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HEALTHCARE & PHARMA

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# In mutant variants, has the coronavirus shown its best tricks?

By Kate Kelland, Julie Steenhuisen



LONDON/CHICAGO (Reuters) - The rapid rise in different parts of the world of deadly, more infectious coronavirus variants that share new mutations is leading scientists to ask a critical question - has the SARS-CoV-2 virus shown its best cards?

FILE PHOTO: National Institutes of Health Director Francis S. Collins holds a model of SARS-CoV-2, the novel coronavirus, as he testifies on Capitol Hill in Washington, D.C., U.S., July 2, 2020. Graeme Jennings/Pool via REUTERS/



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These include the E484k mutation, nicknamed “Eek” by some scientists for its apparent ability to evade natural immunity from previous COVID-19 infection and to reduce protection offered by current vaccines - all of which target the spike protein.

The appearance of similar mutations, independent of one another, springing up in different parts of the globe shows the coronavirus is undergoing “convergent evolution,” according to a dozen scientists interviewed by Reuters.

Although it will continue to mutate, immunologists and virologists said they suspect this coronavirus has a fixed number of moves in its arsenal.

The long-term impact for the virus’ survival, and whether a limit on the number of mutations makes it less dangerous, remains to be seen.

“It is plausible that this virus has a relatively limited number of antibody escape mutations it can make before it has played all of its cards, so to speak,” said Shane Crotty, a virologist at the La Jolla Institute for Immunology in San Diego.

That could enable drugmakers to stay on top of the virus as they develop booster vaccines directly targeting current variants, while governments struggle to tame a pandemic that has killed nearly 3 million people.

The idea that the virus could have a limited number of mutations has been circulating among experts since early February, and gathered momentum with the posting of a paper showing the spontaneous appearance of seven variants in the United States, all in the same region of the spike protein.

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“If you wanted to sort of write a little textbook about viral evolution, it’s happening right now,” Dr. Francis Collins, a geneticist and director of the U.S. National Institutes of Health, said in an interview.

Scientists saw the process on a smaller scale in 2018 as a dangerous H7N9 bird flu virus in China appeared to begin adapting to human hosts. But no pathogen has evolved under such global scrutiny as SARS-CoV-2.

Wendy Barclay, a virologist and professor at Imperial College London and a member of a scientific advisory panel to the UK government, said she is struck by the “amazing amount of convergent evolution we’re seeing” with SARS-CoV-2.

“There are these infamous mutations - E484K, N501Y and K417N - which all three variants of concern are accumulating. That, added together, is very strong biology that this is the best option of this virus in the given moment,” Barclay said.

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“If it keeps happening over and over again, it must be providing some real growth advantage to this virus,” Collins said.

Some specialists believe the virus may have a limited number of mutations it can sustain before compromising its fitness - or changing so much it is no longer the same virus.

“I don’t think it’s going to reinvent itself with extra teeth,” said Ian Jones, a professor of virology at Britain’s University of Reading.

“If it had an unlimited number of tricks...we would see an unlimited number of mutants, but we don’t,” said Michel Nussenzweig, an immunologist at Rockefeller University in New York.

## CAUTIOUS OPTIMISM

Scientists remain cautious, however, and say predicting how a virus will mutate is challenging. If there are limits on how the coronavirus can evolve, that would simplify things for vaccine developers.

Novavax Inc is adapting its vaccine to target the South African variant that in lab tests appeared to render current vaccines less effective. Chief Executive Stan Erck said the virus can only change so much and still bind to human hosts, and hopes the vaccine will “cover the vast majority of strains that are circulating.”

If not, Novavax can continue matching its vaccine to new variants, he said.

Researchers are tracking the variants through data-sharing platforms such as the Global Initiative on Sharing Avian Flu Data, which houses a huge trove of coronavirus genomes.

Scientists recently identified seven U.S. coronavirus variants with mutations all occurring in same location in a key portion of the virus, offering more evidence of convergent

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Such evidence adds to cautious optimism that mutations appear to share many of the same traits.

But the world must continue tracking changes in the virus, experts said, and choke off its ability to mutate by reducing transmission through vaccinations and measures that limit its spread.

“It’s shown a very strong set of opening moves,” Vaughn Cooper, an evolutionary biology specialist at the University of Pittsburgh School of Medicine, said of this coronavirus. “We don’t know what the end game is going to look like.”

Reporting by Julie Steenhuisen in Chicago and Kate Kelland in London; Editing by Josephine Mason and Bill Berkrot

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