Training Course Description

This five-day course will focus on the differentiation of induced pluripotent stem cells (iPSCs) to endoderm and lung progeny. The course is designed for research scientists working with or planning to work with human iPSCs and lung cell lineages, and who have prior experience in general cell culture techniques. It will include hands-on training, lectures, and demonstrations from leading experts and educators in the field of stem cell biology from the Center for Regenerative Medicine (CReM) at Boston University and Boston Medical Center. Small class size will enable researchers to obtain experience culturing iPSCs and employing the most current approaches in directed differentiation to endodermal and lung epithelial lineages including iAEC2s and alveolospheres. Additional topics will include lectures and training in novel gene editing techniques, including the design and use of CRISPR/Cas9 in iPSCs, and development of 3D culture systems.

LECTURE TOPICS
- Introduction to stem cells
- Embryonic stem cells in development and regenerative medicine
- Directed differentiation of iPSCs to definitive endoderm/NKX2.1+ lung progeny
- Understand principles of flow cytometry (FACS) in the context of iPSC research
- Genomic modification of stem cells
- Gene editing and CRISPR/Cas9 design and construction
- Overview of methods for isolating, expanding and reprogramming PBMC samples
- iPSC culture methods using a feeder-free system
- iPSC characterization and quality control (IF pluripotency staining, fingerprinting, karyotyping, mycoplasma testing)
- Discussion and troubleshooting with course instructors

PRACTICAL LABORATORY SESSIONS
- Learn to prepare definitive endoderm, anterior foregut endoderm, and lung epithelium from iPSCs
- Identify and quantify NKX2.1+ lung progenitors by FACS analysis of NKX2.1^{GFP} targeted iPSCs
- NKX2.1 immunostaining of iPSC-derived lung progenitors
- Proximal airway vs distal alveolar lung protocols
- 3D culture of iPSC-derived lung lineages and alveolospheres in Matrigel drops
- Passage iPSC-derived type 2 alveolar epithelial cells (iAEC2s) carrying targeted SFTPC^{tdTomato} reporters
- Observe early- and late-stages of human PBMCs reprogramming to iPSCs
- iPSC colony passaging, cryopreservation and recovery of frozen iPSCs
- Understand in detail the kinetics of iPSC lung epithelial directed differentiation
- Receive your own vials of NKX2.1^{GFP}, SFTPC^{tdTomato} targeted iPSCs in your lab after you return home to practice and keep up the skills you learn during the course

To register or for additional course information please contact:
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