NAS Study Maintains LNT Validity

On June 29, the National Academies of Science (NAS) Research Council announced the release of a report that upholds the linear no-threshold (LNT) theory of radiation risk, stating, "A preponderance of scientific evidence shows that even low doses of ionizing radiation, such as gamma rays and x-rays, are likely to pose some risk of adverse health effects." The report, titled *Health Risks from Exposure to Low Levels of Ionizing Radiation,* is the seventh in a series of publications issued by what was previously known as the Committee on Biological Effects of Ionizing Radiation (BEIR) and succeeds the last publication in 1990. The report focuses on low-dose, low-linear energy transfer (LET) ionizing radiation, including that from medical imaging procedures. The report extends previous implications of potential cumulative radiation damage, noting "In living organisms, such radiation can cause DNA damage that eventually leads to cancers. However, more research is needed to determine whether low doses of radiation may also cause other health problems, such as heart disease and stroke, which are now seen with high doses of low-LET radiation."

In general, the report supports previously identified risk estimates for solid cancers and leukemia, but the authors note that "the availability of new and more extensive data have strengthened confidence in these estimates," especially the LNT model. "The scientific research base shows that there is no threshold of exposure below which low levels of ionizing radiation can be demonstrated to be harmless or beneficial," said committee chair Richard R. Monson, associate dean for professional education and professor of epidemiology, Harvard School of Public Health (Boston, MA) at a press conference on June 13. "The health risks—particularly the development of solid cancers in organs—rise proportionally with exposure. At low doses of radiation, the risk of inducing solid cancers is very small. As the overall lifetime exposure increases, so does the risk."

Many scientists have argued strenuously against the methodologies and conclusions behind continued support of the LNT model. These critics include those who point to the lack of consideration for potential hormetic effects from radiation and who criticize the data on which continued support of the LNT model rests. The controversy is likely to continue. In this report, as in previous BEIR publications, survivors of atomic bombings in Hiroshima and Nagasaki, Japan, were the primary sources of data for estimating risks of most solid cancers and leukemia from lifetime exposure to ionizing radiation. The review included an examination of updated cancer incidence data from tumor registries of the survivors and of research data on solid cancer deaths (which have doubled in this group since the previous report). The committee combined this information with data on individuals who had been medically exposed to radiation to estimate risks of breast cancer in women and of thyroid cancer. Data from additional medical studies and from studies of individuals exposed to radiation through occupations also were evaluated and found to be compatible with the committee's statistical models. Follow-up studies are recommended for the indefinite future.

The NAS press release accompanying the report noted that adverse hereditary health effects have not been found in studies of children whose parents were exposed to radiation from the atomic bombs but have been documented in extensive data in animal studies. However, the release continued, "There is no reason to believe that such mutations could not also be passed on to human offspring. The failure to observe such effects in Hiroshima and Nagasaki probably reflects an insufficiently large survivor population."

Media coverage of the public conference in which panel members spoke to the press ranged from reassurances that medically associated radiation-linked cancer risks for most individuals remain quite low to an erroneous statement carried on the Reuters new wire on June 29 that "a low dose of about 100 millisieverts of radiation—the equivalent of 10 chest X-rays—can be expected to cause cancer in one out of every 100 people." Although on June 30 Reuters corrected the sentence to read "the equivalent of 1,000 chest X-rays," the damage had been done, as media outlets around the world picked up the story. In fact, these and similar statements were based on comments by panel member Ethel Gilbert, a biostatistician at the National Cancer Institute (Bethesda, MD), who summarized the report's findings at the press conference by saying that the vast majority of Americans will be exposed to total radiation far below what the panel considered a high end for low-dose lifetime exposure (100 mSv), an amount she clarified as "about 1,000 times the dose you receive from a single chest X-ray," adding that with a cumulative low-dose lifetime exposure of 100 mSv "about 1 person in 100 would develop cancer." Gilbert was careful to put that hypothetical projection in context, citing data from the report indicating that in that same group of

100 individuals, 42 other lifetime cases of cancer could be expected as a result of nonradiation-based factors.

