Regenerative Medicine Minnesota
Progress Report

Grant Title:	Minnesota Regenerative Medicine Education & Outreach Program
Grant Number:	RMM 2016 EP 06R
Program Director:	Randy S. Daughters, PhD
Project Timeline:	June 1, 2016 – August 31, 2017

September 30, 2017

Re: Final progress report for RMM 2016 EP 06R

This report gives a brief overview of the major points of progress made during the second year of funding towards achieving the stated objectives of the **Minnesota Regenerative Medicine Education and Outreach Program (MRMEOP)** with funds from Regenerative Medicine Minnesota award (RMM 2016 EP 06R).

I. Brief description of project:

The overall mission of the MRMEOP is to facilitate the understanding and integration of foundational concepts in regenerative medicine (RM) for underrepresented students and members of the community through expansion of educational, training, and outreach opportunities in Minnesota. The strategic approach of the program aims to preferentially reach underrepresented and non-traditional student populations primarily at the undergraduate level as well as 5th – 12th grade level through program associated training, education, and outreach activities. This approach is based on the underlying assumption that underrepresented students can be attracted to, and be competitive in, regenerative medicine, stem cell biology, and biomedical research, if appropriate educational and training opportunities are made available. Specifically, effective opportunities should intervene early in a student's educational career, be sustained, and overcome financial, geographical, social, and ethnically based barriers. Based on the above understanding, the MRMEOP implemented three specific program components for 2016/17:

1. *Regenerative Medicine Undergraduate Research Internship (RMURI).* The overall aim of the RMURI program component is to provide a year-long research based internship for undergraduate students in the area of stem cell biology and regenerative medicine to address the education and training opportunities in regenerative medicine for underrepresented and non-traditional undergraduate student populations in Minnesota.
2. *Regenerative Medicine Student Education and Outreach (RMSEO).* The overall aim of the RMSEO component is to increase the understanding of foundational concepts in regenerative medicine through the development of curriculum, educational resources, and outreach activities throughout Minnesota.
3. *Annual Regional Regeneration Symposium (RRS).* The overall aim of the Regional Regeneration Symposium is to provide a sustainable platform for the formal dissemination of research, education, and outreach activities being conducted in the area of stem cell biology and regenerative medicine throughout Minnesota

II. Where did this project take place?

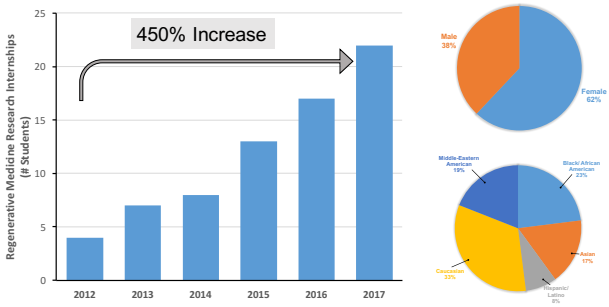
The MRMEOP is a statewide program with administrative support from Macalester College in Saint Paul, Minnesota. Efforts in all program components rely on collaborations with key program partners from the University of Minnesota Stem Cell Institute (UMN-SCI), Mayo Clinic in Rochester, HealthForce Minnesota, Mayo IMPACT program, University of Minnesota Duluth Medical School Center of American Indian & Minority Health, Winona State University, Minnesota State Mankato, Saint Paul College, Augsburg College, Fond Du Lac Tribal and Community College, as well as key partners, institutions, and individual faculty throughout Minnesota. For a complete list of statewide partners please see our web site at MRMEOP.org

III. People impacted by the project and where they are from:

Funding support during 2016/17 from Regenerative Medicine Minnesota (RMM) has been absolutely instrumental to the successful expansion of the reach and impact of the program. This exponential increase in impact is largely a result of a highly collaborative network of educators, scientists, students, and community members, from all corners of Minnesota, committed to fostering the understanding of, and training in, the field of regenerative medicine. Below are main effect summary outcomes of the three core program components.

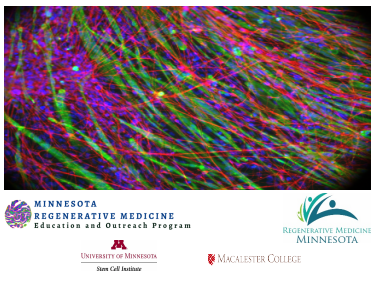
Regenerative Medicine Undergraduate Research Internship (RMURI).

With the second year of funding, we are excited to report that we have achieved significant expansion of the RMURI program. As initially proposed, this is a year-long internship program that includes a 10-week intensive summer research project with concurrent curricular activities at the University of Minnesota Stem Cell Institute, an academic year research and educational component at the student's home institution, and presentations at the annual Regional Regeneration Symposium. Funding from RMM during 2016/17 was essential in funding student research stipends and supply costs directly supporting summer and academic year research projects for a combined 22 undergraduate students from 5 different institutions throughout Minnesota. An assessment of intern basic demographics suggest that students reflected our core objective of recruiting a majority underrepresented or non-traditional students to the program (62% female, 23% African-American, 17% Asian, 8% Hispanic/ Latino, 19% Middle-Eastern). The undergraduate research internship program received a total of 117 highly competitive undergraduate student applicants through the RMURI program site that represented all regions of Minnesota. Collectively, the RMURI program students have presented 189 posters and 26 oral research presentations at various regional and national conferences. To date we have followed RMURI program students after completion of their degree and found that 21% of RMURI students have gone onto Medical School, 18% to graduate school, 32% are in lab tech positions with the remaining having yet to graduate. A total of 527 total undergraduate students have attended the annual regional regeneration symposium over four years.



