Medical Xpress

Experts write on the risks of low-level radiation

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Each time a release of radioactivity occurs, questions arise and debates unfold on the health risks at low doses—and still, just over a year after the disaster at the Fukushima Nuclear Power Station, unanswered questions and unsettled debates remain.

Now a special issue of the *Bulletin of the Atomic Scientists*, published by SAGE, examines what is new about the debate over low-dose radiation risk, specifically focusing on areas of agreement and disagreement, including quantitative estimates of cancer risk as radiation dose increases, or what is known as the linear non-threshold theory (LNT). The issue, which includes essays written by the top experts in their fields, does not claim to put the argument to rest—however, it does provide an indispensible update of the existing literature.

As Jan Beyea, guest editor and nuclear physics and epidemiology expert, says: "The reader will be ready to join the debate armed with a broad-based view of the epidemiologic evidence and its differing interpretations, along with an awareness of the stakeholder and researcher landscape." Beyea personally contributes to the issue and deconstructs the low-level radiation debate, unpacking all its parts and illuminating what deserves more attention and scrutiny.

There has been, and continues to be, considerable debate among members of the scientific community, political and industry leaders, and the public around the claim that atomic-bomb data is relevant to estimating risks from protracted exposures. This debate has contributed

to the delay in updating some US regulatory dose limits that are based on a pre-1990 understanding of radiation risks.

"My article explores the new, large-scale epidemiologic studies that are directly relevant—not to one-time exposures received at Hiroshima and Nagasaki, but to the protracted exposures that are received from continuous decay of radioactive isotopes associated with releases from Fukushima or from the Soviet and US weapons complexes," says Beyea.

Social scientist Paul Slovic updates his classic work on the "perception gap" between expert and the general public on the health risks of radiation sources. Roger Kasperson, another social scientist, writes on how individuals and social groups amplify risk as they process nuclear disasters—and the rippling effects of their understandings.

In his article in the Bulletin, technical and policy analyst Gordon Thompson challenges experts and professional bodies to avoid combining debates on science and policy and to acknowledge the implication of the LNT hypothesis. On another policy note, Terry Brock and Sami Sherbini from the US Nuclear Regulatory Commission examine the role that risk estimates of health effects play in regulating nuclear power in the United States—and that it can take many decades before scientific studies actually affect regulations.

Epidemiologist David Richardson analyzes the history of quantitative data used in LNT predictions of dose response, derived mainly from the one-time exposures of the Japanese atomic-bomb survivors. And radiobiologist Colin Hill reviews the latest biological research on genomic instability, bystander effects, and adaptive response—effects that may lead to a better understanding of responses at very low doses and also help quantify any deviations from the LNT.

But has any of the epidemiologic evidence has been interpreted

properly? Biostatistician Sander Greenland thinks not. Misleading interpretations of low-dose epidemiologic data result in an underestimate of the full health impacts, because of failure to account for diseases with accelerated onsets, he says.

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