THE UNIVERSITY OF MICHIGAN
Center for Organogenesis

ORGANOGENESIS

STEM CELLS & REGENERATIVE MEDICINE

TRAINEE HANDBOOK

For NIH and Non-Traditional Fellowships

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# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. MESSAGE FROM THE PROGRAM DIRECTOR</td>
<td>2</td>
</tr>
<tr>
<td>II. CFO RESEARCH TRAINING PROGRAM</td>
<td>3</td>
</tr>
<tr>
<td>A. Trainee Activities</td>
<td>4</td>
</tr>
<tr>
<td>1. Research Project</td>
<td>4</td>
</tr>
<tr>
<td>2. Monthly Trainee Meetings</td>
<td>4</td>
</tr>
<tr>
<td>3. Trainee Research Presentations</td>
<td>4</td>
</tr>
<tr>
<td>4. Seminar Series</td>
<td>4</td>
</tr>
<tr>
<td>5. Additional Formal Educational Training</td>
<td>4</td>
</tr>
<tr>
<td>6. International Symposium on Organogenesis</td>
<td>4</td>
</tr>
<tr>
<td>7. Clinical Co-mentorship opportunity</td>
<td>5</td>
</tr>
<tr>
<td>8. Participation at Scientific Meetings</td>
<td>5</td>
</tr>
<tr>
<td>10. Responsible Conduct of Research</td>
<td>5</td>
</tr>
<tr>
<td>B. Evaluation Procedure/Progress Report</td>
<td>6</td>
</tr>
<tr>
<td>C. Grievance Procedure</td>
<td>6</td>
</tr>
<tr>
<td>III. CFO ADMINISTRATION AND MISCELLANEOUS PROCEDURES</td>
<td>6</td>
</tr>
<tr>
<td>A. Center for Organogenesis Office and Staff</td>
<td>6</td>
</tr>
<tr>
<td>B. Tuition</td>
<td>6</td>
</tr>
<tr>
<td>C. Health Care Benefits</td>
<td>6</td>
</tr>
<tr>
<td>D. Stipend Checks and Withholding Taxes</td>
<td>6</td>
</tr>
<tr>
<td>E. Hosting and Travel Reimbursements</td>
<td>7</td>
</tr>
</tbody>
</table>
I. MESSAGE FROM THE PROGRAM DIRECTOR

Welcome to the Center for Organogenesis (CFO). We are happy to have you join our Research Training Program. Our goal is to help you prepare for an independent research career in the clinical, applied or basic sciences. We know that your individual progress is essential to the continued success of our research program itself. The maintenance of an environment that enriches your scholarly growth is of the utmost importance to us. We encourage you to take advantage of all that is available here. Also, we welcome your input; please suggest ways that we can improve our program.

As Project Director, I have overall responsibility for the Organogenesis Training Grant Program. Dr. Linda Samuelson serves as the Associate Director of the Training Program. Dr. Gary Hammer will serve as Director of Clinical Co-mentorships, an optional opportunity described further in this handbook. Your faculty mentor will supervise your day-to-day activities. Scott Barolo, Ph.D. serves as faculty ombudsperson.

We hope that you will find this orientation booklet helpful in acquainting yourself with the resources available through the CFO. Retain it for future reference. It includes brief summaries of our research programs, as well as introductions to other trainees. In addition, there are descriptions of facilities and administrative procedures at CFO.

With all best wishes for a rewarding year.

Deneen Wellik, Ph.D.
Director, Organogenesis Training Program
Professor, Internal Medicine and Cell & Developmental Biology
Director, Center for Organogenesis
II. CFO RESEARCH TRAINING PROGRAM

"Organogenesis" unites research in the clinical, basic and applied sciences, translational science and applied arenas with a common goal:

To understand the basic mechanisms by which organs and tissues are formed and maintained, and to use this knowledge to create long-lasting artificial organs, improved stem cell therapies and effective organ transplantation systems that will correct acquired and genetic human diseases.

