# Final Report

# DE-FG02-08ER6473

## The Radiobiological Basis for Improvements in Radiotherapy and Low Dose Risk Assessment

**Principal Investigator: Dr. Tom K. Hei**

**Submitted Electronically 12/08/2009**

a) **Overall Goal**: This conference grant was proposed to organize and host an international conference at Columbia University in New York to critically assess the cellular and molecular signaling events and tissue response following radiation damage. The conference would also serve as a venue to play tribute to the more than forty years contributions made by Professor Eric J. Hall to the radiation biology field. The goals of the meeting were to examine tumor hypoxia and sensitizer development; recent advances made in clinical radiotherapy; addressed several low dose phenomena, including genomic instability and bystander effects that are important in radiation risk assessment.

b) **Study and Results**: The symposium was held on October 13th and 14th, 2008 at the Alfred Lerner Hall in the Morningside campus of Columbia University. The symposium, entitled "From Beans to Genes: A Forty Year Odyssey in Radiation Biology" was attended by more than 120 faculty, scientists, clinicians, fellows and students. The symposium, spanned over a day and a half, covered four scientific themes. These included tumor hypoxia and radiosensitizers; low dose radiation response; radiation biology in the practice of radiotherapy, and radiation hazard in space and genetic predisposition to cancer. The program of the symposium is as follow:

## SYMPOSIUM PROGRAM

**Monday, October 13th, 2008**

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| 8:00 -8:45 a.m. | Continental Breakfast |
| 8: 45-9:00 a.m. | Welcoming Remark by Dr. Tom K. Hei and Dr. Steven Shea, Senior Vice Dean |
| 9:00 - 9:15 a.m. | "Eric J. Hall- the Radiobiologist's Radiobiologist" by Dr. David J. Brenner |
| **SESSION I** | **Tumor Hypoxia and Radiosensitizers**<br>Chairman: Dr. Charles R. Geard |
| 9:15 - 9:45 a.m. | Dr. Martin J. Brown<br>*Sensitizing Tumors to Radiotherapy: What's Important- The Tumor Cells or the Vascular Cells ?* |
| 9:45 - 10:15 a.m. | Dr. James B. Mitchell<br>*Tumor Hypoxia: From Sensitizing to Imaging* |
| 10:15 - 10:45 a.m. | Dr. Ian J. Stratford<br>*Tumor Hypoxia: The Sensitizer Years* |
| 10:45 - 11:10 a.m. | Coffee Break |

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| 11:10 - 11:40 a.m. | Dr. Amato J. Giaccia<br>*Selective Targeting of the VHL/ HIF Pathways for Cancer Therapy* |
| 10:40 - 12:10 a.m. | Dr. Michael L. Freeman<br>*TGFβ Signaling Represses Nrf2 Directed Gene Expression* |
| 12:20 - 2:00 p.m. | Group Picture and Lunch |
| **SESSION II** | **Modulating Factors in Low Dose Radiation Response**<br>Chairman: Dr. Noelle Metting |
| 2:00 - 2:30 p.m. | Dr. Eric G. Wright<br>*The Radiobiology of the Haemopoietic System: Modulation by Radiation quantity and Quality, Genetics and Microenvironment* |
| 2:30 - 3:00 p.m. | Dr. William F. Morgan<br>*Our Research for a Bystander Effect* |
| 3:00 - 3:30 p.m. | Dr. Keiji Suzuki<br>*Higher Order Chromatin Structure and Non-Targeted Effects* |
| 3:30 - 3:50 p.m. | Coffee Break |
| 3:50 - 4:20 p.m. | Dr. Edouard I. Azzam<br>*Intercellular Communication Between the Targeted and the Bystander: a Radiant Journey Through Time* |
| 4:20 - 4:50 p.m. | Dr. Joel S. Bedford<br>*Mildly Radiosensitive Phenotypes: Their Potential Significance and Assays for Detecting Them* |
| 7:00 - 9:30 p.m. | Reception and Banquet (Business casual)<br>Low Library Rotunda, Columbia University |

**Tuesday, October 14th, 2008**

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| 8:00 - 8:45 a.m. | Continental Breakfast |
| **SESSION III** | **Radiobiology in the practice of Radiation Oncology**<br>Chairman: Dr. David Brenner |

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| 8:45 - 9:20 a.m. | Dr. James D. Cox and Dr. Ritsuko Komaki<br>*Molecular and Physical Targeting: A Platform for Improving the Therapeutic Ratio in Cancer Treatment* |
| 9:20 - 9:50 a.m. | Dr. Herman D. Suit<br>*Proton versus Carbon Ion Beams in Definitive Radiation Treatment of Cancer Patients* |
| 9:50 - 10:20 a.m. | Dr. Clifford K.S. Chao<br>*Image-Guided Therapy Paradigms in Radiation Oncology* |
| 10:20- 10:40 a.m. | Coffee Break |
| **SESSION IV** | **Radiation Hazard in Space and Genetic Predisposition to Cancer**<br>Chairman: Dr. Howard Lieberman |
| 10:40 - 11:10 a.m. | Dr. Robert L. Ullrich<br>*Radiation Risk in Space: What Can We Learn From Animal Studies ?* |
| 11:10 - 11:40 a.m. | Dr. Mary Helen Barcellos-Hoff<br>*Do Radiation Quality Effects in Human Epithelial Cells Add Up to Cancer ?* |
| 11:40 - 12:10 a.m. | Dr. Kenshi Komatsu<br>*Role of NBS1 in Genomic Instability* |
| 12:10 - 12:40 p.m. | Dr. Sally A. Amundson<br>*Global Gene Expression Profiling of Radiation Response and Sensitivity* |
| 12:40- 1:00 p.m. | Concluding Remarks: Dr. Eric J. Hall and Dr. Tom K. Hei |
| 1:00 p.m. | Adjourn |

With this final report, we have successfully completed **ALL** the stated goals in our original application.