

# Incubating a new business at Cornell

Startup Glycobia uses bacteria to produce disease-fighting drugs

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by Olivia Hall, Correspondent



*Scientist Brian Hamilton, of Ithaca, and Research Associate Alyssa Stablein, of Cortland, examine a drug product to check its purity in Glycobia's lab in the McGovern Center at Cornell University. Glycobia's potential products contain a specific sugar molecule attached to a protein that will make drugs with more predictable effects in the human body and increased shelf life.*

At a time when politicians, practitioners and insurance companies are scrounging around the health care system for ways to save money, a budding Ithaca company is gearing up to radically reduce the cost of many medications.

Scientists at biotech startup Glycobia have invented a method to manufacture glycoprotein drugs, which are used to treat a wide array of diseases, ranging from cancer to multiple sclerosis to rare genetic diseases. Through genetic engineering, the researchers are inducing *Escherichia coli* (E.coli) to produce the drugs, taking advantage of the bacterium's ability to do so quickly and cheaply.

The technique is the brainchild of Matthew DeLisa, professor of chemical and biomolecular engineering at Cornell, and his research team. DeLisa was a graduate student when he began to ponder how glycosylation — the enzymatic process that attaches certain sugars to proteins to create glycoproteins — might be transferred into bacteria.

Normally, so-called eukaryotic cells — in practice frequently originating from mammals — are used for producing this type of drug, but they are burdened by several disadvantages, including high cost, susceptibility to viral infection, and complex procedures.

“It’s only by the time I arrived at Cornell as an assistant professor that we began to know enough about glycosylation that we could actually sketch on the back of an envelope a possible pathway for doing this in bacteria,” DeLisa said. “That’s how Glycobia really started. We took that envelope and went to the lab.”

The immense potential of the resulting patents — which Glycobia licenses from Cornell — was immediately apparent.

“A major advantage of our technology is that we can combine proteins and sugars in new ways and enable drugs that no one has ever seen before,” said Adam Fisher, DeLisa’s former graduate student and the company’s chief science officer. “Plus, we have a platform for making a variety of drugs — not just one — and therefore many different opportunities for creating revenue. We thought, if this all works out, it’s going to be a really big deal.”

The National Institutes of Health and private investors agree and have supported the young business’ work financially. Chang Hong, a patent attorney, and Robert Langer, a well-known MIT scientist and entrepreneur, are contributing their expertise as members of the board of directors.

One of the first challenges Glycobia faced was finding an appropriate space.

“Starting a biotech company is not something that can be done in a kitchen, a basement, or a rented office — or for that matter, even in your standard lab,” Fisher said. “There are very special infrastructure requirements.”

Fortuitously, Cornell’s McGovern Center, designed to help nascent companies in the life sciences, opened up at just the right time. In January 2012, Glycobia moved to its new home at the center, where its staff of four scientists and one research associate operates in a state-of-the-art lab and shares expensive but essential equipment — such as an autoclave sterilizer and centrifuges — with two other startups.

McGovern Center director Lou Walcer, for his part, is happy to be able to support Glycobia not only with space but also a host of other services, such as business plan development and access to Cornell’s extensive alumni network.

Glycobia, he said, stood out from more than 60 applicants in the past two years: “They were considerably more advanced technically. And one reason I’m particularly entranced with their technology is that it is a fundamental advance in how we make biopharmaceuticals. I think they’re going to be huge.”

The next step on this path is transitioning from a mature startup into a production company.

“Right now we’re in the proof-of-relevance phase,” Fisher said. “This is where we show that these drugs we make work. We don’t actually sell anything yet, which is not uncommon for a young biotech company.”

In the future, Glycobia could either sell its engineered bacterial strains to drug companies, manufacture drugs itself, or proceed with a combination of both options.

“I’m really looking forward to that,” Fisher said. “Thinking back to when it was just an idea and then to actually have drugs that do something real, that’s going to be very, very rewarding.”

### **Additional Facts**

#### About Glycobia

- Glycobia Inc. employs proprietary glycoengineering technology to design bacteria that directly produce human peptide and protein drugs.
  - Founded: 2009
  - Co-founders: Adam Fisher and Matthew DeLisa
  - Employees: six
  - Location: McGovern Center at Cornell University
- Source: Kevin M. McGovern Family Center for Venture Development in the Life