Annual Report 2018-2019

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PHF Endowed Professor of Preventative and Community Health

It has been my pleasure over the past two years to represent the Portage Health Foundation as an Endowed Professor at Michigan Technological University. The generous endowment afforded has supported initiatives that promise to fulfill the goals of health education, research, community outreach and leadership. Below I outline progress made during the past year, and then highlight problems, and the potential for continued growth and collaboration.

Research

My research focus is human integrative physiology. Human integrative physiology research is not as expensive as basic science research, but the costs associated are not trivial. The money provided by the PHF has been used, to date, to support four new research projects, two doctoral students, and a number of active and potential undergraduate researchers.

One of the benefits of a research endowment is the freedom to propose and execute novel projects that might not seem at the outset to be highly fundable from external sources. Pilot data are critical.

New and Ongoing Research Projects:

Since arriving at MTU September, 2017, three new protocols have been approved by the Institutional Review Board for the protection of human subjects in research, and two additional studies are in submission and/or preparation. All studies were initially supported by PHF funds, but the goal is to transition to externally-funded sources.

My research track is leading toward smoking cessation as a primary focus. Due in large part to funds provided by the PHF, I was able to focus last year on a grant to NIH (R15 mechanism) entitled, “Smoking cessation and vaporized nicotine: influences on cardiovascular and cerebrovascular control.” The grant received an impact score of 27, which is happily within the funding line of Heart Lung and Blood Institute (normally funded grants receive scores of 30 and below). The council review will be held in October, 2019, and I am optimistic that the grant will come through (~$450,000 total cost). See bullet 4 below.

1) Vaporized nicotine and autonomic control: Smoking cigarettes continues to kill people: this is true despite the Surgeon General’s warning of the dangers of tobacco revealed in the mid-'60s. Combustible tobacco is the number one modifiable risk factor for cardiovascular disease. The trend today is to transition to electronic cigarettes. Electronic cigarettes are viewed by the public as being a safer alternative to traditional cigarettes, but research in this area is sparse.

2) Controlled breathing and its influence on autonomic function: The autonomic nervous system is intimately involved in the regulation of practically every organ system, but to understand how the autonomic nervous system interacts with various systems requires strict experimental control. With this experiment we compare autonomic responses to both auditory and visual cues. Most subjects report that
auditory cues are much harder to follow, and so we hypothesize that autonomic function might be different when subjects breathe in time to different cues. This is not a trivial question for those of us interested in how the nervous system regulates cardiovascular output.

3) **Fasting and its influence on autonomic regulation:** There are myriad examples of instances of voluntary fasting – these could be related to religious beliefs, athletic preparation, body composition goals, or austere environments such as microgravity.

4) **Smoking cessation and vaporized nicotine: influences on cardiovascular and cerebrovascular control:** In recent months (late summer 2019) several people have fallen ill, or even died (~6 people) from “vape-related” causes, even though the causes are unknown. It is likely that the deaths are directly related to young people buying “e-juice” liquid from illegal street vendors selling THC-infused liquid. Complications related to e-cigarette have resulted in a national campaign to ban flavorings in the nicotine juice – this has been decided despite a lack of evidence (or any evidence for that matter) that commercially-available products are dangerous. It is my sense that carefully-controlled clinical studies such as mine are needed more than ever. An effort to transition smokers from combustible tobacco, and then to move to nicotine-free products all together will be a major thrust of my efforts during this coming year.

The goal is always to look for external funding so that the endowed funds might be used elsewhere. My graduate student (Joshua Gonzalez) and I were successful in obtaining a $3,000 grant from Blue Cross Blue Shield for the first vaporized nicotine project (bullet 1 above), and so funds to support subject costs/supplies have been shifted to this external source. In addition, Mr. Gonzalez and I were successful in obtaining a $5,000 grant from the Michigan Space Grant Consortium to support his dissertation research (bullet 4 above).

We also received funding through the Summer Undergraduate Research Fellowship to support undergraduate student, Stephanie Jewell to support the controlled breathing project. However, the grant was a fellowship, and so money to pay subjects for this project was still supplied by PHF.

Once again I stress that funds supplied by the PHF have led directly to both small, and potentially large grants from external sources.

**Student Recruitment:**

Recruiting students to the burgeoning doctoral program in Kinesiology and Integrative Physiology is a major initiative. I used some PHF funds to invite two students to visit MTU – Joshua Gonzolez and Steven Stelly. I had worked with these two students previously at the University of Texas at San Antonio, and my sense was that they would fit very well in our program. Both students are thriving, and are making good progress toward their dissertation research.

**Student Research Involvement:**

PHF funds have been used to pay undergraduate researchers for various duties.

1) Stephanie Jewell is being paid an hourly rate to assist with data collection and analysis of all ongoing projects
2) Jake Formolo and Jacob Jaskolski were paid a stipend to investigate the feasibility of using arterial pressure waveforms as an indication of dehydration and/or hemorrhage.

3) Approximately 35 research volunteers have been paid from $50 to $100 for their participation in our research activities.

Community Outreach and Leadership

Partnerships:

During the past two years it has been challenging for me to establish effective and sustainable community outreach opportunities. I have been a guest on the radio program, “Copper Country Today,” and have participated in the Health Leadership Roundtable. My goal has been, and continues to be, to develop a “Mobile Health Laboratory,” with the goal reaching people who may not have adequate access to affordable health care – or even affordable health information.

Partnerships are being established. The following health professionals are committed to advancing health outreach programs (highlighted below):

1. Irena Sergeyeva, Registered Nurse, Finlandia University
2. Breanne Carlson, Health Specialist, MSU Extension, Marquette
3. Erich Petrushek, Health Specialist, MSU Extension, Marquette
4. Dawn Contreraus, Health Specialist, MSU Lansing
5. Dawn Opel, Health Specialist, MSU Lansing
6. Donald Simila, Great Lakes Family Health

The initial idea was to find funding to outfit a mobile health laboratory with the capabilities of measuring basic but important health-related concerns

   a. A1C
   b. Glucose tolerance
   c. Cholesterol
   d. BMI
   e. Sub-max fitness
   f. Blood pressure
   g. Basic nutrition

Our coordinated group of health experts are considering the following initiatives:

1) Exercise Oncology
   a. Transportation to and from chemotherapy treatments
2) Marquette and Hancock Food Coop
   a. Collaborative opportunities exist – food delivery and nutritional test kitchens
3) Cloud-based measurement pilot to assess “dining with diabetes.”
4) Exercise interventions for obesity, diabetes and Hypertension
   a. MSU Disease Prevention Management Work team – nutrition and physical activity
   b. Frailty in older adults – Impact report on fall prevention

However, I have found very little enthusiasm from funding agencies, who seem to feel the university or foundation should provide the initial funds for some type of a mobile health unit. Based on recent (2018) data outlining health needs of the Upper Peninsula, transportation
to providers was not high on the list. Some of the highest concerns were lack of adequate health insurance and both tobacco and alcohol dependency.

**Future Plans**

I am very excited about the progress our laboratory has made in the areas of autonomic cardiovascular and cerebrovascular control. We have in the laboratory two very dedicated and talented doctoral students, and at least three (up from one last year) undergraduate students who are benefiting from the freedom part time funding gives them to pursue their career goals. I am still interested in the idea of a mobile health laboratory, but given my success with electronic cigarette research, and given the high profile exposure “vaping” is receiving, I plan to focus a good deal of my community outreach efforts on smoking cessation and options for smokers who want to quit.