MEETING REPORT

New Developments and Future Directions in Radiation Research

American Statistical Association Conference on Radiation and Health
Vail, Colorado, June 15–18, 2008

Co-organizers: Daniel D. Stram, University of Southern California, and Jerome Puskin, U.S. Environmental Protection Agency

The American Statistical Association’s 2008 Conference on Radiation and Health was the 18th in a decades-long series of meetings on the general topic of human health effects of exposure to ionizing and non-ionizing radiation. The purpose of the conferences is to provide a forum for the evaluation of new methodologies and recent research findings from the laboratory, from the clinic, or from follow-up of populations exposed to radiation from their work, disease treatment or environmental contamination. The meetings are attended by a highly diverse group of scientists, including statisticians, epidemiologists, risk assessors, biologists and physicists working in radiation research. Topics are selected by an Organizing Committee that includes scientists with expertise in biostatistics, epidemiology, public health and health risk assessment. The 2008 conference was held in Vail, Colorado, June 15–18, 2008 with the meeting devoted to the general theme of “New Developments and Future Directions of Radiation Research” with five scientific sessions each with four or five speakers and a discussant invited by the Organizing Committee. Scientific presentations were scheduled in morning and evening sessions. Contributed posters were shown and discussed during afternoon hours with other afternoon time devoted to informal discussion and outdoor recreational activities. In addition, Dr. John C. Cooper of the Center for Radiation, Chemical, and Environmental Hazards Health Protection Agency of the United Kingdom gave an evening banquet talk entitled “Response to the polonium poisoning incident in the UK.”

The five scientific sessions covered the subjects of (1) Radiobiology, (2) Chronic and Fractionated Low Dose Studies, (3) The Future of Biostatistics at the Radiation Effects Research Foundation, (4) Biodosimetry for Epidemiology, and (5) Medical and Diagnostic Radiation Exposure. A summary of each of these sessions follows.

SESSION 1: RADIOBIOLOGY

Leslie Redpath, Amy Kronenberg and Tony Brooks, Organizers; Amy Kronenberg, Discussant

Chromosome Instability Resulting from Double-Strand Breaks near Telomeres in Mammalian Cells: Professor John P. Murmane of the University of California San Francisco described the significance of DNA double-strand breaks (DSBs) near telomeres and in particular the induction of breakage/fusion/bridge cycles by sister chromatid fusion and the transfer of telomeres from undamaged to damaged chromosomes. Instability, i.e. the production of DNA deletions and amplifications, is transferred from chromosomes originally affected by the DSB to the donor chromosome since loss of a telomere results in instability in the donor. This instability can then be transferred to additional chromosome as each in turn donates telomeres. Professor Murmane described his group’s current investigations of differences in repair of DSBs near telomeres compared to interstitial sites.

Ionizing-Radiation Induced Bystander Effects: Mediating Mechanisms and Impact on Cancer Risk: Professor Edouard Azzam of the University of Medicine and Dentistry of New Jersey-New Jersey Medical School summarized the current state of knowledge about the transfer of radiation effects from targeted to untargeted cells, especially in tissue or cultures exposed to low fluences of energetic particles. These bystander effects include DNA damage, oxidative stress and unexpected genetic alterations in nearby nonirradiated cells. Professor Azzam noted that research is under way to elucidate the biochemical and molecular events mediating the expression of non-targeted effects of radiation exposure. The current thinking is that the cellular redox environment and tissue microenvironment may affect the nature of propagated bystander effects and that the exposed cell populations or tissues respond as a whole to radiation. Dr. Azzam suggested that an extension of in vitro bystander effect studies to in vivo studies would be relevant to radiation protection specifically since these effects may imply that modeling of health effects should not be based simply on a count of the number of irradiated cells from a given exposure.