MICHIGAN TECHNOLOGICAL UNIVERISTY

# 2020 COMMUNITY REPORT

# COMMUNITY
# HEALTH & WELLNESS

# PARTNERING 4 COMMUNITY

Thanks to a gift from the Portage Health Foundation (PHF), the COVID-19 Testing Laboratory at Michigan Technological University is able to process nearly twice as many tests in half the time and with less personnel.

> ***PHF's purchases for the lab were a pleasant surprise and one we are all very grateful for having received.***
>
> **Caryn Heldt, PhD, Professor Chem Eng**
> **Technical Lead for COVID-19 Community Lab**

PHF's gift includes a KingFisher Flex System RNA extractor, which will double testing capacity, and a Laboratory Information System (LIS) software package to streamline reporting of test results between the COVID-19 Testing Lab and the Upper Great Lakes Family Health Center (UGL). Caryn Heldt, a professor of chemical engineering, director of MTU's Health Research Institute (HRI) and one of the COVID-19 lab's technical leads, said the RNA extractor "has the capacity of processing 96 samples per run, which doubles the number of samples we currently do. "With the current polymerase chain reaction (PCR) testing, the lab needs 12 people over the course of two shifts to process 200 tests a day."

"Using the RNA extractor, we'll be able to process 400 tests a day, with just four technicians over the same two shifts," Heldt said. With the LIS software package, "the test results will automatically be logged to UGL rather than have to be manually entered."

"I've rarely seen such a diverse group come together, solve an incredible range of problems, and work tirelessly to achieve a goal," Dave Reed, Vice President of Research said. "We have to continue to tackle COVID-19 as a community.

> ***Most communities our size do not have the types of partnerships we have to be able to collaboratively respond in times of need. This collective effort ensures our community testing is expanded in a meaningful and appropriate way to keep our community and our economy safely opened.***
>
> **Kevin Store, PHF Executive Director**

The Foundation's purchase of the RNA extraction equipment and software helped to solve the current capacity problem our community was facing." The $142,359 investment by PHF came from its COVID-19 Community Recovery Fund, which is a restricted fund specifically created to help the people in Baraga, Houghton, Keweenaw and Ontonagon counties recover from the ongoing pandemic.

# THE VALUE OF PARTNERING

Since its inception as the Michigan Mining School in 1885, Michigan Technological University has been committed to world-class education that is relevant to the local community. In the past ten years, strategic investments have been made to broaden and deepen Michigan Tech's interest in the health sciences and engineering; thus the establishment of the Portage Health Foundation could not have been more timely.

Together we saw an opportunity to leverage the strengths, strategic missions, and finances of both the Foundation and Michigan Tech to build a health research, health education, and community health infrastructure.

As a result of our work together, we supported groundbreaking research on Parkinson's and Alzheimer's, cancer, mindfulness and mental health, food insecurities and fasting, diabetes and obesity, prenatal and infant heart health, and cardiac interventions and rehab.

We've deepened the collaborative spirit in our community, and we are clearly seeing that play out in the research happening at Michigan Tech.

***Our partnership has resulted in many successes, but those successes are not accidental. They are a result of a purposeful vision to create a longterm infrastructure for economic mobility through health education; health research that provides data informed solutions; and collaboration that propels the very best of who we are as a community.***

**Jodi Lehman, PhD, Executive Director of Corporate and Foundation Relations**

***COVID-19 created a need for Michigan Tech to harness our world class faculty and research capacity and an opportunity to collaborate with PHF, the Western Upper Peninsula Health Department, state and local healthcare systems, businesses and corporate partners to ensure the well-being of all Copper Country residents.***

**Bill Roberts, PhD, Vice President for Advancement and Alumni Engagement**

We recognize the importance of our roles in the community,
because, together, we are community.

# MICHIGAN TECH CREATES A PUBLIC HEALTH MINOR

**Being Health Literate:**
Human health impacts our individual biology as well as the natural, built, and social environments in which we live, work, and play. The ability to integrate a health perspective is important not only in our personal lives but also strengthens disciplines beyond traditional health-related and clinical fields. A minor in public health introduces students to public and underserved communities or creating a marketing plan centered around making healthier food choices are some of the ways a minor in public health can serve the community. With a minor in public health from Michigan Tech, students will learn how to determine community needs, develop or enhance plans based on those needs, and effectively partner with stakeholder groups

***As COVID-19 has made abundantly clear, the health of our neighbors and our environment, whether globally or next door, affects the health of each one of us. Our community's health impacts every part of our society. We cannot separate health from any of our fields, but must instead learn how to integrate a health perspective into students' chosen careers.***

**-Kelly Kamm, PhD, Epidemiologist**
**Kinesiology and Integrative Physiology**

population health principles and research methodologies. Students can integrate public health perspectives into many careers like allied and professional health fields, graduate programs in biology and physiology, as well as law, the social sciences, policy, and engineering.

**Being a Community Partner:**
Advocating for and implementing better water and sanitation systems in

to implement solutions-based programs. Over the past 15 years, there has been a growing recognition of the importance academia plays in teaching these skills. In 2002, an Institute of Medicine report recognized the need to better educate the public health workforce and partners that play key roles in the health of our communities who are not in traditional public health positions.

# PARTNERSHIP POINT OF PRIDE

# IT'S HEALTHY TO EAT LOCAL

With PHF research seed money, Michigan Tech social science faculty, Angie Carter, partnered with local agencies to strengthen western Upper Peninsula food systems during the pandemic and beyond. It's said that to survive and thrive in Michigan's Upper Peninsula, it takes a healthy serving of "sisu" — a Finnish word that roughly translates as "grit." The term is also apt for describing how scientists, health care professionals and planners have pivoted to ensure Yoopers have access to nutritious, local food and to gardening despite the COVID-19 pandemic.

While the news has been full of meat-packing plants closing and worries about the centralized food supply, Carter, and her colleagues, Dr. Michelle Seguin at the Portage Health Foundation (PHF) and Rachael Pressley at the Western Upper Peninsula Planning & Development Region (WUPPDR), have focused on facilitating conversations among farmers, farmers market coordinators and area food banks to ensure people can get the food they need while supporting local growers and increasing food access efforts in the UP. "We need to increase food production in this region," Carter said.

"A lot of the work published about local food movements and infrastructure focuses on urban areas but forgets rural areas, where in some cases there is higher food insecurity than urban areas. Now that food scarcity is in the news a lot, it's even more important to strengthen the infrastructure and educate people about what we can do to strengthen the long history of local foods right here in the western UP."

Through the Western Upper Peninsula Food Systems Council, Carter, Seguin and Pressley have facilitated remote western UP grower check-in calls to share resources and strategize about how the food systems council can help by interpreting policies and tracking down information, so the people farming or gardening can focus on their work. The council, which helps route local food to area food pantries, also worked with the Upper Peninsula Food Exchange to clarify restrictions on garden equipment purchases during the earliest phase of the state's stay-home order. Carter says the food systems council continues to synthesize and share important information for growers and decision makers.

Thanks to funding from a PHF MTU Research Excellence Fund grant and a 2020 Rural Sociological Society Early Career award, Dr. Carter is working closely with the Western UP Food Systems Collaborative (WUPFSC) to study and to strengthen regional food systems. Dr. Carter engages students in community-based research projects in collaboration with WUPFSC. Undergraduate students taking part in the Undergraduate Research Internship Program (URIP), Summer Undergraduate Research Fellowship (SURF), and the new Department of Social Sciences Undergraduate Program for Exploration and Research in Social Sciences (UPERSS) have contributed to food systems assessments, plans for a therapy garden at the Barbara Gundlach Shelter and culinary garden at the Horizons School, and made recommendations to our campus food pantry. In addition to her research, Dr. Carter teaches Communities & Research and Food Systems & Sustainability, providing opportunities for further hands-on and problem-solving learning.

# COLLABORATING 4 COMMUNITY HEALTH AND WELLNESS

**COVID Town Hall Series**

Organized by the Health Research Institute at Michigan Tech, the weekly 60-minute town hall broadcasts were heard at 7 p.m. each Thursday September through December on 97.7 The Wolf (WOLV-FM), and could be viewed live on Facebook or through a Zoom Webinar. Over the course of the series, moderated by Steven Elmer and Kelly Kamm (HRI/KIP), researchers, clinicians, public health officials, and community experts discussed a range of pandemic-related issues. The series was sponsored by UP Health System Portage, Aspirus, MTEC Smartzone, and UPPCO.

**Week 1**

"Role of Public Health to Protect the Community." The moderators were joined by Caryn Heldt (ChE) from the Michigan Tech Health Research Institute, Pete Baril from the Western U.P. District Health Department, and Robin Meneguzzo, a nurse practitioner from Aspirus.

**Week 2**

"COVID-19 Emergency Preparedness and Response". The speaker panel included Chris Van Arsdale, Houghton County Emergency Measures director, Ed Freysinger, CEO of UP Health System Portage, and Christine Harff, UP Regional President for Aspirus.

**Week 3**

"How COVID-19 Impacts the Human Body". Elmer and Kamm were joined by Dr. Tara Robinette, an emergency medicine physician from UP Health System-Portage.

**Week 4**

"COVID-19 Testing, Contact Tracing, and Vaccines." Elmer and Kamm were joined by Cecile Piret (Math), Dr. Zachariah DeYoung (Upper Great Lakes Family Health Center), **Madelyn Morley (PHF Scholar alumni, CDC Foundation)** and Caryn Heldt (ChE/HRI).

**Week 5**

"Acute Care, Hospitalization, and Long-Term Recovery from COVID-19." Elmer and Kamm were joined by Dr. Clayton Charles (Hospitalist – Aspirus) and Dr. Timothy LaBonte (Hospitalist – UP Health System Portage).

**Week 6**

"Importance of Staying Physically Active during the COVID-19 Pandemic." Elmer and Kamm were joined by Dr. Keri Denay (University of Michigan – Family and Sports Medicine Physician), Angela Luskin (UP Health System Portage – Health and Fitness Manager), Steve Short (Denver Nuggets – Physical Therapist and Sports Medicine Director), along with an additional graduate student guest.

**Week 7**

"Impact of COVID-19 on Mental Health."Elmer and Kamm were joined by Leslie Griffith (Outpatient Program Director, Copper Country Mental Health), Amber Bennett (Director of Student Health and Well Being, Michigan Tech), Kevin Trewartha (Assistant Professor in Cognitive & Learning Science, Michigan Tech).

