COLLEGE OF PHARMACY
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Pharmaceutical Sciences Seminar
22nd Annual John G. Wagner Memorial Lecture

"Self-Assembled Supramolecular Nanosystems for Smart Diagnosis and Targeted Therapy of Intractable Diseases"

Presented by:

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Room 2548 C.C. Little Building
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Nanotechnology-based medicine (Nanomedicine) has received progressive interest for the treatment of intractable diseases, such as cancer, as well as for the non-invasive diagnosis through various imaging modalities. Engineered polymeric nanosystems with smart functions play a key role in nanomedicine as drug carriers, gene vectors, and imaging probes. This presentation focuses present status and future trends of self-assembled nanosystems from block copolymers for the therapy and the non-invasive diagnosis of intractable diseases. Nanosystems with 10 to 100 nm in size can be prepared by programmed self-assembly of block copolymers in aqueous entity. Most typical example is polymeric micelles (PMs) with distinctive core-shell architecture. Compared with conventional formulations, such as liposomes, PMs have several advantages, including controlled drug release, tissue penetrating ability and reduced toxicity [1,2]. Notable anti-tumor efficacy against intractable and metastatic cancer, including pancreatic cancer [3], glioblastoma [4,5], and cancer stem cells [6], of antitumor drug incorporated PMs with pH- and/or redox potential responding properties was demonstrated, emphasizing their promising utility in cancer treatment. Versatility in drug incorporation is another feasibility of PMs. Loading of imaging reagents makes PMs with theranostic functions [7].
These results demonstrate the promising features of PMs as platform nanosystems for molecular therapy of various intractable diseases. Very recently, we developed PMs decorated with glucose to crossing blood-brain barrier by recognizing glucose-transporter overexpressing on brain endothelial cells, opening new avenue to deliver versatile drugs for the treatment of neurodegenerative diseases, including Alzheimer's disease [8].

References

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[5] S. Quader, et al, *J. Contrl. Rel.* **258**, 56 (2017).
[6] H. Kinoh, et al, *ACS Nano* **10**, 5643 (2016).
[7] P. Mi, et al, *Nature Nanotech.* **11**, 724 (2016).
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