A new oral antiviral drug for COVID is being tested in humans

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Despite the effectiveness of vaccines, we still need drugs to treat COVID. Even people who have been double vaccinated stand a small chance of getting COVID and ending up moderately or even severely ill. There are drugs to treat COVID, but they have to be given in hospital.

One promising drug that could improve things is molnupiravir, an

antiviral that's moving into the final stages of testing in humans. Researchers are hoping it can be used both to treat and prevent COVID. Importantly, it can be taken as a pill—meaning people wouldn't need to be hospitalized to receive it.

This drug reduces the ability of SARS-CoV-2, the virus that causes COVID, to replicate. It works by mimicking one of the building blocks of the virus's genetic material. When the virus reproduces, it builds a new copy of its RNA, and the drug ends up being incorporated into it.

When the virus then reproduces, the molnupiravir causes mutations to accumulate in the virus's RNA, which increase every time it replicates. Eventually, this causes an "error catastrophe", where excessive mutations stop the virus from being able to reproduce altogether, and it dies off.

How well does it work?

So far, a small trial has looked at the effects of molnupiravir in 202 COVID patients (not in hospital) who had started having symptoms. Participants were randomly allocated to receive molnupiravir or a placebo, with different doses of the antiviral being tested.

The trial's results have been published as a preprint, meaning they are yet to be formally reviewed by other scientists. Still, the trial showed that after three days of treatment, infectious SARS-CoV-2 virus was found significantly less often in participants taking 800mg of molnupiravir (2%) compared to those taking a placebo (17%).

By day five, the virus was not detected in any participants receiving 400mg or 800mg of molnupiravir, but was still found in 11% of those taking a placebo. The trial, therefore, suggests that molnupiravir can reduce and eliminate infectious SARS-CoV-2 in patients with mild COVID. Indeed, it's the fact that molnupiravir speeds up the clearance

of the virus that suggests it could be useful not just for treating COVID but also lessening the chance of it spreading.

But to know just how useful it will be, we need to see what happens in further trials. Molnupiravir is currently also being assessed in newly hospitalized patients with COVID, with this study aiming to find out if early molnupiravir treatment can reduce the time it takes for patients with severe COVID to clear the virus. No results have been disclosed so far.

A larger trial, with 1,850 participants, is now looking to see if molnupiravir is better than a placebo at preventing serious disease and death in non-hospitalized adults with COVID. And a phase 3 trial (the final stage of human testing) is now recruiting participants—across 17 different countries—to see whether early molnupiravir treatment of COVID-positive people prevents others living in the same household from getting infected. Previous research has already shown molnupiravir can stop SARS-CoV-2 spreading in this manner among ferrets.

If it performs well in these trials, molnupiravir's impact could be huge. Given the severity of illness that can be caused by SARS-CoV-2, an effective antiviral would be a valuable weapon to have in the clinical armory—particularly if molnupiravir continues to be as fast acting as it has so far in testing. Patients suffering from COVID can become very sick very quickly.

The fact that it is taken orally is also potentially very helpful, as this would make it easy to use in the early stages of infection, as it could be self-administered outside of hospital. Also, molnupiravir can be produced in large quantities and doesn't require cold transportation. Vaccines and physical measures to control the spread of the virus would still be the primary tactics for managing COVID, but this drug could complement both.

Where did it come from?

Developing antiviral drugs notoriously takes a long time. The fact that molnupiravir is available 18 months into the pandemic is because it wasn't developed specifically for COVID. It is a broad-spectrum antiviral—meaning it can act against a wide variety of viruses. Its development started back in 2013 at Emory University in the US.

The focus then was on finding an antiviral drug for the treatment of equine encephalitis virus infection, a major threat for human and animal public health in the Americas. The initial antiviral drug in development was known as EIDD-1931. Broad testing confirmed that it was able to inhibit several RNA viruses from replicating, including influenza virus, multiple coronaviruses and respiratory syncytial virus.

However, when EIDD-1931 was given orally to monkeys it was quickly metabolized, decreasing its antiviral activity. To address this, scientists created an inactive drug (known as a prodrug) that is then converted into the active drug in the body. EIDD-1931's prodrug is molnupiravir.

Initially, molnupiravir's developers applied to the US Food and Drug Administration for permission to test it in humans as a treatment for seasonal influenza. However, after COVID emerged, and it was shown to have an effect against SARS-CoV-2, a request was submitted to test it against this virus too. One day, it's possible that it could be used to treat a number of different diseases.

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