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Program & Abstracts

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Title: Synthesis and Characterization of Prussian Blue Nanoparticles for Tumor Targeting

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Career Level: Trainees

Category: Basic & Translational Research **Theme:** Biochemistry

Keywords: Prussian blue, nanoparticles, tumor cells

Background This study describes the use of Prussian blue (PB) nanoparticles for tumor therapy. Specifically, the use of PB nanoparticles to locally heat tumor tissue to increase the uptake of drug molecules such as antibodies. PB nanoparticles exhibit a property of robust heating when exposed to near infrared light. Therefore this PB-based temperature increase allows tumor tissue to become more porous and permeable to antibodies. **Objective** In the present work, PB nanoparticles were synthesized and compared against gold nanoparticles, the gold standard of nanoparticles for photothermal heating, using a near infrared laser for photothermal testing. A second goal of this project is to tailor the PB nanoparticles with a specific surface coating to target liquid tumors and eliminate such detrimental cells without damaging normal blood cells. **Methods/Design** For the photothermal heating studies, identical concentrations of PB and gold nanoparticles were subjected to heating studies using the laser. For the targeting studies, two types of cells were used: Eol-1 cells, which mimic cancer cells like leukemia, and Jurkat cells, which we use as control cells in our studies. In order to target the tumor cells, the PB nanoparticles were tagged with avidin, biotin and an antibody. To achieve this assembly, the nanoparticles were first coated with slightly negative BSA and then layered with avidin, biotin, and antibody. **Results/Discussion** Our heating studies demonstrated the ability of PB nanoparticles to heat up in a short period of time. Despite exhibiting slightly lower heating when compared to gold nanoparticles, PB nanoparticles are easier to synthesize at significantly lower costs. Further, our assembled nanoparticles were able to target EoL-1 cells although they exhibited instability. Ongoing studies are optimizing the nanoparticle design to improve the performance of the PB nanoparticles with respect to these two objectives.