

Regenerative Medicine Minnesota - Progress Report

July 14, 2017

Grant Title: Pilot Program in Regenerative Medicine Research for Medical Students

Grant Number: RMM-2016-EP-02

Principal Investigator: Troy Lund, M.D., Ph.D.

Project Timeline: July 1, 2016–June 30, 2017

Brief description of project: The Summer Research Program in Regenerative Medicine was piloted in 2016 at the University of Minnesota. The program aligns with the Medical School’s mission and strategic directions including the Dean’s commitment to research. The combination of faculty expertise in regenerative medicine and institutional resources at the University of Minnesota presents a unique training opportunity for medical students. The primary objectives of the program are to create an infrastructure for medical student research, implement an effective training model, and develop a successful mentoring model. The goal is to provide an overall exceptional research experience for medical students that will promote entry into a physician-scientist pathway, increase the number of regenerative medicine researchers, and advance the field of regenerative medicine.

Where did this project take place? The Summer Research Program in Regenerative Medicine took place at the University of Minnesota on the Twin Cities campus. Students were assigned to laboratories in the Masonic Cancer Research Building, Nils Hasselmo Hall, Lions Research Building, and Mechanical Engineering Building.

People impacted by project and where they are from: Faculty and students from the University of Minnesota Medical School were involved in the education program.

- Isaac Obermeyer’s faculty mentor was Dr. Troy Lund, an Associate Professor in the Medical School, Department of Pediatrics, Division of Blood and Marrow Transplantation and also the Program Director. Isaac’s project title was, “Hematopoietic Stem Cell Expansion Using Decellularized Liver Matrix”. Isaac attends Medical School at the University of Minnesota, Duluth campus.
- Abdul Gamam’s faculty mentor was Dr. David Wood, an Assistant Professor in the College of Science & Engineering, Department of Biomedical Engineering. Abdul’s project title was, “Microfluidic platform to study homing of HSCs to the bone marrow”.
- Elizabeth Smith’s faculty mentor was Dr. Michael McAlpine, an Associate Professor in College of Science & Engineering, Department of Mechanical Engineering. Elizabeth’s project title was, “3D Printed Spinal Cord Scaffold”.
- Elizabeth Straub’s faculty mentor was Dr. Walter Low, a Professor in the Medical School in the Department of Neurosurgery. Elizabeth’s project title was, “Zika Virus Infection of Neural Progenitor Cells, Glioma Cells and Placenta”.

What was the outcome of the project? (Did the project work the way you expected it to? What were the successes? What were the failures? How did it impact regenerative medicine in Minnesota?)

Four first year medical students were selected to participate in the pilot program. The duration of formal research training for the students was eight weeks, beginning on July 1st and ending on August 31st. Each student wrote a project proposal with specific aims and conducted an independent research project focused on a scientific question relevant to regenerative medicine. In doing so, students gained experience in literature review, experimental design, hypothesis testing, data collection, and interpretation. They also learned a variety of laboratory techniques including bone marrow cell isolations, tissue cultures, colony forming unit assays, depletion of lineage cells from bone marrow, extrusion-based 3D printing cell culture, stem cell culture, immunofluorescent staining, and cryostat sectioning. Over the course of the summer, the students attended two Responsible Conduct of Research workshops and a discussion led by the Program Director. During the last week, students presented their projects and demonstrated that the program had improved their knowledge in the foundations of regenerative medicine, specifically stem cell biology, laboratory medicine, and bioengineering. At the conclusion of the program, the students were asked to provide feedback via a Qualtrics survey. All four students responded that they would recommend the program to their peers. We anticipate that additional evidence of accomplishments will be revealed through publications, oral or poster presentations at meetings or conferences, and future research involvement.

The program was administered according to the proposed plan. Feedback from the first cohort of students was highly positive, so we feel it was and will continue to be a successful education program. We have not identified any failures. The overall impact of the program is difficult to assess at this point in time, but we anticipate that the program will ultimately increase in the number of regenerative medicine researchers in Minnesota and advance regenerative medicine therapies in the state and beyond.

Please list any of the following that have resulted from your Regenerative Medicine Minnesota grant funding:

- Publications and/or manuscripts submitted for publication
- Disclosures/patents
- Other grant applications and/or awards: We were pleased to learn from Dr. Michael McAlpine that Elizabeth Smith made significant contributions to a proposal that was awarded the highly competitive Conquer Paralysis Challenge grant. In addition, Regenerative Medicine Minnesota funding was awarded for the Pre-T35 year which started this month.

Responsible Spending:

Please let us know how you spent the money. Any unspent funds must be returned.

Funds were spent according to the proposed budget except for the \$4,000 that was allocated for students to travel to conferences to present their data within 1 year of the research. These funds were reallocated toward administrator support, who coordinated the program after the previous coordinator resigned from her position.

Dr. Troy Lund (Principal Investigator)	\$18,073
Kelly Miettunen (Administrator)	\$5,381
Medical Student Stipends	\$17,920
Supplies	\$12,000
Medical Student Travel	\$4,000
Total Direct Costs	\$57,374
Indirect Costs	\$18,933
Total	\$76,307