



CAN AIR-PURIFIERS PROTECT YOU FROM SARS-CoV-2?

We know that droplets and aerosols with SARS-CoV-2 virus particles are released from the nose or mouth of an infected person not only when they cough or sneeze, but also when they speak or breathe out. In fact, the rate of aerosol generation is directly proportional to speech volume.

Large droplets, thought to be major carriers of viral particles, tend to immediately fall downwards, and settle onto surfaces within a radius of 2 m (or 6 feet). Most common domestic air filters circulate only small volumes of air at a time, taking a while to sample the entire air in the room. Therefore, most infectious droplets would likely settle down before reaching the filter, rendering the filter ineffective.

Being smaller in size, aerosols do not settle down easily, and can be carried to the filter in an air purifier. Aerosols with infective particles are more likely to be generated during certain medical procedures in a hospital, where air purification may be more critical (see **Box 1**). However, the role of aerosols in transmission of the SARS-CoV-2 infection ('airborne' transmission) is not clear yet. According to the World Health Organization (WHO) and Centers for Disease Control and Prevention (CDC), this virus spreads primarily through proximity and contact.

Manufacturers of domestic air purifiers claim that SARS-CoV-2 exhaled by infected persons can be removed by their product. However, only HEPA (High Efficiency Particulate Air) filters can do this. According to a NASA study (2016), these filters can remove over 99.9% of particles smaller than a micron (1000 nanometers). Since the diameter of SARS-CoV-2 is about 0.125 microns (125 nanometers), it can be captured by a HEPA filter.

Box 1. Did you know?

Notably, air sampled from hospital rooms of COVID-19 patients did not have detectable RNA from viruses, although various surfaces in the rooms as well as air vents did test positive for viral RNA. This suggests that the potential for transmission through surfaces could be greater than through contaminated air. However, rooms sampled in the study routinely underwent a complete air exchange; and the study sampled a relatively small volume of air. Hence, further tests are needed to confirm whether infection is more likely to be transmitted via contaminated surfaces or via air flow in a closed room.

Not all air purifiers sold in the market have HEPA filters. However, the efficacy of even HEPA-fitted air-purifiers in reducing the risk of SARS-CoV-2 infection is questionable, since these purifiers take time to filter all the air in a closed room. If an air purifier with HEPA filters is used in a COVID-19 patient's room, the filter must be cleaned frequently, and proper protection and sanitation measures must be used while cleaning.

In a domestic setting, the concentration of shed viral particles can be reduced by maintaining good circulation of fresh air. This can be achieved, for example, by opening the windows, and regularly disinfecting surfaces. Currently, there is no evidence showing that HEPA certified air purifiers are more effective than this simple strategy.

Notes:

1. This response was first published on the Indian Scientists' Response to CoViD-19 (ISRC) website.
2. Source of the image used in the background of the article title: https://commons.wikimedia.org/wiki/File:HEPA_Filter.png. Credits: BruceBlaus, Wikimedia Commons. License: CC-BY-SA.

Indian Scientists' Response to CoViD-19 (ISRC) is a group of more than 500 Indian scientists, engineers, technologists, doctors, public health researchers, science communicators, journalists and students who voluntarily came together in response to the COVID-19 pandemic. This group can be contacted at indscicov@gmail.com.