

Mutations in SARS-CoV-2 may result in escape variants resistant to therapeutics and vaccines

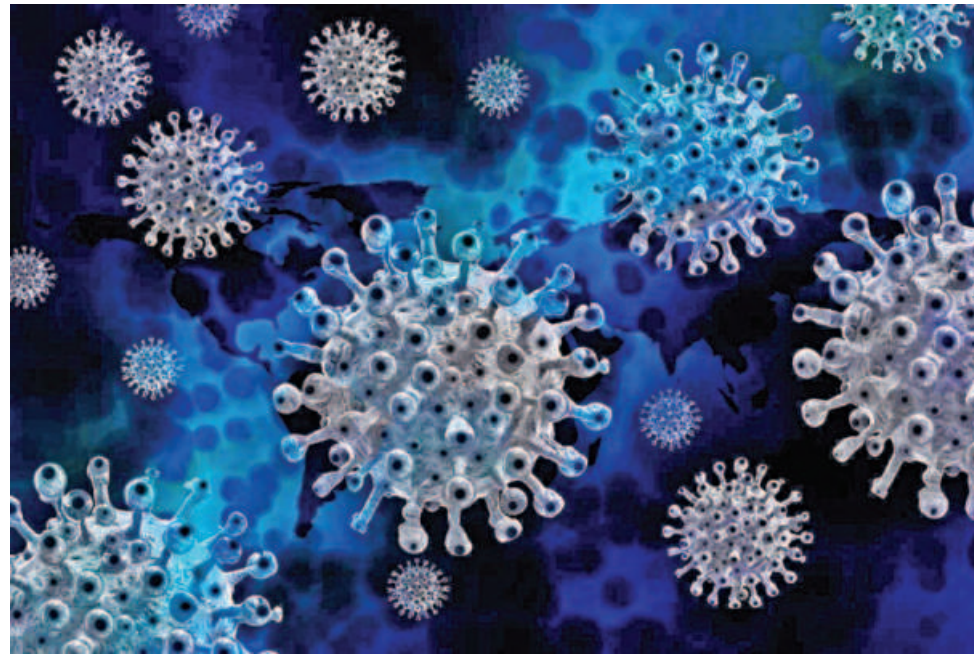
All viruses mutate as they evolve, and most mutations have either negative or neutral effects on viral fitness. However, some mutations give viruses a selective advantage, making them more infectious, transmittable, and resistant to antibody responses and therapeutics.

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The SARS-CoV-2 virus is continuously evolving, and structural changes to the virus may impact the efficacy of antibody therapies and vaccines. A study published in PLOS Pathogens by Anshumali Mittal at the University of Pittsburgh, USA, and colleagues describe the structural and functional landscape of neutralising antibodies against SARS-CoV-2 spike protein and discusses its effects of mutations on the virus spike protein that may allow it to evade antibody responses.

All viruses mutate as they evolve, and most mutations have either negative or neutral effects on viral fitness. However, some mutations give viruses a selective advantage, making them more infectious, transmittable, and resistant to antibody responses and therapeutics. To better understand the relationship between immune responses to the SARS-CoV-2 virus and how mutations may allow the virus to escape neutralisation, researchers conducted a review of the literature, comprising approximately 139 studies. They synthesised research on emerging SARS-CoV-2 variants, described the structural basis of how antibodies may neutralise SARS-CoV-2, and mapped out the spike protein mutations or "escape variants" that resist antibody binding and neutralisation.

According to the authors, "The potency of therapeutic antibodies and vaccines partly depends on how readily the virus can escape neutralisation. The SARS-CoV-2 virus will continue to evolve resulting in the emergence of escape variants; therefore, worldwide genomic surveillance, better



mutations for several antibodies that resist vaccine-elicited and therapeutically relevant binding antibodies. However, future studies are needed to better understand how these mutations may affect illness severity and mortality.

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vaccination drive, development of broadly neutralising antibodies, and new drugs are vital to combat COVID-19".

Mittal adds, "Structure-based escape maps combined with computational modelling are valuable tools to understand how mutations at each residue affect the binding of an antibody, and can be utilised to facilitate the rational design of escape-resistant antibody therapeutics, vaccines and other countermeasures."

Source: PLOS Pathogens

Global progress across sanitation service levels assessed against MDG

A new study in PLOS Water uses a novel metric to compare sanitation improvements across countries between 1990 and 2015, revealing insights that could help progress.

