AFTER BEIR VI and BEIR VII

GILBERT W. BEEBE WEBINAR SERIES

October 19 and 20, 12 PM – 2 PM (ET) Each day

The 2006 Biological Effects of Ionizing Radiation (BEIR) VII report is the latest in a series of reports published by the National Academies that examine radiation exposures and human health. BEIR VII utilized data from the atomic bomb survivors and from the occupational, medical, and environmental studies that were available at the time to develop models for calculating risks of radiogenic cancers in the U.S. population following low doses of radiation. The BEIR VII report did not cover radon exposure, which was reviewed in the earlier BEIR VI report published in 1999. Models and approaches recommended in the BEIR VI and BEIR VII reports and extensions and modifications to them have been foundational in the U.S. radiation protection system. Recognizing the need to periodically review available data and update models for calculating risks, the Nuclear and Radiation Studies Board of the National Academies will host a two-day webinar on October 19 and 20, 2021. Each day will be limited to 2 hours of focused presentations and discussions starting at 12:00 (ET) each day. Attendees need to sign up for each day separately.

On October 19, we will examine the question: What do we know about cardiovascular effects at low doses of radiation? You can register here for the October 19 webinar.

On October 20, we will examine the question: What have we learned about radon risks since publication of the BEIR VI report? You can register here for the October 20 webinar.

For comments and questions about the Gilbert W. Beebe Webinar Series, or suggestions for future topics, please contact Ourania (Rania) Kosti at okosti@nas.edu.

AGENDA

OCTOBER 19

WHAT DO WE KNOW ABOUT CARDIOVASCULAR EFFECTS AT LOW DOSES OF RADIATION?

12:00 PM **Call Day 1 of the 5th Webinar to Order**
5.1 Introducing the Scope of the Webinar
Amy Berrington de González, National Cancer Institute
Jonathan Samet, Colorado School of Public Health

12:15 PM **5.2 Cardiovascular Effects at Low Doses of Radiation: Perspectives from Epidemiology**
Mark Little, National Cancer Institute

12:35 PM **Q&A and Discussion**

12:45 PM **5.3 Cardiovascular Effects at Low Doses of Radiation: Perspectives from Radiation Biology**
Marjan Boerma, University of Arkansas for Medical Sciences

1:05 PM **Q&A and Discussion**

1:15 PM **5.4 Cardiovascular Effects at Low Doses of Radiation: Perspectives for Space Exploration**
Zarana Patel, National Aeronautics and Space Administration

1:35 PM **Q&A and Discussion**

1:45 PM **5.5 BEIR VII Update and Cardiovascular Effects**
Discussion with all presenters and audience participation

2:00 PM **Adjourn Day 1**

OCTOBER 20

WHAT HAVE WE LEARNED ABOUT RADON RISKS SINCE PUBLICATION OF THE BEIR VI REPORT?

12:00 PM **Call Day 2 of the 5th Webinar to Order and Welcome**
5.6 Introducing the Scope of the Webinar
Jonathan Samet, Colorado School of Public Health
Amy Berrington de González, National Cancer Institute

12:10 PM **5.7 What We Don't Know About Radon Today**
Bill Field, College of Public Health, University of Iowa

12:20 PM **5.8 EPA's Application of Radon Risk Models: Past, Present, and Future**
David Pawel, Environmental Protection Agency
Bill Long, Environmental Protection Agency

12:35 PM **Q&A and Discussion**

12:45 PM **5.9 The Pooled Uranium Miners Analysis (PUMA)**
David Richardson, University California, Irvine
Michaela Kreuzer, Federal Office for Radiation Protection, Germany

1:25 PM **Q&A and Discussion**

1:35 PM **5.10 Mechanistic Studies on Radon Health Effects**
David Brenner, Columbia University, Irving Medical Center
Igor Shuryak, Columbia University, Irving Medical Center