# COLLABORATING 4 COMMUNITY HEALTH AND WELLNESS

**Week 8**
"Impact of the COVID-19 Pandemic on Teaching and Learning". Elmer and Kamm were joined by George Stockero (Copper Country Intermediate School District), Mike Meyer (William G. Jackson Center for Teaching and Learning), Marney Polkky and Pam Brown (Nursing and Physical Therapy Assistant Programs, Finlandia University).

**Week 9**
"Working Safely and Productively during the COVID-19 Pandemic." Elmer and Kamm were joined by Carolyn Duncan (KIP) and Renee Hiller (Human Resources).

**Week 10**
"Michigan Tech Response to the COVID-19 Pandemic". Elmer and Kamm were joined by Karyn Fay (Biological Sciences, Michigan Tech), David Holden (Van Pelt and Opie Library, Michigan Tech), Dr. Jennifer Becker (Civil & Environmental Engineering, Michigan Tech), and Isaac Wedig (PHF Scholar, Kinesiology & Integrative Physiology, Michigan Tech). Examples highlighted will include the COVID-19 testing lab, 3D printing of personal protective equipment, monitoring of the virus in human waste, and keeping the community healthy through exercise as medicine.

**Week 11**
"Impact of the Pandemic on the Economy". Joining the moderator were Dr. Laura Connelly (Michigan Tech - College of Business). Jen Julien (Local business owner, KEDA member, and Tech alum).

***The goal of the Town Hall Series is to increase awareness about COVID-19 and its impact on health and society. To do this, we rely on our local experts to discuss what is currently known and answer questions from the community. We appreciate the support from our community sponsors and campus partners to help make the Town Hall Series possible.***

**-Steve Elmer, PhD, Associate Professor KIP**

**Week 12**
"Health Disparities and COVID-19". Elmer and Kamm were joined by Heather Orom (Associate Professor in Community Health and Health Behavior, University of Buffalo) and Whitney Elmer (Country Director, Mercy Corps).

# HEALTH RESEARCH

# INVESTING, INNOVATING AND COLLABORATING TO MAKE A DIFFERENCE

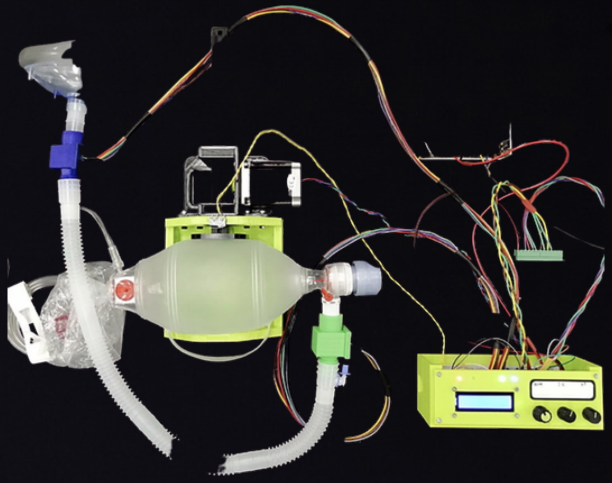
"We applaud the Foundation for seeing the value of investing in health research that not only produces humanitarian benefits, but also generates significant domestic economic activity," said Vice President for Advancement and Alumni Engagement, Bill Roberts.

The diligence of early planning between the Western UP Health Department and local hospitals was well worth the time and effort. Researchers from Johns Hopkins, and Cal Tech surveyed campus plans across the nation, and concluded that Michigan Tech has one of the most robust plans in the nation.

“Michigan Tech doesn't have a university health system. We are at a major disadvantage for doing baseline and surveillance testing, and yet we have figured it out by working with our local community health providers,” epidemiologist Kelly Kamm said. “It says a lot that when insurance companies wouldn’t pay for asymptomatic testing, our administration said we’re still going to do testing and not charge the students.” Similarly, the cost of testing was a community need the Foundation also stepped up to help address.

*Pictured here is Caryn Heldt, PhD, Professor Chemical Engineering and Technical Lead for the COVID-19 Lab*

# 3-D MANUFACTURING TO MEET COMMUNITY COVID SUPPLY NEEDS



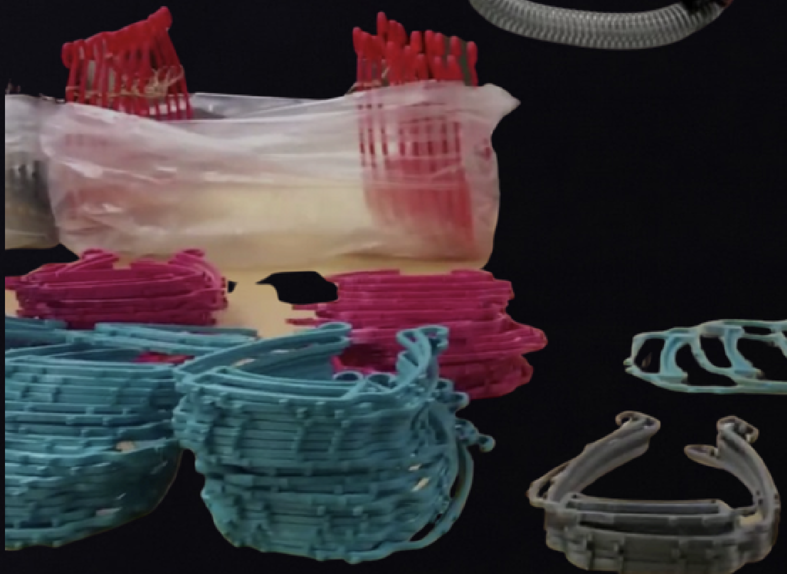
On campus, many individuals pivoted quickly and with agility to prepare our community for COVID-19–understanding it wasn't a matter of "if" but "when" it hit the Western U.P.

In addition to standing the lab up in 3 weeks, last spring Michigan Tech surveyed local organizations to find out what personal protection equipment (PPE) was in short supply.

Michigan Technological University's Open Sustainability Technology (MOST) Lab designed and developed three new tools to help a high-temperature 3D printer, a firefighter mask and a printable, emergency-use ventilator.

Thanks to the work of David Holden and John Schneiderhan, a mini manufacturing center was set up in Michigan Tech's library to produce needed PPE during the spring and summer months.

> ***John and David have been great to work with — they tweaked the design several times based on feedback we gave them. This quick response in design and production has been very well received by the many groups we have distributed the shields to.***
>
> **-Pete Baril, Western UP Health Dept**



# THE CORONAVIRUS IN HUMAN WASTE

“When the virus that causes COVID-19 finds its way into wastewater, what happens to it?" Environmental engineers will track the coronavirus in wastewater and biosolids to find out. Unlike many viruses, SARS-CoV-2, which causes the disease COVID-19, is not eliminated in the human gastrointestinal tract. So, when a person infected with the virus — whether they have noticeable symptoms or not — has a bowel movement, the live virus in their feces enters the wastewater stream. The current production methods are very effective at reducing even the hardiest disease-causing organisms historically found in wastewater. However, the SARS-CoV-2 virus clearly doesn't always behave in expected ways. "We want to make sure the SARS-CoV-2 virus particles are no longer infectious when we spread biosolids,” said Jennifer Becker associate professor of civil and environmental engineering. “If any of the virus particles stay in the wastewater stream during treatment, what happens when wastewater is discharged to the environment? We know almost nothing about the answer to this question right now.”

Becker works with Eric Seagren, professor of civil and environmental engineering, Ebenezer Tumban, associate professor of biological sciences, and Daisuke Minakata, associate professor of civil and environmental engineering. The team received seed funding from Michigan Tech's College of Engineering to put together a research proposal to track SARS-CoV-2 in wastewater in partnership with local wastewater treatment facilities, including the Portage Lake Water & Sewer Authority in Houghton. A positive wastewater test could be used by municipal wastewater managers as an early monitoring tool in communities that have not yet seen other evidence of the virus. “People can be asymptomatic but are shedding the virus in their stool,” Becker said. “Dr. Seagren and I have for several years been doing research looking at the fate of pathogens in wastewater treatment biosolids.”

The tests used to look for the virus in wastewater samples are similar to clinical tests used on people. A positive wastewater test could be used by municipal wastewater managers as an early monitoring tool in communities that have not yet seen other evidence of the virus.

Since the Michigan Tech researchers proposed their research plan, scientists at Michigan State University and other research institutions have begun discussing the development of a network of labs that could monitor for the virus throughout Michigan. A lab in the Upper Peninsula at Michigan Tech would be especially helpful for detecting the virus in local communities. Currently, the Michigan Tech researchers are seeking additional funding sources and developing strict safety procedures. “We all think of food and water as being essential to life. They are, but waste is also a critical part of life,” Becker said. “All organisms generate it, and it’s something people don’t really want to deal with. However, we all produce waste, and we have to manage it appropriately to protect public health and the quality of our environment. This is one of the key responsibilities of environmental engineers, and it’s really essential to sustaining livable communities.”

# HUMANITARIAN AND ECONOMIC IMPACT OF RESEARCH

**High-brightness Probes for Faster, More Robust COVID-19 Testing.**

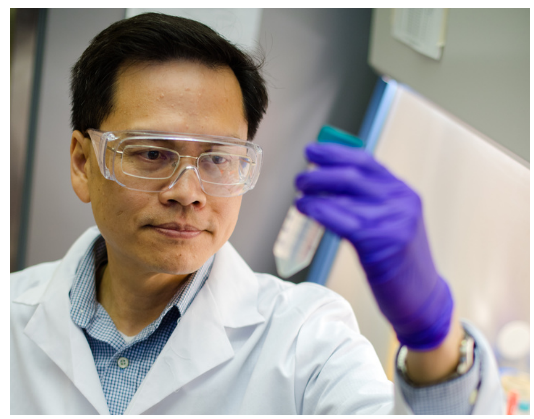
New probes using incredibly bright dyes could help detect COVID-19 earlier, leading to faster testing even when only trace amounts of SARS-CoV-2 RNA are present. As the COVID-19 pandemic continues, scientists search for ways to catch positive cases earlier and run samples faster. Rapid testing is crucial to slow the spread of the virus. High-brightness dyes offer the promise of greatly improving COVID-19 testing methods. That's why the National Science Foundation (NSF) approved a new $256,000 grant for high-brightness fluorophores developed by researchers and StabiLux Biosciences, a Michigan-based health tech business founded by Michigan Tech faculty.

**The Benefits of Tech Transfer**

The original high-brightness dye technology is currently funded as a NSF STTR Phase IIB project for rare antigens detection by flow cytometry. Funding for the Phase I and Phase II projects tops $1.6 million. "The primary goal of technology transfer is to achieve societal benefit from discoveries made by researchers," said Jim Baker, associate vice president for research administration. "This recent support from NSF to investigate applications of our technology to address COVID-19 is a great example of the potential public benefit achieved through the commercialization of Michigan Tech research outcomes."