Advances in organogenesis will demand fluent interdisciplinary cross-talk among basic, applied and clinical scientists. Importantly, such cross-talk will accelerate the speed at which important findings in basic research are translated into therapeutic advances in the clinic. At the same time, the constant exchange of information between basic and applied scientists will trigger important improvements in in vitro models for the study of organ development, function and disease.

These are exciting times, as the genome projects are providing vast opportunities for functional analysis of genes. It has been estimated that 50% of the genome is devoted to sequences that encode molecules required during processes of organogenesis. But for the vast majority of genes, function has yet to be assigned. Moreover, it is clear that single genes can give rise to multiple protein isoforms, which in many cases have distinct functions. Thus, discovery of the signaling networks that control development and homeostasis of any single organ is a major challenge for the future. Research in model organisms will provide important clues. Already, work in the fly has correctly identified many of the genes required to make a human heart; work in the frog has led to an understanding of how the embryo knows anterior from posterior and dorsal from ventral; the genetic basis of apoptosis was first identified in the worm; plants are now providing clues to innate immunity; and through the study of mutations in zebrafish, genes have been identified that lead to organ malformation or dysfunction and the human counterparts of these same genes cause similar human diseases and birth defects. The assignment of gene function and the clarification of regulatory networks will continue to benefit from our ability to explore and exploit such model systems.

We are also beginning to see the clinical possibilities afforded by several of the secreted molecules discovered in various developmental systems. Such molecules are now being used to promote the growth of blood vessels in diseased hearts, to allow the culture and amplification of bone marrow stem cells for transplantation, and to create prosthetic bone grafts that will promote local generation of new healthy bone. The study of secreted factors used during development in the embryo (e.g., the Wnt and Hedgehog proteins) are providing new information on the cellular pathways that lead to cancer. Past the gene level, research in tissue engineering is leading to development of new strategies for maintaining, expanding and differentiating stem cells in culture, for healing difficult fractures, for correcting major skeletal defects, and for developing artificial eyes, ears, teeth, kidneys, livers and intestines.

As we look to a future in which the importance of interdisciplinary work in the biomedical sciences is increasingly stressed, it is important to identify strategies to help the next generation of scientists to successfully navigate an increasingly complex research landscape. The training program in Organogenesis was therefore initiated with two major objectives:

* To provide intellectual and technical training in the field of organogenesis.
* To promote interdisciplinary thinking by exposing trainees to research that crosses boundaries between the clinical, basic and applied sciences.

The training program in Organogenesis operates within the context of the richly interactive environment provided by the CFO. The activities of the Center are designed to foster the training program and promote the intersection and involvement of trainees with all aspects of Center functions.
Training faculty are chosen from among the >140 faculty members of the CFO from the following schools and colleges, and disciplinary units:

- **College of Engineering**: Departments of Biomedical Engineering, Chemical Engineering, Mechanical Engineering, and Macromolecular Science and Engineering.

- **College of Literature, Science and the Arts**: Department of Molecular, Cellular and Developmental Biology

- **Medical School**: Departments of Internal Medicine, Dermatology, Biological Chemistry, Surgery, Cell and Developmental Biology, Human Genetics, Ophthalmology and Visual Sciences, Pathology, Pediatrics and Communicable Diseases, Pharmacology, Molecular & Integrative Physiology.

- **School of Dentistry**: Departments of Periodontics and Oral Medicine, Biologic and Materials Sciences, Orthodontics and Pediatric Dentistry and Cariology, Restorative Sciences and Endodontics

- **School of Public Health**: Environmental Health Sciences (Toxicology)

### A. Trainee Activities

All predoctoral and postdoctoral trainees are expected to engage in the activities listed below.

1. **Research Project.** The primary activity for each trainee in the program is a research project that is directly related to organogenesis and to the research of the mentor(s), and is supervised by your mentors during the entire period of the training. For predoctoral trainees, this project will relate directly to the dissertation. Postdoctoral trainees will be expected to design a research project that may be an outgrowth of their dissertation research, but will represent a new research direction.

