

*The Medicinal Chemistry Seminar Series presents:*

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***“*** ***Radiolabeled nanocarriers: Imaging tools for patient-based drug delivery”***

**1544 North University Building  
11:00am Thursday, November 2, 2023**

**Abstract:**

Nanomedicines, nanoparticle/ liposomal/ pegylated drug formulations, have been extensively evaluated for the delivery of cancer therapeutics. However, since 2000 there have only been 7 FDA approved nanomedicines, a significantly low number considering all the promising published preclinical successes. These formulations have been shown to significantly alter the pharmacokinetics and toxicological profile of conventional low molecular weight cancer chemotherapeutics (e.g. doxorubicin, paclitaxel, gemcitabine, etc). Encapsulating chemotherapeutics in liposomes or micelles or coupling chemotherapeutics to polymeric/ polyethylene glycol (PEG) molecules reduces their interaction with blood proteins, protects the molecules from metabolic degradation, increases their circulation half-life, reduces potential off target / toxicologic effects and improves target site accumulation. Despite their promising properties, variability in treatment response significantly limits their effectiveness and full clinical translation. Star-PEG polymer-based constructs have been used as vehicles to deliver SN-38, active metabolite of irinotecan, and talazoparib, a PARP inhibitor, to solid tumors. We have developed cognate zirconium-89 labeled star-PEG polymers with and without the pendant drugs as imaging agents to assess the pharmacokinetic properties of the nanomedicines in a variety of preclinical solid tumors models. We have shown that the 89Zr-star-PEGs accumulate and are retained in the tumors. Molecular imaging using positron labeled nanomedicines provides a means to non-invasively visualize delivery and quantitate accumulation of therapeutic agents. Thus, this imaging approach may be applicable as a predictive strategy for evaluating drug delivery and concentration in tumors, to overcome the challenge of choosing the right patients in clinical trial and ultimately treatment settings.