

Regenerative Medicine Minnesota
 Final Progress Report
 Title: Innovators of the Future: Youth Science Program
 Number: RMM-2016-312ED-06
 Project Director: Anna Wirta Kosobuski, EdD

Project Summary

Innovators of the Future Youth Science Program was offered to Native American students in grades 7-12. Activities were held in Duluth, MN, a total 51 students were served.

The goals of the project were to 1) improve the understanding of biomedical science and regenerative medicine; and 2) increase awareness of and encourage students' interest in math and science education and research career options. These goals were achieved using two approaches: a four-hour block of biomedical science and regenerative medicine content during a 7th-12th grade on-campus summer program and classroom outreach in the Duluth School District.

The on-campus project was an unqualified success. In total, there were 37 student participants. Biomedical and regenerative medicine, and research were introduced using the following curriculum. It should be noted that the program was split into one-week sessions: one-week for 7th and 8th graders; one week for 9th and 10th graders; and one week for 11th and 12th graders. The point here being that the faculty who instructed each component did so for three consecutive weeks, adjusting material for each level of student.

| Session | Format | Content | Faculty/Instructor |
|---|---------------------------------------|---|---|
| Pre-survey | Classroom | 3-5 questions | CAIMH Staff |
| Introduction to Regenerative Medicine | Classroom presentation and discussion | Overview of cells, DNA, and biomedical research and lab safety | Sarah Lacher, PhD Post-doc, Biomedical Sciences |
| Demonstration of microscope to view cell slides | Lab activity with discussion | View slides using microscope | Jon Holy, PhD Assoc. Prof. Biomedical Sciences |
| Cheek Cell Lab | Lab activity with discussion | Swab for cheek cells and view under microscope | Sarah Lacher, PhD Post-doc, Biomed Sci Grant Carlisle, MS2 |
| Introduction to Stem Cell Research | Classroom presentation and discussion | Overview of stem cells & stem cell research including application, advances, and future directions in science knowledge | Matthew Slattery, PhD Asst. Professor Biomedical Sciences |
| Overview of <i>Bridges to Baccalaureate</i> and <i>Pathways to Advanced Degrees in Life Science</i> | Classroom presentation | Overview of UM MS Duluth campus biomedical science research training programs for disadvantaged students | Benjamin Clarke, PhD Associate Prof. & Shannon Redbrook, MS, Program Coordinator |
| Post survey | Classroom | 3-5 questions | CAIMH Staff |

Student survey feedback and individual interviews demonstrated that the on-campus activities met the program goals. The program was evaluated using pre- and post-surveys gathering information on the students' experience. Of note:

- Prior to the program, **27** of the students indicated that they had heard of stem cell research and regenerative medicine.

- **32** of the students indicated that they better understood stem cell research and regenerative medicine better after receiving instruction during the program.

A significant outcome of the program is **26 of the 37 of the students indicated that they would consider a career in scientific research**. Only 0.2% of the nation's biological/medical scientists (all degrees) are Native American; the number who hold doctorates is so low that it cannot be calculated with accuracy. However, the number of Innovators of the Future students (n=26) who indicated interest in a biomedical science research career equaled 70% of the total number of students (n=37).

On the post survey, students were given the option of including comments. Some of these include:

- "I really liked learning about all the cells and the science behind it."
- "If we know the chemical signals required to change an already specialized cell back to a stem cell, can't we just do this to cancerous cells, using chemical signals to change the cells back?"
- "Could we raise the dead in the condishions [*sic*]?"
- "I learned a lot more about stem cell research and I really enjoyed the sessions & learning things I previously did not know"
- "This was very informative because I didn't have a real big knowledge about stem cell research before this."
- "The instructors were knowledgeable, and interesting- particularly Dr. Holy but don't tell the others"

Individual interviews were conducted with some student volunteers from the on campus Innovators of the Future Youth Science Program. A full account of these interviews was sent to Regenerative Medicine Minnesota in December 2016; if another copy is desired, it will most enthusiastically be submitted. Responses were overwhelming positive; many showed alarming creativity and insight. The interviews included: 9 total youth; age range 13-16 years; five males and four females.

After instruction on the topic, one interview question asked students if they found research and regenerative medicine interesting. Of the nine students:

- **Seven** indicated yes
- **One** said "a little" and **one** said "Partly interesting"

As a follow up question, the students were asked if a scientific research career is a possibility them. Of the nine:

- **five** indicated yes
- **three** were maybes ("After this...possibly", "Maybe...IDK [*sic*] ", "Maybe")
- **one** indicated no

The outreach component of this Innovators of the Future program included three school visits conducted for 14 students at Duluth middle and high schools. For one visit, a planaria activity planned and carried out across the two visits by a UM Medical School Biomedical Sciences Department post-doc. The other included a science lesson on mixing compounds.

Innovators of the Future Youth Science Program fell did not quite fulfill its target number of students (60); in all, 51 were served. The primary concern was with the school visits as the target number of visits (5) was also not achieved. There were two primary factors at play. One was that the Center of American Indian and Minority Health (CAIMH) was seeking funding for

all programs and to cover partial personnel expenses. In 2015, a federal grant closed and not refunded; such a circumstance is a recipe for challenge. The outreach to Duluth School District students was impeded by very strict school district classroom schedules. Though a schedule was developed during the fall, as the year unfolded, teachers and CAIMH staff people had difficulty in making final arrangements. Nevertheless, given that the Regenerative Medicine Minnesota program made such a marked impact on the students successfully reached, it cannot be questioned that the program did what was hoped and more. The summer program went extremely well and students indicated they learned a lot, enjoyed the experience, and found an increased level of interest in science. While acknowledging that there are real barriers, Dr. Wirta Kosobuski is steadfast in opening up the world of exciting and fulfilling world of science to Native American youth.

A self-selection bias regarding outcomes must be acknowledged in that the students who participate in the CAIMH summer programs are those with interest in advanced education and are exploring medicine and health professions career options. However, that the students are attracted to the summer program due to its emphasis on health professions makes it all the more compelling to find that so many students are interested in research careers.

Other information

Some *Innovators of the Future Youth Science Program* photographs are included with this report.

A final financial report will be submitted by the University of Minnesota.