Whole-body CT scans were specifically cited in the report as an area of concern, again with mathematical odds reported by the press. The statistic most widely cited from the panel's report was that "approximately 1 person out of 1,000 would develop cancer from exposure to the amount of radiation from a single, average whole-body CT scan," although many news reports omitted the "whole-body" qualifier. The press release accompanying the study included the following language:

> Follow-up studies of people who receive CT scans, especially children, should be conducted. . . . Also needed are studies of infants who are exposed to diagnostic radiation because catheters have been placed in their hearts, as well as infants who receive multiple x-rays to monitor pulmonary development. CT scans, often referred to as whole body scans, result in higher doses of radiation than typically experienced with conventional x-rays.

"We estimated that whole exposure to a whole-body [CT] scan is about 10 mSv," said Monson. "That's a relatively high dose. There's currently no information on whether there's an association between exposure to radiation from CT scanning and adverse health effects . . . but prudence should always be your guideline, and exposure to unnecessary radiation should be avoided."

Copies of the NAS report are available from the National Academies Press at www.nap.edu.

National Academies of Science

NIH "Roadmap" Grants to Establish 9 Screening Centers

The National Institutes of Health (NIH) announced on June 15 the award of $88.9 million in grants to 9 institutions over 3 years to establish a collaborative research network that will use high-tech screening methods to identify small molecules that can be used as research tools. "This tremendous collaborative effort will accelerate our understanding of biology and disease mechanisms," said Elias A. Zerhouni, MD, NIH director. "More importantly, it will, for the first time, enable academic researchers to explore novel ideas and enable progress on a broad front against human disease."

The Molecular Libraries Screening Centers Network (MLSCN) is being developed through the NIH Roadmap for medical research. Specifically, the network is part of the Roadmap's "New Pathways to Discovery" initiative, which has set out to advance the understanding of biological systems and build a better "toolbox" for medical researchers in the 21st century. The network is funded by all of the institutes of the NIH and co-administered by the National Institute of Mental Health (NIMH) and the National Human Genome Research Institute (NHGRI) on behalf of NIH. A project team made up of staff from NIH's 27 institutes and centers will oversee the operation of the network.

Data generated from the high-throughput assays conducted at the screening centers will be made available to researchers in both the public and private sectors through the PubChem database (http://pubchem.ncbi.nlm.nih.gov/), created and managed by the National Library of Medicine at NIH. The network's first screening center, the NIH Chemical Genomics Center (NCGC), was established in June 2004 by the NHGRI intramural program to jumpstart the roadmap effort.

Another critical component of the network is the Molecular Libraries Small Molecule Repository, located in San Francisco at Discovery Partners International, a drug discovery research firm. The repository houses the collection of small molecules that will be used for screening by the centers. Already, the repository has acquired nearly 100,000 compounds that are being utilized by the NCGC.

"This new Screening Centers Network will be the engine of discovery in the NIH Roadmap Molecular Libraries initiative," said NIMH Director Thomas R. Insel, MD. "Using the compounds from the Molecular Libraries Small Molecule Repository and supported by the informatics capabilities of PubChem, the MLSCN should provide researchers with many new chemical tools to explore how cells function at the molecular level."

The 9 institutions receiving grants as part of the MLSCN are: Columbia University Medical Center (New York, NY), Emory University (Atlanta, GA), Southern Research Institute (Birmingham, AL), Burnham Institute (La Jolla, CA), Scripps Research Institute (La Jolla, CA), University of New Mexico Albuquerque, University of Pennsylvania (Philadelphia), University of Pittsburgh at Pittsburgh (PA), and Vanderbilt University (Nashville, TN).

