Letter to the Editor: Low-dose whole body irradiation: a potential therapeutic modality?

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TO THE EDITOR: The recent article published by Zhang et al. (11) in this Journal is indeed very interesting and has great clinical relevance with far-reaching consequences. This appears to be the first detailed report that suggests that multiple exposures to whole body low-dose radiation (WB-LDR) significantly suppresses diabetes-induced systemic and renal inflammatory response and renal oxidative damage, resulting in prevention of renal dysfunction and fibrosis. In the study, the data show that the levels of most of the parameters like blood glucose, urinary microalbumin, and creatinine and other cytokines in blood/tissue returned to near the control values even after two or four weeks of fractionated whole body exposure (accumulated dose 0.175 Gy at 2 wk and 0.35 Gy at 4 wk) of the diabetic animals, and the whole body exposures for longer duration do not provide proportional beneficial effects. Had the authors studied simultaneously the temporal long-term impact of WB-LDR on the pancreatic as well as the renal tissue in diabetic animals, it would have certainly added significant information at the molecular level to our existing knowledge. In addition, it would have been much more interesting to know whether preexposure to WB-LDR of streptozotocin-induced-diabetic animals yielded similar results as obtained in the present study. Under discussion (3rd paragraph, p. E1374), the authors quoted other workers (1, 3, 9) for using “moderate doses” (3–6 Gy) of ionizing radiation for suppressive effects on renal inflammatory responses in various animal models.

We would like to state that, according to the United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR) report in 1986 (8), acute radiation doses above 2.0 Gy, between 0.2 and 2.0 Gy, and below 0.2 Gy are regarded as high, intermediate, and low, respectively. Generally, damaging or lethal effects are observed following high radiation doses, while cellular stimulatory effects are observed following low-dose short-term exposures in the range of 0.01–0.5 Gy (2). Since the LD50/30 (radiation dose at which 50% of the animals die within 30 days of exposure) in the case of Swiss albino mice has been reported to be 7.86 Gy (7), the application of moderate doses (between 3 and 6 Gy) for therapeutic purposes appears to be unacceptable by the scientific community. With the application of higher radiation doses, acute toxic effects and potentially late long-term effects are expected. Furthermore, the earlier reports also suggest that preexposure of mice to WB-LDR reduces the incidence of alloxan-induced diabetes (6) and delays the onset of hyperglycemia in diabetes-prone nonobese diabetic mice (5).

In another interesting study, Yamaoka and Komoto (10) reported that the Misasa Hot Spring treatment with radon significantly improved vasodilation and alleviated diabetic symptoms. In animal studies, WB-LDR has been found not only to decrease the incidence and percentage of developing diabetic mice, but also to enhance the survival rate of type 1 and type 2 diabetic animals (4, 5). It is clear that none of the medications used in clinical practice is absolutely nontoxic. Therefore, there is a need to evaluate the application of non-invasive technology like WB-LDR to be as realistic and parallel as is done for other therapeutic modalities. If WB-LDR really can play a critical role in the prevention or treatment of certain disorders such as diabetes, then we should accept the same without any radiation phobia in the mind.

DISCLOSURES

No conflicts of interest are reported by the authors.

REFERENCES


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