

8TH ANNUAL RADIATION PROGRAM INVESTIGATORS' WORKSHOP

April 29-May 3, 1997

AGENDA

Location: Berkner Hall, Brookhaven National Laboratory, except as noted.

Tuesday, April 29

9:00 AM - 5:00 PM Registration
Training for BNL-1 and 2 returnees and new investigators

Wednesday, April 30

8:00 - 8:30 AM Registration

8:30 - 8:35 AM Introduction and Announcements (B. M. Sutherland)

8:35 - 8:45 AM Welcome/Opening Remarks (T. Kirk, W. Schimmerling)

Session I Radiation and Risk

Chair: S. B. Curtis

Co-chair: L. W. Townsend

8:45 - 9:15 AM The Future of Space Radiation Research (R. Setlow)

9:15 - 10:00 AM Uncertainty in Risk Estimation (C. Meinhold)

10:00 - 10:30 AM Risk Extrapolation from Cell and Molecular Biology (R. J. M. Fry)

10:30 - 11:00 AM Break

11:00 - 11:30 AM Overview of Solar Particle Events (R. Turner)

11:30 AM - Noon Fluence-Based, Dose-Based and Event-Based Radiation Protection Systems for Spaceflight - Discussions by NCRP Committee 88 (S. B. Curtis)

Noon - 1:00 PM Lunch

1:00 - 1:15 PM Atmospheric Ionizing Radiation Exposures in Commercial High Altitude Aircraft Operations (D. L. Maiden)

1:15 - 1:45 PM Radiation Safety for High Altitude Aircraft and the Atmospheric Ionizing Radiation Measurement Project (P. Goldhagen)

1:45 - 2:00 PM The Concept of Acceptable Risk in Life Support Systems for Piloted Space Flight (V. Petrov)

- 2:00 - 3:30 PM BNL/AGS Radiobiology Facilities Users' Meeting
- 3:30 - 4:30 PM Tour of AGS, including radiobiology facilities (M. E. Vazquez, D. Lazarus)
- 4:30 - 5:30 PM Tour of BNL Medical Department laboratory facilities (S. J. Gatley)
- 7:00 - 9:00 PM Reception (Ramada Inn East End)
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Thursday, May 1

Session II AGS Experiments - I

Chair: T. C. Yang

Co-chair: L. Lutze-Mann

9:00 - 9:15 AM AGS Operations (D. Lowenstein, P. Pile, D. Lazarus)

9:15 - 9:30 AM BNL-2 Run Summary (M. E. Vazquez, L. Heilbronn)

BNL-2 Results: Cell and Tissue Radiobiology

9:30 - 9:45 AM Lethal and Cytogenetic Effects of Iron Particles (T. C. Yang, H. Wu, K. George, M. Durante and L. Craise)

9:45 - 10:00 AM Early Cellular Responses to 1 GeV/amu Iron Ion Exposure (N. F. Metting)

10:00 - 10:15 AM *In Vitro* Neurotoxicity of 1 GeV/amu ⁵⁶Fe Ions (M. E. Vazquez and E. Kirk)

10:15 - 10:30 AM Some Preliminary Results on the Responses of L5178Y S/S Cells to 1 GeV/amu ⁵⁶Fe ions (A. B. Cox, J. T. Lett and C. Mariano)

10:30 - 11:00 AM Break

BNL-2 Results: Animal Radiobiology

11:00 - 11:15 AM HZE-Induced Remodeling of Tissue Microenvironments (M. H. Barcellos-Hoff, D. Callahan and B. Parvin)

11:15 - 11:30 AM The Effect of Exposure to High Energy Iron Ions on Different Endpoints in Transgenic Mice (L. Lutze-Mann, I. P. Samuels, R. A. Winegar, M. J. Ramsey, J. D. Tucker and V. E. Walker)

11:30 - 11:45 AM Effects of Exposure to 1 GeV/nucleon ⁵⁶Fe Particles on Amphetamine-Induced Taste Aversion Learning (B. M. Rabin, J. A. Joseph, B. Shukitt-Hale and S. Erat)

11:45 AM - Noon Oxidative Stress in the CNS and Cosmic Radiation (⁵⁶Fe Particles): Implications for Immediate or Delayed Behavioral Performance Deficits (J. A. Joseph, B. Shukitt-Hale, B. M. Rabin and S. Erat)

Noon - 12:15 PM Evaluation of Mitotic Abnormalities and Micronucleated Lens Cells After 1 GeV/amu ⁵⁶Fe Irradiation (A. Lindgren, K. Beetham, L. Miranda, J. Edwards and G. Lindgren)

12:15 - 12:30 PM Measurement of Dopamine Receptors and Transporters in Rats After Irradiation with a 1 GeV/amu ⁵⁶Fe Beam (S. J. Gatley, M. E. Vazquez, B. Pyatt, A. Lindgren and N. Volkow)

12:30 - 1:30 PM Lunch

Session III AGS Experiments - II

Chair: M. E. Vazquez

Co-chair: B. M. Rabin

BNL-2 Results: Physics

1:30 - 1:45 PM Fragmentation Physics Results from the 1995 and 1996 Runs (C. Zeitlin, L. Heilbronn, J. Miller, T. B. Borak, T. Carter, K. A. Frankel, S. E. Rademacher, W. Schimmerling and C. Stronach)

