

May 21, 2020

Dear Sir or Madam,

I wish draw your attention to the following text, contained in the draft report.

298	(10)In <i>Publication 26</i> (ICRP, 1977a), a quantitative value for the detriment at low dose and
299	low dose rate relied on a linear model. <i>Publication 26</i> noted that linear extrapolations may lead
300	to an overestimate of the radiation risks at low doses and low dose rates but endorsed this as a
301	cautious assumption. Additionally, while recognising that risks for some cancer sites were age

It is puzzling that the community accepts a linear extrapolation downward from high doses to represent a stochastic effect. The belief is flatly unphysical: the electron liberated by a single ionization is a discrete entity that cannot be divided. Nature does not comport with any analytical framework contrary to this fundamental reality. I have pointed out the correct method of extrapolation in two journal articles published in the peer-reviewed scientific literature, "Shot Noise in Radiobiological Systems"¹ and "Shot Noise Explains the Petkau $^{22}\text{Na}^+$ Result for Rupture of a Model Phospholipid Membrane"².

In fact, in the proper analysis accounting for the stochastic nature of a low-dose exposure the reference dose representing the biological effect varies not linearly, but with the square root of the absorbed dose. (The outcome is simple to understand as analogous to the one-sided random walk from basic statistical mechanics.) Since this is true, it is frankly incorrect by orders of magnitude to assert that the linear extrapolation is properly cautious.

While I have no expectation that the committee will adopt my views simply upon the criterion of the publication of my work - nor that any other scientist should agree with me - it would be valuable to the community to see acknowledgment that it exists and has been considered. The shot noise phenomenon was first described in the scientific literature in 1919, more than a century ago. Shot noise is furthermore acknowledged to play an important role in other biological fields. I do not feel it is too strong a statement to assert that perhaps it is time for the field of health physics to catch up.

Sincerely yours,

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¹ <https://doi.org/10.1016/j.jenvrad.2016.06.017>

² <https://doi.org/10.1097/hp.0000000000001094>