1:50 PM **Q&A and Discussion**

2:00 PM **Adjourn Day 2**

SPEAKER BIOS

Dr. **Amy Berrington** is the Branch Chief and senior investigator in the Radiation Epidemiology Branch. She is an internationally recognized cancer epidemiologist who has made important contributions to the understanding of cancer risks from medical radiation exposures. Dr. Berrington is the PI of the U.S. Pediatric Proton Therapy Cohort, the Kaiser Breast Cancer Survivors Study and co-PI of the UK Pediatric CT scans cohort, which was the first epidemiological study to support a direct link between CT scans and subsequent cancer risk. Dr. Berrington is currently a member of the NAS Nuclear and Radiation Studies Board and has participated in numerous national and international radiation and cancer advisory committees. She is an elected member of the American Epidemiological Society and served on the editorial board for the *American Journal of Epidemiology*. Before joining the NCI, she held faculty positions at Oxford and Johns Hopkins University. Dr. Berrington is also the Senior Advisor for Strategic Activities in DCEG. In this role, she provides advice to the Director on the division research portfolio and works with the Deputy Director to oversee strategic planning.

Marjan Boerma received her PhD in radiation biology from Leiden University, the Netherlands in 2004 and followed this with a postdoctoral fellowship in the Department of Surgery at the University of Arkansas for Medical Sciences (UAMS). She is currently an associate professor in the Division of Radiation Health within the College of Pharmacy at UAMS. Her research expertise is in animal models of normal tissue injury from ionizing radiation, specifically in the cardiovascular system. Her laboratory uses animal models that address whole-body radiation exposure due to radiological accidents, cardiac side effects of radiation therapy, and cardiovascular effects of low- and high-linear energy transfer radiation to mimic exposures during deep-space travel. Her research funding has been provided by the National Cancer Institute, the National Institute of Allergy and Infectious Diseases, the National Aeronautics and Space Administration, the American Cancer Society, and other federal and private funding sources. She has published more than 90 peer-reviewed articles and has given over 50 invited lectures in local, national and international settings. In addition, Dr. Boerma serves as the Director of the Ultrasound Imaging Core and the Experimental Radiation Core at UAMS. She has served as an advisor for the International Atomic Energy Agency in Vienna, and the Radiation Effects Research Foundation in Hiroshima. She is a standing member of the National Institutes of Health (NIH) Radiation Therapeutics and Biology Study Section and has served as an ad-hoc member on several other NIH study sections and U.S. Department of Defense grant review panels.

Dr. **David Brenner** is the Director of the Columbia University Center for Radiological Research, which is the oldest and largest radiation biology center in the US. He is also P.I. of the Center for High-Throughput Minimally-Invasive Radiation Biodosimetry, a multi-institute consortium to develop high-throughput biodosimetry technology to rapidly test individual radiation exposure after a radiological incident. He is also Director of the Columbia Radiological Research Accelerator Facility (RARAF), which is a national facility dedicated to probing the mechanisms of radiation induced cancer. Dr. Brenner's research focuses on mechanistic models for the effects of ionizing radiation on living systems. Over the past few years Dr. Brenner and colleagues have developed a promising technique to prevent the airborne transmission of viruses like influenza virus, which they expect to be effective for coronavirus too.

Dr. **Bill Field** is a Professor at the University of Iowa's College of Public Health with appointments in the Department of Occupational and Environmental Health and Department of Epidemiology. He serves as the Deputy Director of the NIOSH funded Heartland Center for Occupational Health and Safety and Program Director of its Occupational Epidemiology Training Program. Dr. Field was the lead author of the Iowa Radon Lung Cancer Epidemiologic Study and a co-author of the North American Pooled Radon Study. In 2009, his Keynote Address at the International Radon Meetings launched the World Health Organization's Handbook on Indoor Radon on behalf of the WHO's International Radon Project. He is currently a Co-Principal Investigator of an NIH funded study examining the potential association between radon exposure and stroke. Dr. Field has served on numerous NAS committees and recently completed 8 years of service on the U.S. EPA's Science Advisory Board. He also currently serves as a Presidential Appointee on the CDC's Advisory Board on Radiation and Worker Health. Dr. Field received his PhD in Preventive Medicine from the College of Medicine at the University of Iowa. He has received numerous awards for his long-term public health commitment to educating the public, and health care providers, about the risk posed by protracted radon exposure.

