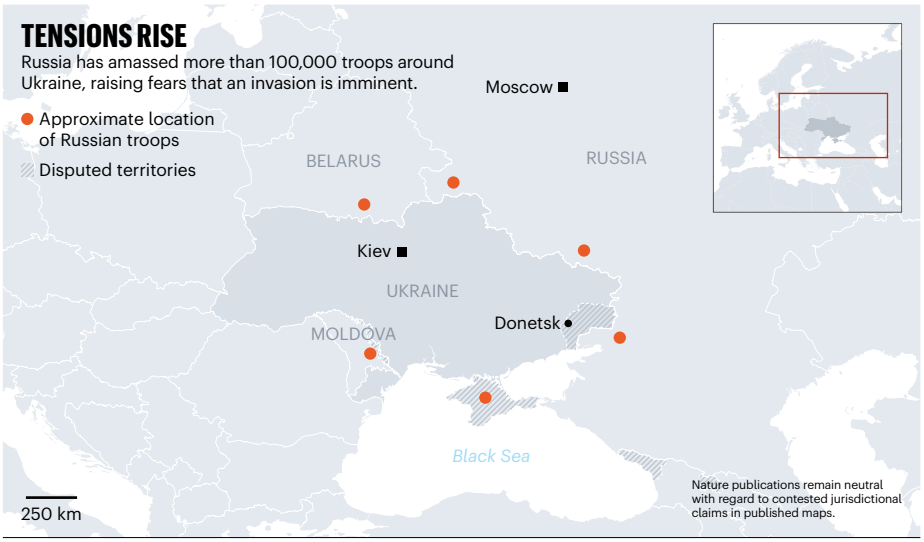


relocating out of Luhansk and Donetsk to other parts of the country, with many researchers losing their homes and laboratories. Most of the academic staff at one displaced university — Vasyl' Stus Donetsk National University, now in Vinnytsia — are people who were forced to leave and who lost their property, livelihoods and family ties, says Roman Fedorovich Hryniuk, the institution's rector.

As a result of the conflict, many Ukrainian researchers cut links with Russia and formed ties with their peers in Europe, the United States and China. "It was painful to lose established relations and build up new ones, but it gave us a new point of view," says Illya Khadzhynov, vice-rector of scientific work at the university. In 2015, Ukraine joined the EU's flagship research-funding programme, giving its scientists the same rights to apply for grants as EU members.

Troop movements

Now, Russia has mobilized some of the tens of thousands of troops that were stationed at the border with Ukraine and inside Belarus; the West sees this as an act of aggression (see 'Tensions rise'). Some scientists are feeling the strain.

"There is a very certain threat of war. I feel like I could die tomorrow, or in two days, but I can't do anything about that," says Yegorchenko. She is keeping electronic devices such as phones and power banks charged, and is in constant contact with her family. "All scientists do that," she adds.

"This Russian tension is aiming to create chaos in Ukraine, and harm to the economic situation. We know that we will have less funding for research, less opportunities to travel and zero chances of internal conferences in Ukraine," she says. But overall, she is trying not to worry and is working more than usual. "Mathematics is a good therapy," she says.

At the Sumy National Agrarian University, which is 30 kilometres from the border with Russia, staff have been trained in how to behave in the event of hostility. The university has drawn up plans for employees to evacuate from the building to bomb shelters. There are also plans to move scientific equipment and biological specimens out of the region.

"In private conversations, scientists say that they have collected 'alarming suitcases' with documents and essentials," says Yurii Danko, an economist at the institution. The bags contain clothes, medicines, tools, self-defence items and food, he says. Danko says that if war breaks out, many scientists will be forced to move from their homes to areas controlled by Ukraine to continue working — or might have to go abroad. "In case of the occupation, scientists will not work for the enemy," he adds.

Trying to keep calm

Further west, in the city of Lviv, computer scientist Oleksandr Berezko says that many feel the tension but are trying to keep calm. "It might sound strange, but the war has started eight years ago," he says. Berezko, who works at Lviv Polytechnic National University, was planning a small meeting for around 20 early-career researchers to discuss open science at the end of March; he says it is now likely to be cancelled. If there is war, the government's priority will be the armed forces and helping people.

