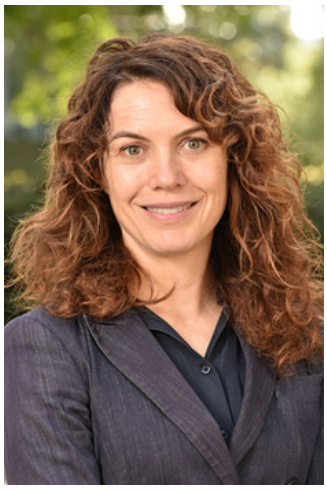
CARNEGIE MELLON UNIVERSITY
BME 2024 SPRING SEMINAR SERIES

From biophysics to cellular farming: towards scalable processes for culturing tissues for food production



PRESENTED BY

Amy Rowat, Ph.D.
Professor and Vice Chair of Graduate Education
Department of Integrative Biology & Physiology
University of California in Los Angeles

SCHEDULE

Doherty Hall (DH) 2315

Thursday,
April 4, 2024
(11:00-12:00PM)

The rapidly developing field of cellular agriculture—which addresses the challenge of growing muscle tissue ex vivo by harvesting precursor cells from animals and culturing them in a bioreactor—has exciting potential to provide a sustainable alternative method for meat production with reduced environmental impact. However, innovations in production efficiency will be key for scaleup. A critical step for scaleup is to culture cells in suspension using a large-scale bioreactor. However, in living animals, nearly all cells attach to extracellular scaffolds, which enable muscle cells to 'flex' and generate biological tension. My group recently developed edible microcarrier scaffolds that have tunable mechanics—which can mimic the natural growth environment of muscle and fat cells—and are compatible with suspension culture. In this talk I will discuss our recent work showing how edible microcarriers can support the growth and differentiation of myogenic cells in a single bioreactor system. I will show how we can customize scaffold physical properties to support the growth of adipogenic microtissues. Our work also demonstrates how scaffolds provide the foundation for structuring and organizing the growth of both myogenic and adipogenic cells and microtissues. In addition to manipulating the cellular mechanical environment, we are identifying small molecules that accelerate desired phenotypes—such as myotube growth and lipid accumulation in adipocytes—using high-throughput chemical screening approaches. Identifying mechanical and soluble factors that can increase the efficiency of cultured meat growth supports our longer-term vision of developing scalable processes to produce cultured meat as a nutritious and delicious protein source.

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