

JOINT EVENT

11th International Conference on**Tissue Engineering & Regenerative Medicine**

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4th International Conference on **Synthetic Biology and Tissue Engineering**

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**Katherine Kiwimagi**

Massachusetts Institute of Technology, USA

Synthetic biology and programmable organoids

Differentiation of induced pluripotent stem cells, iPSCs, into organoids has been achieved via a plethora of modalities. One of these modalities includes developing multi-day culture strategies where morphogens and growth factors are added and removed to achieve different differentiation paradigms. This has and continues to give insight into genetic pathways that control differentiation however is limited by diffusion and penetration of these small molecules, as well as a uniform application of the signals. As recent studies involving microfluidics and substrate patterning have achieved spatial resolution, so also engineering synthetic genetic programs to be executed within and across cells holds great promise in the ability to design and create spatiotemporal control over cellular differentiation from within the developing organoid. We have shown that these heterogeneous differentiation programs can yield production of all three germ layers which results in liver like and vascularized organoids. This work hopes to expand on what we have already shown with the development and application of a synthetic cell-cell communication tool box to employ heterogeneous differentiation programs in organoid development.

Biography

Katherine Kiwimagi has completed her PhD in Biomedical Engineering at Colorado State University and is currently working on Postdoctoral studies at Massachusetts Institute of Technology in the Department of Bioengineering as part of Ron Weiss group. Her published work is focused on the interplay of *in silico*, *in vitro* and *in vivo* studies where she has developed both experimental and computational tools with applications in many biological systems. Her current work focuses on cell-cell communication tools for mammalian systems with the application of creating spatio-temporal patterns with the hope of directing organoid differentiation.

Kiwimagi@mit.edu