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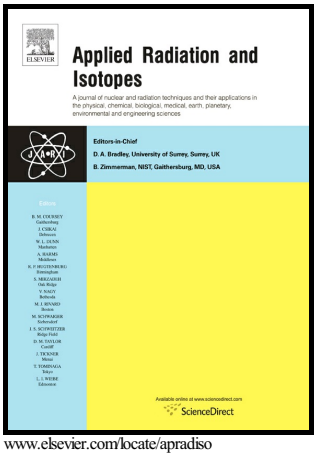

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Estimation of the Effectiveness Ratio (α/β) for Resistant Cancer Cells in U87MG Human Glioblastoma

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Abstract Glioblastoma contains self-renewing, tumorigenic cancer stem-like cells that contribute to tumor initiation and therapeutic resistance. The aim of this research was to estimate and compare the effectiveness ratio (α/β) of stem-like cells and differentiated glioma cells derived from the U87MG glioblastoma cell line. Cell survival experiments were obtained in a dose range of 0-20 Gy (13.52 ± 0.09 Gy/h) as a hyperfractionationated accelerated radiotherapy scheme. Biochemical characterization of the post-irradiated cells was performed by flow cytometry analysis and the percentage of stem-like cells that resisted irradiation was determined by the CD133 expression. Results showed that U87MG stem-like cells are highly proliferative and more radioresistant than the U87MG adherent group (with a lesser stem-like character), this in association with the calculated α/β ratio of 17 and 14.1, respectively.

Key words: Cancer stem cells, Glioblastoma, Linear quadratic model, Survival curves

Introduction

Human Glioblastoma Multiform (HGM) is an aggressive primary brain tumor with poor outcome. Fractionated radiation therapy is the primary adjuvant treatment following resection or biopsy. Inability to control disease at recurrence, continues to be a major challenge for this highly infiltrative tumor [1]. Experimental evidence supports the hypothesis that HGM contains a subpopulation of highly tumorigenic cells, glioblastoma stem-like cells (GSCs), from which recurrent HGM is thought to derive. GSCs have the

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