

Table of Contents

CONTENTS.....	1
COLLABORATING DEPARTMENTS AND INSTITUTIONS.....	3
ACKNOWLEDGEMENT OF SUPPORT.....	3
WEB SITE	3
COLUMBIA COLLOQUIUM AND LABORATORY SEMINARS.....	4
INTRODUCTION	5
STAFF LISTING.....	6
STAFF PHOTO	7
STAFF NEWS	8
RESEARCH REPORTS	
<i>MICROBEAM AND DEVELOPMENT STUDIES</i>	
Proposed Multiphoton Microscope for the Columbia University Microbeam II Endstation Alan W. Bigelow, Gregory J. Ross, Gerhard Randers-Pehrson and David J. Brenner.....	9
Imaging Sub-micron Particle Beams Guy Y. Garty, Gerhard Randers-Pehrson and David J. Brenner	10
A Microbeam Irradiator without an Accelerator Guy Y. Garty, Gregory J. Ross, Alan W. Bigelow, Gerhard Randers-Pehrson, David J. Brenner.....	12
Phase-Based Cell Imaging Techniques for Microbeam Irradiations Gregory J. Ross, Alan W. Bigelow, Gerhard Randers-Pehrson, Chun C. Peng and David J. Brenner.....	13
<i>BYSTANDER STUDIES</i>	
Assessment of Low-Dose Low LET Radiation-Induced Bystander Effect in a Three-Dimensional Cell Culture Model Rudranath Persaud, Hongning Zhou, Tom K. Hei and Eric J. Hall.....	17
Induction of Phosphorylated Protein Kinase C Isoforms in Bystander Cells Rajamanickam Baskar, Adayabalam S. Balajee and Charles R. Geard.....	18
Cytoplasmic Irradiation Induced Bystander Mutagenesis in Mammalian Cells Hongning Zhou, Joseph Gillispie and Tom K. Hei	20
The Function of DNA-PKs in Radiation Induced Bystander Effect Hongning Zhou, Joseph Gillispie and Tom K. Hei	21
Separation of a Mixture of A_L and CHO Cells by a Magnetic Technique and Confirmation of Their Purity by Flow Cytometry Rudranath Persaud, Hongning Zhou, Tom K. Hei and Eric J. Hall.....	22
<i>MOLECULAR STUDIES</i>	
Combined Haploinsufficiency for ATM and RAD9 as a Factor in Cell Transformation, Apoptosis and DNA Lesion Repair Dynamics Lubomir B. Smilenov, Howard B. Lieberman, Stephen A. Mitchell, Ronald A. Baker, Kevin M. Hopkins and Eric J. Hall.....	25
Human Checkpoint Control Protein hRAD9 Co-immunoprecipitates with Androgen Receptor Aiping Zhu, Ralph E. Buttyan, Richard A. Friedman and Howard B. Lieberman.....	29
DUSP1 Is an Essential Target of E2F-1 in the Apoptotic Response to Oxidative Stress Jianli Wang and Yuxin Yin	30

