



Photos by Christopher Moore

(Above) Each person vaccinated receives a card from the Centers for Disease Control and Prevention documenting the date of vaccination and information about which vaccine was given. Both the Pfizer and Moderna vaccines are given in two doses. (Below) Ina Collins, a nurse at Stamps Health Services, talks with staff about vaccination procedures when they received their first shipment of vaccine.



## 9 Things to Know About the Covid-19 Vaccines

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As the two Covid-19 vaccines start to arrive in communities across the country — including on campus — they're accompanied by questions about how they work and how they were created so quickly.

Two researchers in the Wallace H. Coulter Department of Biomedical Engineering work with the components that make up the vaccine and say they're safe and effective.

### 1. Both the Moderna and Pfizer-BioNTech vaccines are made with mRNA. What is an mRNA vaccine?

These vaccines are made of two primary ingredients: a piece of mRNA and a lipid nanoparticle, which is made from different fats.

The mRNA is essentially a set of instructions — the “m” stands for “messenger.” In this case, the instructions tell our own cells how to make a piece of protein from the SARS-CoV-2 virus called the spike protein.

“If you ever see pictures of the coronavirus, this protein is the big spike that is sticking out of the virus particle,” said Philip Santangelo, professor in the Coulter Department.

First, the mRNA has to enter your cells, which is where the lipid nanoparticle, or LNP, comes in: It's like an envelope that delivers the instructions. The LNP is a combina-

tion of four different fats to create a shell around the mRNA that allows it to penetrate into our cells.

“If you just inject mRNA on its own, your body does not like that, and the mRNA will not enter your cells,” said James Dahlman, assistant professor in the Department. “You can imagine the lipid nanoparticle as a Trojan horse for the mRNA: The mRNA has to enter a cell to work as a drug, but it cannot enter the cell on its own. So, you put the mRNA inside the LNP, which can enter the cell, and as a result the mRNA enters the cell.”

Once the mRNA is inside, the cells start to produce the spike protein. Your body recognizes an invader and starts to mount an immune response.

### 2. Can I get Covid-19 from the vaccine?

No. The Covid-19 vaccines contain no virus.

“The mRNA is only making the spike protein. It's not the whole virus; it's only a part of it,” Santangelo said. “You can't get the virus from the mRNA vaccine.”

### 3. What about the bad reactions some people have experienced?

Santangelo said some people have had reactions at the injection site, but that's common with many vaccines and, while annoying, it usually means the vaccine is doing exactly what it's intended to do: prompting your body to react.

“The needle and the lipids do cause





# What to Read During Black History Month

VICTOR ROGERS  
INSTITUTE COMMUNICATIONS

February is Black History Month, a time to reflect on the struggles and achievements of Black Americans, and their centrality to U.S. history. We asked several avid readers to recommend books that explore race and identity, history and memory. These books range from the autobiography of a young Black woman finding her voice in the Jim Crow era to Stacey Abrams' guide to succeeding as an outsider.

## ***Coming of Age in Mississippi: The Classic Autobiography of a Young Black Girl in the Rural South***

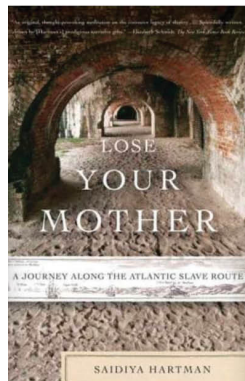
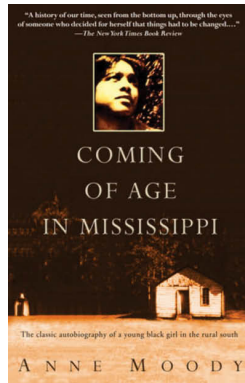
By Anne Moody, Delta  
(Reprint edition 2004, first published in 1968)

—Recommended by  
Tiffany Hughes-Troutman,  
director of the Center for  
Assessment, Referral, and  
Education (CARE)

## ***The Venus Hottentot: Poems***

By Elizabeth Alexander,  
University of Virginia Press  
(1990)

— Recommended by Ruthie  
Yow, service learning and  
partnerships specialist, Center  
for Serve-Learn-Sustain, and  
adjunct faculty, School of  
History and Sociology



## ***Caste: The Origins of Our Discontents***

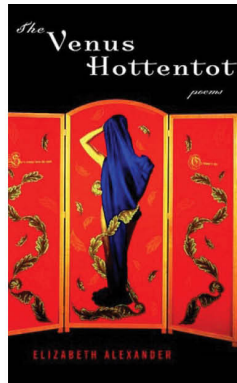
By Isabel Wilkerson,  
Random House (2020)

