SDSU | College of Engineering Mechanical Engineering

Mechanical Engineering Seminar Series

March 4, 2025, 11:00AM

E-203E, Dean's Conference Room

Title: Next-Generation Medical Devices for Minimally Invasive Procedures: Design, Manufacturing, and Translation

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Abstract: Recent advancements in minimally invasive medical applications have led significant progress in the field, including lower-profile structures, enhanced multifunctionality, improved biocompatibility, and innovative hybrid biomaterial designs. Translational medical devices, such as stents, stent grafts, coils, shunts, and microsensors, require rigorous design processes, advanced manufacturing, and comprehensive preclinical validation to ensure their safety and effectiveness. This presentation will discuss recent research efforts focused on the design, manufacturing, and functional evaluation of these devices. Through *in vivo* preclinical studies involving both small and large animal models, the practical applicability and safety of these novel medical devices have been demonstrated. Highlights of this presentation include four innovative devices: (1) a novel neurovascular devices for the treatment of cerebral aneurysms, (2) a microsensor-embedded coronary artery stent designed to monitor in-stent restenosis (ISR) progression, (3) smart stent grafts engineered for the treatment of non-compressible torso hemorrhage and for optimizing organ procurement in donation after cardiac death (DCD), and (4) a soft ventriculoamniotic shunt for the treatment of fetal aqueductal stenosis. The successful translation of these technologies has the potential to greatly improve patient outcomes, enhance quality of life, and contribute to a reduction in healthcare costs associated with disease and injury management.

Brief Bio: Dr. Youngjae Chun is a Professor in the Department of Industrial Engineering with a secondary appointment in the Department of Bioengineering at the University of Pittsburgh. He also serves as the director of the Translational Medical Device Research Laboratory at Pitt. Dr. Chun earned his PhD in Mechanical Engineering from UCLA in June 2009, where he focused on developing smart material-based endovascular devices for the minimally invasive treatment of vascular diseases and injuries. He completed his postdoctoral research at the Center for Advanced Surgical and Interventional Technology (CASIT) at UCLA, receiving the UCLA Chancellor's Award for Postdoctoral Research. Dr. Chun is actively engaged in translational medical device development and commercialization, with expertise in designing and manufacturing metallic medical devices and implantable sensors, conducting biocompatibility studies, analyzing mechanical and physical behaviors, and testing biomedical devices. His research is supported by funding from the NIH, DOD, NSF, AHA, and various foundations. By integrating knowledge from material processing, MEMS/nano fabrication, biomedical science, and surface engineering, he leads interdisciplinary projects focused on advancing metallic biomaterial-based medical devices for vascular repair.