MACALESTER

Medical Marvels

Innovation scholars from left to right: Sam Palmer, Kaleb Getu Gezahegn, Hanna Guo, August Miller

September 15 2021

By Alexandra McLaughlin '16

Fatigue. Hair loss. Nausea. Anyone who has counted out pills for a long-term illness or sat under the fluorescent lights of an oncology ward knows that drugs meant to treat a disease can cause terrible side effects.

"The obvious thing would be chemo," says **Sam Palmer '23** (Crystal Lake, Ill.). "Chemo has really bad side effects because it causes the death of other cells."

But what if you could deliver drugs in a new way? Localize the drugs to the lungs instead of spreading them throughout the body?

This could reduce side effects from systemic exposure, and it could be a game changer. Debilitating side effects force patients to reduce their drug dosage or even stop treatment. Preventing side effects could help patients handle increased doses and attain better treatment outcomes. This could transform the standard of care for many different conditions.

This summer, Palmer and three other Mac students spent seven weeks digging into that dream. As part of the Innovation Partners program, they paired up with Isola Therapeutics, an early stage biomedical company in the Twin Cities. Isola is developing a novel method to deliver drugs, targeting lung diseases in particular. Because of the proprietary nature of this discovery, the details of the technology are protected by a non-disclosure agreement, which everyone involved must sign.

The students were tasked with locating drugs and diseases that would be good candidates for Isola's technology. They combed through hundreds of pages of research, examining clinical trials and drug side effects. Over 50 lung diseases were considered. Potential drugs must fit the technical requirements of the delivery system and make sense from a market standpoint. There were numerous considerations—*Is the drug FDA approved? When does the patent expire? What are the drug's side effects? What is the incidence and prevalence of a condition?*

"We're looking for diseases with a lot of patients, or diseases with patients who aren't receiving adequate treatment," says neuroscience major **August Miller '23** (New York). "We're trying to find any sign of dose reductions to make sure there is an opportunity for Isola to do something that no other current treatment method could."

Mayo Clinic roots

> **"The team got to know a CEO."**
> **—Lorna Untiedt**
> **Project Manager at 3M**

Innovation Partners grew out of 14 years of history with the Mayo Innovation Scholars Program (MISP). In MISP, multidisciplinary teams of undergraduate students from Minnesota private colleges and universities work alongside an MBA student team leader to evaluate the potential of inventions—from new drugs to surgical tools to wellness apps—in development at the world-renowned Mayo Clinic.

When COVID-19 hit, Mayo Clinic paused MISP to focus on the pandemic. That's when Innovation Partners was born.

Funded by Medtronic Foundation, Richard M. Schulze Family Foundation, and Mayo Clinic, with support from the Minnesota Private College Council, Innovation Partners matches teams of students with early stage biomedical companies in the Twin Cities. Other projects this year involve stem cell research, organ transplantation, and ventilators. The companies are eager to collaborate with young minds.

"Companies benefit so much from fresh eyes looking at their ideas and saying, 'What if you tried this population or that application or this drug?'" says Macalester biology professor Liz Jansen, who coordinates Innovation Partners and is the academic program director of MISP.

Working remotely and across time zones, the Macalester students met twice a week with their team leader, Lorna Untiedt, an MBA student at the University of St. Thomas and Project Manager at 3M. The team also met with Macalester professors, Pete Ferderer (economics), Lin Aanonsen (biology), and Jansen to discuss their research and their evolving understanding of the technology and its potential market and applications. Occasionally the team met with Isola's CEO, Brian Craig, to discuss their progress and ask questions.

"The team got to know a CEO," says Untiedt. "How often do you get to meet a CEO?"

Cross-disciplinary collaboration

> **"They're learning about the economic factors that drive decision-making in an early stage company."**
> **—Liz Jansen**

Biomedical technology is just the beginning of what students learn.

"They're learning a lot about respiration and lung physiology," says Jansen. "They're also learning about entrepreneurship. They're learning about the economic factors that drive decision-making in an early stage company."

For Palmer, the experience was a reminder that in the real world, not everything is in your wheelhouse. With majors in Spanish and economics, he was prepared to investigate intellectual property rights, financial modeling, and patents, but was less familiar with the biology and

pharmacology behind the diseases and drugs. This didn't bother him.

"A lot of it comes down to pure research skills, and whether you have the ability to sift through sources and locate what you're looking for," Palmer says. "It's pretty fun to look for the available information and interpret the data."

Miller, the neuroscience major, describes the team's work style as "everyone does a bit of everything." When the work spills into unfamiliar territory, they ask each other for help.

"We're gaining a lot of new knowledge and experience we might not otherwise have if we were focused too deeply on our own personal skill sets," he says.

Bigger than a grade

> **"It feels like us students can truly do something to help the company move forward to the next stage."**
> **—Hanna Guo '22**

Though Innovation Partners counts for independent study credits in Module 5, the students were focused not on course credit, but on a more crucial goal: tackling the unmet needs of patients whose lives are at risk.

The seven-week program culminated in a 24-page report and a 45-minute presentation, followed by a question and answer session, with Isola employees, Macalester professors, and Innovation Partners staff.

"Intentionally ambiguous" is how the CEO, Brian Craig, describes the task he laid out for the students. "There was *not* a lot of structure or detail," he told the team after the final presentation. "It was up to you to define how you were going to tackle this."

Biology major **Hanna Guo '22** (Beijing, China) appreciates the ambiguity. "Unlike big, influential biochemical companies with concrete everyday goals and perhaps stressful and compact time schedules, start-ups only have a direction, but not everything planned out," she says. "It feels like us students can truly do something to help the company move forward to the next stage."

The students recommended five drugs for Isola to consider. After the presentation, Craig addressed the students: "You had very little experience in the area. And yet you dug in, you researched, you got smart on the topic, and you came up with a great recommendation. I am blown away by the quality of your work. You're producing content that will force us to think about what's next."

For Guo, this was the most rewarding moment of the experience.

"It means that our research and all the time we put in really did help Isola," says Guo.

"We should have more programs like this"

> **"We experienced and explored firsthand the considerations of a company that wants to take a product to a market."**
> **—Kaleb Getu Gezahegn '24**

"We should have more programs like this," says Untiedt, the team leader. "This team was able to complete a hardcore technical project with a lot of complex aspects to it. There is nothing like being able to put your education to work."

Before the program, the youngest team member, rising sophomore **Kaleb Getu Gezahegn '24** (Addis Ababa, Ethiopia) worried whether his success in academics would translate into a professional setting.

"During the final presentation, I was thinking about how far I came within this project," he says. "We experienced and explored firsthand the considerations of a company that wants to take a product to a market."

And along the way, they got to know a CEO, signed a non-disclosure agreement, and worked to advance the reach of a life-changing medical device.