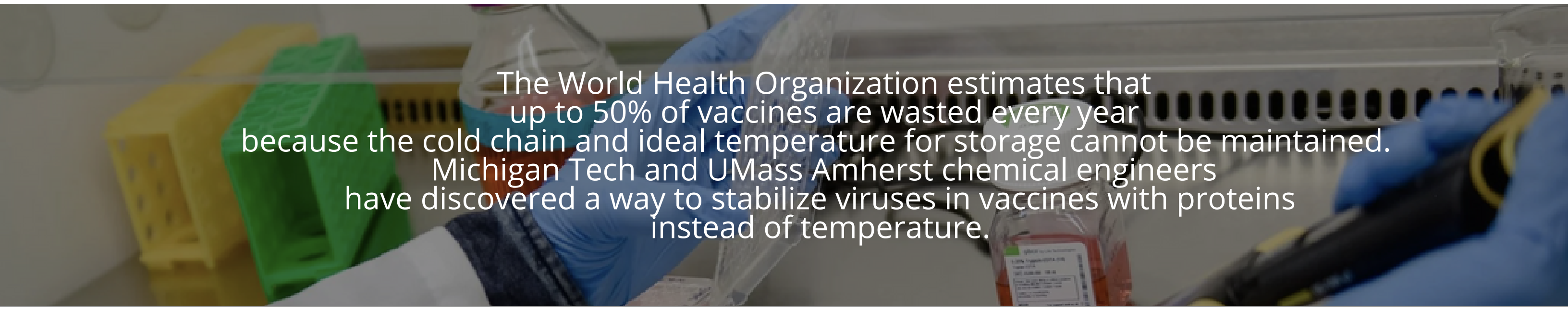
***Being able to detect, quantify, and track viral RNA at low concentration and high accuracy will expedite tests, reduce false negatives and accelerate vaccine and drug development to reduce the impacts of COVID-19 and of future pandemics. The success of the novel PCR probes will save lives, accelerate the development of working vaccines, and support local economic, social and educational activities.***

**-Yoke Khin Yap, PhD, Physics**



StabiLux has begun raising Series A funding to sustain their commercialization efforts. StabiLux was an Innovation Showcase finalist in a recent international conference, CYTO, and is a finalist at the Invest360 health care event on Sept. 24." This technology will be disruptive to the $5.5 billion PCR market and help scientists develop a better virology understanding to prevent future pandemics," said Steve Tokarz, CEO at StabiLux. While the work is still in the research stage, the research team expects high-brightness fluorophore dyes will lead to breakthroughs in immunology, drug discovery and medical diagnosis.

# AN INSTITUTE ON A MISSION TO ELEVATE MICHIGAN TECH'S HEALTH RESEARCH




One of the purposes of the recently established Health Research Institute (HRI) was to establish a nationally visible research hub. It has done this by drawing together health researchers from across campus.

Researchers are tackling a variety of health-related challenges, whether that is developing material for wound care, creating vaccines, or growing heart muscles faster and stronger with less chance of rejection. The research is translational, responsive, collaborative, and local-to-global relevant.

HRI members have 17 active National Institute of Health (NIH) awards and 9 different National Institutes of Health partners.

In the five years of our partnership, the University has brought in over $14M in research expenditures from NIH. As we shared in our proposal to the Foundation, for every $1 expended from an NIH award, it is estimated that $2 goes back into the local community. That adds up to an estimated $28M back into our community through local jobs, services, and purchases—from homes to products.

**MISSION**

The mission of the Health Research Institute is to establish and maintain a thriving environment that promotes translational, interdisciplinary, and increasingly convergent health-related research and inspires education and outreach activities.

**PURPOSE**

The purpose of the HRI is to nurture, expand and accelerate current research and outreach activities at Michigan Tech by:

- establishing a nationally visible research hub,
- promoting on- and off-campus collaborations
- upgrading research infrastructures,
- creating an environment that enhances the probability of securing external funding, and
- getting directly involved in community health and education issues by partnering with local health providers.

# PHF Funding of Health Research Leads to Collaboration with UP Health System

Assistant Professor Weihua Zhou, Applied Computing/Health Informatics, received a Portage Health Foundation Research Seed Grant.

Zhou’s areas of expertise include image processing and computer vision, machine learning, medical image analysis, health informatics, and text mining. The proposed project represents Zhou’s continuous research on cardiac resynchronization therapy for patients with heart failure.

Rudy Evonich, MD, a cardiologist with the Department of Cardiology at UP Health System Marquette, is a clinical consultant.

The research funded by the Portage Health Foundation and Michigan Tech's Vice President of Research will provide the preliminary data Zhou needs to apply for a NIH grant.

# PHF Funding Leads to Federal Funding on Parkinson's Disease

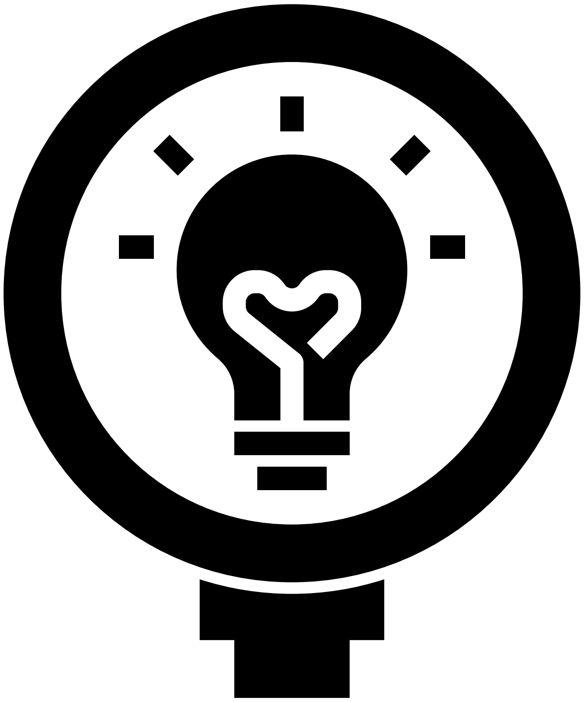
*As the most recent example of the many projects funded through the PHF Research Excellence Funding for early and mid-career faculty, the preliminary research Chunxiu Yu completed using PHF funds resulted in a $463,747 research and development grant from the National Institutes of Health.*

# HEALTH EDUCATION

# BUILDING THE DISCOVERY MUSCLE

Kristen Brezki, Assistant Professor in the College of Forest Resources and Environmental Science, played a critical role in establishing the COVID-19 Lab. Her background is in wildlife immuno- & epi-genetics.

And while heads might have been scratched if we had funded a forestry student through the PHF Making a Difference program, it is the work Brezki is doing in her research lab that helped to meet CLIA certification and State and Federal compliance.

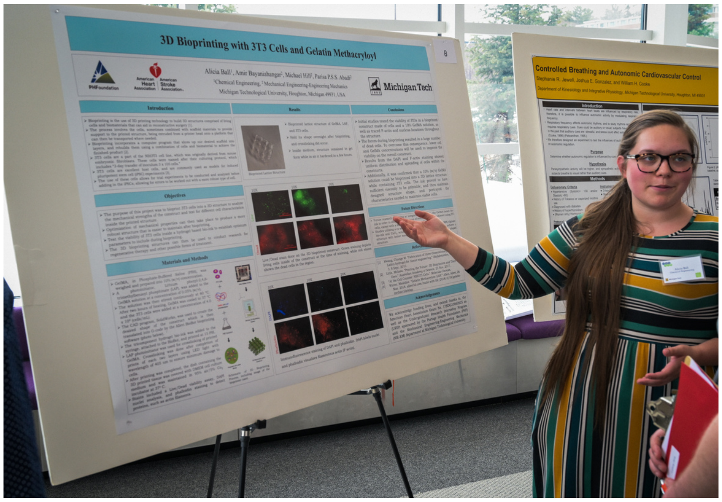


We applaud the Foundation's understanding that a PHF Making a Difference scholar is not defined by choice of major. Rather it is how applicants articulated translating the skills they will learn across disciplines into a specific pathway toward addressing a social determinant of health. Along with merit and financial need, we looked to award scholarships to students who demonstrated: a health-related passion, a drive to succeed, leadership skills that would help other scholars rise to their full potential, and the commitment to "make a difference" and "pay it forward". Michigan Tech is positioned with faculty talent and passion that fuels hands-on education aimed at developing students' discovery muscle, setting them on a pathway to social mobility. Portage Health Foundation support helps to make those opportunities possible.

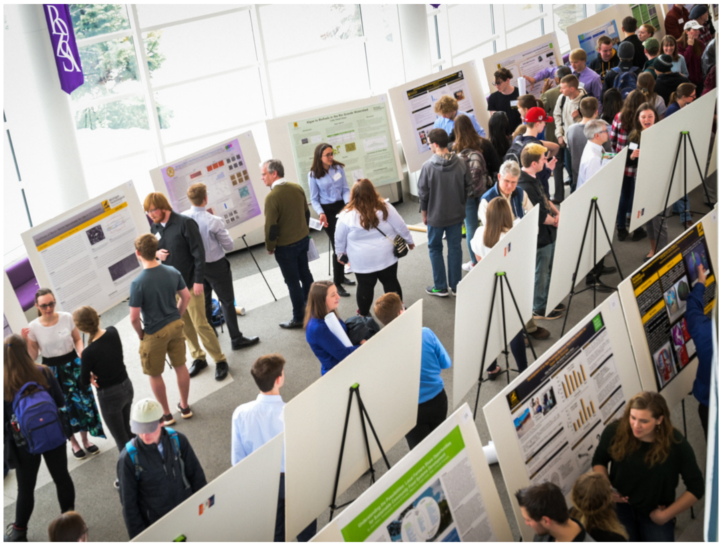
## Thank You Portage Health Foundation for Making Discovery Possible!

The following pages spotlight the discovery process behind the PHF Undergraduate Research Internship Program. Each student presents their research report and poster at a spring symposium in the Rozsa Center. This past spring symposium was cancelled due to the pandemic. This Community Report provides the space to celebrate their hard work during the year. A huge thank you for the time so many of you have taken to participate in past symposiums! The confidence you help build lasts scholars a lifetime.

# UNDERGRADUATE RESEARCH INTERNSHIP PROGRAM (URIP)




Alicia Ball, PHF URIP recipient, talking about 3D bioprinting



**The Portage Health Foundation** undergraduate research interns, showcased in the following pages, have worked alongside Michigan Tech faculty and graduate students to explore, discover, and create new knowledge.