1:45 - 2:00 PM Wall Effects Observed in Tissue-Equivalent Proportional Counters from 1.05 GeV/nucleon ⁵⁶Fe Ions (S. E. Rademacher, T. B. Borak, C. Zeitlin, L. Heilbronn, J. Miller and S. A. Baynes)

2:00 - 2:15 PM Characterization of the 1996 1 GeV/u ⁵⁶Fe Beam (C. Zeitlin, L. Heilbronn and J. Miller)

BNL-2 Results: DNA Damage and Repair

2:15 - 2:30 PM LET Effects on Repair of Base Damage and Double-Strand Break Rejoining (P. K. Cooper, M. Löbrich, S. A. Leadon and B. Rydberg)

2:30 - 2:45 PM DNA Double Strand Break Quantitation in Human Cells Irradiated with cGy Doses of Fe (1Gev/amu) Ions (B. M. Sutherland, P. V. Bennett and J. C. Sutherland)

2:45 - 3:00 PM Track Structure Theory Applied to DNA Strand Breaks Produced in Mammalian Cells (T. Jorgensen, P. Russell and L. Thomas)

3:00 - 3:15 PM Novel Method for Detecting Gene Expression Alterations Induced by X-rays, Fission Neutrons and Fe Ions (E. Balcer-Kubiczek, S. J. Meltzer, L.-H. Han, X.-F. Zhang, G. H. Harrison and J. M. Abraham)

3:15 - 3:45 PM Break

BNL-2 Results: Mutagenesis

3:45 - 4:00 PM Effect of p53 on Cell Killing and Mutation Induction Following Low Fluence Exposure to 1090 MeV/amu Fe Ions (A. Kronenberg, S. Gauny, C. Cherbonnel-Lasserre, W. Liu and C. Wiese)

4:00 - 4:15 PM Modulation of Mutation and Aberration by Genes Controlling Reactive Oxygen Species in the Nematode *C. elegans* (G. A. Nelson, W. W. Schubert, G. A. Kazarians and R. Kern)

4:15 - 4:30 PM Mutation and Antimutation in Human-Hamster Hybrid AL Cells (M. Lenarczyk, A. Ueno, D. Ueno, J. Bedford, T. Hei, A. Kronenberg and C. Waldren)

4:30 - 4:45 PM Molecular Analysis of Heavy Ion-Induced Genomic Alterations in Human Mammary Epithelial Cells (S. Yamada, T. C. Yang, K. George and P. K. Riggs)

4:45 - 5:30 PM Panel Discussion: BNL-3 and Beyond - Scientific Objectives (Barcellos-Hoff, Cox, Cucinotta, Evans, Lutze-Mann, Nelson, Yang)

Chair: A. Kronenberg

Co-chair: B. M. Sutherland

7:00 - 9:00 PM Dinner (Brookhaven Center)

Friday, May 2

Session IV

Chair: S. J. Gatley

Co-chair: L. Heilbronn

9:00 - 9:45 AM LBL-CSU NSCORT Summary (A. Chatterjee)

9:45 - 10:30 AM Imaging the Human Brain with Positron Emission Tomography (N. Volkow, J. Fowler and S. J. Gatley)

10:30 - 11:00 AM Break

11:00 - 11:15 AM The National Space Biomedical Research Institute (NSBRI): Radiation Effects (J. Dicello)

11:15 AM - Noon LLUPTC Facilities Update (G. A. Nelson, M. Moyers)

Noon - 1:00 PM Lunch

Session V International Research

Chair: J. Kiefer

Co-chair: V. Petrov

1:00 - 1:20 PM Mutation Induction in Mammalian Cells by Heavy Ions: Cross Sections and Mutational Spectra (J. Kiefer and P. Schmidt)

1:20 - 1:35 PM Mouse Skin Reaction After Fractional Irradiations with 290 MeV/u Carbon Ions (K. Ando, S. Koike, C. Y. Jau, K. Nemoto, S. Ando, N. Kobayashi, T. Ohbuchi, W. Shimizu and T. Kanai)

1:35 - 1:50 PM LET-RBE and -OER Spectra of Cell Killing for Accelerated ^3He , ^{12}C , ^{20}Ne , ^{40}Ar and ^{56}Fe Ion Beams upon V79 Cells (Y. Furusawa, K. Fukutsu, M. Saito, F. Yatagai and T. Kanai)

1:50 - 2:05 PM Cytogenetic Effects of Heavy Ions in Human Lymphocytes (E. A. Krasavin, R. D. Govorun, B. S. Fedorenko, V. M. Petrov, S. Kozubek, E. Lukášová and M. V. Repin)

2:05 - 2:30 PM Radiobiology Experiments Using Low Energy Ions at the INFN-Laboratori Nazionali de Legnaro (R. Cherubini)

