Evaluation of Radiobiological Effects in Three Distinct Biological Models

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The present work aims to share the process of development of advanced biological models to study radiobiological effects.

Recognizing several known limitations and difficulties of the current monolayer cellular models, as well as the increasing difficulties to use advanced biological models, our group has been developing advanced biological alternative models, namely three-dimensional cell cultures and a less explored animal model (the Zebrafish - *Danio rerio* - which allows the access to inter-generational data, while characterized by a great genetic homology towards the humans). These three models (monolayer cellular model, three-dimensional cell cultures and zebrafish) were externally irradiated with 100mGy, 500mGy or 1Gy. The consequences of that irradiation were studied using cellular and molecular tests.

Our previous experimental studies with 100mGy external gamma irradiation of HepG2 monolayer cells showed a slight increase in the proliferation rate 24h, 48h and 72h post irradiation. These results also pointed into the presence of certain Bystander effects 72h post irradiation, constituting the starting point for the need of a more accurate analysis realized with this work. At this stage, we continue focused on the acute biological effects. Obtained results, namely MTT and clonogenic assays for evaluating cellular metabolic activity and proliferation in the *in vitro* models, as well as proteomics for the evaluation of *in vivo* effects will be presented, discussed and explained. Several hypotheses will be presented and defended based on the facts previously demonstrated.

This work aims to share the actual state and the results already available from this medium-term project, building the proof of the added value on applying these advanced models, while demonstrating the strongest and weakest points from all of

them (so allowing the comparison between them and to base the subsequent choice for research groups starting on the field) for the study of biological effects of low doses of ionizing radiation, believing that there is a clear lack of data related with the biological effects of low doses of ionizing radiation. It is our goal to study the radiobiological effects of those levels of radiation – the medical imaging levels, that characterizes the Nuclear Medicine and Radiology typical environments.

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

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