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Letter to the editor

Caution in comparing keloid treatment regimens through linear quadratic model

Iftikhar Ahmad, Muhammad Rauf Khattak

Institute of Radiotherapy and Nuclear Medicine (IRNUM), Peshawar, Pakistan

Dear Editor

An important dose-comparative study of high-dose rate Iridium-192 (Ir-192) brachytherapy for the treatment of keloid surgical scars was published recently by Ahmad et al.[1] Specifically, the treatment outcomes for four different dose regimens from a single centre were compared with other dose regimens reported in the literature and concluded that 10 Gy in single fraction seems the optimal treatment. The comparative analyses were based on the biological effective dose ($BED_{\alpha/\beta}$) using the linear quadratic (LQ) model and, throughout the study, $\alpha/\beta = 10$ Gy was used for the quantitative comparison. Indeed, the LQ model is capable to predict and compare the dose response in the range of 2–18 Gy/fraction, *provided appropriate parameters* are used.[2] This important issue needs more emphases for the common readers, which we would like to elaborate.

There has been growing emphasis on using the most appropriate α/β value in translating the physical dose into bioeffect dose. That said, several important factors (e.g., tissue type, dose fractionation scheme, etc.) contribute in the selection of α/β value. The keloids, a benign condition involving the skin and connective tissue, behave more like that of the late reacting tissues, indicative of low α/β values. The analyses of clinical results have indeed suggested that the α/β values for keloids ranges from 1·12 to 2·86 (mean, 2·08).[3] Importantly, these values are also consistent with that of late fibrosis ($\alpha/\beta = 1{\cdot}9$–$3{\cdot}1$) and telangiectasia ($\alpha/\beta = 2{\cdot}75$–$3{\cdot}7$) after breast radiotherapy.[4,5] The lower α/β values also indicate that treatment with few fractions and high dose fractions should be preferred, as suggested by the authors.

Based on the LQ model, a correction may be required while comparing the treatment schedules with different overall times. Specifically, the tissue repopulation is compensated with a time correction factor that subtracts a fixed dose per day beyond an initial lag period (i.e., 7–14 days); however, this factor is completely ignored in the comparative study. The time correction factors for keloids have been estimated as 0·98–2·13 Gy/day (mean = 1·34) with a lag period of 10 days after surgery.[3]

In spite of overlooking the important role of the above-mentioned factors in a comparative study, we agree with the author's conclusion that 'higher dose per fraction with short treatment schedule appears the optimal strategy for post-surgery keloid treatment'.

Correspondence to: Iftikhar Ahmad, Institute of Radiotherapy and Nuclear Medicine (IRNUM), Peshawar, Pakistan. E-mail: iahmadmp@gmail.com

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