

Longest known COVID-19 infection—505 days—described by UK researchers

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This scanning electron microscope image shows SARS-CoV-2 (yellow)—also known as 2019-nCoV, the virus that causes COVID-19—isolated from a patient, emerging from the surface of cells (blue/pink) cultured in the lab. Credit: NIAID-RML

The longest known COVID-19 infection is described by UK researchers

at this year's European Congress of Clinical Microbiology & Infectious Diseases (ECCMID) in Lisbon, Portugal, (23-26 April).

The patient tested positive for COVID-19 for 505 days before their death. The previous longest known PCR confirmed case is thought to be 335 days.

The researchers, who studied the virus from nine COVID patients in London, also provide evidence that new COVID variants may arise in [immunocompromised individuals](#) and present details of one of the first occult COVID infections (cases where the patient was thought to have cleared the virus, with negative testing to show that, but is subsequently found to have had an ongoing [infection](#)).

The team, from King's College London and Guy's and St Thomas' NHS Foundation Trust, were interested in how SARS-CoV-2 changes over time in immunocompromised individuals.

First author, Dr. Luke Blagdon Snell, of Guy's and St Thomas' NHS Foundation Trust, says: "New variants of SARS-CoV-2, the virus that causes COVID-19, have emerged throughout the pandemic.

"Some of these variants transmit more easily between people, cause more severe disease, or make the vaccines less effective. One theory is that these viral variants evolve in individuals whose immune systems are weakened from illness or [medical treatments](#) like chemotherapy, who can have persistent infection with SARS-CoV-2.

"We wanted to investigate which mutations arise, and if variants evolve, in these people with persistent infection."

The study involved nine [immunocompromised patients](#) who tested positive for the virus for at least eight weeks. Infections persisted for 73

days, on average, but two patients had persistent infections for more than a year.

The patients, who were studied between March 2020 and December 2021, had weakened immune systems due to [organ transplantation](#), HIV, cancer, or medical therapies for other illnesses.

Regular sampling and genetic analysis of the virus showed that five of the nine patients developed at least one mutation seen in variants of concern. Some individuals developed multiple mutations associated with variants of concern, such as the Alpha, Delta and Omicron variants. The virus from one individual contained 10 mutations that would arise separately in variants of concern, such as the Alpha, Gamma and Omicron variants.

Dr. Snell and colleagues said: "This provides evidence that mutations found in variants of concern do arise in immunocompromised patients and so supports the idea that new variants of the viruses may develop in immunocompromised individuals.

"It is important to note, however, that none of the individuals in our work developed new variants that became widespread variants of concern.

"Additionally, whilst this work shows variants could arise in immunocompromised individuals, whether the previous variants of concern like Alpha, Delta and Omicron arose in this manner remains unknown."

Five of the nine patients survived. Two of those five cleared SARS-CoV-2 infection without treatment, two cleared the infection after treatment with antibody therapies and antivirals, and one individual has ongoing infection. At their last follow-up in early 2022, the patient with

ongoing infection had been infected for more than one year (412 days). At their last follow-up in early 2022, the patient with ongoing infection had been infected for more than one year (412 days). The person has been treated with monoclonal antibodies to try to clear their infection. If this person remains positive at their next follow-up appointment, they will likely pass the previous longest known infection of 505 days described in this report.

Dr. Gaia Nebbia, co-author, says: "Immunocompromised patients with [persistent infection](#) have poor outcomes, and new treatment strategies are urgently needed to clear their infection. This may also prevent the emergence of variants."

The researchers also report one of the first cases of an occult COVID-19 infection.

They say: "Occult infection describes someone who is thought to have cleared the virus, for instance with negative tests, but is later found to have an ongoing infection.

"This has been described with other viruses such as those that cause Ebola or hepatitis B and is different to long COVID where the virus is generally thought to be cleared from the body but symptoms persist.

"The patient was symptomatic and tested positive for COVID before recovering. They then tested negative several times before developing COVID symptoms again several months later. A PCR test was positive and genome sequencing of the virus at this point showed the infection was caused by the Alpha [variant](#), which had by then been eliminated from the UK, suggesting the [virus](#) had been present in the body ever since the initial infection but remained undetected."

Provided by European Society of Clinical Microbiology and Infectious Diseases

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