They've spent long hours in the lab or out in the field designing experiments, gathering data, creating new models, and testing hypotheses. They've applied their classroom knowledge in new and sometimes unexpected ways, and developed new skills that will propel them forward in their careers.

Each student was mentored by a faculty member who took great care to guide them through the trials, errors, and successes of research. Through the process, they've built strong relationships that will last a lifetime.

Among the many things we've all come to appreciate this year is the importance of researchers, ideators, analysts, and problem solvers.

HTTPS://WWW.MTU.EDU/HONORS/RESEARCH/URIP/

## In their words:

The following pages spotlight the discovery process behind the PHF Undergraduate Research Internship Program, as explained by PHF recipients—in their own words.

PSYCHOLOGY

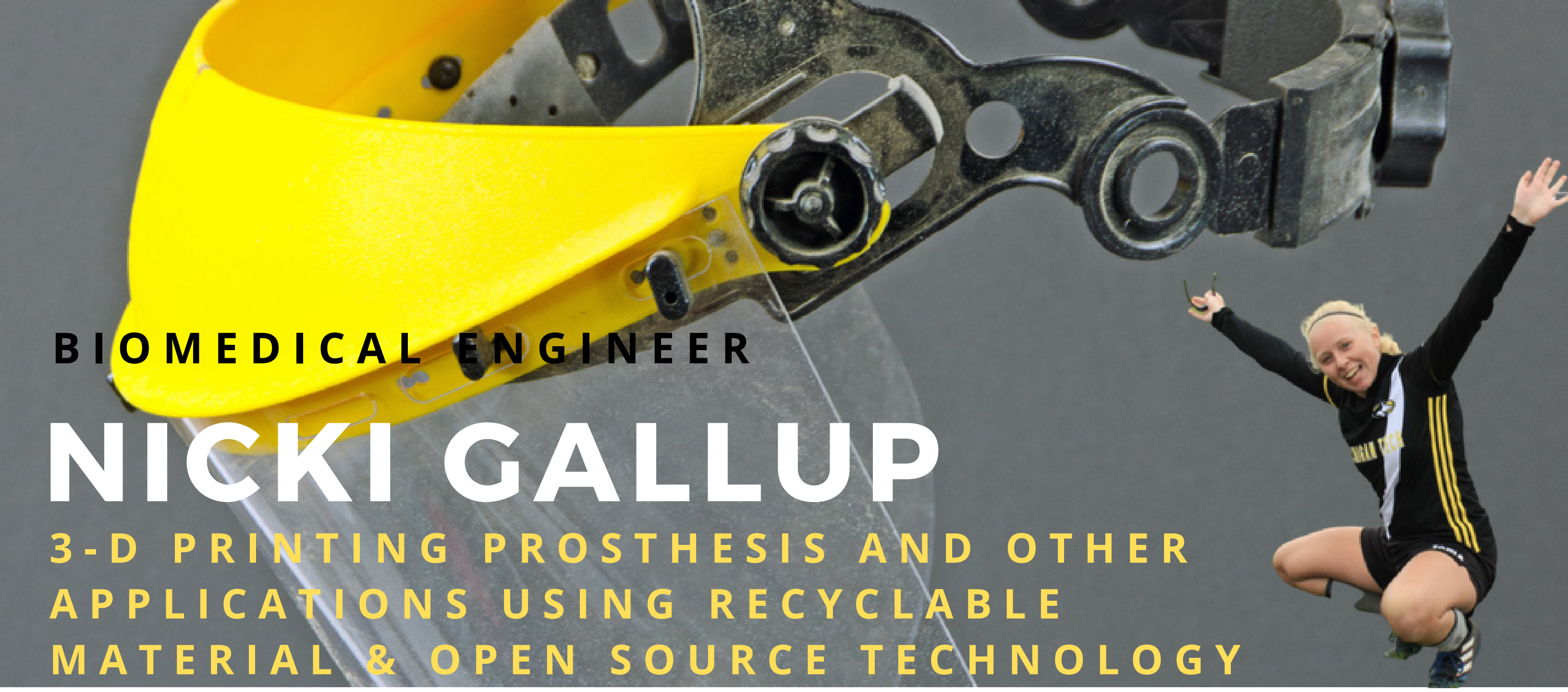
# HANNAH KARINIEMI

## SELF-REGULATION, SELF-COMPASSION AND GRIT IN HIGHER EDUCATION

**Introduction:** Self-regulated learners (SRLs) take control of and evaluate progression in their own learning. SRL factors have been used to understand academic success. The concept of grit, or perseverance for long term goals, has been linked to long-term academic success. A new concept recently brought into academics from therapeutic practice is self-compassion (SC), or how one treats themselves when facing hardships. The three positive factors of SC are: self-kindness, mindfulness, and common humanity. This study examined the role of SRL in understanding SC, grit, and GPA in students along with student satisfaction and confidence in their major.

**Materials and Methods:** Subjects were solicited from a Michigan Technological University through the Sona Systems psychology subject pool. Participation was anonymous. Data was collected online via Survey Monkey. The scales used included: The Motivated Strategies for Learning Questionnaire (MSLQ; Pintrich & DeGroot 1990), the Self-Compassion scale (Neff, 2003), and the 12-Item Grit scale (Duckworth, 2007). Upon completion, 173 respondents participated. Two-thirds of the participants were lower classmen, the remaining were upperclassmen. The respondents were largely male (63.9%) and Caucasian (86.9%).

**Results and Discussion:** Interactions and main effects of gender were examined prior to further analyses. No significant differences were found based upon gender. A median split score using the total MSLQ score was used to create two groups: one high in SRL and one low. Using independent sample t-tests, significant differences were found in overall GPA, major GPA, grit, the self-compassion scores of mindfulness and self-kindness, confidence in completing major, and major satisfaction. Those who scored high in SRL also scored significantly higher in grit, mindfulness, and self-kindness; had higher GPAs, and were more satisfied and confident in completing their major. These findings indicate that students who can self-regulate may perform better academically, be more confident in themselves, and have better abilities to withstand hardships. In the future, understanding how SC and grit vary across degree progression and curriculum type may be beneficial to understanding student self-views and degree completion rates. An intervention study to teach students how to be more self-regulatory and the importance of showing themselves self-compassion may also aid students through increased retention and success.



BIOMEDICAL ENGINEER

# NICKI GALLUP

## 3-D PRINTING PROSTHESIS AND OTHER APPLICATIONS USING RECYCLABLE MATERIAL & OPEN SOURCE TECHNOLOGY

**Introduction:** With technology, such as 3D-printing, becoming increasingly more popular, the possibilities of what can be done are endless. The technology from the typical, factory manufactured printers have created open-source printers known as RepRap printers. These printers can bring 3-D printing to a new level. With this technology and the use of materials such as broken up windshield wipers and plastic bags, various applications can be created such as prosthesis and medical devices. This idea can lower the cost dramatically of medical applications, be implemented in underdeveloped countries, and decrease the amount of litter that has piled up throughout the years.

**Materials and Methods:** Windshield wiper pellets were inserted through a device known as the Recyclebot to create a roll of filament that would be able to run through a Lulzbot Taz 6 3D-printer as if it was brand name filament. The temperature on the printer started at 240°C and was increased to 290°C. After testing this process, varying sizes of windshield wiper pellets were inserted into an injection molding de- vice that was created from students in the Michigan Tech Open Sustainability Technology Lab. The injection molder was set to a constant temperature of 270°C using an Inkbird temperature controller. The pellets were then melted and injected into two molds that were created using open-source software, such as OpenSCAD, Blender, and the Lulzbot Cura slicer. These molds represented fingertips for a prosthetic hand and the hammer portion of a reflex hammer that is commonly used during physical examinations. The rest of the prosthetic hand was 3D-printed using a Lulzbot Taz 6 and PETG filament, along with the holder for the hammer. The windshield wiper fingertips were then epoxied onto the PETG hand. Regarding the reflux hammer, the hammer portion easily slid into the holder to complete a functional device.

**Results and Discussion:** The windshield wiper filament did not function properly through the Lulzbot printer due to the varying diameter of the filament. The pellets also contained different material properties due to the composition of windshield wipers. This made it difficult to print at a specific temperature since some portions of the filament melted at higher temperatures when compared to other sections. The injection molding process worked significantly better in regard to results. This process shows that windshield wiper material can be injection molded at a constant temperature of 270°C to create functional applications.

******Note that the research Nicki did alongside Dr. Joshua Pearce played an important role in the 3-D printing of COVID-19 face shields, testing swabs, and ventilator & air filtration parts.***

BIOCHEMISTRY

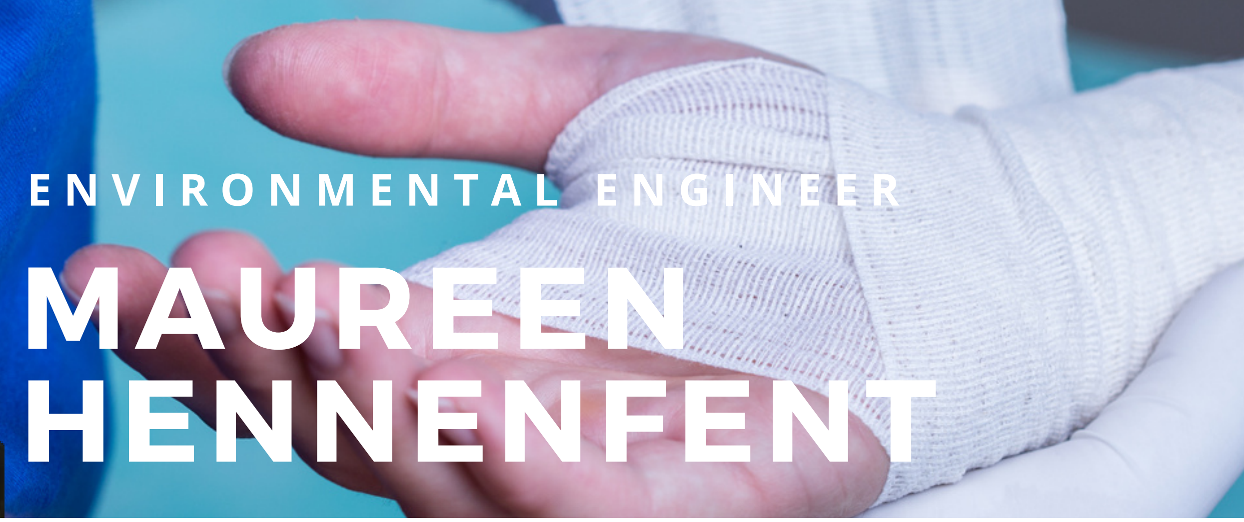
# MICHAEL HROMADA

## CHARACTERIZATION OF A NEW BIOACTIVE COMPOUNDWITH THERAPEUTIC POTENTIAL

**Introduction:** Throughout history, numerous plant-derived compounds have been used for drug discovery and development. On occasion, these compounds may be directly used as drugs, or as lead compounds that could be modified into active drug molecules. These natural therapeutics have major contributions to many disease therapies and treatments, such as chemotherapy, pain management, malaria treatment, and cardiovascular disease treatment. In cases such as chemotherapy, some drugs, called cytotoxic agents, are capable of killing undesirable cells. While searching for bioactive compounds or potential drug leads, our lab has discovered a novel cell lytic and agglutinating compound termed as Hemolysin X (HelyX)..