Vladimir Kuznetsov, a plant biologist at the K. A. Timiryazev Institute of Plant Physiology in Moscow, says that the situation between his country and Ukraine is highly undesirable. "Many researchers will leave Ukraine and that will be very bad," says Kuznetsov.

OMICRON SUB-VARIANT: WHAT SCIENTISTS KNOW SO FAR

Early studies suggest that the BA.2 lineage might prolong the Omicron wave.

By Ewen Callaway

COVID-19 researchers are rushing to understand why a relative of the main Omicron variant is displacing its sibling in countries around the world.

The variant, known as BA.2, has spread rapidly in countries including Denmark, the Philippines and South Africa in the past few weeks. It follows the initial spread of the BA.1 Omicron variant of the virus SARS-CoV-2, which was first identified in southern Africa in late November and quickly spread worldwide (see 'Omicron's many variants').

A laboratory study[1] of BA.2 suggests that its rapid ascent is probably the result of it being more transmissible than BA.1. And other preliminary studies suggest that BA.2 can readily overcome immunity from vaccination and previous infection with earlier variants, although it is not much better than BA.1 at doing so.

If real-world epidemiological studies support these conclusions, scientists think that BA.2 will be unlikely to spark a second major wave of infections, hospitalizations and deaths after Omicron's initial onslaught.

"It might prolong the Omicron surge. But our data would suggest that it would not lead to a brand-new additional surge," says Dan Barouch, an immunologist and virologist at Beth Israel Deaconess Medical Center in Boston, Massachusetts, who led the laboratory study[1], posted on the medRxiv preprint server on 7 February.

Growth advantage

BA.2's steady rise in prevalence in multiple countries suggests that it has a growth advantage over other circulating variants, says Mads Albertsen, a bioinformatician at Aalborg University in Denmark. That includes other forms of Omicron, such as a less-prevalent lineage called BA.3.

"From a scientific perspective, the question is why," says Barouch. Researchers think that a large part of the reason Omicron quickly

replaced the Delta variant is its ability to infect and spread among people who were immune to Delta. So one possibility for BA.2's rise is that it's even better than BA.1 at overcoming immunity – potentially including the protection gained from a BA.1 infection.

The variants' differing behaviours could be explained by their many genetic differences. Dozens of mutations distinguish BA.1 from BA.2 – particularly at key portions of the virus's spike protein, the target of potent antibodies that can block infection. "BA.2 has a whole mess of new mutations that no one has tested," says Jeremy Luban, a virologist at the University of Massachusetts Chan Medical School in Worcester.

To assess any differences between BA.1 and BA.2, Barouch's team measured how well 'neutralizing', or virus-blocking, antibodies in people's blood protected cells from infection by viruses with either variant's spike protein[1]. The study looked at 24 people who had received three doses of the RNA vaccine made by Pfizer in New York City; they produced neutralizing antibodies that were slightly better at fending off infection by viruses with BA.1's spike than those with BA.2's. The same was true for a smaller group of people who gained immunity from infection during the initial Omicron surge, and in some cases also from vaccination.

The small difference in overall potency against the two variants means that an ability to evade immunity is unlikely to explain BA.2's ascent worldwide, says Barouch.

Comparing variants

The results chime with those from a 9 February preprint study[2] led by virologist David Ho at Columbia University in New York City, which found that BA.2 and BA.1 had similar abilities to resist neutralizing antibodies in the blood of people who had been vaccinated or infected.

But Ho's team also found signs that genetic mutations unique to BA.2 affect how some antibodies recognize the variant. The researchers found that one family of antibodies that attach to part of the spike protein that binds to host cells was much less effective at neutralizing BA.2 than BA.1, and another type of spike antibody tended to be more active against BA.2. A 15 February preprint study[3] led by virologist Kei Sato at the University of Tokyo found that hamsters and mice infected with BA.1 produced antibodies that were less potent against BA.2 than BA.1.

