



CANCER PREVENTION & RESEARCH
INSTITUTE OF TEXAS

Award ID:
RP110165

Project Title:
Protein scaffolds for targeted delivery of toxic iron to cancer cells

Award Mechanism:
High Impact/High Risk

Principal Investigator:
Kurtz, Donald

Entity:
The University of Texas at San Antonio

Lay Summary:

A naturally occurring hollow spherical protein nanoparticle will be modified to contain 24 tumor targeting peptides on its outer surface, 12 photosensitizing molecules in the walls of the sphere and ~3,000 iron atoms filling the interior cavity. The surface-exposed peptides on the spherical nanoparticle will bind to receptors on the cancer cells like "Velcro". The photosensitizers in the protein nanoparticle will then be irradiated with tissue-penetrating near-infra-red light. This irradiation triggers release of massive doses of "free" iron through pores in the wall of the nanoparticle. This massive release of iron is highly toxic to cells because it produces reactive oxygen species and free radicals, which overwhelm the antioxidant capacity of the cells. The proposed approach is distinct from singlet oxygen photodynamic therapy or photothermal ablation, which have had only limited effectiveness in the clinic. Prostate and breast cancer cells would be targeted initially, but the proposed approach can potentially be targeted to a wide range of cancers. The photo-triggered release of massive doses of iron in a single tumor-targeted nanoparticle is unprecedented; it represents a truly innovative, but chemically and biologically sound approach to cancer therapy.