**Materials and Methods:** HelyX was extracted in an organic solvent system and resuspended in aqueous buffer. The extracted crude was purified through size exclusion chromatography, and its hemolytic activity was monitored through the use of rabbit erythrocytes. Following size exclusion chromatography, the optical density of each fraction was monitored using UV-VIS spectroscopy at an absorbance of 214 nm. To ensure the isolated compound was HelyX, ligand binding assays were completed with predetermined ligands and compared to preliminary results. The molecular mechanisms of cell disruption by HelyX were explored and visualized through Field Emission-Scanning Electron Microscopy (FE-SEM) and Atomic Force Microscopy (AFM), where HelyX treated cell surface structures were analyzed.

**Results and Discussion:** HelyX has previously been extracted in aqueous solution, however, its isolation in an organic solvent system has yet to be fully elucidated. One particular fraction of HelyX from the organic solvent extracts showed an intriguing feature. When purified by size exclusion chromatography, this fraction lost its lytic activity, but it started agglutinating (clumping together) rabbit erythrocytes. The reason for this transition is currently under investigation. The agglutinating fraction of HelyX demonstrated significant ligand recognition to various lipids and glycoproteins, naturally found on or in the membrane of mammalian cells. We believe that binding of HelyX to such membrane glycoproteins and lipids initiates a process of systematic disruption of the cell membrane. Microscopic analysis of HelyX treated RBCs supports this view. Through the use of FE-SEM and AFM, we are able to visualize the pore formation and agglutination of HelyX. Considering its robust and specific cytotoxic properties, HelyX has the potential to become a valuable tool for clinical research.



ENVIRONMENTAL ENGINEER

# MAUREEN HENNENFENT

## EVALUATING ANTIMICROBIAL AND WOUND HEALING PROPERTIES OF A HYDROGEN PEROXIDE MICROGEL

**Introduction:** Battlefield injures can become easily infected and lead to sepsis. Currently, the most common topical antimicrobial, silver, does not directly induce wound healing and can exhibit cytotoxicity. There is a need for a safe, portable treatment that is actively antimicrobial and wound healing in character. Hydrogen peroxide is being considered as a topical wound healing agent due to its antimicrobial and wound healing properties. However, a means to deliver hydrogen peroxide on demand does not exist. The aim of this work is to develop a dry catechol containing microgel that releases controlled amounts of hydrogen peroxide during wound healing.

**Materials and Methods:** First to evaluate hydrogen peroxide ($H_2O_2$) stability in culture, a stock 0.03% $H_2O_2$ solution was serially diluted and added to standard culture media composed of DMEM, 0.5% Pen Strep and 10% Fetal Bovine Serum. The rate of $H_2O_2$ decomposition was determined using a colorimetric FOX assay at incubation times of 15 minutes, 1 hour, 6 hours and 24 hours in culture media with PBS used as a standard. $H_2O_2$ releasing microgels were generated by copolymerizing catechol with N-dimethylacrylamide and N- hydroxyethyl acrylamide monomers using emulsion polymerization and methylene bisacrylamide as a cross-linker. Microgels were sterilized and cultured with dermal fibroblasts using a transwell culture system. Cell viability and proliferation behavior were evaluated using standard live/dead fluorescence imaging

**Results and Discussion:** Preliminary testing confirmed that passive and active degradation of $H_2O_2$ occurs in culture. Passive degradation was a result of media components while active degradation was likely caused by catalase produced by cells to control reactive oxygen species. Catalase converts $H_2O_2$ to water and oxygen. In addition, the transwell model was developed and used to expose cells to $H_2O_2$ produced by microgel over a 24-hour period. Cells were exposed to 0, 5, 7.5, and 10mg of 0.02% microgel. While the cell viability was not affected by different dosages of microgel, cell density was significantly lower when exposed to the highest dose (10mg) for 24 hours. These results set an upper limit for microgel dosing. Ongoing experiments include a scratch wound model to characterize the viability, proliferation, and migration of cells exposed to $H_2O_2$, along with assessing the effect of $H_2O_2$ on VEGF and Prdx6 ex- pression to determine the microgel ability to enhance angiogenesis and cytoprotection against oxidative damage. In addition, the antimicrobial effects of continuous released $H_2O_2$ and the release profiles able to prevent attachment of gram-negative and gram- positive bacteria are being determined.

CHEMICAL ENGINEER

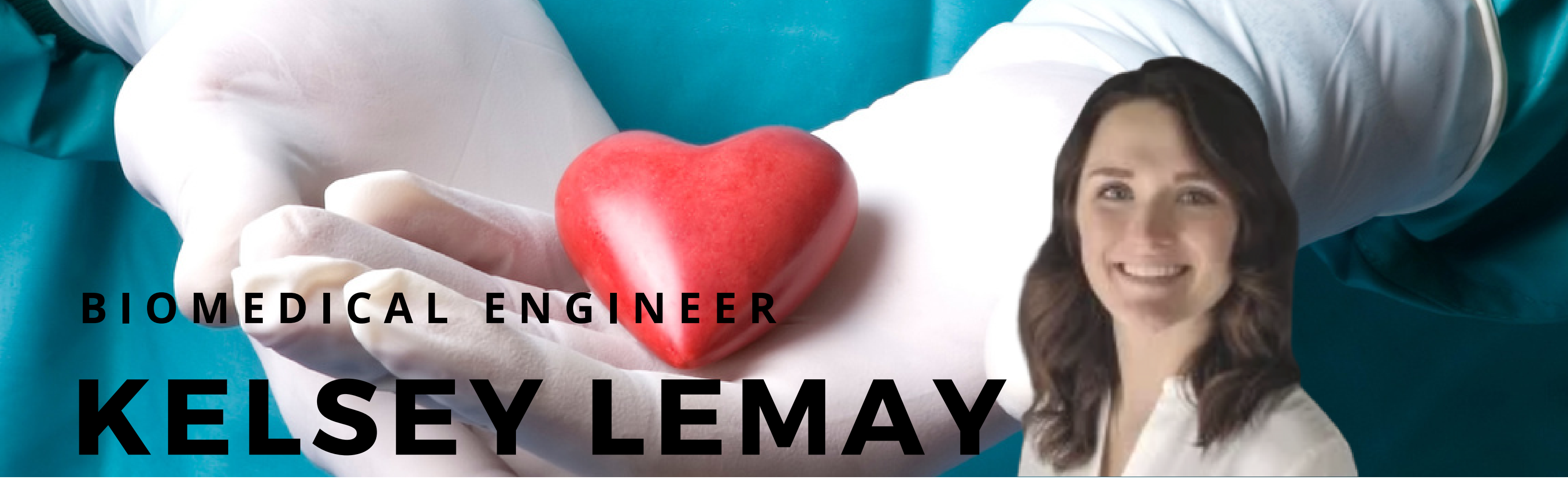
# JACOB LEBARRE

## PURIFICATION OF VIRUSES USING ANION EXCHANGE MEMBRANE CHROMATOGRAPHY

**Introduction:** There is a constant constraint on the supply of available vaccines. Companies are exiting the market due to multifactorial production issues leaving countries without access to vaccinations for months. Vaccine manufacturer's ability to make pure and potent vaccines depend directly on the capability to purify viruses with a high yield. Currently, chromatography is the most commonly used method of purification because of its versatility. Improved methods of purification are needed to bring new vaccines and gene therapy vectors to address the demand-supply discrepancies.

**Materials and Methods:** 3M Emphaze anion exchange (AEX) Hybrid Purifier were a kind gift from 3M (Saint Paul, MN) and the objective was to test the purification efficiency of viruses and develop a purification process. Multiple strategies were employed for different viruses to develop the process. The pH of system was varied around the isoelectric point of the virus to control the surface charge of the virus. AEX allows the negatively charged viruses to bind to the positively charged quaternary ammonium salt functionalized. An increasing stepwise salt gradient was used to elute the contaminant proteins and virus particles off the chromatography surface. The negatively charged salt anions will competitively bind to the chromatography surface, forcing the virus particles to elute out of the column. Three different viruses, the enveloped herpes simplex-1 (HSV1), and pseudorabies (SuHV) viruses, and the non-enveloped porcine parvovirus (PPV), were tested to determine the versatility of the purification method. Recovery was determined by measuring the infectious virus titer. The Bradford assay was used to quantify contaminant protein removal, along with an SDS-PAGE to visually confirm the separation of proteins.

**Results and Discussion:** A chromatogram was generated to display the elution of virus from the AEX filter as a function of salt concentration. More than 99% of the contaminant proteins were removed from all the model viruses used in the study. Using the chromatogram, the process can be optimized by reducing the number of elution steps, thus decreasing cycle time. Further development of this method will be to increase the recovery of the viruses by using elution gradients that vary in salt concentration and pH simultaneously.

