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7. **Abstract**
   Patient-specific Organs-on-Chip models of human pathophysiology

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   Evolution of tissue engineering has been driven by the need to provide biological substitutes of our tissues lost to injury or disease, towards long and healthy life. To this end, human cells are used in conjunction with biomaterial scaffolds (providing a structural and logistic template for tissue formation) and bioreactors (providing the molecular and physical signals and insights into biological events). A reverse paradigm has emerged in recent years, with the development of “organs on chip” with micro-sized human tissues designed to recapitulate organ-level functions, such as contractility of the heart, metabolism of the liver, or barrier function of the lung or vasculature [1, 2]. A new class of “organs on chip” platforms has been designed to maintain each tissue in its own optimized niche, link tissues by vascular flow containing circulating cells, and separate the intratissue and intravascular spaces by endothelial barriers [3]. Engineering tissues from iPS cells allows individualized approach to studies of human physiology in the context of injury, regeneration and disease. To illustrate the capabilities of these multi-organ platforms and their potential to address some current challenges, we discuss patient-specific studies of systemic conditions in response to radiation injury, ischemia, cardiomyopathies and cancer metastasis.

   [1] Ronaldson-Bouchard K. and Vunjak-Novakovic G. Cell Stem Cell 22(3):310-324 (2018).

[2] Vunjak-Novakovic G et al., Cell 184: 4597-4611 (2021).
[3] Ronaldson-Bouchard K et al., Nature Biomedical Engineering 6:351-371 (2022)
[4] Baldassari et al. An engineered model of metastatic colonization of human bone marrow reveals breast cancer cell remodeling of the hematopoietic niche. PNAS 121(42):e2405257121 (2024)
[5] Fleischer S et al. Modeling lupus-mediated myocarditis using engineered human cardiac tissues conditioned with patient autoantibodies reveals distinct patterns of reactivity and functional alteration Nature Cardiovascular Research 3(9):1123-1139 (2024)

8. **Are you interested in doing an oral or poster presentation? (check one or both)**
   Oral Presentation