International Journal of Hyperthermia

ISSN: 0265-6736 (Print) 1464-5157 (Online) Journal homepage: http://www.tandfonline.com/loi/ihyt20

Comment on: "A comprehensive model for heat-induced radio sensitization" by Bruninck et al. on Int. J. of Hyperthermia. 2017 Jun 23:1-19.

Giovanni Borasi

To cite this article: Giovanni Borasi (2017): Comment on: "A comprehensive model for heat-induced radio sensitization" by Bruninck et al. on Int. J. of Hyperthermia. 2017 Jun 23:1-19., International Journal of Hyperthermia, DOI: 10.1080/02656736.2017.1362116

To link to this article: http://dx.doi.org/10.1080/02656736.2017.1362116

Accepted author version posted online: 31 Jul 2017.

Comment on: "A comprehensive model for heat-induced radio sensitization" by Bruninck et al. on Int. J. of Hyperthermia. 2017 Jun 23:1-19.

Giovanni Borasi - Universita degli Studi di Milano-Bicocca, Medicine, Milano, 20126 Italy

giovanni.borasi@gmail.com

It would be very interesting to demonstrate that the LQ model for hyperthermia (in general, heat) cell killing requires, at high thermal dose, an exponential extension as in proposed in [1]. In other words the asymptotic trend of these survival curves, following the Authors, should be exponential. That would reinforce the analogy between mathematical models for radiation and heat: in both cases the LQ model with an exponential extension seems the most reasonable choice. This question of the exponential asymptotic trend of radiation survival curves was discussed many years ago in the Radiotherapy field. An "Universal" survival curve was proposed and experimentally validated. See for example [2] and the subsequent discussion [3, 4]. However, in my opinion, more experimental research is required to validate this conclusion for which concern the heat survival curves. What is presented in the paper seems insufficient to validate this conclusion. As an example, give a look at the data of Fig.1 of your paper fitted here with the simple LQ model, without any weighting of data (Figure 1). An additional exponential asymptotic trend seems not necessary. I don't say that this is the right fitting. I just would like to stimulate to have the highest accuracy in the weighting evaluation. This latter can change significantly results and conclusions. If the weighting is not the result of very large number of independent evaluation, may be better to fit data (in a logarithmic scale) without any weighting of data.

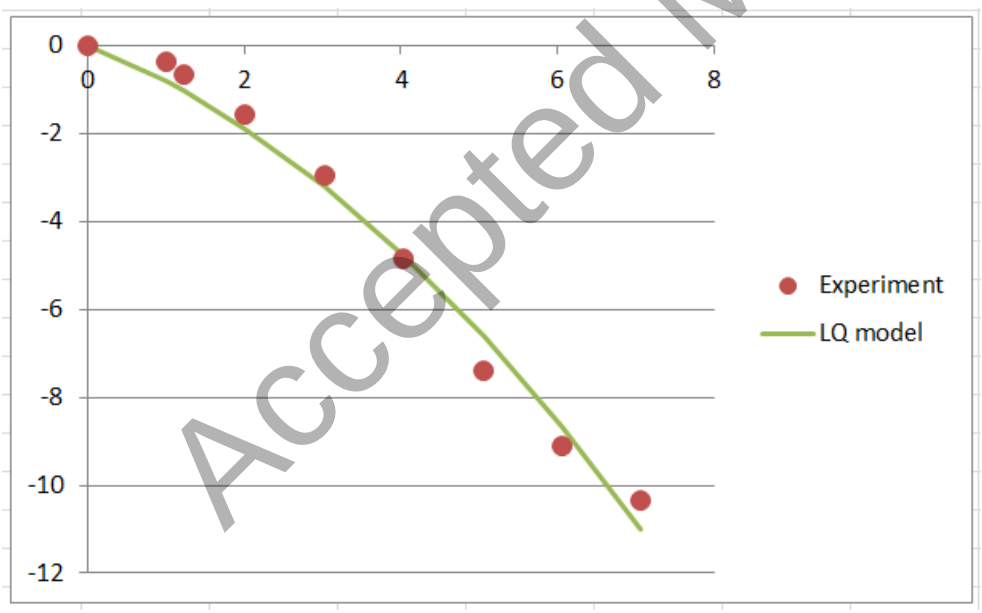

Figure 1. The data of the quoted paper, fitted with the LQ model without any weighting of data.

Bibliography

1. Bruningk, S.C., et al., *A comprehensive model for heat-induced radio-sensitization.* Int J Hyperthermia, 2017: p. 1-19.
2. Park, C., et al., *Universal survival curve and single fraction equivalent dose: useful tools in understanding potency of ablative radiotherapy.* Int J Radiat Oncol Biol Phys, 2008. **70**(3): p. 847-52.
3. Tome, W.A., *Universal survival curve and single fraction equivalent dose: useful tools in understanding potency of ablative radiotherapy: in regard to Parks et al. (Int J Radiat Oncol Biol Phys 2008;70:847-852).* Int J Radiat Oncol Biol Phys, 2008. **72**(5): p. 1620; author reply 1620-1.
4. Lindblom, E., et al., *Survival and tumour control probability in tumours with heterogeneous oxygenation: a comparison between the linear-quadratic and the universal survival curve models for high doses.* Acta Oncol, 2014. **53**(8): p. 1035-40.