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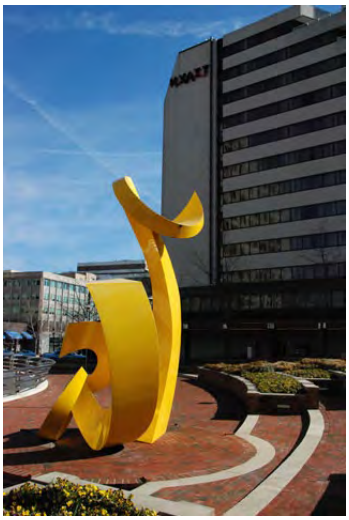
In This Issue

NCRP 49th Annual Meeting
Radiation Dose and the Impacts on Exposed Populations

Bruce Napier, CHP



About 325 radiation protection researchers and practitioners, physicians, engineers, state and federal agency personnel, and members of the academic community packed the National Council on Radiation Protection and Measurements (NCRP) annual meeting in person in Bethesda, Maryland, 11–12 March 2013, and several dozen others participated remotely via live webinar. The topic of the meeting was "Radiation Dose and the Impacts on Exposed Populations." Along with the webinar, several other new approaches were tried at this meeting, including receipt of written questions from the live and remote audiences answered by panels of speakers at the end of each session. The presentations, questions, and responses will be posted soon on the NCRP website at ncrponline.org, thanks to support from the National Cancer Institute (NCI). The proceedings of the meeting should be published in *Health Physics* by the end of this year (we are trying for record time!). The entire conference was video recorded for later use as well, thanks to Dr. Tom Johnson, Colorado State University, and his students.

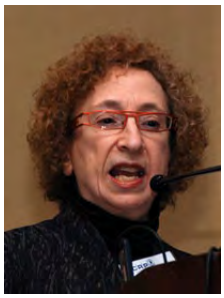
Shunichi Yamashita

Because the first day of the meeting was also the second anniversary of the Great East Japan Earthquake and Tsunami of 2011, the meeting was dedicated to the people of Japan affected by these combined disasters. The meeting opened with the Tenth Annual Warren K. Sinclair Keynote Address presented by Dr. Shunichi Yamashita, vice-president of the Fukushima Medical University, on the "Fukushima Nuclear Power Plant Accident and Comprehensive Health Risk Management." In this talk, Yamashita described the plans for and initial results of the Fukushima Health Management Survey, which includes a survey of all 2 million residents of the Fukushima Prefecture to allow individual external radiation dose reconstruction, and detailed thyroid ultrasound examinations, comprehensive health checkups, mental health and life-style surveys, and pregnancy and child surveys to support long-term care. Yamashita opened with the lesson learned from the accidents at Chernobyl and Fukushima that inadequate communication equals inadequate protection; this became one of the continuing themes of the meeting. He also highlighted that the major impacts at Chernobyl and Fukushima include severe psychosocial and emotional impacts, even in the absence of radiation exposure. Because of poor initial communications by experts with the media, there has been a loss of credibility of scientific and government officials. The Japanese public does not accept scientific results and there has been an increase in public anger, anxiety, and distrust. The health

effects seen in children include changes in school performance, anxiety, and increased obesity (influenced by "comfort eating" and reduced exercise from staying indoors to avoid perceived contamination). Increases in adults of sleep disorders, alcoholism, and other stress-related problems are evident. Because of the detailed screening, researchers have discovered that the baselines of nonsymptomatic thyroid diseases are much higher than reported in other parts of Japan—but that this is because the investigators are looking more closely and not because of radiation or other traumatic exposures.

Steven L. Simon

The first session of the meeting, chaired by S.Y. Chen, was designed to pose the questions of Who, Why, and What regarding radiation dose and risk. Dr. Steven L. Simon, NCI, led off with what he subtitled as the "ABCs of exposed populations" (literally providing a long alphabetized list of groups of people who have been studied for radiation exposure). Simon introduced the basic characteristics of various populations that make them useful in the study of radiation health risks, including attributes such as behavior and lifestyles, as well as the more familiar magnitude of exposure and population size. He underlined for the audience that the sources of radiation and opportunities for exposure for people around the world are numerous and varied.

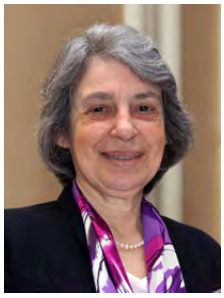


Martha S. Linet

Dr. Martha S. Linet complemented Simon's presentation with a discussion of "Why" radiation-exposed populations are studied. Such studies provide critical information about health outcomes and also address public concerns, clinical needs, and public health requirements. New knowledge on effects necessitates continued assessment of detriment.

