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Why 'T Cell Immunity' Won't End The Coronavirus Pandemic



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A bounty of new studies on immune cells and Covid-19 are the inspiration for the latest misinterpretation of Covid-19 research currently infecting social media, particularly among political supporters of President Trump.

A casual scan of Twitter shows that some early research from scientists investigating coronavirus and the immune system has been wildly misinterpreted. These social media posts claim that thanks to "T cell immunity," it will only take about 10-20% of the population to be infected

with SARS-CoV-2 to reach herd immunity—the point where the disease will slowly stop its spread. According to some dangerously optimistic tweets, this means the pandemic could be over by October.

It certainly sounds good, because who doesn't want the Covid-19 pandemic to be over? There's only one problem: According to scientists, this isn't at all how it works. Far from preventing infection, T cell immunity may at best lead to a less severe case of Covid-19 in individuals.

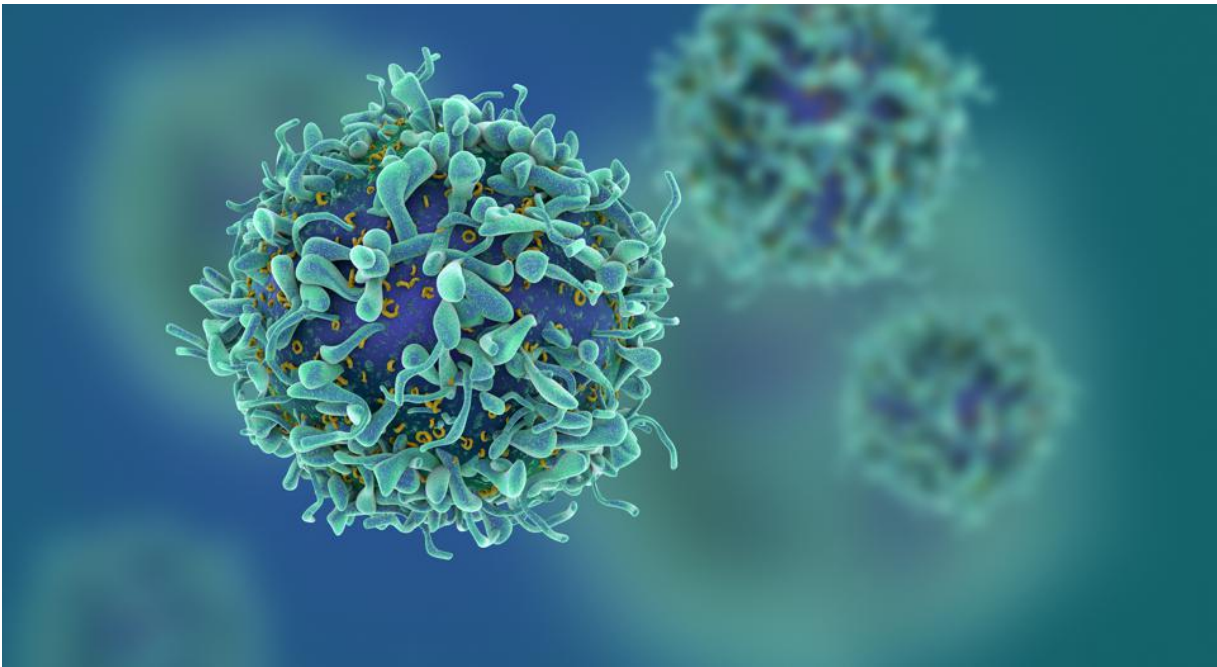
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And when it comes to this disease, “less severe” may just mean “not immediately hospitalized.” A [recent study](#) in *The Journal of the American Medical Association* found that some people who tested positive for Covid-19, but had mild or even no symptoms had myocarditis, an inflammation of the heart that can lead to serious damage or even heart attacks. Which shows that many of the dangers of Covid-19 are still unknown.

Still, that doesn't mean things are hopeless. To help clarify things, here's a rundown of scientific answers to your questions about how T cells work, what the recent research *really* tells us and what immunity from Covid-19 might look like.

What Are T Cells?



CG render of T-cells GETTY

Think of your body like a medieval castle under siege. That castle protects itself through means of both defense and offense: the innate immune system and the adaptive immune system. Just as a castle has built-in defenses, such as a moat, walls and drawbridge, the innate immune system is your body's bulwark against bacteria. Skin, mucous, stomach acid and other things are all designed to repel outside attacks. Should attackers breach your castle, your adaptive immune system acts as the archers, spies and knights against the invaders. They may take a little longer to get their armor on, but once they fight back they are able to use deadly precision. These are your body's B cells, which produce antibodies, and T cells.

