THE UNIVERSITY OF ARIZONA
COLLEGE OF ENGINEERING
Biomedical Engineering

DEPARTMENT OF BIOMEDICAL ENGINEERING SEMINAR SERIES

PRESENTS

Bo Sun, Ph.D.

Research Associate, Radiation Oncology, University of North Carolina at Chapel Hill

"Nanocrystals for the parenteral delivery of poorly water-soluble anticancer drug"

BIO: Bo Sun a research associate working at the University of North Carolina at Chapel Hill. He received my PhD degree in Pharmaceutics from Purdue University in May 2016. During my PhD study, I proposed to develop a new therapeutic approach against ovarian cancer with paclitaxel (PTX) nanocrystals and biodegradable hydrogel depots as their intraperitoneal (IP) delivery platform, which was funded by Purdue Research Foundation in 2013. In vivo efficacy studies demonstrated that PTX nanocrystals-HA gel outperformed the same IP dose of TAXOL® by extending the survival of mice with IP tumors due to the enhanced PTX release and regional depot effect. Furthermore, I have developed albumin-coated PTX nanocrystals with high drug loading, better circulation stability, and tumor accumulation compared to the commercial product ABRAXANE®. This project was supported by NAL Pharmaceuticals Ltd. and resulted in a U.S. provisional patent application in 2016.

ABSTRACT: Nanoparticulate carriers are widely used to achieve selective delivery of chemotherapeutic drugs to solid tumors by exploiting the enhanced permeability of tumor vasculature. However, clinical development of nanoparticles is challenging because of their limitations in physicochemical properties, such as low drug loading efficiency and poor circulation stability. Low drug loading not only causes technical difficulty in administration but also increases the amount of co-delivered carrier materials, imposing biological burdens to patients. Poor circulation stability causes loss of pharmacokinetics benefits of nanoparticles. To overcome these challenges, we developed an albumin-coated nanocrystal (Alb-NC) formulation of paclitaxel (PTX) with 90% drug loading and higher serum stability than Abraxane□. Alb-NC showed higher antitumor efficacy than Abraxane at the same dose in a mouse model of B16F10 melanoma, which demonstrated the feasibility and benefits of delivering an anticancer drug using a carrier-free nanoparticle formulation with good circulation stability. To further exploit PTX nanocrystals (PNC), we developed an in-situ crosslinkable hydrogel depot containing PNC for intraperitoneal (IP) chemotherapy of ovarian cancer. A single IP administration of PNC-gel extended the survival of tumor-bearing mice significantly better than Taxol. These results demonstrated the promise of PNC-gel depot as an IP drug delivery system.

Please join us on

Monday, February 25th, 2019

12:00-12:50 pm, Keating Bldg., Room 103

Refreshments will be available at 11:50 am

Host: Young-Jun Son, Ph.D.

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