Conférence

Département des sciences de l'imagerie médicale et des radiations

Harnessing Radioluminescence for Next-Generation Nanoradioimmunotherapeutics

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Radioluminescent nanoparticles (RLNPs) are an emerging class of materials that emit light upon excitation by ionizing radiation. These nanoparticles are highly efficient at attenuating ionizing radiation and inducing localized dose enhancement through secondary ionization cascades, establishing their potential as powerful radiosensitizers. Furthermore, their intrinsic luminescence facilitates photodynamic therapy (PDT), enabling the generation of oxidative stress within targeted cells. This dual-action approach, termed X-ray photodynamic therapy (X-PDT), has garnered significant interest for addressing the challenges of treating radiation-resistant cancers. In addition to these properties, the surface chemistry of RLNPs can be engineered to introduce immunomodulatory functionalities, adding a third therapeutic dimension to the X-PDT platform. This capability aligns with the growing recognition of the interplay between radiotherapy and immune activation. By leveraging immune-mediated mechanisms alongside radiosensitization and PDT, X-PDT represents a promising strategy for advancing the next generation of cancer treatment modalities. My research program focuses on understanding the radiobiological aspects of RLNPs and X-PDT treatments and the properties that govern immunomodulatory outcomes of these new treatments. My research program is dedicated to developing new RLNP-based cancer treatments and elucidating the radiobiological mechanisms underlying their therapeutic efficacy, with a key focus on investigating the physicochemical and biological properties that influence immunomodulatory outcomes.

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