T cells are hyper-specialized white blood cells, with each type of T cell taking on a specific role during the course of infection. Some T cells kill invading cells directly, while other T cells help activate B cells and stimulate them to make antibodies. Still others become "memory cells," which patrol the body for years after the initial infection to prevent reinfection from previously defeated viruses or bacteria. If these memory cells encounter a past foe, an immune response is activated. Certain types of B cells can also be memory cells, and quickly pump out antibodies if a recognized pathogen returns.

How Do T Cells Relate To Covid-19 Immunity?

SARS-CoV-2 is one of seven coronaviruses known to infect humans, four of which are prevalent pretty much everywhere and cause colds and other respiratory infections. “Most people have been exposed [to a coronavirus] by early childhood,” says John Wherry, an immunologist at the University of Pennsylvania.

Those childhood infections lead to the creation of memory T-cells, and several [recent papers](#) have shown that memory T cells from other coronaviruses recognize SARS-CoV-2, the virus that causes Covid-19. Not with a lot of specificity—to use an analogy, the T-cells can recognize that it’s an enemy soldier in uniform, but can’t tell what the soldier’s rank is or what their specialty is. Still, that’s enough to at [least sound the alarm](#): at least 20-50% of people who have not been exposed to Covid-19 may already have T cells that will activate and defend against the disease.

Does This Mean That 20-50% Of People Are Already Immune To Covid-19?

Some politicians, including new Covid-19 task force member Scott Atlas, have allegedly suggested that due to cross-reactive immunity the pandemic could be over as early as October. Scientists disagree.

“No, not correct,” says Wherry.

That’s because a T cell recognizing the coronavirus doesn’t mean you won’t still get sick. T cells are only activated when the virus is already replicating inside a cell, so by the time cross-reactive memory T cells get involved, you’ve already been infected. All sounding the alarm does is get your body’s immune system to work more efficiently, meaning that you may end up with a less severe illness than you would have had otherwise. Emphasis on “may,” because there’s still a lot we don’t know.

“Even if our most optimistic speculations about cross-reactive T cell memory were found to be correct,” says Shane Crotty, an immunologist at the La Jolla Institute for Immunology, “the most likely effect would be not a prevention of SARS-CoV-2 infections. Instead, the cross-reactive T cell memory would reduce the disease severity, such that fewer people would become severely ill or die from COVID-19.”

How Does This All Relate To Herd Immunity?



"Herd" immunity is important to fighting the Covid-19 pandemic. GETTY

Herd immunity means that once a certain percentage of people in a population are immune to Covid-19, the disease stops spreading in that population. Think of it like traffic lights: even if there's a green light up ahead, you won't be able to drive through it if you keep hitting red lights on the way. Researchers think that to stop the spread of Covid-19, about 70% of the population must be immune to the virus.

Recently, an idea has been trending on social media suggesting that hard-hit regions, like New York or Sweden, have already reached the herd immunity

threshold. But that isn't how it works, says Crotty. "Corners of the Twittersverse started adding up 20% of the population (e.g., in NYC) who had recovered from Covid-19, plus the 50% of individuals who have cross-reactive T cells, and falsely concluded that we now have reached herd immunity because $20\% + 50\% = 70\%$," he says, referencing some viral social media posts making this claim. "That's just incorrect immunology."

There are two ways to get herd immunity against Covid-19: either 70% of the population gets sick, or 70% of the population gets a vaccine that protects against Covid-19. Currently, more than 160 groups around the world are working to develop a vaccine against Covid-19. No vaccines have been approved in the U.S. yet, but several companies, including Moderna and Pfizer, are testing their vaccines in Phase 3 clinical trials. Most experts predict that the earliest an effective Covid-19 vaccine could be approved is 2021.

That said, a vaccine or even natural herd immunity isn't a silver bullet. Just as you have to get a flu vaccine every year, Covid-19 may also require regular shots to stay protected. And just as public health experts are constantly on the lookout for new, more dangerous forms of the flu, the same might be true for coronaviruses.

So, What Do We Do Until 2021?

"If you want something that will make it easier to achieve herd immunity, our public health practices will do that," Wherry says. This includes continuing to practice social distancing, wearing masks, and tracking what regions have high transmission of the disease. Keep washing your hands and while you're at it: get a flu shot. Experts warn that as we get into flu season, the one-two punch of influenza and coronavirus has the potential to increase the severity of both.

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