令和7年度 第1回 超越バイオメディカルDX研究拠点 エクセレントコアセミナー

日 時：令和7年 6月 3日（木）10:30 – 12:00

開催場所：JAISTイノベーションプラザ2F シェアードオープンイノベーションルーム

要予約：定員30名

Bioengineering and Nanomedicine Program for Cancer Theranostics

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The advancement of targeted drug delivery faces significant challenges for clinical translation, such as issues related to poor solubility, non-specific distribution, and limited bioavailability of cancer theranostics. To solve these problems, we have synthesized a series of indocyanine contrast agents that varied systematically in net charge, conformational shape, hydrophilicity, lipophilicity, and charge distribution. Using 3D molecular modeling and optical fluorescence imaging, we have defined the relationship among the key independent variables that dictate biodistribution and tissue-specific targeting such as lung and sentinel lymph nodes (Nat Biotech. 2010), human prostate cancers (Nat Nanotech. 2010), and human melanomas (Nat Biotech. 2013). Recently, we have developed a new pharmacophore design strategy “structure-inherent targeting,” where tissue-specific targeting is engineered directly into the non-resonant structure of a near-infrared fluorophore, thus creating the most compact possible optical contrast agent for bioimaging and nanomedicine (Nat Med. 2015). The biodistribution and targeting of these compounds vary with dependence on their unique physicochemical descriptors and cellular receptors, which permit selective binding to the target tissue/organ, visualization of cancer specifically and selectively, and provide curing options such as image-guided surgery or photon-induced therapy. Our study solves two fundamental problems associated with bioimaging and nanomedicine and lays the foundation for additional targeted agents with optimal optical and in vivo performance.

Biography: Dr. Hak Soo Choi is a Professor of Radiology at Harvard Medical School and faculty of Dana Farber/Harvard Cancer Center, and Director of the Bioengineering & Nanomedicine Program at Harvard. Dr. Choi received a Ph.D. from Japan Advanced Institute of Science and Technology in 2004. After postdoc training in the field of Gene and Drug Delivery, he extended his research into Molecular Imaging at Harvard. Since 2008, his laboratory has focused on developing targeted contrast agents for tissue-specific imaging, which can be used to diagnose and treat human cancer by specifically visualizing the target tissue via “Structure-Inherent Targeting” while avoiding nonspecific uptake in normal background tissues.