Michaela Kreuzer obtained a diploma in statistics from the Ludwig-Maximilians-University (LMU) in Munich in Germany in 1987 and a PhD in epidemiology in 1996. Since 2004 she is member of the Medical Faculty of the LMU ("Habilitation") and private teacher (Priv.-Doz.) in epidemiology. Michaela Kreuzer started her scientific career in 1988 as epidemiologist at the Institute of Occupational Medicine, Heinrich-Heine University of Düsseldorf. In 1990 she moved into the research field "indoor radon and lung cancer" at the University of Wuppertal, Germany and the Institute of Epidemiology at the HelmholtzZentrum Munich (HMGU), Germany. Since 1998 she is working at the Federal Office for Radiation Protection (BfS) in Neuherberg in Germany, where she was previously heading the working group "Radiation Epidemiology" and is now heading the division "Effects and risks of ionizing and non-ionizing radiation". She is principal investigator of the German uranium miner cohort study with nearly 60.000 radon-exposed miners. Michaela Kreuzer is member of the European research platform "Multidisciplinary European Low Dose Initiative (MELODI)", which was founded in 2010. From 2014-2017 she was chair of the working group "Strategic Research Agenda (SRA)" and since 2018 vice-chair.

Dr. **Mark Little** studied mathematics at Trinity College, Cambridge and obtained his doctorate in mathematics at New College, Oxford. Over the last two decades he has analyzed dose response for cancer and cardiovascular disease risks in populations exposed to ionizing radiation and cigarette smoke. Dr. Little has developed statistical models to elucidate mechanisms of carcinogenesis and cardiovascular disease in various irradiated populations, and to highlight the effects of measurement error on regression estimates. He worked at Imperial College before taking up his current position at NCI. He currently serves as a member of Council on the National Council on Radiation Protection and Measurements (NCRP), and has previously been a member of the Advisory Group on Ionising Radiation of the United Kingdom (UK) Health Protection Agency (now the UK Health Security Agency). He has also served as consultant to the United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR), the International Atomic Energy Agency (IAEA), and to the UK Committee on Medical Aspects of Radiation in the Environment (COMARE).

Bill Long is the Director of the Center for Radon and Air Toxics in EPA's Indoor Environments Program. He has over 20 years of experience directing national and international environmental programs to improve air quality and save lives at the US EPA.

Dr. **Zarana S. Patel** is a Senior Scientist at KBR and works within the Human Research Program (HRP) at the NASA Johnson Space Center in Houston. She has previously served as Lead Scientist for the "Risk of Cardiovascular Disease from Radiation," one of over twenty human health risks from spaceflight that are documented within the HRP. Within that role, she was responsible for identifying science requirements and managed the research portfolio and schedule required to inform and mitigate the CVD Risk. Dr. Patel currently serves as project manager for the Space Radiation Element Cardiovascular Disease (CVD) Risk Modeling project, providing her expertise on systems engineering and cardiovascular disease risk assessment towards the development of a risk model for spaceflight-induced CVD.
Dr. Patel earned her BS in Biomedical Engineering from Johns Hopkins University, her PhD in Bioengineering from Rice University, and then joined the Space Radiation Element at NASA Johnson Space Center in 2007. She has performed NASA-funded radiation research and education outreach for over 10 years. This has included investigations to elucidate the role of radiation exposure (both gamma and space radiation heavy ion exposures) in the development and progression of epithelial cancers for cancer risk assessment models, as well as effects on endothelial dysfunction, inflammation, and senescence for radiation-induced CVD.

Dr. **David J. Pawel** is a statistician at the U.S. Environmental Protection Agency (EPA) within the Office of Radiation and Indoor Air. Dr. Pawel has a B.A. degree in Mathematics from the College of William and Mary, an M.S. degree in Statistics from Rutgers University and a Ph.D. in Statistics from the University of Wyoming. At EPA, his responsibilities include the evaluation of radio-epidemiological studies and implementation of the Agency's radiogenic risk models. Prior experience includes evaluation of radiation risks to the atomic bomb survivors as a research scientist at the Radiation Effects Research Foundation (RERF) in Japan from 1992-1994. In 2003, Dr. Pawel was awarded a Gilbert W. Beebe Fellowship, which enabled him to revisit RERF to study methods to improve cancer-specific radiogenic risk estimates. Dr. Pawel is a Council member of the (U.S.) National Council on Radiation Protection and Measurements. Dr. Pawel has served as member of the United States delegation to UNSCEAR since 2014 and as alternate representative since 2017.

