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Is Covid-19 Airborne?



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Airborne transmission of Covid-19 starts with exhaled droplets GETTY

One of Covid-19's hottest topics is the possibility and scale of airborne transmission. Since the onset of the pandemic, the [World Health Organization](#) has maintained that the likelihood of airborne transmission is low and that virus transmission is primarily through contaminated surfaces and large droplets caused by talking, coughing, and sneezing.

Based on contact and large droplet transmission, prevention measures such as sanitizing surfaces, washing hands, wearing masks, and maintaining six or more feet of distance from others should be quite effective. However, there are several [reports of infections](#) where there has been no reported physical or droplet contact and [evidence of airborne transmission continues to mount](#).

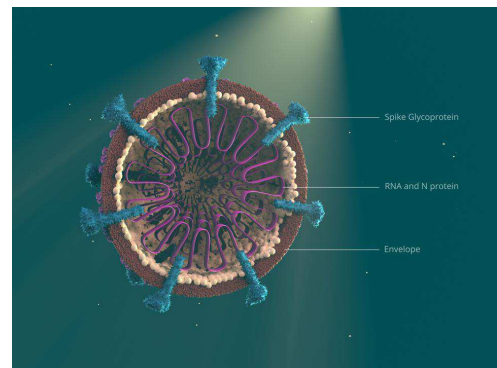
What is airborne transmission?

The key difference between airborne and droplet transmission is that large droplets fall to the ground within about six feet. Although the generality of this rule has been [contested](#), the agreed upon exception is that very small droplets around five micrometers across or less — called aerosols — may remain aloft for a long period of time. Aerosolized particles not only remain around for long periods but can also be carried on [air currents](#), thus moving further than droplets. Once Covid-19 virus particles are aerosolized, they could be stable and infectious for up to [16 hours](#).

What is the evidence for airborne spread of Covid-19?

It has proven difficult to determine just how many Covid-19 clusters or individual cases should be attributed to aerosols. A key reason lies in the difficulty of culturing SARS-CoV-2 (the virus that causes Covid-19) collected from the air. The delicate viral envelope can be [damaged in the process of aerosol collection](#), yielding low recovery of virus particles in culture. The alternative to collecting and culturing viruses is sampling for their RNA. The problem there lies in that although Covid-19 RNA may be present in a sample, it does not prove the presence of live virus. Fundamentally, this is a measurement problem.

Although direct evidence of airborne transmission has been hard to find, many studies have found plenty of indirect evidence. One [analysis](#) summarized data from fourteen hospitals that collected air samples from rooms of patients with Covid-19. Of these hospitals, half collected air samples that were positive for Covid-19 and two had collection points six or more feet from the patient, suggesting the escape of particles from the six



Structure of SARS-Cov-2 showing key features of the virus particle including the viral envelope. GETTY

foot zone. This implies that these were the lighter aerosols rather than the larger droplets.

Another [study](#) isolated viable virus from six to almost fifteen feet from two positive patients. Although some medical procedures such as [ventilation or intubation](#) generate aerosols artificially, these patients were not subject to these procedures. This suggests that infectious aerosols may be generated naturally by Covid-19 patients.

There is also evidence from case studies. In one instance, [diners were infected at a restaurant](#). The ten individuals were seated among three adjacent tables. Researchers reviewed video footage from the restaurant and determined that there was no direct contact among tables or sharing of possibly contaminated objects (known in medical language as “fomites”). The tables were also as much as fifteen feet apart. Subsequent measurements of airflow in the restaurant combined with computer simulations show that the pattern of infection distribution is most consistent with aerosols generated via ordinary exhalation.

Another outbreak implicating airborne transmission occurred on a [tour bus](#). Of the 49 people aboard the bus, eight were infected by a single index patient. Most interestingly in this outbreak, one of the individuals who became infected sat fifteen feet from the index case and entered and exited via a separate door, practically eliminating the possibility of contact spread.

The bottom line is we still don't have watertight, direct evidence that Covid-19 is airborne, but the indirect case is overwhelming. What will be more challenging is to quantify just how many cases are caused by aerosolized virus particles and what interventions may be most effective at stopping spread.

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