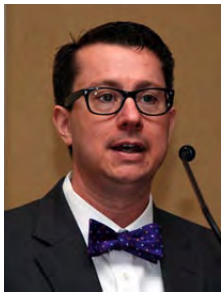
Roy E. Shore

Dr. Roy E. Shore, Radiation Effects Research Foundation (RERF), emphasized that while the effects of radiation at high doses are well known, at lower doses understanding of the effects is fuzzy and at very low doses the effects are really unknown. To highlight the need to find out more in the fuzzy and unknown regions, he pointed out that there are over 25 million CT (computed tomography) scans performed in the United States every year, with individual doses ranging above 100 mSv for 15 percent—and over 250 mSv for 4 percent of the patients. Beyond solid cancers and leukemias, other possible health concerns include cataracts, cardiovascular diseases, and cerebrovascular diseases. There is a need to learn more about protracted and fractionated exposures compared to acute doses.



Evelyn Bromet

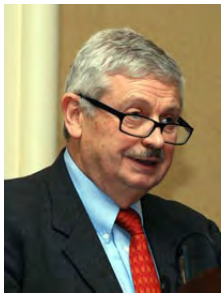
Did you know that mental disorders may be more important than cancer? Dr. Evelyn Bromet reinforced that most people genuinely fear radiation exposures. In studies after Chernobyl—and now after Fukushima—the most prevalent serious effects in most people are related to continued stress, uncertainty, and loss of life security. Instances of depression, post-traumatic stress disorder, and alcoholism rise dramatically in people who believe that they were exposed—irrespective of actual levels of exposure. Although there is essentially no evidence of actual neurocognitive damage related to radiation exposures, people suffer long-term emotional responses to radiation-related events, and these responses can be expressed as poorer perceived (and actual) physical health. These are often enhanced by the reactions that people receive from poorly trained medical personnel, who receive insufficient instruction in mental health issues in medical school, and made worse by post-event discrimination and stigma by others. Bromet suggests that physicians and medical staff should be educated in proper responses to reported mental health-related symptoms, that mental health measures should be integrated into medical surveillance, and that efforts be made to communicate with the public and that alliances be made with participants in medical surveys. Care is


Lawrence T. Dauer


James A. Brink


Lois Travis


James W. Neton


Andre Bouville

needed because implications of mental impacts may be offensive to and misinterpreted by the impacted populations (i.e., don't blame it on "radiophobia").

The second session focused on radiation exposures in medicine and was chaired by Kathryn D. Held. Dr. Lawrence T. Dauer, Memorial Sloan Kettering Cancer Center, directed attention to the exposures received by medical personnel involved with the expanding traditional and novel uses of radiation and radioactive materials in medical practice. He noted the subtle differences in radiation protection philosophy and nomenclature between NCRP and the International Commission on Radiological Protection (ICRP). For instance, what we in the United States still tend to refer to as "deterministic" effects are now called "tissue reactions" by ICRP. Staff involved with interventional radiology receive the largest proportion of medical dose, but preparation and assay of radiopharmaceuticals leads to the highest individual occupational exposures. The latest research indicates that the lens of the eye may be more sensitive to development of cataracts than previously supposed. Regulations to minimize eye exposures could have substantial impacts on the way that some procedures are done and on how many certain providers could perform. New applications for radionuclides such as ^{89}Zr, that have higher gamma energies than those currently used, may impact designs of medical facilities. New types of facilities like proton irradiators will require new types of radiation protection programs.

Dr. James A. Brink, who recently moved to Massachusetts General Hospital/Harvard Medical School, discussed dose tracking for patients. The variability of patients and their treatments makes dose estimation difficult, and there is some need for common metrics of dose (effective dose? organ dose?). There is also an effort to standardize the selection of types of examinations for patients based on diagnostic algorithms.

Recent NCRP Report No. 170, concerning occurrence of second malignant neoplasms and cardiovascular disease following radiotherapy for first cancers, was presented by Dr. Lois Travis, University of Rochester Medical Center. She noted that in 2007 there were 13.7 million survivors of first cancers in the United States and, therefore, there was a growing need to evaluate the likelihood of late effects of therapy. The report makes several recommendations, including the long-term, large-scale follow-up of these survivors to allow development of guidelines for prevention and intervention.

The third session shifted focus to radiation workers. This session was chaired by Christopher H. Clement, scientific secretary for ICRP. Dr. James W. Neton, National Institute for Occupational Safety and Health (NIOSH), described the methods used to estimate radiation doses to covered workers for the Energy Employees Occupational Illness Compensation Program Act. To support the dose reconstruction of almost 40,000 workers to date, NIOSH has collected millions of pieces of supporting information. Because the doses are estimated with "claimant favorable" methods, they are not currently appropriate for epidemiological uses, but the accumulated data could be put to use supporting potential future risk studies.

