

# **Nanomedicine as a Promising Approach to Overcome Current Challenges in Cancer Radiotherapy**

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## **Abstract**

By 2040, the number of new cancer cases per year is expected to rise to 29.5 million and the number of cancer-related deaths to 16.4 million. Approximately 50 percent of all cancer patients can benefit from radiotherapy (RT). Although an increasing number of patients survive at least five years past their cancer diagnosis, cancer continues to be the leading cause of death worldwide. RT is an essential element of curative treatment of many cancers including breast, prostate, cervix, head and neck, lung, and brain. For prostate cancer, radiotherapy dose-escalation is known to improve disease control, but can also increase late normal tissue toxicity. Despite advancements in treatment planning & delivery we are now approaching the limit of RT dose that can be safely delivered to patients, creating a clear need for novel methods to enhance radiotherapy effects to further improve the survival, while reducing side effects.

Enhancing targeted delivery of radiotherapy (RT) has tremendous potential to maximize the effect of dose given to the tumor and reduce the dose given to normal tissue. One of the current strategies to preferentially increase tumor radiation dose effect is to add a radiosensitizer to RT, which has improved survival for those with cancers. Dr. Chithrani uses gold nanoparticles in combination with other radiation sensitizing agents to optimize current radiotherapy. In this talk, she will discuss the promising outcomes of such novel strategies to overcome current challenges imposed by the tumour and its microenvironment.