NUS National University of Singapore | Department of Pharmacy, Faculty of Science

Thursday, 9th Mar 17 at 3 pm
MD1-06-03M, Seminar Room

Biomimetic Nanotechnology for Improved Cancer Diagnosis, Prognosis, and Treatment: Targeted delivery platforms and cancer cell capture devices

By **Prof Hong, Seungpyo**

Abstract:

Despite the ongoing fight against cancer, the debilitating disease remains the second most cause of death in the US. This presentation will highlight our current research in an effort to intervene cancer development through marriage of dendrimer chemistry, nanotechnology and biomimicry, focusing on 1) novel nanocarriers for targeted drug delivery and 2) biomimetic devices for effective detection and separation of circulating tumor cells (CTCs). For targeted drug delivery, we have developed a hybrid nanoparticle system integrating targeted poly(amidoamine) (PAMAM) dendrimers and poly(lactic acid)-poly(ethylene glycol) (PLA-PEG) nanoparticles. This unique design allowed us to combine the advantages of each nanocarrier, i.e, effective tissue penetration of dendrimers and prolonged circulation of PLA-PEG nanoparticles, in a controlled manner, providing a novel delivery platform. Additionally, we have also found that the tumor penetration behaviors of nanoparticles are highly dependent upon the size, surface charge, and rigidity of the nanoparticles. For CTC capturing, we have developed a novel separation method using a biomimetic approach combined with nanotechnology. The biomimetic combination of dynamic rolling and multivalent binding via dendrimers significantly enhances the surface capture efficiency of target tumor cells by up to ~150 fold, compared to a surface with a single cancer cell marker such as aEpCAM. Recent clinical data obtained using our device will be also presented, which has shown the strong correlation between kinetic CTC profiles and clinical outcomes. These results indicate that our CTC device with high sensitivity and specificity has great potential to be translated.

Biography:

Dr Seungpyo Hong is Professor of Pharmaceutics in the Pharmaceutical Sciences Division, School of Pharmacy at the University of Wisconsin-Madison (UW-Madison). He also holds an adjunct appointment as Associate Professor in the Underwood International College at Yonsei University, Seoul, Korea and serves as Associate Editor for Nanomedicine: Nanotechnology, Biology and Medicine of Elsevier. Please visit his website for more information at https://apps.pharmacy.wisc.edu/sopdir/seungpyo_hong/

Hosted by
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