The United Nations (UN) pledged in 2004 to reduce the number of people without basic sanitation by half by 2015. While progress was made, it fell short of the Millennium Development Goal (MDG). Although the simple pass-fail metric used to track progress may miss meaningful gains like a household switching from open defecation to a shared latrine. Or it could curtail progress by rewarding minor changes. It was instead developed but not used for the MDG period.

The new Sanitation Ladder Score has now been applied to 190 countries, covering 99.8% of the global population. For most countries, the ladder score improved on the previous pass-fail metric. Forty-one countries improved their ladder score, while five countries deteriorated (Libya, Seychelles, Granada, Aruba, and French Polynesia).

The researchers studied data from Ghana, Ethiopia, Cambodia, Lao People's Democratic Republic, Nepal, and Poland. They believe the 1990-2015 ladder score could help countries achieve the UN's 2030 Sustainable Development Goals. Determining how to address sanitation deficits in urban and rural areas requires looking backwards at MDG progress.



Worldwide disparities in treatment rates for major depressive disorder

A meta-analysis of 149 previous studies found that treatment rates for major depressive disorder are low globally, especially in low- and lower-middle-income countries. Between 2000 and 2021, 149 studies on major depressive disorder therapy were reviewed in 84 countries. The meta-analysis shows that treatment rates are low globally and that treatment varies between countries with varying resources.

Severe depressive disorders are expected to be treated at a rate of 33% in high-income countries, but only 8% in low- and middle-income countries. Treatment rates for severe depressive disorder are lower, estimated at 23% in high-income countries and 3% in poor and lower-middle-income countries. Major depressive disorder is undertreated globally, with many people not receiving treatment that meets practice guideline standards.

The Lancet-World Psychiatric Association Commission stresses reducing negative childhood (including neglect and trauma) and life experiences (including depression) to prevent depression. An individual intervention focusing on risk factors like intimate partner violence and life events like bereavement or financial crisis is also required (e.g., smoking, alcohol consumption, inactivity). They support psychological therapies and antidepressants and more intensive and specialised treatments like electroconvulsive therapy (ECT) for severe, refractory forms of the illness.

We must reconsider the availability of appropriate care and treatment facilitators.

Daily vit D supplementation prevents some new autoimmune diseases

Vitamin D limits inflammation in vitro and in animal models of autoimmune diseases, but it has not shown benefit in humans' observational studies or clinical trials.

Omega-3 (ω -3) fatty acid supplementation limits symptoms in some autoimmune diseases in humans. But neither of these supplements has been studied for preventing autoimmune disease in randomised trials. In the placebo-controlled VITAL study, 25,000 adults were randomised to take vitamin D (cholecalciferol; 2000 IU daily), ω -3 fatty acids (1 g daily), both, or neither for 5 years.

Investigators assessed the effects of these interventions on new-onset autoimmune disease. The difference between groups was barely statistically significant. The newly diagnosed autoimmune disease was less common in patients taking omega-3 fatty acids than in the placebo but not statistically significant. Those who took both supplements had a lower incidence of autoimmune disease.

What is causing your loss of SMELL AND TASTE?

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We take our sense of smell for granted. But have you ever imagined losing your sense of smell? Food tastes different without your sense of smell, you cannot smell a flower, and you could be in a dangerous situation without realising it! Find out the following causes of smell loss:

The smell-taste connection: Taste usually follows the smell. Because your nose's olfactory area controls both. Your nose determines whether that sweet taste is from a grape or an apple. Food does not taste the same when you cannot smell it.

Age: As you age, you lose some of the olfactory nerve fibres in your nose. This often affects your ability to notice salty or sweet tastes first.

Illness or infection: Anything that irritates and inflames the inner lining of your nose, such as cold, allergies, COVID-19, and makes it feel stuffy, runny, itchy, or drippy can affect your senses of smell and taste.

Obstructions: If you cannot get enough air through your nose, your

sense of smell suffers, and smell affects taste.

Head injury: Your olfactory nerve carries scent information from your nose to your brain. Trauma to the head, neck, or brain can damage that nerve, as well as the lining of your

As you age, you lose some of the olfactory nerve fibres in your nose. This often affects your ability to notice salty or sweet tastes first.



nose, nasal passages, or the parts of your brain that process smell.

Certain medical conditions: Doctors do not understand why, but the loss of smell can be an early warning sign of dementia, Alzheimer's, and Parkinson's disease.

Cancer and treatment: Certain kinds of cancer and treatment can change the messages between your nose, mouth, and brain, such as tumours in head or neck and radiation to those areas.

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 - Arterial Trauma
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- ✓ Congenital Vascular Malformations
- ✓ Diabetic Foot and Gangrene