Laboratory Fellow Puts COVID-19 Tests Through the Paces

For many years, Jessica Prince-Guerra has been passionate about combining laboratory science and public health to make a real-world difference in fighting infectious diseases. Her career has taken her to Ecuador, where she learned firsthand the importance of laboratory work in improving a community's health. She also witnessed health inequities that motivated her to devote her career to public health.

She earned the PhD in microbiology and molecular genetics at Emory University, where she sought out a project "that didn't keep me in a lab … I wanted to connect to communities that were affected by the disease I was studying." She continued conducting laboratory field work in Zambia, Guatemala, Bolivia, and Mexico.

"My international experience has taught me to expect the unexpected, troubleshoot problems quickly, organize field teams, work with diverse communities, and the importance of ensuring culturally and linguistically appropriate communications with the communities," says Jessica. "Little did I know that this work was preparing me for a pandemic."

In July 2020, as COVID-19 was spreading across the globe, Jessica joined CDC's Laboratory Leadership Service (LLS) as a fellow to begin her disease detective training.

"One of the things that drew me to the LLS program was having the opportunity to be on the frontlines of public health in a leadership role," Jessica says. "This work has affirmed my passion for public health and helped me develop my skills as a leader."

But in September, CDC's COVID-19 emergency response needed Jessica's lab expertise. Arizona and Georgia had asked CDC to help them evaluate the antigen test being distributed by the federal government. The test had received Emergency Use Authorization (EUA) from the Food and Drug Administration for use in people with symptoms.

"We didn't have a lot of data on how well antigen tests performed, particularly in people who don't have symptoms," Jessica says.

Antigen tests detect proteins from the virus in samples from people who have COVID-19. To date, 13 antigen tests have received EUA, and most can deliver results in about 15-30 minutes. However, public health officials need to understand how antigen tests perform and when to consider using more sensitive real-time reverse transcription-polymerase chain reaction (RT-PCR) tests, which look for the presence of virus.

"I found it exciting to work with the Arizona team from start to finish," says Jessica. "Working with health department employees, being able to communicate with Spanish speakers, writing fact sheets for the public, and analyzing the data … it felt good to be part of a project that was helping the community."

Her job was to compare the antigen test to real-time RT-PCR testing, considered the "gold standard" for detecting current infection from a virus, like the one that causes COVID-19. But real-time RT-PCR tests require specialized equipment and technical skill to perform. Communities with widespread transmission need fast, easy-to-use tests that can be performed without highly technical equipment.

These tests could help states and others, like colleges, reduce testing costs, isolate sick people sooner, and start contact tracing quickly.

Jessica deployed to both Arizona and Georgia. In Tucson, Arizona, she led a team that tested 3,400 residents, with and without symptoms, over a two-week period. Jessica's team discovered that the antigen test yielded few false-positive results, meaning that "for most samples, a positive antigen test result accurately detected when a person had COVID-19," she says.

Jessica's team learned that the antigen test correctly came back negative for most people without confirmed COVID-19 disease. However, for people who were positive by real-time RT-PCR, the antigen test was correct for two out of three samples from people with symptoms and was correct only for about one out of three samples from people **without** symptoms.

A CDC Morbidity and Mortality Weekly Report describes results from Arizona. Although the antigen test didn't perform as well as health officials had hoped, the results will help public health officials decide how best to use the antigen test and whether (or when) to use real-time RT-PCR testing to confirm results.

During Jessica's Georgia deployment, she was part of a team that tested more than 2,000 students and staff at a college over a four-day period. Results for the Georgia evaluation will be published in the coming months.

"Being in the lab all the time, you don't always have a full appreciation of the human component of the work you are doing," Jessica says. "Going into the field, I was in testing centers hearing people's personal stories, which was very impactful for me. All different walks of life, each person with their unique situation and story plays into public health decisions in one way or another."

Jessica holds out hope that her work will help the country be in better shape as 2021 unfolds. "I think, in public health, we have to be cautiously optimistic," she says. "Because if you don't have optimism about things getting better, it is hard to see the light at the end of the tunnel and to keep moving forward."