Frontiers in Stem Cells & Regeneration
MBL – Woods Hole, MA

Course Agenda
October 2 – October 9, 2022

Co-Directors: Jennifer Morgan, PhD, MBL; Ina Dobrinski, DVM, PhD, University of Calgary
Course Managers: Warren Vieira, PhD; Gloria Perez, DVM; Dorianne Mebane, EdM

All lectures are in Loeb G70. Lab exercises are held in Loeb 306.
Coffee breaks will be served in the Quadrangle Tent.
Meals are in the Swope Center Dining Room, 2nd floor. Any meal may be taken outdoors or in your room.
Breakfast: 7-8:30AM; Lunch: 11:30AM-1:00PM; Dinner: 5-7:00PM.

SUNDAY, OCTOBER 2

2:00 PM  Optional Workshop: Basics of Cell Culturing
Gloria Perez, Michigan State University (Meet in Loeb 306)

5:00 PM  Welcoming Dinner, Café Swope Terrace Tent (first floor of Swope Center)

7:00 PM  EEO Information and Logistics:
Biosafety, Regulatory Restrictions, Student Surveys & Team Assignments
Warren Vieira, Benchling, Inc.

7:15 PM  Brief Overview of Stem Cells, Directed Differentiation and iPSCs
Warren Vieira, Benchling, Inc.

8:00 PM  Development and application of regionally-defined brain organoids
In-Hyun Park, Yale University
MONDAY, OCTOBER 3

9:00 AM  **MBL Welcome**
Linda Hyman, MBL, Burroughs Wellcome Director of Education

9:15 AM  **Introduction to Regeneration/Skin Regeneration**
Jeff Biernaskie, University of Calgary

10:00 AM  **Stem Cells and Regeneration in Planarian Flatworms**
David Forsthoefel, Oklahoma Medical Research Foundation/Oklahoma University Health Science Center

10:45 AM  **Coffee Break** (Quadrangle Tent, outside Loeb)

11:00 AM  **Pre-Lab Prep: hESC Differentiation**
_Instructor: Diane Carlisle. TA: Emily Horoszko, University of Pittsburgh._
Students will differentiate hESC into their cell lineage of choice. On Day 1, trainees will plate human iPSCs to be differentiated over the week as well as propagate a plate of iPSCs. Medium will need to be changed on student’s own time on Tuesday and Wednesday following instructions in the lab binder.

11:30 AM  **Break**

Noon  **Lunch**

1:00 PM  **Lab 1: Deriving Mouse Embryonic Stem Cells by Immunosurgery**
_Instructor: Cal Simerly, Magee Women’s Research Institute. TA: TBD._
Students will learn how to isolate the inner cell mouse cells (ICM) from expanded blastocysts using the antibody: complement technique and transfer isolated ICMs for deriving mouse embryonic stem cells.

**Lab 2: Regeneration in Planarians**
_Instructor: David Forsthoefer; TA: Lily Wong, OMRF; Univ. of OK Health Sci Ctr_  
Students will observe regeneration in living planarians, conduct colorimetric development of antibody-labeled samples to visualize cellular proliferation, and then design and conduct experiments to test planarians’ regenerative capacity and the necessity of proliferation.

6:00 PM  **Dinner**

7:00 PM  **Lecture: Mammalian Digit Tip Regeneration**
Mimi Sammarco, Tulane University
TUESDAY, OCTOBER 4

9:00 AM  Lecture: Bioengineering Human CNS Morphogenesis in 2/3D
Randolph Ashton, University of Wisconsin at Madison

9:45 AM  Lecture: Title TBD
Kate McCusker, UMass-Boston

10:30 AM  Coffee Break (Quadrangle Tent, outside Loeb)

10:45 AM  Lecture: Bottom-Up Islet Engineering
Quinn Peterson, Mayo Clinic

11:30 AM  Break

Noon  Founder’s Luncheon (Swope Private Dining Room)
With Jerry Schatten, UPitt (Group 1)

1:15PM  Lab 1: Regeneration in Salamanders: limb regeneration
Instructors: James Monaghan; Kate McCusker, University of Massachusetts, Boston.
TA: Tim Duerr, Northeastern University
Students will use the Accessory Limb Model to study cell cycle dynamics.

Lab 2: Pancreatic Islet Engineering
Instructor: Quinn Peterson. TA: TBD.
TBD: description.

6:00 PM  Dinner

7:00 PM  Lecture: Investigating Mitochondrial Mechanisms of Sporadic ALS
using Patient-Specific Motor Neurons
Diane Carlisle, University of Pittsburgh

8:00 PM  Course Participant Introductions
WEDNESDAY, OCTOBER 5

9:00 AM  Lecture: Picking your favorite - Cell identification and Selection Strategies in Human Neural Stem Cell Biology
Jan Pruszak, Paracelsus Medical University (PMU), Austria

9:45 AM  Lecture: Neuroprotective and Regenerative Stem Cell Therapy in a Pig Stroke Model
Franklin West, University of Georgia

10:30 AM  Break

10:45 AM  Marine Resources Center and MBL Library Tours

Noon  Founder’s Luncheon (Swope Private Dining Room)
With Jerry Schatten, UPitt (Group 2)

1:00 PM  Lab 1: Isolating & Characterizing Neural stem cells using FACS Strategy
Instructor: Jan Pruszak. TA: Gloria Perez.
In this laboratory, trainees will learn the techniques for isolating specific PSC-derived subsets of therapeutic and scientific relevance using flow cytometry.

