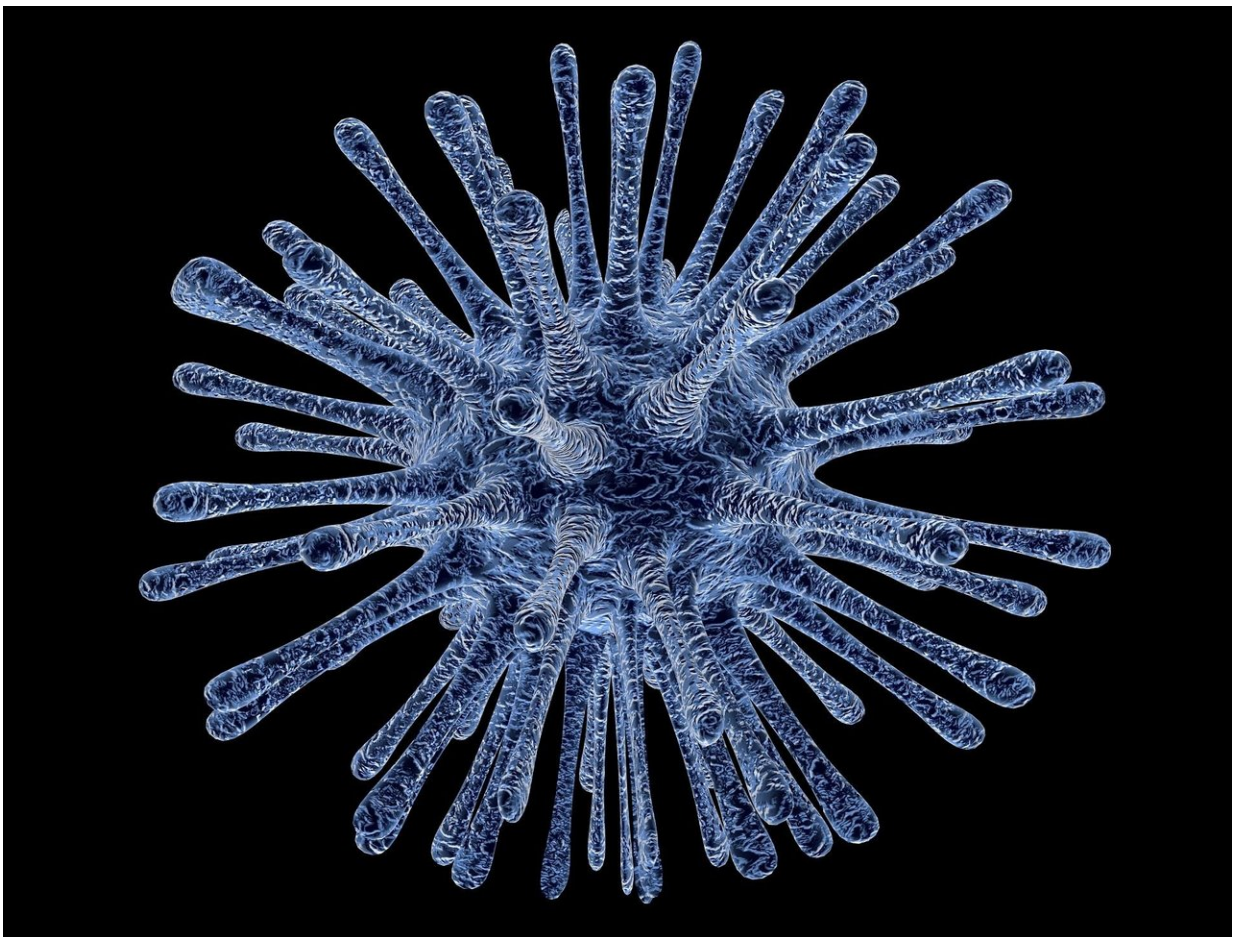


Discovery of immune cells able to defend against mutating viruses could transform vaccine development

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Scientists have found immune cells can fight different strains of the same virus—a discovery which could help transform vaccine development.

Vaccines become ineffective when a [virus](#) mutates, and tackling this problem is a priority for researchers. Vaccinations aim to stimulate the body to produce "memory" cells which provide long-lasting protection from disease. Until now it was thought that these cells could only remember—and be able to protect against—one particular strain of virus.

Researchers have now found the immune system can produce memory cells which have the ability to recognise different strains of the same virus, rather than just one. This could help scientists transform the way vaccines are produced and given.

Diseases such as influenza, Dengue fever and AIDS are caused by viruses which constantly mutate, allowing them to hide from the immune system and evade any response from their host. Current vaccines can provide good protection against particular strains of virus but fail to protect against new strains caused by genetic mutation. For this reason the influenza [vaccine](#), for example, has to be updated and administered annually, often with limited success, to pre-empt the appearance of new variant viruses.

Dr. Harry White, from the University of Exeter, who led the Wellcome Trust-funded research, said: "Trying to find vaccines which can protect people against different strains of virus is a focus for scientists around the world. So far, despite a large global effort, there has been limited success in the war against virus mutation.

"We have found the immune system is able to recognise threats from new strains of a virus. We have long known of the existence of different

types of immune memory cells, and now we know what these differences mean.

"After exposure to one strain of virus, these memory cells are then better able to recognise variants of the virus if they encounter them in the future. The immune system learns to protect against a whole group of related viruses, not just the one it experienced. It is this property that needs to be exploited to help make broadly protective vaccines."

The memory cells examined in this study are immature, or less developed, which allows them to more easily change and adapt to fight different viral strains. The antibodies from these cells are less focused on the infecting virus, but this is an advantage if the virus has mutated.

The research involved academics from the University of Exeter, University of Bristol and University of Birmingham testing the reaction of mice vaccinated with proteins from different strains of virus. Through painstakingly isolating hundreds of different individual cells and analysing the different antibodies each one made they were able to detect the presence of the immature cells that made these less focused antibodies. The mice which were immunised sequentially with proteins from different strains of the same virus produced more of these less developed memory cells.

Professor Rick Titball said "The holy grail for many scientists is to find a way of developing vaccines which work against all [strains](#) of a microorganism. This work could bring us a step closer to this and avoid, for example, the need to develop a new flu vaccine each year"

'Variant proteins stimulate more IgM+ GC B-cells revealing a mechanism of cross-reactive recognition by antibody memory' is published in the journal *eLife*.

Provided by University of Exeter

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