— Recommended by  
Kamau Bobb, senior director,  
Constellations Center for  
Equity in Computing,  
College of Computing

## ***Lose Your Mother: A Journey Along the Atlantic Slave Route***

By Saidiya Hartman, Farrar  
Straus & Giroux (2006)

— Recommended by  
Nihad M. Farooq, associate  
professor, School of Literature,  
Media, and Communication



## ***Caste: The Origins of Our Discontents***

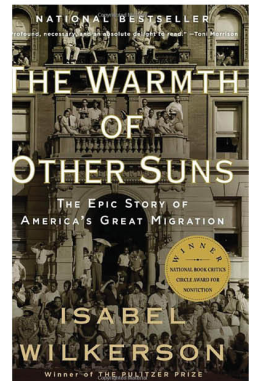
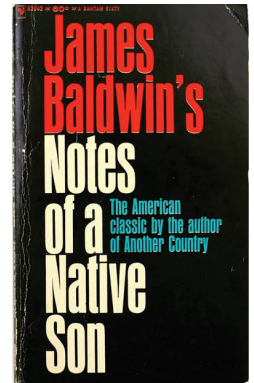
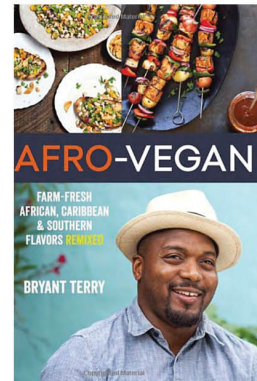
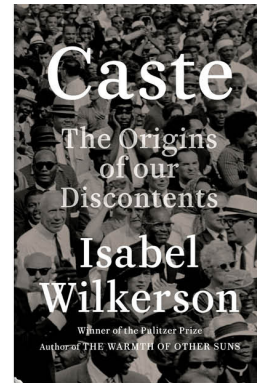
By Stacey Abrams,  
Macmillan (2018)

— Recommended by  
Etta Pittman, director of  
corporate development,  
College of Engineering

## ***Afro-Vegan: Farm-Fresh African, Caribbean, and Southern Flavors Remixed***

By Bryant Terry, Ten Speed  
Press (2014)

— Recommended by  
Kaye Husbands Fealing, dean  
and Ivan Allen Jr. Chair, Ivan



Allen College of Liberal Arts

## ***Notes of a Native Son***

By James Baldwin, Beacon  
Press (1955)

— Recommended by  
Steven W. McLaughlin, provost  
and executive vice president  
for Academic Affairs

## ***The Warmth of Other Suns: The Epic Story of America's Great Migration***

By Isabel Wilkerson, Vintage  
(part of Penguin Random  
House), (2011)

— Recommended by  
Candice Bovian, program  
manager, Human Resources



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a little inflammation,” he said. “That’s what tells the immune system, ‘Hey, we need to send some cells to the muscle to pick up that spike protein,’ and then initiate the immunological responses. Then, when your body sees that protein [again] if you’re exposed to Covid-19, your body will respond rapidly and help clear the infection.”

**4. Are any human cells used to create the vaccines?**

No. The two parts of the vaccine are made in labs using readily available, purified ingredients — and no human or animal tissue, Santangelo said.

The mRNA particles are just like the RNA made in our bodies, he said, but they are assembled chemically in a lab using natural proteins.

Dahlman said the four parts of the lipid nanoparticle are either naturally occurring — like cholesterol — or designed by scientists in the lab.

**5. How were the vaccines developed so quickly?**

Two reasons, according to Dahlman and Santangelo.

First: The pharmaceutical companies had a head start.

“Both companies had lipid formulations they knew would be useful for delivering mRNA via an intramuscular injection,” Santangelo said. At that point, they just needed to know what kind of mRNA to use.

“One of the reasons why this platform is so exciting is that it is somewhat plug-and-play,” he said. “As soon as they had information about the sequence for that spike protein, the companies were easily able to put that into their pipelines and generate an mRNA for that spike. Then all they had to do was make that mRNA and combine it with the same lipids that they had been using before.”

The government and the pharmaceutical industry also had been planning for some kind of pandemic to happen eventually — most likely a flu — and conducting research on mRNA vaccines, Dahlman said.



Photo by Christopher Moore

Georgia Tech received its first shipment of vaccines in January. Both Pfizer and Moderna vaccines have been administered on campus.

“Did we know it was going to be Covid-19? No, we didn’t. But scientists had an idea that something could come along,” he said. “There’s been a lot of research ahead of time to study whether mRNA-based vaccines would work against emerging diseases.”

