**TITLE:** Molecular Engineering of RNA-nanoparticle vaccines targeting malignant brain tumors

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**RESEARCH PROJECT DESCRIPTION**  
(brief overview of background, hypothesis, methods, role of medical student, funding and relevant publications)

Glioblastoma multiforme (GBM), the most common malignant brain tumor, remains resistant to conventional therapies thus necessitating the development of novel targeted therapeutics. Cancer immunotherapy can re-direct the immune system against refractory malignancies with unparalleled specificity; however vaccination strategies have proven to be only weakly immunogenic. Consequently we have designed a novel, translatable nanoparticle (NP) vaccine that can be embedded with immunomodulatory modifications to generate robust anti-tumor responses against murine models for GBM.

My lab is developing next-generation cancer vaccines. We hypothesize potentiating immunotherapeutic response against malignant brain tumors by engineering existing vaccine formulations with immunomodulatory RNAs designed to stimulate intracellular pathogen associated molecular patterns (PAMPs) while simultaneously downregulating immunoregulatory pathways.

Medical students will participate in molecular biology experiments synthesizing novel RNA constructs and incorporating these into existing NP formulations. If students are interested, they may participate in pre-clinical animal studies assessing the immunogenicity and anti-tumor efficacy of novel RNA-NP formulations. Funding for the project is provided by the American Brain Tumor Association, BeeZ Foundation, and Hyundai Hope on Wheels.