Assemblée Générale 2023 du GdR Mi2B



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Characterizing the Time-Dependent Response of a Population of Gliomas to Single-Dose Radiation: Comparison of a Mathematical Model With Experiments

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Gliomas are a type of brain tumor distinguished by their highly invasive cells exhibiting the capacity to migrate considerable distances while remaining below the detection threshold of MRI scans. This inherent invasiveness often leads to unavoidable tumor reappearance post-treatment. Radiotherapy stands as a crucial cornerstone of their therapeutic strategy, entailing the delivery of fractionated doses following a meticulous timetable.

Although essential components of radiotherapy treatment have undergone thorough investigation, the current clinical framework exclusively predicts the fraction of surviving cells following a specific radiation dose, disregarding the temporal aspect of the response. We believe that by characterizing the tumor's time-dependent reaction to irradiation, treatment protocols could be better tailored, ultimately leading to improved disease outcomes.

To investigate this, we employed time-resolved fluorescence microscopy to track glioma cells receiving different single radiation doses. We also varied the initial cell concentrations to explore potential collective effects. Subsequently, we developed a mathematical model describing the evolution of cell density over time taking into account various biological process and we compared it to the experimental results. The latter suggest that the initial seeding density does play a role on the growth following irradiation.

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Classification de Session: Pôle Effets des Irradiations sur le Vivant