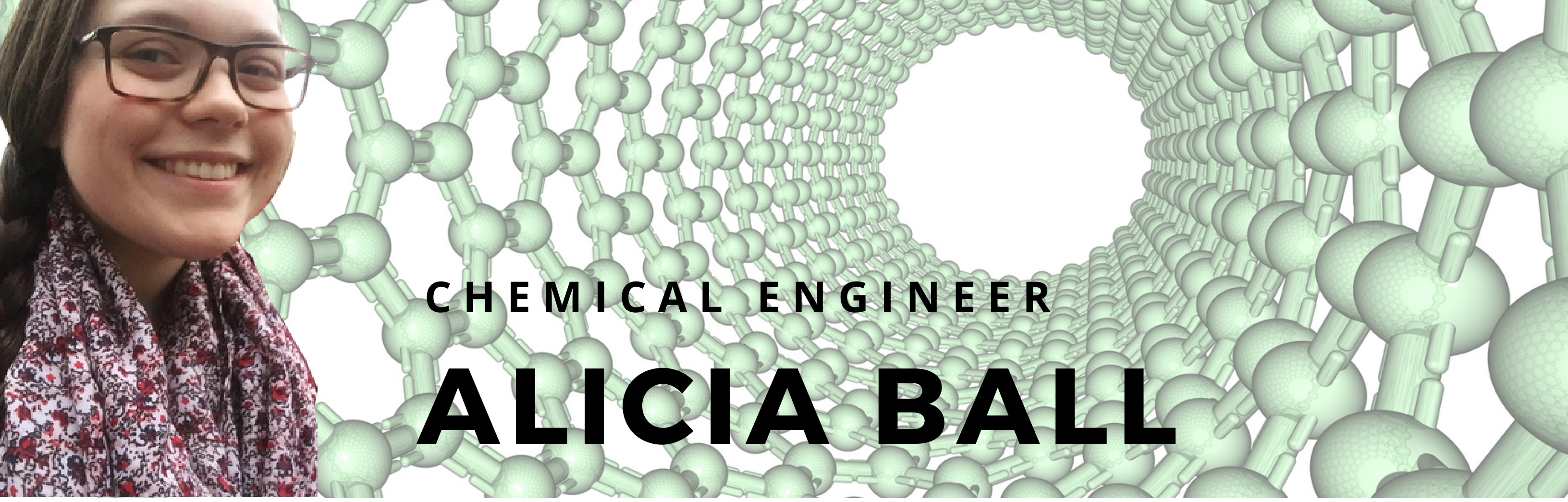



# PROCESSING OF PORCINE INTERNAL MAMMARY ARTERIES FOR HUMAN BYPASS GRAFT APPLICATIONS

**Introduction:** This project aims to create a human compatible bypass graft from the porcine internal mammary artery through selective decollagenization and decellularization of the artery. This processed native graft offers an alternative to using a patient's endogenous saphenous vein or internal mammary artery. Decellularization minimizes the negative immune response from the foreign graft and increases the shelf life. Through selective decollagenization and removal of the basal lamina, the internal arterial surface gains optimal blood contacting characteristics by exposing a pure elastic lamina to blood flow, yet without impairing the mechanical proper- ties provided by collagens present in the medial and adventitial layers

**Materials and Methods:** This ongoing research focuses on the first step of artery processing, decollagenization. Luminal surface collagens are removed from the artery with 70% glycolic acid gel without dissolving collagen from the medial layer, thus maintaining the structural and mechanical integrity of the artery. For treatment, the porcine arteries were held vertical, with the bottom end sutured or clipped closed. The room-temperature 70% glycolic acid gel was pipetted into the top opening of the arteries, which were then kept at room temperature. Each artery was closely monitored and any depletion of the gel was promptly replaced. At the specified treatment end point, the gel was removed, the arteries were rinsed with deionized water and snap frozen with liquid nitrogen. Samples were cross sectioned with a cryo-microtome at a thickness of 8µm and placed on microscope slides. Histological samples were stained with Verhoeff–Van Gieson (VVG) and Anti-Laminin antibody to identify laminin, elastin, and collagen within the vascular layers. Each sample was imaged with a light microscope to determine the effects of acid gel processing on the surface collagens and structural integrity of the artery. Quantitative assessment of collagen coverage was conducted with Olympus CellSens software

**Results and Discussion:** The optimal time for acid gel treatment was determined to be 20 hours. The process was found to selectively deplete surface collagens and laminins while the medial wall retained its compact layering and collagen. With this processing strategy, a natural shelf-stable vascular graft will be created with optimal mechanical and suturing properties to serve as a replacement blood vessel in urgent cases.



CHEMICAL ENGINEER

# ALICIA BALL

## NIH/3T3 FIBROBLAST GROWTH ON CARBON NANOTUBE FORESTS

**Introduction:** Carbon Nanotube (CNT) Forests are strands of pure carbon, held together by van der Waals forces. Because of their structure and electrical conductivity, they prove to be useful scaffolds for tissue engineering. The scaffolds could be used in various applications including biorobotics and in-vitro models for drug testing. Our research focuses on the growth of 3T3 Fibroblasts into the 3D structure of CNT forests. We investigate the viability, adhesion, and spreading of the cells on the scaffolds. The results show the promise of using CNT forests as conductive scaffolds for tissue engineering.

**Materials and Methods:** NIH/3T3 Fibroblasts are a continuous cell line, which originated from embryonic. fibroblast cells. The nature of the cells leads to rapid proliferation and proves to be useful for cytotoxicity studies. Our process included passaging the fibroblasts, and seeding them onto CNT scaffolds, glass coverslips, and polystyrene well plates. The scaffolds were coated with 1% (w/v) Gelatin, which allowed the cells to attach more readily to the materials. After seeding, various tests were conducted on the samples to investigate growth rate, viability, spreading, and the levels of gene expression related to adhesion.

**Results and Discussion:** Initial testing included making the gel coating for the CNT forests. Two types of gels were tested, Gelatin and Gelatin-Methacryloyl (GelMA). No significant difference between the two coatings was detected. Hence, 1% gelatin was chosen for the rest of the experiments. Different concentrations were also evaluated, and 1% Gelatin was selected to carry out the experiments. Live/Dead stain- ing was conducted, and showed high viability on all samples at a variety of time points. F-Actin staining was also done to show the cytoskeleton of the cells, followed by a DAPI stain to show cell nuclei. These images showed the cells and their attachment to the CNT forests and spreading over the structures, which supported our prior viability assays. Further testing and results are currently scheduled, including scanning electron microscopy and gene expression studies.

EXERCISE SCIENCE

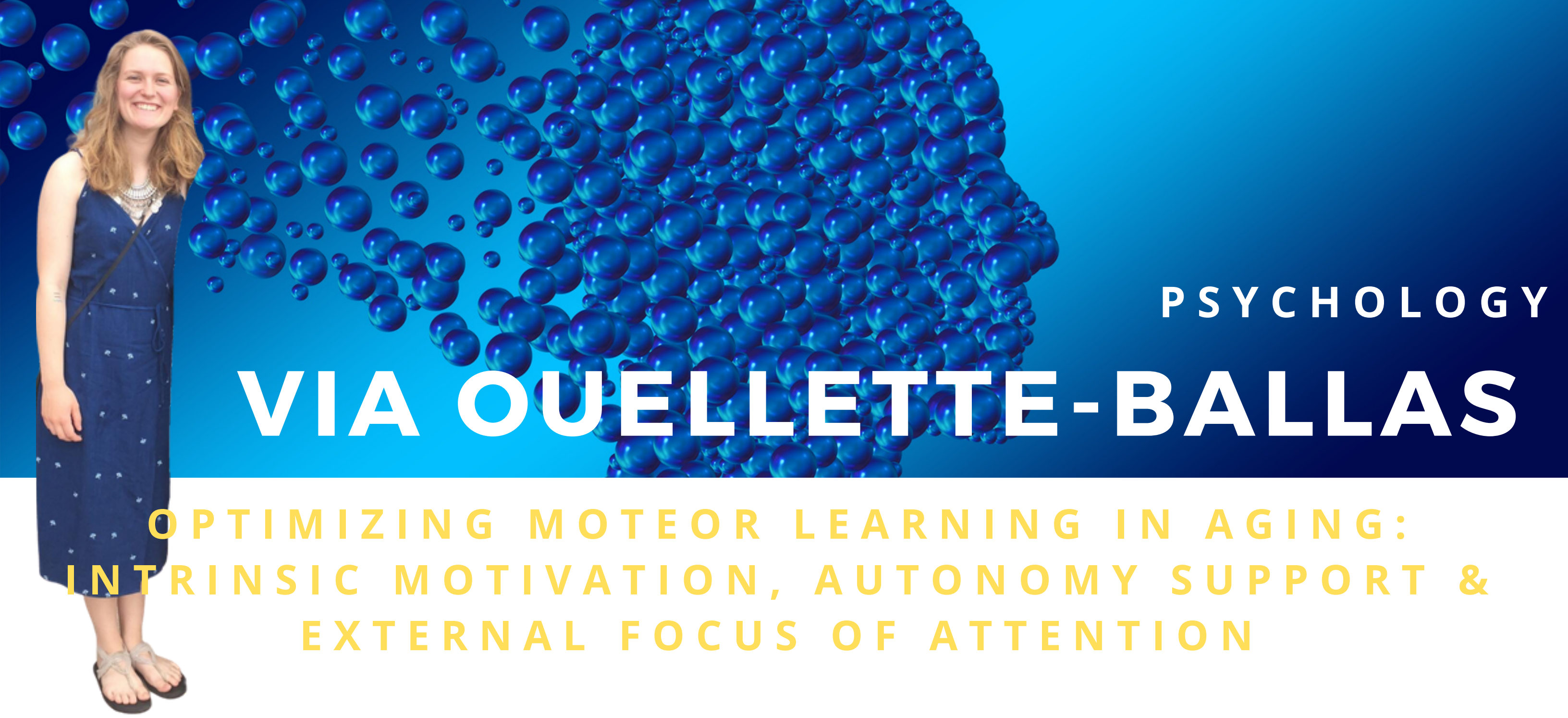
# ADISON COOK

## BALANCE RECOVERY TO SIMULATED OPTIC CHANGES

**Introduction:** Falls are a leading cause of fatal injury in our society. Visual, vestibular and somatosensory information has been proven to assist in maintaining balance by providing information about body movement and relative position, however little is known about how the absence of one of these systems can limit the body from successfully preventing a fall when faced with a balance destabilizing event. The purpose of this study examined how individuals are able to recover their balance in situations with limited visual inputs due to decreased lighting.

**Materials and Methods:** Five healthy, young individuals (mean age 21.2± 0.84 years, height 1.71± 0.08 meters, mass 75.74 ± 8.53 kg) with no experience in balance recovery studies were recruited for this study. Participants performed a series of lean-and-release trials in three different lighting conditions: normal lighting, a nightlight, and complete darkness. During these trials, participants leaned forward in a har- ness that was tethered to the wall. While leaning forward the tether was released causing the person to stumble forward. The lean angle during each condition was increased in 2-degree increments until the participant could not successfully recover their balance. During all trials, three-dimensional kinematics and lower muscle activations (tibialis anterior, medial gastrocnemius, rectus femoris, and biceps femoris) were collected. The maximum lean angle and stepping temporal-spatial parameters (step length, step width, and stepping time and velocity) were recorded as well.

