

NIH News in Health

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Clearing the Air All About Airborne Viruses

Nobody likes being sick with a virus. It can feel even worse if you get your loved ones sick, too. But you can keep your family healthier by learning ways to prevent viruses from spreading.

Some viruses, like other germs, can live on surfaces. You become infected when you touch them and then touch your eyes, nose, or mouth. But many viruses can spread through the air. These are called airborne viruses. A range of illnesses—from mild colds to the flu to COVID-19—are caused by airborne viruses.

The COVID-19 pandemic shed new light on how viruses spread. During the pandemic, scientists learned that viruses can linger for a long time in the air. In fact, this may be the main way that many of them infect people.

Researchers are now taking a closer look at how viruses spread through the air and testing ways to clear out germs.

A Sea of Aerosols • Every time you talk, sneeze, sing, or cough, you breathe out more than just air. You also exhale lots of tiny fluid particles. These come in a wide range of sizes. The larger ones, called droplets, fall quickly to the ground. These typically travel less than 3 to 6 feet. But the smallest particles, called aerosols, can hang in the air for minutes or even hours. They are able to travel through the air further than 6 feet.



Just as you breathe out aerosols, you can also breathe in aerosols that others exhale. And some viruses can hitch a ride in them. The more viruses that are in the air, the more likely you are to breathe them in and become infected.

Studies have found SARS-CoV-2, the virus that causes COVID-19, in aerosols. This is now thought to be the main way the virus spreads.

Dr. Donald Milton, who studies airborne viruses at the University of Maryland, recently measured how often virus is exhaled by people with the flu. He found that about 80% exhaled some influenza, the virus that causes flu. Most of the virus was found in the tiny airborne aerosols. People didn't have to cough or sneeze to expel these viruses into the air. The flu virus was detectable in the

air after normal breathing and talking.

Other illnesses are also caused by viruses that are airborne. These include the common cold, respiratory syncytial virus (RSV) infections, measles, and severe acute respiratory syndrome (SARS).

Exactly how many particles you need to inhale to get sick isn't clear. And how many you breathe in can depend on many different factors.

Spreading Indoors and Out • How much virus is floating around in the air depends on where you are. Indoor spaces tend to be poorly ventilated compared

to the outdoors. Outdoors, aerosols can float off or blow away. In a building with poor ventilation, there's nowhere for the aerosols to go.

When aerosols collect in the air, you're more likely to breathe them in and get infected. That's why many outbreaks of COVID-19 were traced to places with poor ventilation where people were talking loudly or singing—such as restaurants, bars, or places of worship.

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Good airflow can quickly clear indoor air of aerosols. This lowers the chance that people will breathe in enough viruses to become infected.

Some viruses, like the flu, are known to spread more rapidly during the colder seasons. People tend to spend more time indoors when the temperature drops. But other factors may also affect how easily viruses spread during cold weather.

Certain viruses, including the flu, last longer in cold temperatures. And humidity, or how much water is in the air, drops in colder air. Humidity can affect how well viruses spread. One reason may be that moisture aids the mucus flow in our airways. This flow helps to clear out viruses.

Studies also suggest that the flu spreads better at lower humidity. Dr. Seema Lakdawala, a flu researcher at Emory University, has found that

flu viruses in aerosols can survive over a wide range of humidity levels. So, humidity might not harm the viruses themselves. Instead, it may affect their ability to stay in the air.

At lower humidity, Lakdawala explains, water from aerosols will evaporate. This causes them to shrink, allowing them to stay in the air longer and travel farther. At higher humidity, aerosols might absorb water from the air, causing them to fall faster.

Preventing Infection • With all these viruses floating in the air, what are the best ways to stay healthy?

“A lot of the lessons we learned from the COVID-19 pandemic are tools that we can apply every day,” Lakdawala says.

Getting CDC-recommended vaccines can help your body fight off germs. Maintaining a healthy lifestyle can also help keep you from getting ill. That includes a healthy diet and enough physical activity.

Face masks trap fluid droplets coming from your mouth and nose. This can stop viruses from spreading through the air. Masks can also protect the people wearing them.

Researchers are studying other ways to help lower the number of viruses in the air. These include improving building ventilation, air filtration, and even disinfecting the air with **ultraviolet light**.

Dr. Peggy Sue Lai, a lung doctor at Massachusetts General Hospital, is studying how to improve indoor air quality in schools. “We have detected multiple respiratory viruses in the air of classrooms,” she explains.

