AbstractID: 2549 Title: Nanotechnology for Molecular Imaging

Developments in molecular science are pushing the temporal detection horizon of medical diagnosis and therapy back from the anatomical sequelae of disease to its earliest physiological and biochemical manifestations. The emerging field of "Molecular Imaging" may be envisioned as the *in vivo* diagnosis of complex pathological processes by detection of unique biochemical signatures. The concept is analogous to microscopic detection of specific epitopes with immuno-histochemistry techniques translated into a complex and hostile *in vivo* environment and detected with noninvasive medical imaging systems.

We have developed a novel multi-modal site-targeted contrast agent for sensitive and specific imaging of molecular epitopes and local therapy. This “platform” approach comprises a nanoparticle that is applicable to at least three common noninvasive imaging modalities: ultrasound (native particle), magnetic resonance (gadolinium conjugated), and nuclear imaging (radionuclide conjugated). Homing ligands linked to the surface of the nanoparticle an injectable agent with long circulating half-life and high signal amplification upon binding to a molecular target. This novel platform has been used to detect angiogenesis, fibrin, tissue factor and collagen III and to locally deliver therapeutic agents through a unique contact facilitated mechanism. Over the next decade, molecular imaging, in conjunction with rational targeted therapies, will likely change many clinical paradigms in medicine.