**Results and Discussion:** Temporal spatial parameters and maximum lean angle of release did not differ between conditions. The unchanged stepping mechanics across all conditions suggests that young, healthy individuals have the ability to reweight input from the vestibular and somatosensory systems to execute similar compensatory stepping responses when visual input is reduced. Researchers are unsure of how the aging process, sensory limitations, or unfamiliar environments may yield conflicting results. Future projects following the completion of this study look to answer many unknowns in the balance recovery field and how the visual, vestibular, and somatosensory systems play a role.



PSYCHOLOGY

# VIA OUELLETTE-BALLAS

## OPTIMIZING MOTEOR LEARNING IN AGING: INTRINSIC MOTIVATION, AUTONOMY SUPPORT & EXTERNAL FOCUS OF ATTENTION

**Introduction:** Our aim is to apply proven motivational and attentional factors as short-term interventions to facilitate motor learning and performance among older adults. To date, motivational techniques like enhanced expectancies, external focus of attention, and autonomy support have been used to improve learning and performance only among younger adults. The effectiveness of this technique has not been verified in sensorimotor adaptation tasks, despite the fact that they are a gold standard for studying motor learning. In addition, to date this technique has been tested only in healthy younger adults and it is unknown whether these effects are generalizable to other age groups or clinical populations. The first goal of this project is to establish whether this intervention works for improving learning in a sensorimotor adaptation task in younger adults. The second goal is to establish whether older adults are differentially affected by the intervention. If validated, this technique offers a quick and easy intervention to improve motor learning across a broad age group. This research will pave way for a novel, effective yet simple method to enhance learning and performance across various fields including rehabilitation, training, education, sports across age groups.

**Materials and Methods:** We recruited 36 younger adults between ages of 18-25 and plan to recruit an additional 4 younger adults and 40 older adults between the ages of 65-80. Each group will be randomly subdivided into optimized (experimental) and non-optimized (control) groups with a goal of 20 participants in each group. All 4 groups will be given a visuomotor rotation task in which participants reach towards visual targets using a robotic device with a cursor representing their hand position during the reach.

**Results and Discussion:** This is a first of its kind study that will examine effectiveness and applicability of these techniques in older adults. In this study, our first step is to assess if this technique enhances sensorimotor adaptation in younger adults. We recruited 36 younger adults between ages of 18-25 and plan to test 40 older adults ages 65-80 to test the hypothesis that this intervention would boost sensorimotor adaptation compared to the control group. Their performance will also be compared between groups to see if there was an effect on learning. The overarching goal is then to compare the younger adults and older adults to see if this intervention differentially affects these two groups. Our hypothesis include: the optimized participants in both age groups will learn a visuomotor rotation task (VMR) better than their non-optimized counterparts; the comparative level of improvement displayed by optimized older adults will be equivalent to the optimized younger adult group; the optimized group will be less susceptible to proactive interference when learning an alternate form of the VMR task. We will also study whether the extent to which older adults benefit from the optimization procedures for motor learning is related to a number of other cognitive variables including, memory processes (implicit and explicit), cognitive flexibility, emotion regulation, emotional management ability, intrinsic and extrinsic achievement motivation, and personality.

BIOMEDICAL ENGINEERING

# MAX REAUME

## CATECHOL-CONTAINING MICROGEL

**Introduction:** Contaminants such as organic dyes, heavy metal ions, and antibiotics present in industrial wastewater are hazardous to human health. Additionally, the presence of organic compounds from agricultural waste cause the growth of bacteria and other microorganisms. Wastewater may be treated with reactive oxygen species (ROS). ROS include oxygen free radicals that are highly reactive, which allows them to degrade organic compounds and microorganisms into benign degradation products. In this research, a dopamine methacrylamide (DMA) microgel containing catechol was developed that releases ROS via a metal-catechol interaction with iron magnetic nanoparticles (FeMNP).

**Materials and Methods:** Dye Degradation - 2.5-10 mg of FeMNP and 25 mg of microgel were incubated in different dye solutions containing Alizarin Red S, Rhodamine B, Crystal Violet, or Malachite Green for up to 24 hours. At different time points for the duration of incubation, the solution was diluted and examined using UV-vis spectroscopy to determine residual dye

concentration. Antibiotic Degradation – 5 mg of FeMNP and 25 mg of microgel were incubated in a solution with up to 0.45 mM of an antibiotic drug ciprofloxacin. The concentration of ciprofloxacin after incubation was determined with UV-vis spectroscopy. Metal Ion Removal – 25 mg of microgel was incubated for 24 hours in a solution with 1 mL of a 5-40 mM solution of metal ions made by dissolving metallic salts. After 24 hours, microgels were collected, dried, and tested with inductively coupled plasma optical emission spectrometry to determine ion concentration in solution. Antibacterial Properties – 10 mg of sterilized 40 mol % microgel and 2 mg FeMNP were incubated with 500 mL of S. aureus and E. coli at 37° C for 4,8 or 24 hours, streaked onto agar plates, incubated for 24 more hours. A live/dead stain was used and examined under fluorescence microscope.

**Results and Discussion:** Organic Compound Degradation – When combined with FeMNP, DMA-containing microgels degraded and reduced the concentra- tion of organic dyes, especially Rhodamine B. A 40 mol % DMA microgel and FeMNP successfully degraded >99% of Rhodamine B for concentrations up to 3 mM over 24 hours, and over a wide range of pH. The DMA-containing microgels were also capable of removing an antibiotic drug, ciprofloxacin (CIP). For an initial concentration ≤ 0.23 mM, 40 mol % DMA microgel successfully de- graded 99% of CIP. Metal Ion Removal – The DMA-containing microgel removed heavy metal ions from solution and used the metal ions to generate ROS. When 40 mol % microgel was incubated with metal ions, >85% of $Fe^{2+}$, $Ni^{2+}$, $Cu^{2+}$, and $Co^{2+}$ ions, as well as >65% $Pb^{2+}$ ions, were removed from solution. Antimicrobial Properties – 40 mol % DMA microgel killed 91-94% and 91-95% of a gram positive (S. aureus) and a gram negative (E. coli) bacteria, respectively. After 24 hours of incubation, 40 mol % DMA microgel in the presence of FeMNP killed more E. coli than when in the absence of FeMNP (99% vs. 91%).

BIOMEDICAL ENGINEERING

# SHAINA ROYER

## POLYDOPAMINE FUNCTIONALIZED SILICONE GEL SUBSTRATE FOR USAGE IN TRACTION FORCE MICROSCOPY (TFM)

**Introduction:** Traction Force Microscopy (TFM) is an assay used to determine the mechanical force exerted by cells. The force reconstruction is based on quantifying the deformation of a soft gel by tracking fluorescent beads attached to the gel surface. Bead coating on the gel is typically done by amine-silanizing surface so that carboxylated beads can form covalent bond with the surface. This silane coating, via vapor phase deposition, is time consuming and has shown spatially irregular bead distribution. Here, as an alternative method, we investigated possibility of using Polydopamine which has emerged as versatile coating method for many kinds of material.

**Materials and Methods:** A variety of different variations of the base protocol were assessed for bead coating on the silicone gel. The silicone gel was pre- pared by mixing base and crosslinker together, spin coating on a glass coverslip and being cured in an oven at 100°C for 2 hours. As a base protocol of polydopamine-based bead coating, 1 μL of fluorescent beads are added to 5 mL of 10 mM Tris-HCl, followed by sonication for 15 minutes and addition of 50 mg of dopamine, making pre-bead-dopamine mixture. Within this pre-mixture, the cured silicone gel was submerged for 10 minutes, followed by rinsing off with PBS. This base testing trials were repeated with the various amount of time of submerging, 10 minutes to 4 hours. Separate coating method: the gel was submerged in the dopamine solution (without beads) for 4 hours followed by rinse-off, then submerged in polydopamine-bead mixture for 10 minutes followed by rinse-off. In a final variation, dopamine was added to the bead solution, then whole bead-dopamine solution was sonicated before the silicone was submerged in it. The quality of bead coating was assessed by FITC (red) epifluorescence microscope imaging of AF562-coated beads.

**Results and Discussion:** Of the various protocols tried, the base protocol worked by far the best in terms of regular bead coating. However, it was still vastly inferior to the results achieved by coated with conventional silanization method, which resulted in the beads being evenly and densely attached to the gel with the occasional small clump. The base protocol resulted in scattered clumps of large beads, implying bead-to-bead attraction has exceeded bead-to-dopamine attraction. The separate coating method did not result in improvement from the base method, suggesting that bead clumping has occurred already within bead-dopamine mixture. Increasing the amount of time of submerge in the bead solution increased bead clumping on the silicone gel surface, demonstrating that bead-to- bead attraction can accumulate over time. Further, the more time of incubation of the bead-dopamine mixture solution caused the more severe clumping to the point that there would only be a handful of large clumps on the gel. These results represent that within polydopamine solution, beads are unable to overcome hydrophobic-hydrophobic interaction between themselves, which in 1-Ethyl-3-(3-dimethylaminopropyl)carbodiimide solution could be overcome via sonication. Taken together, the sticky, viscous but still water-soluble nature of polydopamine appears to make it unsuitable for bead coating in TFM application.

# MAKING A DIFFERENCE SCHOLAR SPOTLIGHT

## COREY MILLER

Corey Miller cares for elders in a local nursing home, providing an essential service to her community that's also helping to clarify her career goals.

Global pandemics do not offer silver linings or golden opportunities. But they can open the door to new possibilities — of finding ways to move forward even in the most dire of times and to be of service while doing so. For Michigan Technological University student Corey Miller, a 2019 exercise science graduate working on her accelerated master's degree in kinesiology, that means caring for elders at PortagePointe, a skilled rehabilitation facility in Hancock that offers 24-hour nursing care to 60 residents.

Miller, a certified nursing assistant (CNA), started work at PortagePointe during the 2020 spring semester and plans to continue through fall semester. It's her second stint at the facility. She worked there part-time from 2016 to 2018 while completing her undergraduate degree. Michigan Tech students on the pre-health professional track and community health care providers have a long history of working together: students get time with mentors and interaction with patients while helping to fill essential needs. Corey's CNA job underscores the multi-generational dimension of Miller's health and wellness training and outreach. In addition to working with older people, she's on staff with Michigan Tech's Student Health and Wellness, and is also working to educate both college students and teens about the dangers of vaping. She also did some work related to integrative physiology PhD candidate Joshua Gonzalez's research on the effects of vaping on healthy young adults, but feels her strengths lie in the interactive education component rather than the lab.

