Title: **3D *vs* 2D Cell Cultures in the Evaluation of Radiobiological Effects of Exposition to Low Doses – Medical Imaging Levels – of Ionizing Radiation**

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Introduction:

Pretending to develop advanced biological models to study biological effects of low doses of ionizing radiation and following the actual policies on Animal Sciences, based on 3 R's Rule (to Reduce, Refine and Replace) – that limits as much as possible the application of animal models – scientific research using cellular models is constantly increasing. Nevertheless, the intrinsic limitations of actual cellular models quite often had been recognized on a significant number of papers pointing a significant number of non-concordances between results obtained using *in vitro* and *in vivo* studies. Actually, an increasing number of authors admit that three-dimensional cell culture (and spheroid cell culture in particular) could represent an interesting solution and a step further on use of cellular models. The work here to be presented reflects the first phase on the use of this methodology on the study, evaluation and

quantification of cellular effects of low doses – starting on medical imaging level - of exposition to ionizing radiation.

Aim:

This paper demonstrate and pretend to collaborate on dissemination of the preliminary results obtained on the comparison between several techniques to perform spheroid cell culture, helping to create evidence to support and sustain the choice of an advanced cellular model to study radiobiological effects.

Materials and Methods:

Different cell lines (healthy fibroblasts, pheochromocytoma, follicular thyroid carcinoma, medullar thyroid carcinoma, hepatocellular carcinoma, transient cells bladder carcinoma,…) were cultured on two-dimensional cell culture (monolayer) with the appropriate recommended medium and stored in cell incubators at 5% CO2 atmosphere, but also had been cultured as spheroid, using three different techniques: Agar Coating, Shaker and Matrigel®. The comparison had been performed and the selection of "the best methodology" has been done regarding criteria as technical easiness, practicability and reproducibility, namely regarding the amount of specialization and inherent complexity needed in terms of human resources, materials and equipment being used, but also reproducibility when performing the biological and functional characterization using Cellular and Molecular Biology techniques.

Results and Conclusion:

The results obtained will be presented and discussed, demonstrating our findings and opinions about methods and techniques to produce spheroid human tumor cell cultures to be used in radiobiology studies to evaluate Low Dose radiation Effects.

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

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