What We Learned About Genetic Sequencing During COVID-19 Could Revolutionize Public Health

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Image courtesy of Time

The COVID-19 pandemic is a hands-on workshop in how genetic information can help us more quickly control a pandemic. Relying on the SARS-CoV-2 code, first made public in January 2020, researchers at academic labs were ready to develop a diagnostic test for the virus within weeks (although regulators were slow to greenlight them). Teams at the National Institute of Allergy and Infectious Diseases and biotech company Moderna, as well as U.S.-based Pfizer and German biotech BioNTech, went to work to develop vaccines relying on the virus's genetic material called mRNA and set new speed records in coming up with formulas ready to test in people. In under a year, they stunned medical experts when they showed their shots were 94% and 95% efficacious, respectively, in protecting people from symptoms of COVID-19, becoming the first COVID-19 vaccines authorized by the U.S. Food and Drug Administration, in December.

Knowing the virus's genetic footprint, scientists at other pharmaceutical companies developed other types of vaccines, as well as drugs to treat infection. And a year into the pandemic, the same viral genetic blueprint is helping researchers predict how different patients' immune systems will respond to infection and triage those who might be more prone to getting seriously ill so they can be treated more aggressively early on. It's also enabling experts like Ho to track deviations in the genetic code that might enable the virus to slip past these drugs and vaccines.

"Genomics and genomic epidemiology have emerged as an incredibly powerful tool in fighting this pandemic," says Francis deSouza, CEO of Illumina, which makes the genetic-sequencing machines that form the foundation of this field. "And they will be essential to how we fight future biological threats, whether it's the next coronavirus or antimicrobial resistance or even bioterrorism."

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