

COVID vaccine development was quick. What's holding HIV back?

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While multiple effective COVID-19 vaccines were developed with astonishing speed, it has been more than 40 years since University of Rochester alumnus Michael Gottlieb, M.D., first described the disease

that became known as AIDS, and yet there is still no effective vaccine.

However, University of Rochester Medical Center (URMC) HIV/AIDS researchers, who pivoted to studying COVID vaccines and treatments during the pandemic, are turning back to HIV trials armed with valuable data and lessons learned from two years of living with SARS-CoV-2.

In answer to the question of why successful vaccines were developed so quickly for COVID, when scientists have worked for years to develop one for HIV, the virus that causes AIDS, Steve Dewhurst, Ph.D. notes that the two viruses are profoundly different. "HIV is a much tougher nut to crack. One profound difference from COVID is the number of mutations in a single individual. In an untreated person, HIV can replicate and mutate for years; COVID doesn't do that. The rate at which HIV generates new mutations is off the charts."

Michael Keefer, M.D. adds, "HIV has thousands of variants; there are not enough Greek letters to give them all names."

That said, two key factors were foundational to the rapid discovery of effective COVID-19 vaccines. One was the impact of investments in fundamental aspects of RNA vaccine technology and structure-based antigen design—which allowed them to be immediately applied to SARS-CoV-2. Barney Graham, M.D., Ph.D., deputy director of the NIAID's Vaccine Research Center, developed structure-based vaccine designs in his quest for an HIV vaccine, and his work on [respiratory syncytial virus](#) (RSV) paved the way for RNA vaccines. The second factor was an enormous global infusion of resources into the search for a COVID-19 vaccine, which enabled the very rapid evaluation of a huge number of vaccine concepts. Both of these advances can now be applied to HIV.

Both Dewhurst, professor of Microbiology and Immunology, and Keefer, professor of Medicine in Infectious Diseases, have studied

HIV/AIDS for more than 30 years. They note that the COVID vaccines were built from a foundation of more than 20 years of vaccine research in HIV and other [infectious diseases](#). Now, they are turning the table and using knowledge gained from COVID vaccine development to inform efforts in HIV.

"It's a bit of a renaissance," says Keefer. "We're going back to the [drawing board](#), and our blueprint is mRNA vaccines. COVID has given us a lot of safety data that we can use now, and our understanding of vaccine development has grown."

The AIDS crisis has claimed millions of lives since it became prevalent in the 1980s, and it is estimated that there are currently 38 million people in the world living with HIV today. There is no cure, but there are prevention methods and treatments that can help people manage the condition. Unfortunately, not everybody has access to these medications and not everybody can tolerate them. The ultimate goal remains to develop a vaccine that will prevent infection in the first place.

Thomas Warfield, a local performance artist and community activist, lived in New York City during the 1980s—the epicenter of the AIDS crisis. "I got involved early in organizations to assist people living with HIV, really dying of HIV back then," Warfield said. "We've now moved into an era where people with HIV are living longer because of medical advances in treatment, but because of that, we've become complacent about education. There's still more work to be done."

When Warfield returned to his hometown, Rochester, he continued to promote [community involvement](#) in HIV/AIDS discussions. He produced annual World AIDS Day benefit concerts here for a decade, which were sponsored by the Rochester Victory Alliance, URMC's site to conduct HIV vaccine studies. These events included music, dance, arts and crafts, and community speakers. They raised both funds and

awareness, bringing communities together. He believes that art is a way to open dialogue, and he found that people truly listened and engaged thanks to these concerts.

Warfield, who used to serve on the Rochester Victory Alliance community advisory board, continues to advocate for people to get involved in research and clinical trials. "Everyone can play a role in how we eradicate and even manage HIV/AIDS," he said. "We often think it's someone else's issue. For those of us who aren't impacted directly, we're still impacted indirectly through the community we share. People find different ways to contribute, and if we each do our part, all the small things add up to big things, and then we can not only see the change, but experience it."

The Rochester Victory Alliance team, led by Keefer and Catherine Bunce, senior associate in the department of Medicine, Infectious Diseases, is currently enrolling participants in new HIV vaccine clinical trials. "This is a bit of a reboot," said Dewhurst. "In the past, we ran trials for people who were at high risk of HIV, but anyone can participate in these trials. You could be part of the generation that says, 'we got rid of HIV.'"

Volunteers are needed who are HIV-negative and between the ages of 18 and 55. To learn about volunteering for an HIV vaccine trial, call (585) 756-2329 or visit www.RochesterVictoryAlliance.org.

If you are not in the Rochester, NY area and are interested in volunteering, the HIV Vaccine Trials Network has established the Red Ribbon Registry. This national website asks volunteers to fill out a survey, and can then connect them to a nearby clinic or study.

Jackie Dozier, a current member of the community [advisory board](#) at the Rochester Victory Alliance, is also a passionate advocate for bringing

HIV education to the community. "When COVID came around, I wanted to do something to help," she said, "but I didn't know how. Then I heard about the COVID vaccine trials and I signed up. With HIV, people are not dying like they used to because of treatments and medications available, but it's still an issue. There should be a vaccine for HIV. People should participate in these studies because we have a great infectious disease research community here, and the HIV infection rates could be lower with a preventive [vaccine](#)."

As she meets people in the community to discuss HIV and research, Jackie often sees misconceptions and negative stereotypes. She works hard to change the dialogue through positive interactions, community education, and offering reliable resources to build trust.

Provided by University of Rochester Medical Center

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