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Application of Nanotechnology in Cancer Research

Devika Chithrani
University of Victoria, Canada

Extended Abstract

Cancer remains the leading cause of death worldwide, and due to the heterogeneity of different types of cancer, there is still ample room for improvement in treatments. Radiotherapy (RT) is one of the main modalities of cancer treatment. One of the challenges with RT is that we cannot increase the radiation dose to the tumor further due to the proximity of other important organs. One strategy to increase the local RT dose is to introduce radiosensitizers to the tumour environment to enhance the local RT dose. The addition of two radiosensitizing agents with complementary benefits can further enhance the local RT dose. I will discuss how a unique combination of gold nanoparticles (GNPs) and chemotherapeutic drug, docetaxel (DTX) as radiosensitizing agents to improve current radiotherapy outcomes. Less than 0.1% of chemotherapeutic drugs reaches the tumor when used in free form. Therefore, we used a lipid nanoparticle (LNP) platform to deliver anticancer drug, docetaxel. This NP based combined treatment approach is expected to generate significant improvements in obtaining local control of the disease and reducing metastasis over current standard of care. We have a team of radiation oncologist, medical physicist, pharmacologist, and a biomedical scientist involved in this proposal. The outcome of this work will lay a solid foundation to run a phase I clinical trial in the near future.