



Thursday, August 31, 2023 | 2:20-3:35 PM CST

ETB 1034 | Meeting ID: 964 7448 2896 | Passcode: 387957 | [tx.ag/BMEseminar](https://tx.ag/BMEseminar)

## Pumps, Pipes and AI: Engineering Vascular & Cancer Medicine with Organ-Chips

### Abstract

The perpetual rising cost of healthcare is one of the biggest socioeconomic problems of our globe. Part of the challenge is that productivity of drug companies is declining, and relatively fewer drugs are reaching market. This is partly so because drug discovery largely rests on the results from animal studies, which can turn into negative outcomes in human clinical trials. The Jain lab creates microphysiological systems and associated technologies that predict human physiology and complement in vivo studies with an emphasis on hematological and cardiovascular disorders. They have made contributions in advancing preclinical research in sickle cell disease, diabetes, vein thrombosis, ovarian cancer, and lymphedema. Here, few examples of their approach will be presented. First, a Vein-Chip platform that integrates fully vascularized venous valves and its hemodynamics. Second, a tumor microenvironment-chip (or Tumor-Chip) which recapitulates platelet function through the microcirculation. This organ-chip has revealed how combinatorial antiplatelet-vascular-antitumor drugs may arrest metastatic signaling. Finally, approaches that converge artificial intelligence models with microphysiological systems will be presented that is enabling their standardization and adoption in pharmaceutical industry.



### Abhishek Jain, Ph.D.

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Dr. Abhishek Jain is an Associate Professor of Biomedical Engineering and holds TEES and Cain faculty fellow positions at Texas A&M University. He directs the Bioinspired Translational Microsystems (BioinSyst) lab that specializes in making microengineered models of vascular and hematologic diseases. The overarching theme of his lab is to harness tools from engineering, biology, and mathematics, in order to reconstruct the *in vivo* functionality of human tissues and organs in microfluidic devices (organs-on-a-chip). With this platform, his lab has put efforts to advance physiology, drug development and humane science. Dr. Jain has won numerous awards, including the NSF CAREER Award, NIBIB Trailblazer Award, Dean of Engineering Excellence Award and a TEES Young Faculty Fellow Award. Dr. Jain did B.Tech in Mechanical Engineering from Indian Institute of Technology-Delhi. After graduation and a short stint in industry, he went to Boston University and Harvard Medical School to get his PhD in Biomedical Engineering. Following that, he accomplished his postdoctoral fellowship with Dr. Don Ingber at Harvard's Wyss Institute of Biologically Inspired Engineering.