Session VI Physics - Experiments and Models

Chair: J. Miller

Co-chair: J. W. Wilson

- 2:30 - 2:45 PM Depth Dependence of Absorbed Dose, Dose Equivalent, and Linear Energy Transfer Spectra in Polyethylene and Comparison with Model Calculations (G. D. Badhwar and F. A. Cucinotta)
- 2:45 - 3:00 PM Fragmentation of $275 \text{ MeV/u } ^{12}\text{C}$ in C, CH_2 , Al, Cu and Pb (J. Miller, A. Fukumura, L. Heilbronn, T. Murakami and C. Zeitlin)
- 3:00 - 3:30 PM Break
- 3:30 - 3:45 PM Radiation Protection From Solar Particle Event Exposures in Deep Space (J. W. Wilson, J. L. Shinn, L. C. Simonsen, F. A. Cucinotta, T. D. Jones, C. K. Chang and Y. Kim)
- 3:45 - 4:00 PM Calculation of the Microdosimetric Quantity, Mean Specific Energy Squared, $\overline{z^2}$, as a Function of Radial Distance from Heavy Ions (R. Katz, F. A. Cucinotta and J. W. Wilson)
- 4:00 - 4:15 PM Molecular Kinetics Description of the Cell Cycle and Gene Expression After X-ray and Heavy Ion Exposure (F. A. Cucinotta, J. W. Wilson, J. F. Dicello, J. R. Williams and M. Mabry)
- 4:15 - 4:30 PM Biophysical Modeling of Radiation-Induced Large Deletion Mutations in the Human HPRT Gene (H. Wu, R. K. Sachs and T. C. Yang)

Session VII Flight Measurements

Chair: G. Reitz

Co-chair: G. D. Badhwar

- 4:30 - 4:45 PM Radiation Measurements and Radiobiological Experiments in Space (G. Reitz, C. Baumstark-Khan, R. Beaujean, R. Facius, G. Horneck and P. Rettberg)
- 4:45 - 5:00 PM Preliminary Results from the Environmental Radiation Measurements Experiment Aboard the Mir Station (E. R. Benton, E. V. Benton and A. L. Frank)
- 5:00 - 5:15 PM Solar Modulation of Dose Rate On Board the Mir Station (G. D. Badhwar, V. Shurshakov and V. Tsetlin)
- 5:15 - 5:30 PM Investigation of 3D ORAM Materials for Space Radiation Dosimetry (G. Phillips, S. Mueller and M. Moscovitch)
- 7:00 - 10:00 PM Banquet
- Speaker: Dr. Christopher S. Romanek
Savannah River Ecology Laboratory
University of Georgia
- Title: Potential Biologic Origin for Secondary Minerals in Martian Meteorite ALH84001
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Saturday, May 3

Session VIII Animal, Tissue and Cell Radiobiology

Chair: M. H. Barcellos-Hoff

Co-chair: A. B. Cox

- 9:00 - 9:20 AM Modeling Human Risk: Cell and Molecular Biology in Context (H. Warner, M. J. Bissell and A. Chatterjee)
- 9:20 - 9:35 AM Stability of Translocation Frequency Following Whole-Body Irradiation of Rhesus Monkeys (A. B. Cox, J. N. Lucas, F. S. Hill, C. E. Burk and T. Straume)
- 9:35 - 9:50 AM Radiation Effects on the Balance Between Cell Growth, Differentiation and Death in Human Lens Epithelial Cells (E. Blakely, K. Bjornstad, P. Chang, G. Aragon and S. Lin)
- 9:50 - 10:05 AM Radiation Exposure Decreases Electrical Resistance Across Cell Membranes in Cultured Epithelial Cells (P. K. Riggs, C. H. Pedemonte and T. C. Yang)
- 10:05 - 10:20 AM Development of a Harderian Gland Epithelial Cell Culture Model (V. Srinivasan, L. M. Heman-Ackah, S. M. Stiefel, E. P. Clark and E. J. Ainsworth)
- 10:20 - 10:35 AM Mechanism of Radiation-Induced Cell Death in Human Cells (N. Ramakrishnan, J. F. Kalinich, D. E. McClain and E. J. Ainsworth)
- 10:35 - 10:50 AM Break

Session IX Molecular Radiobiology

Chair: E. Blakely

Co-chair: N. F. Metting

- 10:50 - 11:05 AM Induction of Genomic Instability by High Energy Radiation (H. Evans, J. Schwartz, M.-F. Horng and M. Ricanati)
- 11:05 - 11:20AM Relationship of DNA Double Strand Break Induction and Repair to the Spectrum and Frequency of Mutation in the Human-Hamster Hybrid AL (B. Fouladi, C. Waldren and P. K. Cooper)
- 11:20 - 11:35 AM Assessment of Radiation-Induced Carcinogenesis by Molecular Biomarkers: Oncogene Activation and Altered Tumor Suppressor Expression (A. C. Miller, J. Xu, T. Whittaker and E. J. Ainsworth)
- 11:35 - 11:50 AM Radiation Anticarcinogenesis by Thiazolidine Prodrugs (R. Warters and J. Roberts)
- 11:50 AM - Noon Closing Remarks (W. Schimmerling)
- Noon Adjourn