

Does the Current System of Radiological Protection Sometimes Lead to Unintended Unethical Actions?

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The core of the current system of radiological protection (SRP) consists of 3 fundamental principles: justification, optimization, and applying ionizing radiation dose limits¹: the principle of justification specifies that any activity (or intervention) that changes the exposure scenario should be overall beneficial to individuals and/or society; the principle of optimization specifies that radiation doses should be as low as reasonably achievable, considering both economic and societal factors; the principle of dose limitation applies to planned radiation exposures (other than medical and environmental) and dictates that doses should not exceed established limits. The dose limits are linked to the linear-no-threshold (LNT) risk model for ionizing radiation harm.

Ethics and societal values form one of the 3 pillars supporting the current SRP of humans, augmenting the science (considered flawed by some)^{2,3} related to the system.¹ The International Commission on Radiological Protection (ICRP) has highlighted the ethical foundations of the SRP for humans via its Publication 138⁴; the earlier Publication 91⁵ outlined ethical principles that apply to environmental radiation protection of non-human species.¹ Now there is interest in addressing the ethics associated with intentional diagnostic or therapeutic (e.g., for pets) or other exposures of animals to ionizing radiation (such as in animal research). The already cited new publication¹ on this topic is entitled *Ethics and Values Surrounding the Radiation Protection of Animals*. The following important question is raised in this letter to the editor: are ethical values used in the current SRP based on sufficient knowledge about low-dose-radiation health effects in humans and in animals? This question relates to current reliance on the LNT model for low-dose-radiation health risk assessment. What if the LNT model is invalid? This would be the case if there are actual dose thresholds³ for the different health effects of interest or if low radiation doses are not harmful and often beneficial² to our health (i.e., hormetic)

depending on the circumstances. Now there is overwhelming evidence that low radiation doses stimulate rather than suppress the body's natural defenses.² In fact, the use of low-dose radiation to stimulate the body's natural defenses is now being considered for treating life-threatening COVID-19-related pneumonia⁶ and greatly-debilitating Alzheimer's disease.⁷ Should convincing success with low-dose-radiation therapy be demonstrated for such diseases, *physicians not using the therapy due to concern for harm to patients from low radiation doses because of the current SRP-projected health risks should be considered unethical in my opinion.*

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