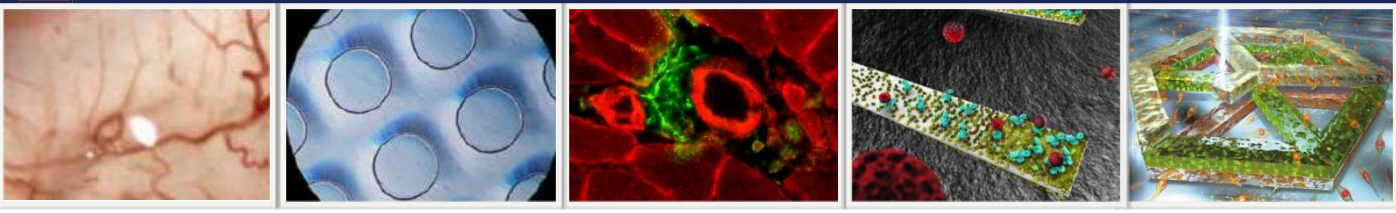
BioNanotechnology Seminar Series

Spring 2011



Development of Anticancer Nanomedicine

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Date: Tuesday, March 29, 2011

Time: 12:00 – 1:00 p.m. CDT

Location: 1000 MNTL

Abstract:

Nanoparticles are promising carriers for the delivery of chemotherapeutics for cancer therapy because they are able to carry large payload of therapeutic modalities, extravasate leaky tumor vasculatures, and mediate sustained drug release in tumor tissues. However, over the past several decades there has been only very limited clinical success of anticancer nanomedicine because of tremendous issues related to their formulation. We developed various controlled chemistries and engineering processes to prepare anticancer nanomedicines with well-controlled physicochemical and biological properties. In one study, we developed the nanoconjugation technique, utilizing hydroxyl-containing therapeutic agents initiated lactide polymerization followed by nanoprecipitation to develop polymeric nanoconjugates with defined drug loading, quantitative loading efficiency and controlled release profiles.[1-3] We also developed drug-conjugate silica nanoparticles with precisely controlled particle sizes and demonstrated the size-dependent tumor tissue penetration.[4] Preliminary studies on cancer targeting using aptamer-nanoparticle conjugates was also evaluated and demonstrated in vitro and vivo.[5]

References:

1. Tong, R.; Cheng, J. "Ring-Opening Polymerization-Mediated Controlled Formulation of Polylactide-Drug Nanoparticles". *J. Am. Chem. Soc.* **2009**, 131, 4744-4754.
2. Tong, R.; Cheng, J. "Paclitaxel-initiated, controlled polymerization of lactide for the formulation of polymeric nanoparticulate delivery vehicles". *Angew. Chem., Int. Ed.* **2008**, 47, 4830-4834.
3. Tong, R.; Yala, L. D.; Fan, T. M.; Cheng, J. J. "The formulation of aptamer-coated paclitaxel-polylactide nanoconjugates and their targeting to cancer cells". *Biomaterials* **2010**, 31, 3043-3053.
4. Tang, L.; Fan, T. M.; Borst, L. B.; Cheng, J. "Drug-conjugated silica nanoparticle with precisely controlled size enhances tumor penetration". *in preparation* **2011**.
5. Cao, Z. H.; Tong, R.; Mishra, A.; Xu, W. C.; Wong, G. C. L.; Cheng, J.; Lu, Y. "Reversible Cell-Specific Drug Delivery with Aptamer-Functionalized Liposomes". *Angew. Chem., Int. Ed.* **2009**, 48, 6494-6498.

Seminar Presented by:

Center for Cellular Mechanics
University of Illinois at Urbana-Champaign

IGERT Integrative Graduate Education and Research Traineeship
Cellular and Molecular Mechanics and BioNanotechnology

M-CNTC NCI Alliance for Nanotechnology in Cancer
Midwest Cancer Nanotechnology Training Center