CANCER PREVENTION & RESEARCH INSTITUTE OF TEXAS

Award ID:
RP180736

Project Title:
Nanoparticle-Mediated Hyperthermia to Improve Chemotherapeutic Efficacy in HIPEC

Award Mechanism:
High Impact/High Risk

Principal Investigator:
Holder, Ashley

Entity:
The Methodist Hospital Research Institute

Lay Summary:

Peritoneal malignancies or cancers that spread to the peritoneum (lining of the abdomen) pose a treatment challenge. IV chemo often has minimal effect on these cancers, and surgical resection alone may miss microscopic tumors. Currently, recommended treatment is surgical removal of visible tumors followed by filling the abdomen with a heated chemo (HIPEC) bath to kill remaining cancer cells. This method has shown significant survival benefit for patients with metastatic gastric, colorectal, and ovarian cancers, with cures reported in patients with appendix cancer. Since the current HIPEC technique has a considerable recurrence risk and causes digestive dysfunction for up to a year after surgery, our goal is to re-invent HIPEC to be more targeted and less toxic. Interestingly, tiny molecules of gold, known as nanoparticles, can generate heat by shining a laser on them. We propose to design a film of gold nanoparticles and chemotherapy that surgeons can place in the abdomen, directly onto microscopic tumors. The surgeon would then shine a laser on the film to heat the target area, delivering localized chemo to maximize cancer cell killing and minimize toxicity. We will refine this film to provide controlled heating and to ensure chemo is efficiently released. We will test the effectiveness of this film on gastric cancer cells and then in an animal model of metastatic gastric cancer with peritoneal tumors. This project challenges the accepted method of treatment for patients with peritoneal malignancies by allowing the surgeon to direct chemotherapy to diseased areas. Our proposal could define a more effective and less toxic technique for patients with these cancers. If successful, the treatment of patients with other cancers could benefit from our work; this film could be used to decrease the risk of cancer returning in any surgical site, especially in areas where minimizing removal of normal tissue is of utmost importance, such as in breast cancer.