CANCER PREVENTION & RESEARCH INSTITUTE OF TEXAS

Award ID:
RP170040

Project Title:
Exploiting DNA repair defects using intensity modulated proton therapy

Award Mechanism:
Individual Investigator

Principal Investigator:
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Entity:
The University of Texas M.D. Anderson Cancer Center

Lay Summary:

In the United States and specifically Texas, about one third of the population will be diagnosed with cancer in their lifetime. More than half of patients with solid tumors are treated with radiotherapy. Our research aims to improve cancer treatments by combining one of the most advanced techniques in radiotherapy, intensity modulated proton therapy (IMPT), with newly developed molecularly targeted drugs (MTDs). The combination of IMPT and MTD has the potential to reduce side effects to healthy tissues and to escalate the radiation kill effect to the tumor volume. Moreover, it has the potential to reduce treatment time, leading to cost reductions. The rationale for using proton therapy beams clinically lies in reducing the integral radiation dose and sparing surrounding healthy tissues and critical organs, minimizing treatment related complications and reducing the risk of radiation-induced secondary cancers. We hypothesize that proton therapy beams can be exploited using IMPT to precisely trigger tumor cells to repair their DNA differently than the cells in the surrounding healthy tissues located in the proton beam path. This would represent a unique scenario in which IMPT is combined with drugs that inhibit specific DNA repair enzymes in the tumor cells to enhance tumor control. We propose to investigate the synergistic effects of combining proton therapy and MTD in cell and animal models. Our research will serve as the basis for studies that will transition to potential clinical trials combining IMPT and MTD to improve the outcome for various types of cancers. Hence, our work has high clinical relevance that can have a tremendous direct impact on developing novel personalized therapeutic combinations to improve cancer treatment.