It's not yet clear what the latest lab studies mean for immune protection against BA.2 in the real world. Barouch says his team's study cannot indicate whether people who have recovered from BA.1 are susceptible to BA.2 reinfection. But he thinks his team's data suggest that such risks are unlikely to be much higher for BA.2 than for BA.1.

According to news reports, researchers in Israel have identified a handful of cases in which people who had recovered from BA.1 became infected with BA.2. And Danish researchers have begun a study to determine how frequently such reinfections occur, says Troels Lillebaek, a molecular epidemiologist at the State Serum Institute in Copenhagen and chair of Denmark's SARS-CoV-2 Variants Risk Assessment Committee. "If there was no protection, that would be a surprise and, I think, unlikely."

Another study, of Omicron spread in more than 8,000 Danish households, suggests that BA.2's rise results from a mix of factors[4]. Researchers including Lillebaek found that unvaccinated, double-vaccinated and boosted individuals were all more susceptible to BA.2 infection than to BA.1 infection.

That unvaccinated people are also at heightened risk of BA.2 infection suggests that properties of the virus other than immune evasion are at least partly behind its enhanced transmissibility, says Lillebaek.

In Denmark, where vaccination rates are high, BA.2's ascent is not causing major issues, says Lillebaek. A preliminary study found that the variant seems to cause no more severe illness than does BA.1, including in children.

But BA.2 could pose greater challenges in places with lower vaccination rates, says Lillebaek. The variant's growth advantage over BA.1 means that it could extend Omicron peaks, increasing the odds of infection for groups at high risk of severe disease. "You risk even more people testing positive within a short time, putting strain on the hospital system."

Mutation, mutation, mutation

There are also hints that BA.2 could limit treatment options. In lab experiments, Ho's team found[2] that the variant was resistant to a therapeutic monoclonal antibody, called sotrovimab, that was effective against BA.1. However, the drug's manufacturer, Vir Biotechnology in San Francisco, California, said in a press release on 9 February that its own unpublished experiments suggest that sotrovimab remains effective against BA.2.

Identifying the specific properties of BA.2 and the genetic mutations responsible for its growth advantage will be no simple matter, says Luban. In other fast-spreading variants, including Alpha and Delta, researchers have spotted mutations that seem to speed transmission, but these are unlikely to fully explain those variants' behaviour.

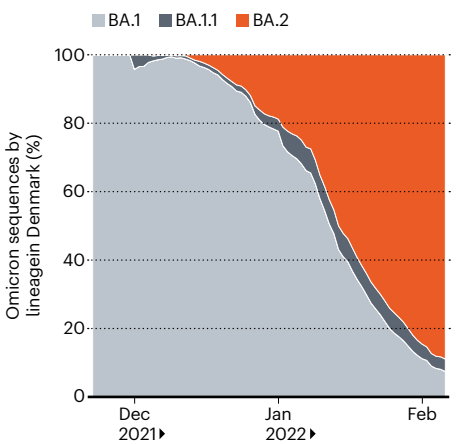
"Omicron really slapped a lot of people in the face who thought everything was clear," says Luban. "It's a puzzle."

LISA MARIE DAVID/REUTERS

The Philippines is one nation where the BA.2 Omicron sub-variant has spread quickly.

OMICRON'S MANY VARIANTS

The BA.2 lineage of Omicron spreads faster than the original BA.1 variant, and it has now become the prevalent Omicron lineage in Denmark.



SOURCE: OUTBREAK.INFO

1. Yu, J. *et al*. Preprint at medRxiv https://doi.org/10.1101/2022.02.06.22270533 (2022).
2. Iketani, S. *et al*. Preprint at bioRxiv https://doi.org/10.1101/2022.02.07.479306 (2022).
3. Yamasoba, D. *et al*. Preprint at bioRxiv https://doi.org/10.1101/2022.02.14.480335 (2022).
4. Lyngse, F. P. *et al*. Preprint at medRxiv https://doi.org/10.1101/2022.01.28.22270044 (2022).