Effects Evaluation of Murine Melanoma Treatment Using a Combination of Photodynamic Therapy and Radiotherapy

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There are many types of treatment for malignant tumors. Radiotherapy (RT) is one of the most applied and well-established treatments. Other therapies such as chemotherapy and photodynamic therapy (PDT) act on metabolism and cell structure except for surgery. Usually, the damage promoted by only one technique is not enough to eliminate the tumor, but the effect can be potentiated when procedures are associated. Melanoma-type lesions, specifically, present resistance mechanisms for both RT and PDT, however, this technique combination has shown promising results. RT generates free radicals that react with cellular macromolecules such as DNA, RNA, proteins, and membranes, causing cell dysfunction and death. These damages may favor the result of a consecutive application of PDT, either by allowing greater photosensitizer penetration into the cells or by weakening the defense mechanisms. On the other hand, PDT promotes direct damage to the cell that can activate an immune response against tumor cells, which can optimize the effect of another technique applied in sequence, such as RT. In this study, in vitro and in vivo assays will be carried out to evaluate the effects of RT and PDT using different photosensitizers (such as indocyanine green, Photogem, and photoditazine) with the B16F10 melanoma cell line. Different combinations of techniques have been carried out to obtain the best treatment strategy with additive or synergistic treatment effects, as well as the assessments of tumor volume growth rates and histological and immunohistochemical evaluation of tissues treated with the different protocols.