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From: Scientists for Accurate Radiation Information ([SARI](#))

## **Recommendations for Expanded Considerations by the SC 1-25 Committee in Reviewing the LNT Model**

From the April HPS News: "[Epidemiology and LNT](#). *The last comprehensive look by the NCRP at the linear no-threshold (LNT) model used for radiation protection was Report No. 136, chaired by Arthur Upton in 2001. In support of Council Committee (CC) 1, charged with updating protection guidance for the United States, SC 1-25 is preparing a commentary to be published this year that evaluates recent epidemiologic studies as to whether they support the LNT model as used in radiation protection today.*" The description of the committee's task says, "...that evaluates recent epidemiologic studies as to whether they support the LNT model as used in radiation protection today". This task question is biased from the start. It limits the evidence to only recent epidemiological studies (what about radiobiological studies?). More importantly, it directs the committee members to evaluate whether they support LNT rather than the larger question of which model provides the optimum basis for protection from radiation and protection by radiation.

The current task wording sets LNT up as the default hypothesis, and implies that the committee should determine whether recent studies imply that LNT should continue to be supported. This inappropriately sets up LNT as the null hypothesis, and evidence must be provided that it should be rejected. In fact, LNT should be one of the alternative hypotheses that should be

tested against the null (at least in a frequentist framework). What about alternative hypotheses (e.g. hormesis, threshold, etc.)? Is there sufficient evidence to reject the null of no effect in favor of any of these alternatives to the exclusion of the other alternative hypotheses? The correct question should be something along the lines of, “which hypothesis is in best agreement with current scientific evidence, and which provides an optimal basis for protection from radiation and protection by radiation?”

We, the undersigned members of [Scientists for Accurate Radiation Information \(SARI\)](#) recommend that you refine your task description to remove the current inherent bias and also to consider the attached list (just an example of the information available) of recent research and documentation that should be considered when evaluating this important issue.

### **Recommended recent documentation for SC-1-25 consideration**

[Adjuvant Therapy for Resected Exocrine Pancreatic Cancer by Half-Body Low-Dose Irradiation](#)  
Jerry M. Cuttler, Philippe Garzon, Ron E. J. Mitchel, Ludwig E. Feinendegen, Kiyohiko Sakamoto and James S. Welsh

[Cancer and Low Dose Responses \*In Vivo\*: Implications for Radiation Protection](#),  
R. E. J. Mitchel, Dose Response. 2007; 5(4): 284–291.

[Threshold for Radon-Induced Lung Cancer from Inhaled Plutonium Data.](#)  
Cuttler JM, Sanders CL.

[Commentary on Inhaled \(239\)PuO<sub>2</sub> in Dogs - A Prophylaxis Against Lung Cancer?](#)  
Cuttler JM, Feinendegen LE.

[Cancer immunotherapy: how low-level ionizing radiation can play a key role](#)  
Marek K. Janiak, Marta Wincenciak, Aneta Cheda, Ewa M. Nowosielskaans Edward J. Calabrese

[LNTgate: The ideological history of cancer risk assessment](#)  
Edward J Calabrese

[LNT 999](#) . Health Physics News XLIII (10):23-24, October 2015. Siegel JA, Sacks B, and Stabin MG.

[The birth of the illegitimate linear no-threshold model: an invalid paradigm for estimating risk following low-dose radiation exposure.](#) Am J Clin Oncol 2015; doi: 10.1097/COC.000000000000244. Siegel JA, Pennington CW, Sacks B, and Welsh JS.

[The mismeasure of radiation: debunking the flawed science that low-dose radiation may cause cancer; in fact, it may even be beneficial.](#) Skeptic Magazine 20(4):46-51, 2015. Siegel JA and Pennington CW.

[Does imaging technology cause cancer? Debunking the linear no-threshold model of radiation carcinogenesis.](#) Technol Cancer Res Treat 15(2):249-256, 2016. Siegel JA and Welsh JS.

Low-dose radiation exposure should not be feared. Phys Today 69(1):12-13, January, 2016. Available at: <http://dx.doi.org/10.1063/PT.3.3037>. Siegel JA, Pennington CW, and Sacks B.

Why what you think about radiation might just be wrong. U.S. News & World Report; Op-Ed, April 21, 2016. Available at: <http://health.usnews.com/health-news/patient-advice/articles/2016-04-21/why-what-you-think-about-radiation-might-just-be-wrong> Welsh JS and Siegel JA.

Rectifying radon's record: an open challenge to the EPA. Int J Radiol Imaging Technol 2(2):014, 2016. Available at: <http://clinmedjournals.org/articles/ijrit/international-journal-of-radiology-and-imaging-technology-ijrit-2-014.pdf>. Siegel JA, Pennington CW, Sacks B, and Welsh JS.

[Regulatory application of the LNT hypothesis and ALARA to protect radiosensitive people is misguided.](#) Health Physics News XLIV (11):23-24, November 2016. Siegel JA, Marcus CS, Welsh JS, Pennington CW, and Stabin MG.