Downregulation of Betaig-h3 Gene Is Involved in the Tumorigenic Process of Human Bronchial Epithelial Cells Induced By Heavy Ion Radiation	
Yongliang Zhao, Genze Shao, Chang Q. Piao, Jessica Berenguer and Tom K. Hei	33
Profiling of Differentially Expressed Genes Induced by Organophosphorous Pesticides and Estrogen of Human Breast Epithelial Cells	
Gloria M. Calaf, Debasish Roy and Tom K. Hei.....	36
Gene Expression in Response to Heavy Metal Stress	
Sally A. Amundson, Khanh T. Do and Albert J. Fornace Jr.....	38
Stress-Specific p53-Dependent Responses	
Sally A. Amundson, Khanh T. Do and Albert J. Fornace Jr.....	40
CELLULAR STUDIES	
Histone H2AX Is Dispensable for Base Excision Repair Activity	
Adayabalam S. Balajee, Rajamanickam Baskar and Charles R. Geard.....	43
Mouse ES Cells Devoid of <i>Mrad9B</i> Are Sensitive to UV Radiation	
Corinne Leloup, Aiping Zhu, Kevin M. Hopkins and Howard B. Lieberman.....	45
Effect of Haploinsufficiency on Oncogenic Transformation and Survival in Mouse Embryo Fibroblast Cells	
Stephen A. Mitchell, Lubomir Smilenov, Howard B. Lieberman and Eric J. Hall.....	46
Role of EGFR Signaling in the Regulation of Arsenite-Induced Apoptosis of Human Melanoma and Prostate Carcinoma Cell Lines	
Vladimir N. Ivanov and Tom K. Hei.....	49
Quantification of <i>CD59</i>⁻ Mutants of Human-Hamster Hybrid (A_L) Cells by Using Flow Cytometry	
Hongning Zhou, An Xu, Joseph A. Gillispie, Charles A. Waldren and Tom K. Hei	51
Establishment and Characterization of Mitochondrial DNA Deficient (ρ^0) A_L Cells	
Su X. Liu and Tom K. Hei.....	52
Induction of Transformation and Chromosome Alteration by Arsenite in hTERT-expressing Human Small Airway Epithelial Cells	
Chang Q. Piao, Masao Suzuki and Tom K. Hei	53
A Comparison of Genotoxicity between Arsenic and DiMethylarsenic Acid (DMA^V) in A_L Cells	
Su X. Liu and Tom K. Hei.....	54
POPULATION-BASED RADIOLOGY OR RADIOTHERAPY ORIENTED STUDIES	
Cytogenetic Analysis of Lymphocytes from Mayak Workers	
Catherine R. Mitchell, Tamara V. Azizova, Adayabalam S. Balajee, Ludmilla E. Burak, Valentin F. Khokhryakov, Charles R. Geard and David J. Brenner.....	57
Genetic Susceptibility to Cataract Induction by High Energy Heavy Ions	
Eric J. Hall, David J. Brenner, Basil V. Worgul and Lubomir Smilenov	58
Fractionation and Late Rectal Toxicity: The α/β Value for Late Rectal Bleeding	
David J. Brenner.....	59
Mass Screening with CT Colonography: Should the Radiation Exposure be of Concern?	
David J. Brenner.....	61
Cancer Risks after High Doses of Ionizing Radiation	
David J. Brenner and Rainer K. Sachs.....	63
Small Group Apprenticeship Program in Radiation Biology	
Alan W. Bigelow and David J. Brenner	65
THE RADIOLOGICAL RESEARCH ACCELERATOR FACILITY – an NIH-Supported Resource Center	
<i>Dir., David J. Brenner, PhD, DSc; Mnger., Stephen A. Marino, MS; Chief Physicist, Gerhard Randers-Pehrson, PhD</i>	
Table of Contents / RARAF Professional Staff	66
Research Using RARAF	67
Development of Facilities	70
Accelerator Utilization and Operation	73
Training	74

Personnel 74
Recent Publications of Work Performed at RARAF (2003-2004) 74

THE RADIATION SAFETY OFFICE

Table of Contents 76
Radiation Safety Office Staff 77
Introduction / Overview / Summary of Radiation Safety Office Operations for 2004 78

ACTIVITIES AND PUBLICATIONS

Professional Affiliations & Activities 91
Publications 93

Collaborating Departments and Institutions

Individuals from the following departments and institutions (listed alphabetically) collaborated with Center for Radiological Research staff in the above research abstracts (for individual attributions see specific reports):

Collaborating Columbia University Departments:

- Department of Ophthalmology
- Department of Urology
- Herbert Irving Comprehensive Cancer Center and Department of Biomedical Informatics, Columbia University Medical Center.

Collaborating Institutions:

- Brookhaven National Laboratory, Biology Department, Upton, NY
- International Space Radiation Laboratory, National Institute of Radiological Science, Chiba, Japan

- Radiation Effects Research Foundation, Hiroshima, Japan
- Southern Urals Biophysics Institute, Ozyorsk, Russia
- Stuyvesant High School, New York, NY (student participating in our Small Group Apprenticeship program)
- University of California, Berkeley, Ca
- University of Tarapaca and Research Center for the Man in the Desert, Arica, Chile
- US Department of Health and Human Services
 - National Institutes of Health
 - National Cancer Institute, Division of Basic Science, Bethesda, MD

Acknowledgment of Support

In 2004 the Center for Radiological Research was supported by competitively awarded grants from the following agencies:

Federal:

- Department of Energy
 - Office of Energy Research
 - Office of Environment, Safety and Health
 - Office of Health Programs
- Department of Health and Human Services
 - Health Resources and Services Administration
 - National Institutes of Health:
 - National Cancer Institute [Program Project (PO1) & Individual Research Grants (RO1s)]
 - National Institutes of Environmental Health and Safety (RO1s)
- National Institute of General Medical Sciences (RO1)
- National Institute of Bioimaging and Bioengineering (P41)
- National Center for Research Resources (S10)
- National Aeronautics and Space Administration

Private:

- Lance Armstrong Foundation
- Radiological Society of North America
- Ruth Estrin Goldberg Memorial for Cancer Research ■

Web Sites

- **Center for Radiological Research** <http://crr-cu.org>
- **Radiological Research Accelerator Facility** <http://www.raraf.org>
- **Web-Rad-Train** <http://www.web-rad-train.org>
- **Department of Radiation Oncology** <http://cpmcnet.columbia.edu/dept/radoncology>
- **Radiation Safety Office** <http://cpmcnet.columbia.edu/dept/radsafety>
- **CRR Annual Reports (1998-present; any corrections will be posted here)** <http://crr-cu.org/reports.htm>