The second reason the vaccine came together quickly was a result of the design of the clinical trials, according to Dahlman. The companies designed the phase 2 and phase 3 trials at the same time the initial trials were underway. That’s usually a prohibitively expensive proposition.

“In this case, there was a global emergency, so companies and governments took on the financial risk to design the phase 2 and phase 3 clinical trials earlier,” Dahlman said. “It was worth the risk to have the vaccine move along more quickly, given the dire human and economic consequences of this pandemic.”

**6. How do we know the vaccines are safe?**

Dahlman and Santangelo pointed to the tens of thousands of people involved in those clinical trials.

“Just because the clinical trials were run more quickly than normal does not mean the data is unreliable,” Dahlman said. “The data has been peer-reviewed. The data is clear: The vaccine is safe.”

He and Santangelo also pointed to the short amount of time the vaccine’s components remain in the human body.

“The mRNA does not last forever,” Santangelo said. “It may express for a few days, and it will degrade through normal processes inherent to every cell in your body. The lipids also are metabolized through normal metabolism pathways.”

He added: “We want the vaccine to go in, to express the viral protein — the spike protein — you want your body to react to that, you want your immune system to mobilize in response to that spike being there. But we don’t want the vaccine there forever. You’re relying on your immune system to do the heavy lifting; the vaccine just gets things started.”

**7. Why do we get two doses of the vaccine instead of one?**

Santangelo said it’s not uncommon for vaccines to require multiple doses. Think of the booster shots kids receive for some vaccines.

In the case of the Covid-19 vaccine, he said: “The data suggests that after one shot, there is an immune response, but it’s not as strong as they would like, and that’s why they give you the second one. The second one is a booster. And



## Covid-19 Vaccines at Georgia Tech

### Where are we in the vaccine distribution process?

Georgia Tech has administered nearly all doses of its first shipment of vaccines to members of the community in the 1A+ group, as designated by the Georgia Department of Public Health. If you have received an email about being vaccinated and not made an appointment, visit [health.gatech.edu/coronavirus/vaccine](https://health.gatech.edu/coronavirus/vaccine) for instructions to do so.

### What next?

Georgia Tech anticipates receiving another order of vaccines during the 1A+ distribution phase. Administrators also expect to be able to place an order for vaccinations for the 1B group soon. This group will include a broader community of Georgia Tech employees.



### How will I know when I'm eligible?

Employees will be emailed directly about making an appointment to receive a vaccine once they become eligible.

### Where can I learn more?

Visit [health.gatech.edu/coronavirus/vaccine](https://health.gatech.edu/coronavirus/vaccine) to follow updates about the vaccination process.

## VACCINES, from page 3

what you see in the data is your antibody responses increase significantly.”

### 8. Why do the vaccines have to be stored at such cold temperatures?

The Pfizer-BioNTech vaccine has to be stored at -70 degrees Celsius. Moderna's is frozen at -25 degrees Celsius. That's all about preserving the stability and effectiveness of the vaccine, Santangelo said, and the difference is attributable to the different kinds of lipids the two companies used around the mRNA.

It may not be ideal, but Santangelo said the requirements keep the vaccine from degrading in any way.

“They had to move so fast creating the vaccines, so they went with what they knew would work,” he said.

### 9. How long will protection last from the vaccine?

We don't have as much information about the durability of protection as we would like, Santangelo said. He pointed to data that shows persistence of antibodies for at least three to six months after the second dose.

Even with that question still unanswered, he said getting the vaccine will benefit everyone.

“It's going to help protect you from the virus,” he said. “Even if you get Covid — not from the vaccine, but post-vaccination — you're not going to get as sick if you have the vaccine than if you didn't have the vaccine. If the vaccine keeps us out of the hospital, if it keeps us from getting very, very sick, that is a very good thing.”



## In Memoriam

### Bridgette A. Barry

One of Bridgette A. Barry's last published research papers focused on providing more detail about what exactly happens during oxygen photosynthesis, which she called “the great fueler of life on the planet.”

Even though much has been studied about the sunlight-powered process that provides Earth with oxygen, Barry knew that there was still a lot to uncover about photosynthesis for the good of humankind. “You could work with it to make crops more productive,” Barry said in 2018. With an eye on climate change's impact on nature, she added, “We may have to repair and adapt the photosynthesis process someday, too.”

Professor Barry, a renowned professor of biochemistry and biophysics in the School of Chemistry and Biochemistry, and a member of the Parker H. Petit Institute for Bioengineering and Bioscience, died January 20, 2021. She was 63. According to a memorial written by her family, her death comes after several years of bravely battling a severe autoimmune disease and the side effects of treatment.

Read more about Barry and share memories at [c.gatech.edu/barry](https://c.gatech.edu/barry).