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Abstract Title

TITLE: The acute effect on three-dimensional cellular proliferation rate of low dose irradiation exposures

Authors and Institutions

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ABSTRACT

ABSTRACT BODY:

Objectives : Low doses of ionizing radiation are not yet consistently studied and documented. In such context, more advanced and complex biological models should be applied to obtain relevant data. Known limitations of monolayer cellular models and ever increasing difficulties to use some biological models, lead to develop advanced biological models, namely three-dimensional cell cultures.

Methods : These cellular models (monolayer and three-dimensional cell cultures - cultured with encapsulation in 1% alginate and 1.5% agarose coating) were externally irradiated with 100mGy and 1Gy. Biological effects of irradiation were studied in terms of proliferation rate (using MTT assay) and DNA damage (using comet assay), in two time-points: 24h and 72h post-irradiation.

Results : Results obtained demonstrated an acute tendency of decrease in the proliferation rate of three-dimensional cell cultures irradiated with both doses, 24h post-irradiation, that are statistically significant, followed by normalization of values 72h post-irradiation.

Interestingly, monolayer cell cultures displayed an entirely distinct proliferative behavior, when compared with three-dimensional cultures, since both doses of irradiation lead to a considerable increase of cellular proliferation rate.

On other hand, there seems to be no evidence of any relation between these doses of irradiation and DNA damage, 24h post-irradiation, while culture method being used has a considerable impact on it: Could it be possible that higher manipulation steps in three-dimensional cultures are on the basis of the increase of genetic damage?

Conclusions : As a conclusion, acute response of three-dimensional cell cultures to low dose irradiation seems to be related with the decrease of proliferation rate, with recovery 72h post-irradiation, seeming to have no significant genetic impact.