

CORONAVIRUS

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COVID-19 can be spread by building ventilation, argue Canadian researchers working on an HVAC fix

A group of Alberta researchers are working on ways that buildings could change their HVAC set-ups to curb the risk of infection



An African restaurant is closed off along with other businesses in Guangzhou's Sanyuanli area, where a neighborhood is in lockdown after several people tested positive for the novel coronavirus disease (COVID-19), in Guangdong province, China April 13, 2020. REUTERS/David Kirton



TOM BLACKWELL

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4:30 PM EDT

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The outbreak of COVID-19 at a restaurant in the southern Chinese city of Guangzhou was a puzzle.

The suspected index patient was a visitor from the coronavirus's epicentre in Wuhan. But the eight other customers who later tested positive were not sitting close enough for droplet transmission, and most of the patrons and staff avoided infection altogether.

A team of local scientists eventually came to an eye-opening conclusion about the episode: tiny particles of virus had hitched a ride on currents created by the eatery's air-conditioning.

That runs counter to the prevailing view that the novel coronavirus is transmitted only by heavier "droplets." But for a group of civil engineers at the University of Alberta, the finding was no surprise. In their world, they say, it's well known that building ventilation systems are efficient disseminators of viruses and other pathogens, and they believe the COVID-19 bug is no exception.

Aided by a \$440,000 [federal-government grant](#), they're now working on ways that buildings could change their HVAC set-ups to curb the risk of infection, what the researchers call a "non-pharmaceutical" intervention against the disease.

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STORY CONTINUES BELOW

We want to save lives, let's cut right to the chase



“We want to save lives, let’s cut right to the chase,” said Prof. Brian Fleck, part of the project. “There are so many, many, many buildings ... This affects absolutely everybody. Billions of people. If we are able to cut down the transmission rate by a per cent, that’s a lot of people.”

The engineers’ belief in the importance of building ventilation as a transmitter of the COVID-19 virus is not universally held.

The World Health Organization and [other public-health bodies](#), citing the science to date, say the pathogen is spread almost entirely by droplets, heavier particles emitted mostly when infected people cough or sneeze, and which fall down within a short distance. Hence the two-metre rule for social distancing, and the emphasis on washing hands after touching surfaces where virus may have alighted.

“The HVAC systems in most non-medical buildings play only a small role in infectious disease transmission, including COVID-19,” argued the [American Society](#) of Heating, Refrigerating, and Air-Conditioning Engineers last month.

It’s just smaller and lighter aerosol particles that can spread through a ventilation system and “the truth is that we still don’t really know if the (COVID-19) virus can be spread by aerosols,” said [Matthew Miller](#), a virus expert at McMaster University in Hamilton.

But Chinese and Australian air-quality experts, citing in part the experience with SARS, another coronavirus, [argued in a paper](#) earlier this month that as droplets from an infected person start to evaporate, the resulting smaller

particles can indeed become airborne.

They point to evidence that passengers confined to their cabins on cruise ships like the Diamond Princess may have been infected through the vessels' air ducts.

"It is highly likely that the SARS-CoV-2 virus also spreads by air," they conclude, urging "all possible" action in response, including modifications to ventilation systems. "We predict that ... failure to immediately recognize and acknowledge the importance of airborne transmission and to take adequate actions against it will result in additional cases."

Then there was the Guangzhou restaurant case, detailed in a U.S. Centers for Disease Control online journal recently. [Researchers concluded](#) flow from an air conditioner moved over three tables, carrying virus from the infected patron at the middle one to the far table, then back to the diners closest to the air conditioner.

Even if it turned out SARS-CoV-2 does not spread that way, influenza viruses can, and the University of Alberta research would be valuable for that reason alone, said Miller.

Heating, ventilation and air conditioning (HVAC) engineers have long known that tiny particles of pathogen travel in the air that is circulated, heated and cooled in modern buildings, said Fleck. He pointed to Legionnaires disease, a bacterial pneumonia first traced to a hotel's air-conditioning system.

The particle can stay airborne long enough to go all the way through the system and then pop out in somebody else's office



"This has been on people's radar for quite a while," he said. "Somebody on a different floor sneezes ... The particle can stay airborne long enough to go all the way through the system and then pop out in somebody else's office."

