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NRC BACKS LINEAR NO-THRESHOLD MODEL FOR RADIATION SAFETY

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Ionising radiation: The LNT model states biological effects such as cancer and hereditary effects increase as a linear function of dose, without threshold. | Photo Credit: cokada

Now it is official. The U.S. Nuclear Regulatory Commission (NRC) decisively upheld the Linear No-Threshold model to prescribe radiation safety standards, ending the protracted controversy on the topic. Radiation protection specialists worldwide were eagerly awaiting the NRC's decision.

Over six years ago, during February 2015, Dr. Carol S. Marcus, Mr. Mark L. Miller, Certified Health Physicist, and Dr. Mohan Doss, and others, through three petitions requested the NRC, "to amend its regulations based on what they assert is new science and evidence that contradicts the linear no-threshold (LNT) dose-effect model that serves as the basis for the NRC's radiation protection regulations."

The LNT model states that biological effects such as cancer and hereditary effects due to exposure to ionising radiation increase as a linear function of dose, without threshold.

The petitioners support "radiation hormesis," a concept that posits that low doses of ionising radiation protect against the deleterious effects of high doses of radiation and result in beneficial effects to humans.

The NRC denied the three petitions because they failed to present an adequate basis supporting the request to discontinue use of the LNT model. "The NRC has determined that the LNT model continues to provide a sound regulatory basis for minimizing the risk of unnecessary radiation exposure to both members of the public and radiation workers. Therefore, the NRC will maintain the current dose limit requirements," the NRC declared recently.

Petitioners' proposed substantial increase in dose limits to workers; raise the public dose limits to be the same as the worker doses; end differential doses to pregnant women, embryos and fetuses, and children less than 18 years of age; remove the As Low As Is Reasonably Achievable (ALARA) principle entirely from the regulations because they claim that ''it makes no sense to decrease radiation doses that are not only harmless but may be hormetic''.

"Convincing evidence has not yet demonstrated the existence of a threshold below which there would be no stochastic effects from exposure to low radiation doses. As such, the NRC's view is that the LNT model continues to provide a sound basis for a conservative radiation protection regulatory framework that protects both the public and occupational workers. Despite the various studies cited by the petitioners, uncertainty and lack of consensus persist in the scientific community about the health effects of low doses of radiation." the NRC, asserted.

The LNT model helps the agencies to regulate radiation exposures to diverse categories of licensees, from commercial nuclear power plants to individual industrial radiographers and nuclear medical practices.

The NRC noted that although there are studies and other scholarly papers that support the petitioners' assertions, there are also studies and findings that support the continued use of the

LNT model, including those by national and international authoritative scientific advisory bodies.

Authoritative scientific advisory bodies such as the U.S. National Academy of Sciences (NAS), the National Council for Radiation Protection and Measurements (NCRP), the International Commission on Radiological Protection (ICRP) and the International Atomic Energy Agency (IAEA), that have a specialty in the area of radiation protection support the continued use of the LNT model. The National Cancer Institute (NCI), the National Institute of Occupational safety and Health (NIOSH) and the Environmental Protection Agency (EPA) also endorse the use of LNT model.

The NRC gave due weight to NCRP Commentary No. 27: ‘‘Implications of Recent Epidemiologic Studies for the Linear-Non-threshold Model and Radiation Protection,’’ released in April 2018. The commentary assesses currently available epidemiological evidence and concludes that the LNT model should continue to be utilised for radiation protection purposes.

The NRC received over 3,200 comment submissions, with 635 of those being unique, including submissions from certified health physicists, nuclear medicine professionals, scientific associations, federal agencies and concerned citizens. There were 100 unique comment submissions that agreed with the petitioners. The NRC responded to all questions. Its procedures to arrive at its decision are a model for other regulators to emulate. (Details available at *The Federal Register: The Daily Journal of the United States Government,* proposed rule - Linear No-Threshold Model and Standards for Protection Against Radiation.)

(The writer is a former Secretary, Atomic Energy Regulatory Board.

ksparth@yahoo.co.uk)

Does the knowledge of nerve impulses which can perceive temperature and pressure when initiated help to treat pain?

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