125
<b>Summary of Radiation Safety Office Operations for 2007</b> .....	126
<b>ACTIVITIES AND PUBLICATIONS</b>	
<b>Professional Affiliations &amp; Activities</b> .....	140
<b>Professional Publications</b> .....	142