National Institutes of Health

Vaska Honored with Presidential Award

At an awards ceremony in Washington, DC, on June 13, more than 50 young and/or early career scientists were honored for their work, ranging from the development and synthesis of nanoscale materials to improved medical diagnostic imaging. Among the recipients of the Presidential Early Career Award for Scientists and Engineers was Paul Vaska, PhD, Brookhaven National Laboratory (Upton, NY), who was recognized for his leadership and scientific innovation in the field of medical imaging physics, particularly for the development of novel instrumentation and techniques to improve the capabilities of PET in medicine. Vaska is head of PET physics at Brookhaven's Center for Translational Neuroimaging. In collaboration with several Brookhaven scientists, Vaska has played a

pivotal role in developing a new small animal PET scanner (dubbed RatCAP) that the animal wears while conscious, thus eliminating the effects of anesthesia and enabling imaging innovations that correlate behavior and neurochemistry. Vaska has also pioneered practical, new gamma-ray detection strategies by developing unique designs and adapting detector technologies from other fields to PET. For example, he is exploring a cadmium-zinc-telluride detector that can provide extremely high spatial resolution. In addition, he has been a dedicated mentor to several students, from high school to postdoctoral levels.

"With its world-class imaging program and superb capabilities in instrumentation, Brookhaven Lab is the ideal place to carry out this type of research," Vaska said. "I'm most grateful that the Department of Energy [DOE] and the National Institutes of Health are willing to fund this important work at the interface of physics and medicine and for the support of my Brookhaven colleagues, particularly Drs. David Schlyer and Craig Woody." Vaska also was one of 6 awardees who were presented with the DOE Office of Science Early Career Scientist and Engineer Award in another ceremony at DOE headquarters in Washington, DC.

The Presidential Early Career Award for Scientists and Engineers is the highest honor bestowed by the U.S. government on outstanding scientists and engineers who are beginning their independent careers. Each award winner received a citation, a plaque, and a commitment for continued funding of their work from their agency for 5 years. Dr. John Marburger, Director of the White House Office of Science and Technology Policy, presented the awards.

U.S. Department of Energy

NRC Restores Documents to Public View

The Nuclear Regulatory Commission (NRC) announced on June 9 that it is restoring public access to more than 70,000 additional documents through its on-line public library, ADAMS, after reviewing them for security sensitivity. The restoration involves administrative, contractual, research, and other documents not related to a specific licensee that were deemed nonsensitive as a result of NRC review.

The documents were removed from the ADAMS library on October 25, 2004, to determine whether any information included could be of use to a terrorist. The agency has already restored access to about 163,000 nonsensitive documents in several categories, including those pertaining to reactors, Yucca Mountain, and selected hearings. Most documents dealing with nuclear materials (i.e., nonreactor) licensee documents, including many pertaining to medical radioisotopes, have not been restored, and the Commission continues to evaluate them.

The newly restored documents are available through the Electronic Reading Room on the NRC Web site at www.nrc.gov. Pending further restorations to the site, time-sensitive documents that have not been restored, particularly those related to opportunities for hearings or needed for public reviews and comments on regulatory matters such as license amendment applications, may be available by contacting the NRC Public Document Room at pdr@nrc.gov.

U.S. Nuclear Regulatory Commission

HHS to Launch Changed Medicare Appeals Process

The U.S. Department of Health and Human Services (HHS) announced on July 1 the introduction of new procedures mandated by the Medicare Prescription Drug, Improvement, and Modernization Act of 2003 designed to offer quicker resolution to appeals by Medicare beneficiaries, providers, and suppliers. The Medicare hearings function, currently handled by the Social Security Administration, transitioned on that date to the Office of Medicare Hearings and Appeals (OMHA), located within HHS. The agency reports that the changes will help ensure that fee-for-service Medicare claims appeals are resolved within a mandated 90-day timeframe. "As HHS assumes responsibility for handling Medicare hearings, we are committed to making the appeals process better, faster and more convenient for seniors and other people with Medicare," HHS Secretary Mike Leavitt said. "Our goal is to eliminate the need for an aged or disabled beneficiary to travel if other resources are available closer to home."

HHS anticipates it can reduce hearing timeframes by using video teleconferencing technology (VTC) with a state-of-the-art electronic hearings process to provide significantly more access points than currently exist. HHS has access to VTC sites in more than 1,000 cities nationwide. Both VTC and in-person hearings will be offered as appropriate to best meet the needs of all parties.

More information on the new Medicare appeals function is available from OMHA Web site at www.hhs.gov/omha.

U.S. Department of Health and Human Services