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Assessment of the potential of radiosensitizers to improve the efficacy of Radiation Therapy

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Radiotherapy is one of the major therapeutic approaches used in cancer treatment, along chemotherapy and surgery. Current data shows that around 50% of cancer patients undergo radiotherapy for the treatment of local tumors. This methodology is based on the deposition of ionizing energy in tumor cells, commonly through the use of high-energy gamma rays, X-rays, or charged particles, in order to damage these cells and induce tumor reduction/elimination. In this context, the use of radiosensitizing agents may play a crucial role to obtain enhanced radiobiological effects with improved therapeutic outcomes. For this purpose, several classes of radiosensitizers with diversified mechanisms of actions can be studied. Towards this goal, this project will investigate the ability of, already developed, radiosensitizers to enhance radiation therapy using the clinical beam at Fundação Champalimaud. The biological and physical studies will focus on the analysis of local deposition energy and its impact on the direct effects of radiation, through quantification of Deoxyribonucleic Acid (DNA) damage in the form of DNA double strand breaks (DSBs), and long term effects through clonogenic assays. The primary objective of this project is to assess the impact of radiosensitizers in radiotherapy treatment planning by incorporating the obtained biological data into the calculations.

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