Therapeutic Biomaterials: Engineering Material "Structure" to Modulate Biologic Delivery

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Abstract: The ability to deliver therapeutics within and across biologic barriers is a much sought after goal. In this talk, I will discuss our recent work in developing nanostructured materials for biologic delivery as well as injectable micro/nanoscale materials for the modulation of fibrosis and immune activation. By incorporating micro and nanoscale features into biomaterials, one can modulate properties such as tissue permeability, matrix production, and cell activation. The understanding of how small scale topographies can influence the biological microenvironment allows us to design platforms for applications in therapeutic delivery and tissue regeneration. Micro and nanostructured materials can add functionality to current drug delivery platforms while becoming an enabling technology leading to new basic discoveries in the pharmaceutical and biological sciences.

Bio: Tejal Desai is the Ernest L Prien Endowed Chair and Deborah Cowan Endowed Professor of the Department of Bioengineering & Therapeutic Sciences, Schools of Pharmacy and Medicine at University of California, San Francisco (UCSF); and Professor in Residence, Department of Bioengineering, UC Berkeley (UCB). She serves as director of the NIH training grant for the Joint UCSF/UCB Graduate Program in Bioengineering, and founding director of the UCSF/UCB Masters Program in Translational Medicine. She was recently named the Inaugural Director of the UCSF Engineering and Applied Sciences Initiative known as HIVE (Health Innovation Via Engineering).
Desai's research spans multiple disciplines including materials engineering, cell biology, tissue engineering, and pharmacological delivery systems to address issues concerning disease and clinical translation. She has published over 240 peer-reviewed articles and patents. Her

research is at the cutting-edge in precision medicine, enabled by advancements in micro and nanotechnology, engineering, and cell biology directed to clinical challenges in disease treatment. She seeks to design new platforms to overcome existing challenges in therapeutic delivery. Her research efforts have earned recognition including Technology Review's "Top 100 Young Innovators," Popular Science's Brilliant 10, and the Dawson Biotechnology Award. She is President-Elect of the American Institute for Medical and Biological Engineering. In 2015, she was elected to the National Academy of Medicine and in 2019 to the National Academy of Inventors.

Desai is a vocal advocate for STEM education and outreach to women and underrepresented minority students. She serves on the university's Differences Matter Executive Committee and has worked extensively to break down institutional barriers to equity and cultivate a climate of inclusion. To foster the next generation of scientists, she has been involved in the SF Science Education partnership and has worked with outreach organizations such as the Lawrence Hall of Science, PBS, and the UN Women's council to develop hand-on exhibits and videos related to nanotechnology and women in engineering.

She received her B.S. from Brown University in biomedical engineering in 1994 and was awarded a Ph.D. in bioengineering jointly from UCSF and UCB in 1998.