Dr. Andre Bouville, NCI, compared high worker exposures from historical nuclear accidents at Windscale, Three Mile Island, Chernobyl, and Fukushima to those received by workers in the Soviet Mayak facility. The highest individual and collective doses occurred at Chernobyl, leading to acute radiation sick-

ness in 36 people. The cumulative doses at Mayak were also very high, with average reconstructed doses of over 0.5 Gy a year for the first years. In comparison, those received by the workers to date at Fukushima were relatively low. Only six people at the Fukushima Daiichi Nuclear Power Plant have exceeded 250 mSv, primarily via inhalation of radioiodines within the plant during the early phases of the accident.

Paul K. Blake

Radiation exposure of U.S. military personnel was discussed by Dr. Paul K. Blake, Defense Threat Reduction Agency (DTRA). There are about 1.4 million active duty, 1.3 million reserve, and 0.7 million contractor personnel associated with the military; of these about 2 percent are monitored for radiation exposure. Interestingly, the Air Force, Navy, and Marines have broad scope material licenses with the U.S. Nuclear Regulatory Commission (NRC), and the Army, DTRA, and Defense Logistics Agency have specific NRC licenses. The military is self-regulating for some sources, including military hospitals. Over 8,000 individuals were monitored during Operation Tomodachi following the Fukushima accident in Japan. The procedures used keep personnel exposures well below the regulatory limits.

F. Ward Whicker

The first day concluded with the 37th Annual Lauriston S. Taylor Lecture by Dr. John E. Till, introduced by Dr. F. Ward Whicker. Till gave an interesting presentation titled "When Does Risk Assessment Get Fuzzy?" and led the audience through the steps of an environmental assessment from source term, through transport, exposure, dose, and risk estimation, with considerations of uncertainty, validation, stakeholder participation, and communication. He concluded that none of the steps were particularly fuzzy and that risk assessment has matured into a multidisciplinary field that is widely accepted as valid, credible, and useful.

John E. Till

The second day opened with the annual NCRP Business Meeting. In keeping with the theme of new approaches, many of the more routine procedures had been voted on by electronic ballot and only the election results were announced and officers delivered their annual reports to the members (see page 6).

Harry Cullings

Bruce Napier

The fourth session, addressing radiation exposures to the general public, was chaired by Dr. David J. Pawel, Environmental Protection Agency. In lead position, Dr. Harry Cullings, RERF, discussed the latest results of the study of the atomic bomb survivors. About half of the cohort of 93,741 survivors remain alive. Of the deaths, about 537 excess solid cancers out of 10,928 are statistically attributed to radiation. Similarly, 94 leukemias out of 312 and 353 noncancer (cardiovascular and cerebrovascular diseases) deaths out of 35,685 are attributed to the effects of the radiation. The annual absolute rates of radiation-related deaths in the cohort are expected to peak in the near future and then decline as the cohort continues to age and grow fewer in number. Cullings provided updates to the estimated excess relative risk of radiation-induced cancers and also provided an interesting spin on them by providing estimates of life lost per unit dose: 10 years per gray for women and 15 years per gray for men.

Bruce Napier, Pacific Northwest National Laboratory, gave a stimulating overview of the history of the operations, radionuclide releases, and public doses associated with the Mayak Production Association in central Russia. Environmental releases from Mayak have affected cohorts of people in the residential

city of Ozersk nearby, along the Techa River downstream, and the East Urals Radioactive Trace downwind of Mayak. Each of these cohorts is providing risk results for protracted exposures similar in magnitude to those seen from the acute exposures at Hiroshima and Nagasaki.


Daniel O. Stram

The U.S. National Academy of Sciences has recently finished a feasibility study for conducting radioepidemiological studies around U.S. power reactors and other nuclear facilities. Dr. Daniel O. Stram, University of Southern California, provided an overview of the results. The study concluded that based upon the historically reported releases from U.S. commercial nuclear facilities, the doses would be very low and the statistical power of any study to find effects would likely also be low. However, there are other societal reasons to proceed with a limited pilot study of seven facilities in six states to evaluate ability to appropriately perform such work. In light of the overall discussions at the NCRP meeting concerning transparency, openness, credibility, and public involvement, that conclusion was accepted more readily than some might have expected.

In a parallel fashion with the prior session, a discussion on public effects from nuclear reactor accidents was given by Dr. Maureen Hatch, NCI. Again, for reasons of magnitude and impact, this primarily focused on studies after the Chernobyl accident. She discussed the increase in risk of thyroid cancer from radioiodine intakes in Ukraine and Belarus and the enhancement of that risk through low stable iodine intake. The risks to individuals irradiated as children at the time of the accident do not yet appear to be decreasing. It is now estimated that the releases at Chernobyl have caused about 5,000 excess thyroid cancers in children in the region. Echoing previous speakers, Hatch noted that psychosocial outcomes will likely emerge as the most significant health effects.


