Conférence

Département des sciences de l'imagerie médicale et des radiations

Radiobiological Aspects of Novel Antibody-Based Peptide Theranostics in Solid Tumors

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Radionuclides that emit β-particles, α-particles, or Auger electrons can induce lethal DNA double-strand breaks in cancer cells and when targeted, within radiopharmaceuticals, can potentially overcome resistance associated with existing therapies. Moreover, those that also emit ɣ-photons or positrons, enable cancer imaging, via SPECT or PET. The use of such Radiopharmaceuticals for both diagnostic imaging and treatment, represent what is termed the radiotheranostic approach. Clinically, this has been successful with agents like 68Ga-DOTATATE and 177Lu-DOTATATE for neuroendocrine tumors, as well as 68Ga-PSMA-11 and 177Lu-PSMA-618 for metastatic prostate cancer.

I propose to synthesize novel peptide-based radiotheranostics by exploiting short loops within monoclonal antibodies (mAbs) that interact with target receptors. mAbs themselves are not optimal for imaging purposes due to their long circulation times, and potential toxicity, but can be studied with computational methods to identify suitable peptide sequences. Further modifications during synthesis—such as adding albumin binding domains or non-natural D-amino acids—will enhance their pharmacokinetic properties. Considering the large numbers of mAbs already approved for various cancer types, this approach could significantly expand the range of effective radiotheranostics. Additionally, I will focus on the radiobiological aspects of these novel peptide theranostics and compare them to external beam radiation therapy (EBRT). I believe this research plan represents an exciting opportunity to translate fundamental radiation biological science into more effective cancer treatments.

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