이름: 서승범 / SeungBeum Suh
직위: 선임연구원 / Senior Research Scientist
소속: 한국과학기술연구원 / KIST

국문 강연제목: 박테리아 기반 마이크로로봇 개발
영문 강연제목: Bacteria based Micro/Bio Robot system

Abstract
Cancer drug delivery remains a formidable challenge due to systemic toxicity and inadequate extravascular transport of nanotherapeutics to cells distal from blood vessels. It is hypothesized that, in absence of an external driving force, the Salmonella enterica serovar Typhimurium could be exploited for autonomous targeted delivery of nanotherapeutics to currently unreachable sites. To test the hypothesis, a nanoscale bacteria-enabled autonomous drug delivery system (NanoBEADS) is developed in which the functional capabilities of the tumor-targeting S. Typhimurium VNP20009 are interfaced with poly(lactic-co-glycolic acid) nanoparticles. The impact of nanoparticle conjugation is evaluated on NanoBEADS' invasion of cancer cells and intratumoral transport in 3D tumor spheroids in vitro, and biodistribution in a mammary tumor model in vivo. It is found that intercellular (between cells) self-replication and translocation are the dominant mechanisms of bacteria intratumoral penetration and that nanoparticle conjugation does not impede bacteria's intratumoral transport performance. Through the development of new transport metrics, it is demonstrated that NanoBEADS enhance nanoparticle retention and distribution in solid tumors by up to a remarkable 100-fold without requiring any externally applied driving force or control input. Such autonomous biohybrid systems could unlock a powerful new paradigm in cancer treatment by improving the therapeutic index of chemotherapeutic drugs and minimizing systemic side effects.

Brief Biosketch
- University of California, San Diego, CA (B.S) (2006)
- University of Michigan, Ann Arbor, MI (M.S.) (2007)
- Virginia Tech, Blacksburg, VA (Ph.D.) (2017)