Subjecting radiological imaging to the linear no-threshold hypothesis: a non sequitur of non-trivial proportion. - [J Nucl Med 58\(1\):1-6, 2017 \(10.2967/jnumed.116.180182\)](#). Siegel JA, Pennington CW, and Sacks B.

[Point/counterpoint: advocating for use of the ALARA principle in the context of medical imaging fails to recognize that the risk is hypothetical and so serves to reinforce patients' fears of radiation.](#) Med Phys 44(1):3-6, 2017 (<https://doi.org/10.1002/mp.12012>) Siegel JA, McCollough CH, and Orton CG.

[Nuclear Energy's Critical Illness: Continue with Failed Treatments or Pursue the Cure?](#) Public Utilities Fortnightly 155(3):40-43,74-75, March, 2017 Pennington CW and Siegel JA

[Treatment of Cancer and Inflammation With Low-Dose Ionizing Radiation](#)  
*Three Case Reports*

Shuji Kojima, Mitsutoshi Tsukimoto, Noriko Shimura, Hironobu Koga, Akishisa Murata, Tsuyoshi Takara

[Update on a Patient With Alzheimer Disease Treated With CT Scans](#)

Jerry M. Cuttler, Eugene R. Moore, Victor D. Hosfeld, and David L. Nadolski<sup>4\</sup>

[Leukemia and Ionizing Radiation Revisited](#)

Jerry M. Cuttler and James S. Welsh

[Below-Background Ionizing Radiation as an Environmental Cue for Bacteria](#)  
Hugo Castillo and Geoffrey B. Smith

[The Linear No-threshold Theory: Readers Weigh In \(article in Physic Today\)](#)  
Jeffrey Siegel, Charles Pennington and Bill Sacks

[Epidemiology Without Biology: False Paradigms, Unfounded Assumptions, and Specious Statistics in Radiation Science](#)  
Bill Sacks, Gregory Meyerson and Jeffry A. Siegel

[Studies of the mortality of atomic bomb survivors, Report 14, 1950-2003: an overview of cancer and noncancer diseases.](#)  
Ozasa K<sup>1</sup>, Shimizu Y, Suyama A, Kasagi F, Soda M, Grant EJ, Sakata R, Sugiyama H, Kodama K.

[The threshold vs LNT showdown: Dose rate findings exposed flaws in the LNT model part 1. The Russell-Muller debate.](#)  
Calabrese EJ

[Linear No-Threshold Model VS. Radiation Hormesis.](#)  
Doss M

[Comments on "Studies of the mortality of atomic bomb survivors, report 14, 1950-2003: an overview of cancer and noncancer diseases" \(Radiat Res 2012; 177:229-43\).](#)  
Doss M, Egleston BL, Litwin S.

[Destroying the Linear No-threshold Basis for Radiation Regulation - A Commentary](#)  
Carol S. Marcus

[Evidence That Lifelong Low Dose Rates of Ionizing Radiation Increase Lifespan in Long- and Short-Lived Dogs](#)  
Jerry M. Cuttler, Ludwig E. Feinendegen and Yehoshua Socol

Checking the foundation: recent radiobiology and the linear no-threshold theory. [Health Physics](#) 99: 747-758; 2010. Ulsh BA.

[The new radiobiology: returning to our roots.](#) [Dose Response](#) 10: 593-609; 2012. Ulsh BA.

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[The LNT Debate in Radiation Protection: Science vs. Policy – Dose-Response, 6/2011.](#) Kenneth L. Mossman

Observations on the Chernobyl Disaster and LNT. Zbigniew Jaworowski. [Dose-Response](#), vol. 8, 2, First Published January 28, 2010.

[The Linear No-Threshold assumption and its ALARA Principle: non-science that is inapplicable to Medical Imaging](#) - [Diagnostic Imaging Europe](#) 33(2):70-71, March 2017  
Dr J A Siegel, C W Pennington & Dr B Sacks

[Progress in the studies on hormesis of low-dose pollutants](#) - December 03, 2016, IP: 70.176.113.63]. Junyi Shi, Mitchell Huber, Ting Wang, Wang Dali, Zhifen Lin, Yin Chun-Sheng

[Changing the Paradigm of Cancer Screening, Prevention, and Treatment](#)  
Mohan Doss

The Dangers of Radiophobia. David Ropeik. Available at:  
<http://www.tandfonline.com/doi/full/10.1080/00963402.2016.1216670>

[CT Scans May Reduce Rather than Increase the Risk of Cancer](#). Bobby R. Scott, Ph.D., Charles L. Sanders, Ph.D., Ron E. J. Mitchel, Ph.D. and Douglas R. Boreham, Ph.D.

[Letting go of what we believe about radiation and the risk of cancer in children](#).  
Andronikou S.

[EXPLORING BIOLOGICAL EFFECTS OF LOW LEVEL RADIATION FROM THE OTHER SIDE OF BACKGROUND](#) - [Health Physics](#) . 100(3):263-265, March 2011. Smith, Geoffrey Battle; Grof, Yair; Navarrette, Adrienne.

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