Maureen Hatch

John Boice

For the final session, chaired by Dr. Paul A. Locke, NCRP President John Boice gave a rousing summary of the meeting (which of course you don't need because all of his best points have been liberally presented herein). In a good quote that I haven't used yet that succinctly summarizes much of the discussion concerning public involvement and education, Boice said, "There is no threshold for fear." President Boice closed the meeting by informing the attendees of the 2014 NCRP Annual Meeting, planned for the same venue, "NCRP—Achievements of the First 50 Years and Opportunities for the Future" and encouraging them to attend on 10–11 March 2014.

Those attending the NCRP members-only dinner on the Sunday night before the meeting were addressed by invited guest speaker and science reporter Miles O'Brien—who also gave the NCRP members the admonition to communicate with the public and to be open to members of the press.


Miles O'Brien

President and First Lady Boice sing an introduction.

(And I expect someone to post on YouTube our NCRP president and his wife Jennifer, the First Lady of Radiation Protection, with their singing introduction of the speaker . . . keep an eye out for it! Things like that cannot be kept secret!)

The entire meeting resonated with the energy and enthusiasm of the new NCRP president. Dr. Boice has added a level of engagement (and fun) that made the attendees sit up and take notice. (Any really snappy descriptions in this article of the various talks are cheerfully plagiarized from Boice's summary.) Another of his new additions to the NCRP annual meeting is collaboration with the Radiation Research Society (RRS) to sponsor three NCRP/RRS Scholars. Rebecca Abergel, Lawrence Berkeley National Laboratory, Caitlin Mills, McMaster University, and Chris Nielsen, Pacific Northwest National Laboratory, received travel grants to attend the meeting and various receptions and luncheons and talk with some of the people actively leading radiation-related activities.



NCRP/RRS Scholars receive congratulations from NCRP President John Boice. Left to right: Rebecca Abergel, Caitlin Mills, and Chris Nielsen

All NCRP meeting photos by Genevieve Roessler

NCRP Business Meeting: New Members Elected

Laura Atwell, NCRP

The National Council on Radiation Protection and Measurements (NCRP) held its 49th NCRP Annual Business Meeting on 12 March, in conjunction with the 2013 NCRP Annual Meeting "Radiation Dose and the Impacts on Exposed Populations."

Council consists of 100 elected members recognized as leaders in many scientific fields of relevance to radiation protection and measurements in medicine, homeland security, environmental protection, nuclear technology, and public and occupational radiation exposures. Additional information about NCRP is available online at ncrponline.org.

The newly elected members of Council and their affiliations are Richard R. Brey (Idaho State University), Donald A. Cool (U.S. Nuclear Regulatory Commission), Francis A. Cucinotta (National Aeronautics and Space Administration Johnson Space Center), Wayne D. Newhauser (Louisiana State University), Ehsan Samei (Duke University Medical School), George Sgouros (Johns Hopkins University, School of Medicine), and Daniel O. Stram (University of Southern California).

Members of Council who were reelected to another six-year term on Council are Kimberly E. Applegate, Stephen Balter, Ronald E. Goans, Timothy J. Jorgensen, Jill A. Lipoti, Ruth E. McBurney, and Chris G. Whipple.

The following individuals were elected as Distinguished Emeritus Members in recognition of their outstanding contributions to NCRP's scientific program: Thomas B. Borak, Leslie A. Braby, Ann R. Kennedy, and David S. Myers.

Elected officers were President John D. Boice, Jr., Senior Vice President Jerrold T. Bushberg, and Secretary/Treasurer James R. Cassata.

Elected to the Board of Directors: James A. Brink, Paul M. DeLuca, Donald P. Frush, Raymond A. Guilmette, Kathryn D. Held, Paul A. Locke, Ruth E. McBurney, William F. Morgan, Bruce A. Napier, Kathryn H. Pryor, and Richard E. Toohey. The president and senior vice president are automatically directors.

For additional information contact NCRP Executive Director James R. Cassata at cassata@ncrponline.org, 301-657-2652 (x20), or 301-907-8768 (fax).

NCRP 48th Annual Meeting Program Committee, left to right: Paul Locke, Shunichi Yamashita, Kathryn Held, Cochair S.Y. Chen, Cochair Bruce Napier, NCRP President John Boice, Christopher Clement, Steven Simon, NCRP Executive Director James Cassata, and David Pawel. Not pictured: Barrett Fountos, Kazuo Sakai, and John Till.