2. **Monthly Trainee Meetings.** Generally held once monthly (September-May). The monthly trainee meeting provides trainees with a forum to meet together as a small group to discuss a variety of topics including trainee research, new technology, ethics, job markets, and grant writing. Lunch is provided to all attendees.

3. **Seminar Series.** Held on Tuesday afternoons at 4:00 pm during the academic year, the CFO sponsors a seminar series (held in the BSRB Seminar Rooms). All trainees are expected to attend all seminars (excused absences are required). As part of the seminar series, training grant fellows will also be encouraged to host certain seminar speakers for lunch. Any expenses incurred by an individual for these activities will be reimbursed by the CFO.

4. **Additional Formal Educational Training.** The graduate course entitled “Organogenesis: Stem Cells to Regenerative Biology – CDB 582/583” is the centerpiece of this training program. The course is offered during the Winter term and will focus on understanding the biology of stem cells, how stem and progenitor cells are important for organ formation during development, maintenance during adult life, how perturbations in these cells can lead to disease, and how tissue engineers are learning to harness these cells to replace damaged tissues and organs. The course is team-taught by faculty with clinical or research expertise in the topic. All trainees are expected to attend specific lectures on stem cell ethics and are encouraged to participate in other sections of this course.

5. **International Symposium on Organogenesis.** The CFO sponsors a series of International Symposia on Organogenesis. These symposia are designed to expose the faculty, students and postdoctoral fellows at the University of Michigan to exciting new ideas and expertise in the area of
organogenesis. During the symposium, 5-6 internationally recognized experts present their current research. A poster session provides opportunities for faculty, fellows and students to display their research. Prizes are awarded to the best student and best postdoctoral poster. All trainees are required to attend the symposium and to present a poster at the poster session. The symposium happens approximately every two years.

7. **Clinical Co-mentorship opportunity.** This component is optional and will be coordinated by Drs. Wellik, Samuelson and Hammer. The objective of the clinical co-mentorship is to provide opportunities for trainees in the basic sciences to engage with clinical problems and activities. Our leadership will help any trainee identify clinical faculty who are willing to work with the trainee to provide information, opportunities for rounding, shadowing, notification of grand rounds or the like.

8. **Participation at Scientific Meetings.** Whenever possible, each trainee will be encouraged to present his/her research at a scientific meeting. The Organogenesis training program provides NIH trainees with $500 per year for this purpose. You must seek approval from the CFO prior to your travel and explain the purpose of the meeting. Additional travel support is available through the Organogenesis BioArtography fund (see below).

9. **BioArtography.** Students, postdocs, faculty and staff are encouraged to submit digital images of tissues and cells to the CFO. These images include muscle, fat, ovary, testes, skin, bone, kidneys, sperm, neurons and both human and mouse embryonic stem cells. A panel will select the best images to be matted, framed and sold at the Ann Arbor Art Fair and on the BioArtography website (www.bioartography.com). Since 2005, the BioArtography sales have grossed around $130,000 and over sixty travel grants have been awarded to students and postdocs. The success of this adventure has been outstanding and enthusiasm is high for continuation. Trainees are expected to volunteer for one 4-hour booth shift or for matting and framing duty during the Ann Arbor Art Fair.

10. **Responsible Conduct of Research.** The NIH mandates that all pre and postdoctoral trainees on institutional research training grants, attend training in the Responsible Conduct of Research a minimum of eight hours of formal training at least once during each career stage and at least every 4 years. To fulfill this NIH requirement, all trainees are asked to attend “PIBS 503 “Research Responsibility and Ethics”. PIBS 503 is in session every fall term from September to December. Course materials including case studies and podcast lectures are available online through CTools, and discussion will take place in small group sessions offered at many different times throughout the semester. Graduate students should register for PIBS 503 (1 credit) in Wolverine Access. Postdoctoral fellows should contact the course administrator Kierstin Fiscus to request a spot in the course (kfiscus@umich.edu).