There are various ways that the risk can be lessened, including use of filters that catch a greater number of those particles, and drawing more fresh air into a system. It also is likely that higher levels of humidity – a factor that only some Canadian buildings can adjust – will help kill off the virus, said Fleck.

But each of those changes carries a cost. Adding more fresh air can require additional heat or air conditioning. Heavier filters means more energy is needed to push the air through them. And more humidity can lead to mould,

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he noted.

“This will make for difficult decision making.”

Funded by the Canadian Institutes for Health Research, the University of Alberta project is led by engineering professor Lexuan Zhong and also involves pediatrics professor Lisa Hartling. It consists of three phases: systematically reviewing literature on air circulation and viruses, determining what strategies would be effective and then carrying out a detailed audit of all the buildings on the Edmonton campus to create a real-world model of what should be done.

The team hopes to have solid results by the summer of 2021, said Fleck.

(Modified 12:40 April 26 to add comments by Matthew Miller.)

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Buck Baldwin 24 MIN AGO

Heavy-duty UV filter/purifiers for HVAC systems will kill viruses as well as mold, mildew, fungi, and bacteria, and should become standard equipment in all office, retail, commercial ventilation systems. One doesn't have to redesign the entire system, just add it to air-supply side of the ductwork. Oh, and maybe do a major duct cleaning at the same time.

One can even gets systems like this for one's home.

REPLY 1 REPLY 1 0



Buck Baldwin 13 MIN AGO

Reply to **Buck Baldwin**

One additional note. One can have an effective air purification system but still pick up pathogens from hand-to-surface contact, so that regular hand cleaning is still required.

REPLY 1 0



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jean marc retrouvey 35 MIN AGO

I just hate these airtight buildings that make us sick. Too hot, too cold, air of poor quality. I now live with my windows open as much as possible in a city that is not overpopulated nor overpolluted and stopped being sick. Strange

REPLY 1 REPLY 3 0



jim james 28 MIN AGO

Reply to **jean marc retrouvey**

anecdotal evidence dude. it lacks expert peer review. but just between you and me i think you're on to something....

REPLY 0 0



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Roy Lee 35 MIN AGO

Covid-19 has an R0 rate of 2-3 (estimates vary widely). That means the average infected person goes on to infect a few others. Think of how long a person is spreading the virus, the potentially thousands of contacts in the community. Out of all those contacts, only the top 2-3 most intimate contacts will get infected. So while its possible the virus may spread through ventilation systems, the viral load for this virus is likely insufficient to infect someone.

REPLY 0 0

BM

Barry Monette 37 MIN AGO

Could be big for anything where crowds go inside - stadiums, arenas, hockey rinks, shopping malls, etc. With some study and change the HVAC systems might also disseminate healthy stuff? EDITED

REPLY 0 0

JJ

jim james 38 MIN AGO

anyone with a brain knows viruses spread this way and how they spread or don't spread depends on the size of the droplets which depends on the particular cougher/sneezer/wheezer. every time i hear some "expert" in whatever field say "we have no evidence as yet of blablabla therefore blabla doesn't exist". it makes me think of when the official position was a flat world while sailors with a brain could see the curve of the earth from watching the apparent motion of objects on the horizon. but i guess all the sailors had was anecdotal evidence. gee...but thats where ya start right??

REPLY 2 REPLIES 1 0

BM

Barry Monette 31 MIN AGO

Reply to **jim james**

Anybody who used the stars to navigate knew the world was curved. Some humans knew this for thousands of years, particularly those who used boats for more than a day trip. My guess anyway.

REPLY 1 REPLY 0 0

JJ

jim james 20 MIN AGO

Reply to **Barry Monette**

you know it. but then that makes you wonder why some fight so hard at any given time against knowledge that's right in your face and may change things for the better. it makes you ask "what do they have to gain by this?". anyway, to a casual observer sitting in his back yard its pretty plain to see that the moon goes around us and we go around the sun. the shadow, the angles, the procession of the stars throughout the year. elementary stuff to those who look up. that explains all the astronomical observatories that were built. its not that those people were so smart...it was that no one was brow beating them about what they could believe. they pursued what ever they thought.

REPLY 0 0



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