Work at PortagePointe during the state of Michigan's stay-home order required extra precautions. Miller took additional training to ensure proper use of personal protective equipment (PPE) and other safety measures required to prevent the spread of the novel coronavirus."The work is physically demanding, but providing my elders with the highest quality of care is worth all the running around I do," she said, adding that it's been hard for residents to not be able to have visitors inside the facility. Somebody needs to cheer them up — and that somebody is quite often Miller."I am kind of a goofball who is always smiling and dancing around the facility. Keeping an upbeat personality helps keep the elders cheerful most of the time." Corey Miller. In return, her elders have inspired new possibilities as she considers what's next after MTU.

“For a long time, I’d thought I wanted to be a medical doctor. Realizing that wasn’t what I wanted was hard,” she said. “Coming back to the nursing home and working with elders who are doing their walking programs has helped me think about a doctorate of physical therapy (DPT). My major checks all the prerequisite boxes. I just need to get more shadowing hours with a DPT.” Like many caregivers, Miller acknowledges that she tends to be a “workhorse” and is better at advocating self-care than doing it. But she makes a conscious effort. “I try to intertwine things I enjoy doing with things I need to get done for professional schools,” she said. “Working as a CNA, for example, helps me get patient care hours and experience working in health care. My vape presentation allows me to do more community outreach to meet my final requirement for my scholarship and provide education on a hot topic that this community needs.” Workouts are a favorite way to relax, including weight training, yoga, and running. “I’m currently training to run my first marathon by the end of the summer somewhere in the Keweenaw,” she said. “Just for fun, not an official race.” She also reminds people that no one is upbeat all the time, and acknowledging stress and doing something to counteract it is important. “I am not going to lie, this situation has caused me some anxiety. I am human, so I know it is OK and completely normal,” she said.

“I am naturally a glass-half-full kind of person and what helps me keep my happy attitude, especially during these hard times, is to stay on a healthy schedule of exercising, work and reaching out to my friends and family. I like to spend a lot of time connecting with nature by trail running or outdoor yoga — I spend a lot of time out at Farmers Block where my family owns 40 acres. “I have learned to focus on myself more and stay calm during hard times,” she added.

Another lesson learned since the beginning of the pandemic: do your own research and focus on the facts. “I have learned to take everything I see on the news or social media with a grain of salt,” Miller said. “There is so much misinformation out there that if you do not check where it comes from, you can get yourself anxious or worked up for no reason." When asked if there’s anything she’d like to tell returning students, Miller focused on keeping our campus united and our community healthy.

> *With all the new safety measures that are being implemented, let's all return to campus with an open mind and take every day one day at a time. If we all do our part, we can keep ourselves and the community healthy.*
>
> -Corey Miller
> Excercise science undergraduate student, and current graduate student, kinesiology

Corey is currently studying for the MCAT to apply to medical programs in June and is a part of the Up & Moving team on campus, providing workout videos to the college and local community.

**Thank you PHF for believing in me!**

# MAKING A DIFFERENCE SCHOLAR SPOTLIGHT

## BELLA NUTINI

Bella is a 2017 PHF recipient of the "Making a Difference" scholarship. This spring, Bella will be applying to a variety of Physician Assistant (PA) schools.

During her sophomore year at Michigan Tech, Bella found her passion in the educational and research opportunities that landed her on a degree path in Exercise Science. This passion infuses all that she has done as a scholar, community volunteer, campus leader, and student researcher.

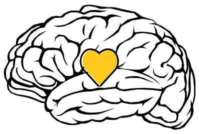
Watching Bella over the last four years, it is clear she takes great pride in promoting wellness and well-being across Michigan Tech's campus and in our local communities— she takes it seriously and with heart.

Bella has served as co-president of Michigan Tech's HOSA (Health Professional) student organization for the past two years. Through a combination of leadership and a personal desire to help others, Bella has created a successful model for mentoring new PHF scholars. This year's scholar cohort entered college under the unusual confines of social distancing and masking. Bella successfully took on the challenge of making sure each student felt supported, had meaningful experiences, and knew where to go for help and guidance.

> *I'm extremely proud of what the HOSA organization has accomplished during my time as a PHF undergraduate scholar.*
>
> *Through persistence and countless zoom meetings during the COVID-19 pandemic, we have continued to promote physical and mental health through a variety of different events.*
>
> -Bella Nutini, HOSA Co-President

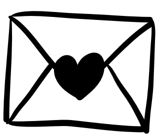
Bella and Alexa having fun while helping with research that aims to serve our local community by providing basic at-home vision testing.

# MAKING A DIFFERENCE THROUGH HOSA



**MENTAL HEALTH.** HOSA has made mental health a priority through raising awareness and promoting the services that Michigan Tech offers. Being an undergraduate student during a pandemic can be stressful. To help students remain positive throughout these challenging times, the members of HOSA came together to create a project known as **"Student Inspirational Boards"**. HOSA members collected inspirational quotes from students all over campus, and posted them on boards that were placed in the resident halls.

**FEELING A NEED.** Many students enroll at Tech unaware of just how much winter we get in the tip of the Upper Peninsula! The members of HOSA understand the importance of dressing properly to reduce the chances of becoming sick during this season. But the reality is, dressing appropriately can be expensive and a challenge for students with limited financial resources. To help with this, HOSA has created and held a winter-long event known as the **"Winter Warm Up"**. Campus community members donate winter apparel that stock the racks in a **grab-n-go closet** located in the basement of Wadsworth Hall. The closet is open to all Michigan Tech students who may be in need of a jacket or hat to keep them warm.



**Combatting COVID Quarantine Blues.** Over the course of the fall 2020 semester, many Michigan Tech students were either required to self-isolate due to a COVID-19 diagnosis or exposure. Being in quarantine can be a lonely experience and can take a toll on one's mental health. To help alleviate the challenges of the pandemic and isolation, the HOSA members created a program called the **"Wellness Pen Pal Project."** Through this project, HOSA members were paired with a Michigan Tech student who was in need of a friend to talk to during isolation, and often throughout the semester.

HOSA MEMBERS ZOOMING TO STAY CONNECTED & TO MAKE A DIFFERENCE

# MAKING A DIFFERENCE
# ATHLETIC TRAIING INTERN

## ALEXA DESTRAMPE

Quickly after Alexa enrolled at Tech, she became an athletic training intern and has served as one each year since. Alexa is a 2017 PHF recipient of the "Making a Difference" scholarship. She has gained a tremendous amount of experience from this program, and is quick to encourage other students to get involved in as much as they can. She is confident that many of the skills she has learned will benefit her as she approaches her next chapter in life. Alexa has been accepted to the Master of Occupational Therapy (MOT) program at Concordia University Wisconsin, starting in January of 2021.

## Q&A:

1

**What is your favorite memory during your time as an athletic training intern?**

As an Athletic Training (AT) intern, I've witnessed celebration, loss, and injury. Through it all, I would have to say my favorite memory was being a part of the US Cross Country Championships that were hosted by Michigan Tech this past January. The atmosphere and athletic skill that was present was simply unmatched compared to any other competition that I have witnessed.

2

**Did this experience come with any challenges? How did you learn from them?**

One of the biggest challenges that came with this position was learning to work with confidence. Knowing when you can treat an athlete and when to refer to the head AT is really important. I learned to take care of what I knew I could confidently complete and when to ask for help from the professionals. Looking at the bigger picture, I also learned to communicate with health professionals and patients.

3

**How do you think this experience at Michigan Tech differs from other universities? What sets this program apart from others?**

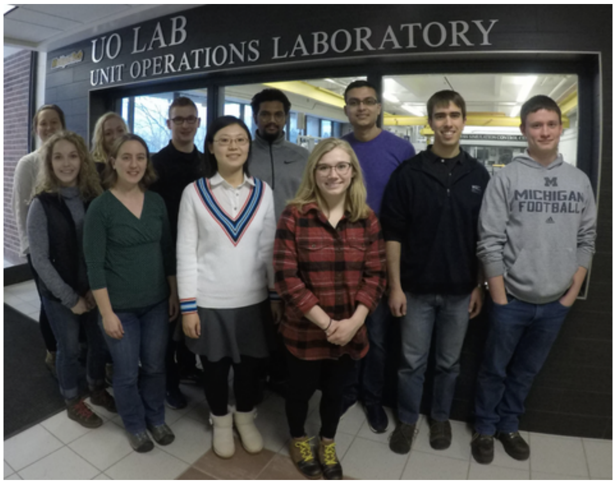
We're all in this together here in the Upper Peninsula. The Michigan Tech campus and our local community is quaint and small, which makes our athletic training program smaller compared to similar operations. I feel as if my experience in the athletic training room was more hands-on and personal than it would have been if I was in a different program.

4

**What are a few key components that you have learned from this program that you will apply to your future career?**

This program has helped guide me into a position where I feel prepared to take on the next step of becoming an occupational therapist. A few key components that have grown within me while being an intern in the AT program are personal responsibility, patient advocacy, and passion for holistic well-being. These three things will be utilized daily as I move forward through my journey and eventually as a practicing clinician.

# PHF Graduate Assistantship Spotlight




As a PHF undergraduate research intern and PHF graduate assistant, Dylan, a native Houghton Gremlin, worked in Dr. Caryn Heldt's Bioseparations Laboratory for 6 years. Above is Heldt's 2018 Research Group: Front - Emily Bromley, Caryn Heldt, Xue Mi, **PHF Scholar Ellie Lucier.** Back - Christa Meingast, Clara Peterson, **PHF Scholar Dylan Turpeinen**, Pratik Joshi, Hassan Raza, Seth Kriz, Matt Weiss.

Dylan defended his dissertation and earned his degree at the end of Summer 2020. In September he married his best friend, Dr. LiLu Funkenbusch, also a Michigan Tech alumni. We are proud to share that **Dr. Turpeinen** is currently working in Thermo Fisher Scientific's Viral Vector Services sector as a quality control scientist. He stayed in the health-adjacent field to help viral vector products that cure rare genetic diseases through quality control and cGMP regulations as a scientist at Thermo Fisher Scientific.

# Dylan Turpeinen

*I am extremely grateful to have received a PHF Graduate Assistantship for the Summer 2020 semester. With the assistantship, I had the financial support necessary to publish my virus purification work and complete my dissertation.*

*I have thoroughly enjoyed working with a diverse group of incredible people. During my time at Michigan Tech, my research focused on the detection of biomolecules with rapid biosensors and the purification of biomolecules. My main project was developing a continuous virus purification process for use in vaccine manufacturing.*

*With an ever-increasing need for life-saving vaccines and manufacturing of those vaccines, my career work has the potential to have a real impact on the lives of many people.*

- Dylan Turpeinen, PhD
Chemical Engineering, 2020

# Thank you PHF for belieiving in me!