UCLA College | Physical Sciences Chemistry & Biochemistry

PHYSICAL CHEMISTRY SEMINAR

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Monday, Apr. 26, 2021
4:00 PM
via Zoom

"Growing Cells on Apples, LEGOs and Bread. Why Developing Unconventional Biomaterials Matters"

Living cells possess an exquisite ability to sense and respond to many forms of information in their environment, even when biologically irrelevant and highly artificial. Indeed, my lab has become fascinated by these responses of mammalian cells (in vitro and in vivo) to extremely artificial stimuli. We have then been able to exploit these responses to direct complex biological behaviors such as tissue organization, differentiation and morphogenesis. In effect, we have been deliberately attempting to break as many rules of bioengineering as we can. This process has led to numerous discoveries that have allowed us to control and augment living systems. In this talk, I will review our work in which mammalian cells are cultured in unconventional biomaterials such as decellularized plant tissues, LEGO blocks and even freshly baked bread. Although plant-derived materials are an unusual choice for tissue engineering applications, in vitro and pre-clinical trials have revealed that these scaffolds are highly biocompatible, illicit minimal immune response, are inert and possess pro-angiogenic properties. In addition, they have been shown to be effective in soft-tissue reconstruction, bone tissue engineering and even treating the devastating effects of spinal cord injury in animals. Recently, the plant scaffold we developed for spinal cord injury was designated a Breakthrough Medical Device by the FDA. They are now undergoing translation and clinical application in human trials. By cultivating positive tension between curiosity, creativity and scientific rigor, our team has reported many new discoveries, created multiple startup companies, developed products and now our most unconventional biomaterials are poised to address a significant unmet medical need.

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