It is also suggested that trainees take advantage of the University’s Research Ethics and Compliance Program (www.research-compliance.umich.edu/), which covers a broad range of activity from general guidelines about conducting research responsibility to specific regulations governing a type of research. The Program for Education and Evaluation in Responsible Research and Scholarship (PEERRS) is a web-based foundational instruction and certification program for members of the University community engaged in or associated with research. http://my.research.umich.edu/peerrs/. For some faculty, staff and students, PEERRS certification is required, which is obtained by passing a short quiz for each required topic area. All UM faculty, staff and students are invited to use the modules and certification tests to improve their knowledge and awareness of responsible research practices.
B. Evaluation Procedure/Progress Report

NIH trainees are required to submit a progress report after one year in the Training Program. This report is evaluated by the Training Program Directors, before the trainee receives continued fellowship support. Evaluation of each trainee will be based on written evaluations submitted by the trainee and mentors, written reports from the mentoring committee (for postdoctoral fellows only) as well as feedback from the trainee presentation. Participation by the trainee in the CFO seminars, Organogenesis graduate course, monthly trainee meetings, trainee research presentations, and other activities, are also a part of the Progress Report. Trainees and mentors will receive notice approximately 6 weeks before the end of the first year of funding to submit the Progress Report to the CFO. Non-traditional trainees are typically appointed for one year and are not required to submit a progress report.

C. Grievance Procedure

All trainees initially are expected to resolve any emerging difficulties by direct interaction with the assigned mentor who will adhere to the principles of scientific ethics in effect in his or her departmental home, as well as at the CFO. In the event that resolution is not possible at this level, then the trainee should approach the faculty ombudsperson (Dr. Scott Barolo). If a resolution is not possible at this level, then the trainee may choose to approach the Training Grant Director (Deneen Wellik). If resolution still is not possible, the trainee shall next file a written statement to the Training Grant Director stating the problem, the facts which support the allegations, and the disposition of the matter at prior informal stages. In the case of grievances directly involving the Training Program, the Training Grant Director may seek advice from the Training Program Operating Committee and/or the CFO Advisory Committee or establish an ad hoc committee for advice on the matter. Before the Director decides a case, she will consult the Office of the General Counsel to assure correct and consistent interpretation of ethical facts. When the Director decides on a matter, the reasons for the decision will be given in writing.

III. CFO ADMINISTRATION AND MISCELLANEOUS PROCEDURES

A. Center for Organogenesis Office and Staff

The CFO office is located on the 2nd floor of BSRB (2058C). Carrie Callahan serves as Administrator to both the Center and Training Program. Please contact Carrie for questions regarding your appointment in the Training Program.

B. Tuition

The Training Grant provides funding to cover tuition and mandatory registration fees for predoctoral fellows. Other student related fees (student assembly, legal services, and school and college government) cannot be paid by this training grant, and are the trainee’s responsibility.

C. Health Care Benefits

All NIH-paid trainees are eligible for health care benefits through the Organogenesis Training Grant. Please note - when a funding change has been made in the trainee’s appointment, it often causes a lapse in health care coverage. It is the trainee’s responsibility to check with the Benefits Office on a regular basis regarding coverage. Please contact Carrie Callahan if you have any questions or problems regarding your health insurance coverage.

D. Stipend Checks and Withholding Taxes

Stipend checks are issued monthly. If you have a discrepancy in your check, please contact Carrie Callahan. As an NIH research fellow, Federal and State income taxes will not be withheld from monthly stipend checks. However, the stipend is considered taxable income. It is the responsibility of the trainee
to file estimated taxes quarterly, or to make other arrangements regarding withholding taxes. The trainee will not receive a W-2 statement from the University of Michigan.

E. Hosting and Travel Reimbursements

Hosting and travel reimbursements will be made to trainees for research-related expenses. Approved travel can be reimbursed if all expenses are documented with receipts. Research-related purchases and all travel requests must be approved by the Training Grant Director in advance and must be documented with receipts. Carrie Callahan will handle all reimbursements. Travel advances are not permitted.

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