Fostering Collaboration at the Engineering-Medicine Interface

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Bio-Sketch

Jeff Holmes is a Professor of Biomedical Engineering and Medicine at the University of Virginia. He obtained his B.S. in Biomedical Engineering from the Johns Hopkins University in 1989, his Ph.D. in Bioengineering from the University of California, San Diego in 1995, and his M.D. from the University of California, San Diego in 1998. His first faculty position was at Columbia University, where he helped found and build a new Biomedical Engineering department from 1999 to 2007. In 2007, Dr. Holmes moved to the University of Virginia, where he heads the Cardiac Biomechanics Group. His laboratory studies the interactions between mechanics, function, and growth and remodeling in the heart, using a combination of computational and experimental models. His research has been funded by the National Institutes of Health, the National Science Foundation, the American Heart Association, the Whitaker Foundation, the Coulter Foundation, the Hartwell Foundation, and the Paul G. Allen Frontiers Group. Dr. Holmes was awarded the Y.C. Fung Young Investigator Award in 2005, an American Heart Association Established Investigator Award in 2006, and the Van C. Mow medal in 2018. He is a Fellow of the American Heart Association, the American Institute for Medical and Biological Engineering (AIMBE), and the American Society of Mechanical Engineers. Dr. Holmes has taught a wide range of undergraduate and graduate courses including Computational BME, Fluid Biomechanics, Cardiac Mechanics, Soft Tissue Mechanics, Advanced Quantitative Physiology, Engineering Physiology, Biomedical Innovation, and Ethics for Biomedical Engineers. Dr. Holmes is the founding Director of the Center of Engineering in Medicine at the University of Virginia, a $10M effort to foster collaboration between engineers and clinicians to improve prevention, diagnosis, monitoring, and treatment of disease.

Abstract

Heart disease, cancer, arthritis – these are the healthcare challenges of our generation. They are hard, complex problems, and addressing them requires groups with diverse expertise working together, developing new methods to prevent, diagnose, monitor, and treat disease. Many of our best current weapons in the fight against these diseases – pacemakers, mammography, artificial knees and hips – developed at the interface between engineering and medicine, and this same interface holds enormous promise to deliver the next generation of advances: sensors that detect illness earlier, nanoparticles that seek out diseased cells and deliver treatment exactly where it is needed, computer models that help doctors customize treatments for each individual patient.

Universities are a major driver of innovations such as these, in large part because they are so good at incubating ideas at the interfaces between disciplines. Yet at a typical research university, engineers and doctors speak completely different languages, teach different classes to different groups of students, and work on different campuses. In August 2017, the University of Virginia (UVA) launched the Center for Engineering in Medicine with a $10M investment to capitalize on our strategic advantages in this area, including the fact that we are one of only 8 universities nationwide with top-40 engineering and medical schools located less than a mile apart. The mission of the Center for Engineering in Medicine is to build the nation’s best ecosystem for generating, developing, and translating innovative ideas at the engineering-medicine interface to improve prevention, diagnosis, monitoring, and treatment of disease. In its first two years of operation, we have funded 33 new partnerships involving 102 faculty from 26 departments and divisions across 4 schools, generating $42M in new proposals and more than $5M in new external research funding. In this seminar, I will discuss our experiences and outcomes building these partnerships, helping them compete for external funding, and exploring alternatives to seed grants for promoting engineering-medicine collaborations. I will also discuss Embedding, a framework for experiential learning designed to improve team functioning, promote new collaborations, and challenge the traditional single-PI / dual-training model of interdisciplinary education.

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