Lab 2: iPSC and Gene Editing
Instructor: Chas Easley, University of Georgia. TA: Beth Waters, University of Georgia.
Students will learn procedures for deriving & culturing human induced pluripotent cells. Students will also use CRISPR/Cas9 genome editing tools to edit a house keep gene in human pluripotent stem cells. Students will also learn to validate CRISPR-mediated gene editing using prepared DNA samples.

6:00 PM  Dinner

7:00 PM  Stem Cell and Regeneration Research Funding
Ravi Ravindranath (NIH/NICHD)
8:00 PM **Career Mentoring Discussion**
Q&A panel facilitated by Jennifer Morgan and other course faculty.

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**THURSDAY, OCTOBER 6**

9:00 AM **Lecture: Large Animal Models for Germ Cell Research**
Ina Dobrinski, University of Calgary

9:45 AM **Coffee Break**

10:00 AM **Lecture: Translating Spermatogonial Stem Cell Transplantation to the Clinic**
Kyle Orwig, University of Pittsburgh

10:45 AM **Lecture: Derivation of Functional Spermatids from Pluripotent Stem Cells**
Chas Easley, University of Georgia

11:30 AM **Break**

Noon **Founder’s Luncheon (Swope Private Dining Room)**
With Jerry Schatten, UPitt (Group 3)

1:00 PM **Lab 1: hESC Pluripotency & Differentiation**
*Instructor: Diane Carlisle. TA: Emily Horoszko, University of Pittsburgh.*
We will check the pluripotency of hESC using a live cell stain and also determine the quality of our week-long directed differentiation using immunofluorescent staining.

**Lab 2: Spermatogonial Stem Cell (SSC) Transplantation**
*Instructors: Kyle Orwig; Meena Sukhwani, University of Pittsburgh. TA: Andre Caldeira-Brant, University of Pittsburgh.*
We will perform hands on SSC transplantation and colony counting in mouse-to-mouse SSC transplants.

6:00 PM **Dinner**
7:00 PM  **BIOETHICS LECTURE: Ethical and Social Aspects of Gene Editing**  
Vardit Ravitsky, University of Montreal

8:00 PM  **T-Shirt Nite Celebration (WootWoot!)**  
Come to the Quadrangle Tent

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**FRIDAY, OCTOBER 7**

9:30 AM  **Lecture: CNS Regeneration in Non-Mammalian Vertebrates**  
Ava Udvadia, University of Wisconsin - Milwaukee

10:15 AM  **Coffee Break**

10:30 AM  **Germ-line Stem Cell Manipulation in Fish: Can Mackerel Produce Bluefin Tuna Gametes?**  
Goro Yoshizaki, Tokyo University of Marine Science and Technology

11:15 AM  **Course Photo – Wear your T-shirts!**  
Meet in Loeb 1st floor Lobby. Photo Location TBA depending on weather

Noon  **Founder’s Luncheon (Swope Private Dining Room)**  
With Jerry Schatten, UPitt (Group 4)

1:30 PM  **Joint Session on Stem Cells with Aquatic Models of Human Diseases AQMHD Conference**  
Mansi Srivistava (Harvard) – Whole-body regeneration in acoel worms  
Celina Juliano (UC Davis) – Stem cells and regeneration in hydra

3:00 PM  **Coffee Break**

3:30 PM  **Joint Session on Regeneration with AQMHD Conference**  
Igor Schneider (UChicago/UFPA Belem, Brazil)  
Sven Reischauer (MPI Bad Nauheim, Germany)

6:00 PM  **Dinner**
Keynote Lecture: Organ Regeneration in Zebrafish
Ken Poss (Duke University)
Podium discussion to follow

8:30 PM Lightning Talks and Poster Session
Joint with AQMHD, with mixer

SATURDAY, OCTOBER 8

9:15 AM SCARE Alumni Mini Symposium
Introduction: Jen Morgan

9:30 AM Lecture: Regulation of stem cell identity by miR-200a during spinal cord regeneration
Sarah Walker, MBL (SCARE 2019)

10:00 AM Lecture: Maternal contributions to the mother of all stem cells during animal evolution
Labib Rouhana, UMass-Boston (SCARE 2013)

10:30 AM Coffee Break

10:45 AM Keynote Alumnus Lecture: "Breathing-on-a-chip: how mechanical forces shape airway epithelial differentiation"
Janna Nawroth, Helmholtz Pioneer Campus, Munich Germany (SCARE 2017)

11:45 AM Break

Noon Lunch

1:15 PM Lab 1: Instructors: Cal Simerly: Check on mESC derivation.
Lab 2: Instructors: David Forsthoefel, Lily Wong: Evaluate blastema formation

2:00 PM Lab 3: Instructors: James Monaghan, Kate McCusker, Tim Duerr: Image blastemas.
Lab 4: Instructor: Chas Easley. TAs: Beth Waters: Analysis of iPSCs using microscopy.
Lab 5: TBD Quinn’s end point assay here
DRAFT 04/07/22

3:30 PM  Free time!

5:00 PM  Pioneer Lecture: Stem Cells and Regeneration in Reproductive Medicine
Shoukhrat Mitalipov (Oregon Health State University)

6:15 PM  Break

6:30 PM  Reception and Awards Banquet
Café Swope Terrace Tent (first floor patio)

8:00 PM  Presentation of Pioneer Award and Student Certificates
Ina Dobrinski, Jennifer Morgan

SUNDAY, OCTOBER 9

Check out of rooms before 10:00 AM

Take any leftover snacks from the breakroom for your trip!
Safe Travels! Keep in touch!

Join our FB Group:
Frontiers in Stem Cells & Regeneration-SCARE