Title:

"Study of Non-Targeted Effects Induced on Cell Lines Using Low Doses of Ionizing Radiation"

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Introduction:

The LNT - Linear-no-Threshold model, used to analyze dose-effect ratios after biological irradiation exposures, theorizes that effects produced are directly proportional to the irradiating doses, with a linear without threshold pattern.

Nevertheless, there is a relevant number of evidence, accumulated essentially over the last decade, suggesting that risks inherent to low doses of irradiation cannot be strictly predicted by the LNT model. Among those, there is a significant number of experimental evidence for a variety of low dose induced biological phenomena, which seems to have an impact on modulating the shape of dose-effect curves, namely for expositions below 0.2 Sv, causing the deviation of LNT model. Accumulated evidence demonstrate that cell irradiation induces biological effects, both to directly irradiated cells as well as to cells not exposed to any kind of ionizing radiation, present in a mixed population. This assumption is breaking the classical idea, based on the belief that damage to cellular DNA is only induced by purely ionizing events in cells directly irradiated. This phenomenon, based on cell communication pathways, is termed "Bystander Effect" - clearly highlighted between the "non-targeted effects" of irradiation not considered by the LNT model - being considered one of the biggest paradigm shifts of modern radiobiology.

Aim: Knowing that not all types of cells will produce or respond similarly to bystander soluble factors generated by the irradiated cells, this paper pretends to disseminate the preliminary results obtained after the analysis of bystander phenomena triggered by low doses of irradiation – starting in the medical imaging, diagnostic region - in three distinct cell lines.

Material and Methods:

Three human cell lines (fibroblasts, pheochromocytoma and follicular thyroid carcinoma) were cultured in 2D (monolayer) were subjected to various protocols of irradiation, with essentially two kind of approaches (exposition to identical doses, but with distinct exposition times, and

exposition to distinct doses, during an identical exposition time), both using sources of X and Gamma Rays, with, in all the cases – but after distinct periods of time - the resulting conditioned media was collected and transferred to the correspondents non-irradiated cell cultures, where the occurrence of bystander effect was studied by examining the apoptosis / necrosis ratio and the clonogenic survival.

Results and Conclusion:

Tables including the preliminary results already obtained will be presented and discussed, allowing comparison with published available data.

Foi decidido que não será apresentada a versão integral deste documento.

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