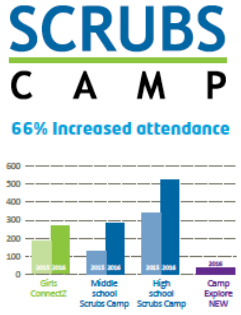
Regional Regeneration Symposium (RRS)

Another main objective of the RMM award is to expand the reach and focus of regenerative medicine in Minnesota through the coordination of the Regional Regeneration Symposium. The RRS was held on November 15th 2016 at University of Minnesota Stem Cell Institute and directly reached over 100 undergraduate students from 8 different colleges throughout Minnesota. Students presented progress on research projects through 6 oral and 21 poster presentations on topics in regenerative medicine. In addition, funding helped support the expansion in focus of this years RRS to include a faculty keynote talk on the cutting edge area of using stem cells to treat blindness by Dr. James Dutton as well as the development of a regenerative medicine education session. The education session, for provided a platform that brought together faculty, teachers,



and community programs to present and discuss education and outreach activities specific to regenerative medicine being done at all grade levels from secondary schools to colleges throughout Minnesota. We had a total of 4 educational specific poster presentations in regenerative medicine associated with the RRS education session. In addition, we brought in members of the regional biotechnology industry to discuss and present opportunities for collaboration.

Regenerative Medicine Student Education and Outreach (RMSEO)
A unique component of the program is the integration of student internships with the requirement for community educational and outreach in regenerative medicine throughout Minnesota. Throughout the year, interns participated in multiple RM outreach activities that targeted underrepresented student populations from schools throughout Minnesota. Program faculty and interns conducted 11 outreach activities teaching hands-on curriculum that reached over 1080 students in grades 5th-12th, with an average of 46% being from URM or non-traditional student populations. These outreach activities grew exponentially in 2016 as a direct result of RMM funding and a highly productive collaboration with HealthForce Minnesota and other key educational partners all throughout the state. In addition, another core objective of the 2016/17 RMM budget period was to identify, contact, and train K-12 teachers throughout the state, on how to incorporate foundational concepts in regenerative medicine. As part of our outreach activities in 2016/17 we significantly expanded the database of potential k-12 teachers by having students in Camps nominate teachers from their home schools. Through this process we now have identified and contacted over 190 teachers/ educators in 5-12th grades throughout Minnesota in an effort to expand the impact of RM. In collaboration with program partners, we have worked with and trained 11 teachers/ educators through either small working groups, or on an individual basis, to develop regenerative medicine related activities and/or curriculum for their specific student demographics. These workshops have spanned the entire state of Minnesota and multiple public school districts (#709, #535, #284, #742, #625).



IV. **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?)

Funding support during 2016/17 from Regenerative Medicine Minnesota (RMM) has been absolutely instrumental to the successful expansion of the program through the establishment of a network of educators, scientists, students, and community members, from all corners of Minnesota, committed to fostering the understanding of, and training in, the field of regenerative medicine. The exciting success of the program has led to a more effective strategy for expanding the reach and impact of RM related activities and the formal alignment of education and outreach initiatives. With the support from RMM, MRMEOP has been effective in meeting our stated objectives for year two as well as driving the significant expansion of complementary efforts in the area of regenerative medicine education and training throughout Minnesota. The successful renewal of the program for 2016 established a support mechanism for new educational partnerships with the aim of more effectively reaching and integrating underrepresented student populations starting in grades 3-12 through the undergraduate level in regenerative medicine. As a result of the successes achieved during year two and to further meet our overall objectives in program reach and impact, we spearheaded the establishment of a new collaboration with Dr. Mary Owen and Dr. Anna Wirta Kosobuski, directors of the UMD Center for American Indian and Minority Health, with the aim of continuing to develop regenerative medicine curriculum for 3-12th grade educators in northern Minnesota and the Tribal communities. In addition, we aim to expand on the "teach the teacher" workshops. The future workshops will be held in regional working groups and will continue to support the training of public school teachers on activities and curriculum related to regenerative medicine.

V. **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)

Given the training, educational, and outreach nature of the program, successful outcome measures are

usually assessed on a different set of metrics. However, of the 18 undergraduate student research internships supported through the program in 2016, throughout the second year, interns gave 7 oral presentations, 21 poster presentations, and 1 was a co-author on manuscript published and 3 on manuscripts in preparation. In addition, the outreach program has been written up in multiple news outlets highlighting impact of regenerative medicine on students throughout the state of Minnesota. As a program, we have developed 7 different regenerative medicine related curriculum suitable for grades 5-12th and undergraduate. In addition, we were successful in securing a third year of funding from RMM for 2017/18 program activities.

VI. Responsible Spending:

All funds were spent during the initial funding period. The table below outlines spending on program components and the percentage of total funds spent for each. Detailed spending reports were sent RMM grants administrated on a quarterly basis per award requirement.

Minnesota Regenerative Medicine Education and Outreach Program Final Spending Breakdown			
Category	**Proposed Year 2**	**Actual Year 2**	**Percentage**
Program Management and Direction	$ 13,990	$ 13,990	14%
Undergraduate Student Research Internship component	$ 43,877	$ 43,877	44%
Program Development 3-12th and Community Education and Outreach	$ 17,908	$ 17,908	18%
Regional Regeneration Annual Symposium	$ 2,000	$ 2,000	2%
Total Direct Costs:	$ 77,775	$ 77,775	78%
Total Indirect Costs	$ 22,225	$ 22,225	22%
TOTAL (DC+IDC)	$ 100,000	$ 100,000	100%