David B. Richardson is Associate Dean for Research in Public Health and Professor in Environmental and Occupational Health at UC Irvine. Prior to this position he was Professor in the Department of Epidemiology, School of Public Health at the University of North Carolina at Chapel Hill and Deputy Director of the North Carolina Occupational Safety and Health Education and Research Center and director of the center's Program in Occupational Epidemiology. His research focuses on the health effects of occupational and environmental exposures, particularly with regards to carcinogens. He has conducted studies of cancer among workers in the United States and abroad. Dr. Richardson's current research includes studies of mortality among nuclear industry workers and uranium miners, and development of new methods for occupational cohort studies. He is a member of Committee 1 (Radiation Effects) of the International Commission on Radiological Protection, serves as a Lead Coordinating Writer for the United Nations Committee on Epidemiological Studies of Radiation and Cancer, Scientific Committee on the Effects of Atomic Radiation (UNSCEAR), and serves as Associate Editor of the journals Occupational and Environmental Medicine and American Journal of Epidemiology. His service on National Academies committees includes the Committee to Review the Health Effects in Vietnam Veterans of Exposure to Herbicides - Tenth Biennial Update and the Committee on the Review of the Department of Labor's Site Exposure Matrix (SEM) Database. Dr. Richardson received a PhD and MSPH, both in epidemiology, from the University of North Carolina at Chapel Hill.

Jonathan M. Samet, MD, MS, a pulmonary physician and epidemiologist, is Dean of the Colorado School of Public Health. Previously, Dr. Samet was the Flora L. Thornton Chair for the Department of Preventive Medicine at the University of Southern California and Director of the USC Institute for Global Health. Dr. Samet received a Bachelor's degree in Chemistry and Physics from Harvard College, an MD degree from the University of Rochester's School of Medicine and Dentistry, and a Master of Science degree in Epidemiology from the Harvard School of Public Health. His research focuses on the health risks of inhaled pollutants—particles and ozone in outdoor air and indoor pollutants including secondhand smoke and radon. He has also investigated the occurrence and causes of cancer and respiratory diseases, emphasizing the risks of active and passive smoking. For several decades, he has been involved in global health, focusing on tobacco control, air pollution, and chronic disease prevention. Dr. Samet has served and chaired numerous committees of the National Research Council and Institute of Medicine, and as chair of the Clean Air Scientific Advisory Committee of the U.S. EPA and the FDA's Tobacco Products Scientific Advisory Committee. For the National Research Council, he chaired, among others, the Biological Effects of Ionizing Radiation (BEIR) VI Committee; the Committee on Research Priorities for Airborne Particulate Matter, Board on Environmental Studies and Toxicology; the Committee to Review the Draft IRIS Assessment on Formaldehyde; the Committee to Develop a Research Strategy for Environmental Health and Safety Aspects of Engineered Nanomaterials; the Committee to Review the IRIS Process; and the Committee on Incorporating 21st Century Science into Risk-Based Evaluations. Dr. Samet was elected to the National Academy of Medicine (Institute of Medicine) of the National Academy of Sciences in 1997 and received the David M. Rall Medal for his contributions in 2015.

Igor Shuryak's main research focus involves quantitatively modeling radiation effects including radiation carcinogenesis, normal tissue complications, radioresistance and non-targeted effects. His previous training and experience have been interdisciplinary, starting with biology (BA from Columbia University) and medicine (MD from SUNY Downstate College of Medicine). He completed the intensive Cancer Training Program (Columbia University, Mailman School of Public Health), where for three years he improved his skills in cancer epidemiology and biostatistics. Dr. Shuryak received a PhD degree with distinction in 2010 from the department of Environmental Health Sciences (Columbia University, Mailman School of Public Health) for mechanistic mathematical modeling of radiation-induced carcinogenesis. His work in this field, and also in the field of resistance to ionizing radiation, has resulted in multiple peer-reviewed publications.