

## Smoking or Vaping May Increase the Risk of a Severe Coronavirus Infection

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Smoking or vaping could make you more vulnerable to a severe infection with the novel coronavirus, some experts say.

Although there have not been many studies investigating this link specifically, a wealth of evidence suggests that smoking suppresses immune function in the lungs and triggers inflammation. There have been far fewer investigations of vaping, but preliminary research suggests it may do similar damage. And both long-term smokers and e-cigarette users are at a heightened risk of developing chronic lung conditions, which have been associated with more severe cases of COVID-19, as the disease caused by the new virus is called. Scientists say it therefore seems reasonable to assume that smoking—and possibly vaping—could increase the risk of developing a serious infection from the coronavirus.

“All these things make me believe that we are going to have more severe cases—especially [in] people who are [long-term] smokers or vapers,” says Melodi Pirzada, chief of pediatric pulmonology at NYU Winthrop Hospital on Long Island.\* She has not treated COVID-19 patients herself, “but it is definitely common sense to think that once you have a history of smoking or vaping, the whole airways, the defense mechanism of your lungs—everything changes,” she says.

Very little research has looked directly at whether smoking or vaping increases a person's risk of severe COVID-19. A preprint study in China found that men were slightly more likely than women to be hospitalized for coronavirus infections, and scientists say this observation could be related to the fact that in the country, vastly more men than women smoke. (The paper, which has not been peer-reviewed, has been withdrawn because it was based on early data. It will be replaced with a more up-to-date version soon, the authors write.) Another study, which has been published online in the *Chinese Medical Journal*, involved 78 patients with COVID-19 and found that those with a history of smoking were 14 times as likely to develop pneumonia.\*\*

There is substantial scientific literature showing that smoking inflames the lungs and suppresses immune function. "For regular smoking, we know it inhibits the ciliary clearance of the airways," Pirzada says. "We have these little [hairlike] structures known as cilia, and they are responsible for taking the toxins and the mucus out of our airways and clearing the lungs when we cough. We know that that is affected when you smoke and when you vape."

During a respiratory infection in the lungs, there tends to be an influx of white blood cells called neutrophils—the first responders that start killing the pathogen—followed by an influx of lymphocytes—which are responsible for clearing the infection. "There's a very coordinated series of events that take place when you do become infected with a virus," says Ray Pickles, an associate professor of microbiology and immunology at the University of North Carolina at Chapel Hill. "These are probably the events that take place in the vast majority of us as individuals, whether we're infected by influenza or whether we're infected by SARS-CoV-2," as the new coronavirus is known. "I think once you start perturbing this sequence of events in any which way or direction, that's when things can go awry."

Smoking is a known risk factor for influenza, says Robert Tarran, a professor of cell biology and physiology at Chapel Hill. "People who smoke are immunosuppressed to some degree," Tarran says. "They make more mucus. It doesn't clear the lungs as well. There are pro-inflammatory changes; immune cells are changed as well. And all that leads up to, basically, they're more likely to get viruses and have a worse outcome."

Vapers' risk of viral infections has not been studied much, although there are some epidemiological studies suggesting they are more likely to get respiratory infections, Tarran says. And animal studies provide some clues. Mice that were exposed to e-cigarette aerosol and then inoculated with *Streptococcus pneumoniae* bacteria or influenza A were less likely to survive. And vaping may interfere with neutrophil function, some studies suggest. Scientists at Chapel Hill have shown that e-cigarette use suppresses the activity of immune- and inflammatory-response genes in nasal cells—more so even than smoking. And a preprint study found that the gene that encodes the receptor ACE2, which the novel coronavirus uses to infect cells, is more active in smokers than nonsmokers.

Of course, none of these studies directly show that smoking or vaping increases the severity of COVID-19 infections; it is not clear to what extent they can be extrapolated to the current pandemic. But given that smoking and vaping do well-established harm to the immune system, it seems prudent to assume they might make coronavirus infections worse.

"I think that a sensible thing to do for people is to stop smoking and stop vaping—and avoid secondhand exposure," says Stanton Glantz, director of the Center for Tobacco Control Research and Education at the University of California, San Francisco. "We don't have every little detail on this nailed down," he says. "But based on what we know, generally, about smoking and e-cigarettes—and in particular about smoking and COVID-19 from people who are already sick, from one study in China—it stands to reason that you would lower your risk if you stopped doing these things." After all, Glantz adds, "what's the downside?"

*\*Editor's Note (3/17/20): This sentence was edited after posting to update Melodi Pirzada's title.*

*\*\*Editor's Note (3/19/20): This sentence was edited after posting to correct the figure for the increased risk of pneumonia.*

*Read more about the coronavirus outbreak [here](#).*