

*Beyond Taxol®:
Nanoparticle Delivery of a Paclitaxel Silicate Prodrug*

Despite decades of research, cancer continues to be a leading cause of morbidity and mortality in the US and elsewhere. Chemotherapy, alone or in conjunction with surgery, remains the most effective and common treatment option for cancer. However, anticancer drugs are associated with severe dose-limiting side effects, which adversely affect treatment regimens and quality of life. These side effects arise due to the non-specific nature of anticancer drugs—they kill normal cells in addition to cancerous cells. Additionally, excipients (non-drug components) used in the drug formulations contribute to these undesirable side effects. We propose a novel nanoparticle-based formulation strategy that will greatly ameliorate the need for excipients, yet improve the tumor specificity of the treatment. We will use paclitaxel, the active chemotherapeutic agent in Taxol® (a first line medication against many cancer types) to demonstrate the viability of our innovative strategy. The objective of the proposed studies is to garner critical preliminary data supporting the use of block copolymer based nanoparticles, loaded with a paclitaxel silicate prodrug (a chemical derivative that, upon *in vivo* cleavage, produces an active drug molecule), to improve therapeutic effectiveness. These results will buttress several major grant applications we envision. We have assembled a multidisciplinary research team to achieve this goal. Our expertise will enable us to synthesize the silicate derivatives, formulate them into biocompatible nanoparticles, and evaluate their anticancer efficacy. The ultimate goal of this research is to develop a clinically-relevant nanoparticle formulation that will positively impact cancer therapy.