

X-ray Hesitancy—Response to Jargin and Sohrabi

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We appreciate the interest and comments made regarding our recent paper on X-ray hesitancy¹ in separate letters by Drs. Sergei Jargin² and Mehdi Sohrabi.³

In Reply to Jargin

Jargin² criticizes our statement “Thus, repeated medical imaging, as long as it is in the low-dose range (<100-200 mGy), will not result in an actual accumulation of radiation-induced DNA damage as long as the repeat imaging is done after a lag period (i.e. 24-hour) enabling the body’s adaptive response systems to do their innate functions (i.e. prevent, repair, and/or remove DNA damage)”¹ claiming it was made “without references.” We note that the statement was in fact summarizing the prior discussion, which is why we began the sentence with *thus* or its synonym *therefore*. The main point is that the dose additivity concept, as it relates to low-dose radiation exposures is invalid since it does not consider the adaptive response systems of the body which not only repairs, but in fact, over-repairs any genetic damage caused initially. This fact invalidates arguments from LNT advocates whose fear-mongering over the dangers of X-rays leads to patient hesitancy and doctors succumbing to sunk-cost bias (i.e. avoiding X-rays to make up for past exposures).

Jargin questions our discussion about “Concern #3,” children *not* being more susceptible to radiation damage than adults, and mentions children who are growing have more cells undergoing mitosis and are therefore at increased susceptibility to mutagenic stimuli. Though we agree this is a common belief, as is presented in our article there is a lack of evidence clearly showing children as being highly radiosensitive to low-dose exposures. Although we⁴ and others⁵ have provided more discussion elsewhere, it comes down to the notion that “for low-dose exposures, even in children the adaptive repair systems overcompensate to prevent, repair, and remove any damage caused, and likely is much more efficient than in adults.”⁴

Jargin mentions that ionizing radiation may act synergistically with other carcinogens. While this is a logical supposition, we contend that other “carcinogens” like radiation, also

act in a hormetic fashion.⁶ We also contend that not only does the current evidence show low-dose radiation exposures not to cause cancers, it shows it prevents cancers and serves as a protection factor from other environmental carcinogens. This is portrayed in studies showing less cancers (e.g. atomic bomb survivors⁷; tuberculosis patients⁸) and increased longevity (e.g. atomic bomb survivors⁷; animal studies⁹) to radiation exposed cohorts versus controls.

Although we do not disagree with Jargin who argues “X-rays should be administered according to generally accepted clinical indications,” we do believe that due to unnecessary hesitancy toward all radiation, there is an untapped potential for the expansion of “accepted clinical indications” for low-dose radiation treatments for many common infectious, neurodegenerative and inflammatory diseases including cancers.^{5,10,11}

In Reply to Sohrabi

We celebrate with Sohrabi who reports that discussions held at a recent Joint American Nuclear Society and Health Physics Conference led to a consensus that the LNT was “unsupported by basic science and represents an overestimate of the risks of low-dose/rate.”³ We have presented this narrative in several publications recently in the arena of risk assessment from X-ray exposures in the manual therapies.^{1,4,12-17} Our article at hand¹ highlighted 3 main concerns fueling “X-ray hesitancy” stemming from the fear-mongering from outdated LNT ideology; namely that 1. All radiation is harmful; 2. Radiation is

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cumulative; 3. Children are more susceptible to radiogenic harm. We provided good evidence that all 3 concerns are false.

We also acknowledge the efforts Sohrabi has made to develop an innovative “Universal Radiation Protection System” (URPS), a model that integrates LNT, threshold and hormesis concepts.¹⁸ Regarding the URPS, we believe, as discussed in recent articles,^{1,4} that because of the stimulation and upregulation of the adaptive protection systems from low-dose radiation (X-rays), the inclusion of a total effective cumulative dose (TCD) from low-doses (that initiates an almost immediate self-repair of genetic damage leaving a “net zero” damage effect) will lead to erroneous dose inputs and the overestimation of risks.

With regard to the specifics of yearly radiation background among residents living in Ramsar, we relied on reports within the literature. Regardless of the specific background level, it is extremely high, and to our knowledge, nowhere in the world has any ill health effects ever been recorded to persons living in super high background radiation localities. Thus, X-rays that give a fraction of the radiation from high background locations should not be feared.


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