If school buildings aren’t well-ventilated, these viruses can build up. But upgrading a building’s heating, ventilation, and air conditioning (HVAC) system to improve ventilation can cost a lot of money, particularly in older buildings. Schools might not always have the funds to make the necessary upgrades.

Lai is testing how well portable air purifiers with high-efficiency particulate air (HEPA) filters reduce virus levels in classrooms. She hopes this could be a less costly alternative to upgrading an HVAC system. But to work effectively, they need to be used correctly. Different air purifiers are designed for different-sized rooms.

“A small air purifier you buy for your bedroom, for example, is not going to work in a large, crowded public space, like a school classroom,” Lai explains. It also needs to be placed properly to ensure that all the air in the room reaches the purifier.

Lakdawala points out that no single strategy will be 100% effective at preventing infections. So she recommends using a combination of strategies to slow the spread of viruses. See the Wise Choices Box for ways you can help prevent airborne virus spread. ■

**Definitions****Ultraviolet light**

A type of energy that comes from the sun and artificial light sources like sun lamps and tanning beds.

NIH News in Health

ISSN 2375-6993 (Print) ISSN 1556-3898 (Online)

Editor Harrison Wein, Ph.D.

Managing Editor Tianna Hicklin, Ph.D.

Graphics Alan Defibaugh (illustrations),
Bryan Ewsichek (design)

Contributors Vicki Contie, Brian Doctrow, and
Tianna Hicklin

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National Institutes of Health
NIH...Turning Discovery Into Health®

Office of Communications & Public Liaison
Building 31, Room 5B52
Bethesda, MD 20892-2094
email: nihnewsinhealth@od.nih.gov
phone: 301-451-8224

**Web Links**

For more about airborne viruses, see “Links” in the online article: newsinhealth.nih.gov/2023/12/clearing-air

**Wise Choices****Reduce the Spread of Airborne Viruses**

- Maintain a healthy lifestyle to help your body fight germs.
- Stay up to date with all CDC-recommended vaccines. Learn more at www.cdc.gov/vaccines.
- Stay home when you’re sick so you won’t spread viruses. Reduce close contact with people who are sick to avoid getting and spreading illnesses.
- Improve indoor ventilation and air filtration. Open windows, use portable air purifiers with a HEPA filter, and turn on fans. Change your HVAC system filters frequently.
- Wear masks or respirators when in high-risk settings, such as in health care facilities, or if you are at high risk of getting very sick.



The Hazards of Hypothermia

Stay Warm in Cold Weather

Winter brings many opportunities for cold-weather fun. But it can also bring dangerous temperatures. As you venture outdoors this season, take care to keep yourself safe from cold-weather hazards like hypothermia.

“Hypothermia is when the body’s core temperature decreases below 95 degrees Fahrenheit,” says Dr. Basil Eldadah, an NIH aging expert.

Hypothermia can happen when you’re exposed to very cold temperatures for too long. If your body temperature drops too low, it can affect your ability to think clearly, walk, or talk. So acting fast when you see signs of hypothermia is important.

Signs of mild hypothermia include cold feet and hands, shivering, a

puffy or swollen face, or pale skin. You may also get sleepy, start to become clumsy, or become angry or confused.

“As hypothermia advances, there may be slurred speech, trouble walking, clumsiness, or stiff movements,” Eldadah explains. “Then, you may experience a slower heartbeat, a weak pulse, and slow or shallow breathing. It could even result in loss of consciousness in advanced stages.”

Anyone can get hypothermia when exposed to cold temperatures. But certain factors increase your risk. These include older age, young age, certain medications, and some illnesses. All can impact your body’s ability to regulate your temperature.

Certain diseases, like diabetes, heart disease, and hypothyroidism can impair your blood circulation. These kinds of diseases become more common with age. “A well-functioning circulatory system keeps our body temperature at the right place,” explains Eldadah.

Older adults may have difficulty controlling their body temperature for other reasons, too. With aging, our bodies have less ability to shiver and perform other internal actions that keep you warmer. Aging can also mean that you have less fat under your skin to insulate your body.

Certain conditions that are more common with age can make the cold more dangerous, too. Parkinson’s disease and arthritis can make it more physically difficult to get out of the cold. People with conditions that cause difficulty with thinking and memory, like dementia, may not dress appropriately for the weather changes.



“For older people, even mild exposure to cold environments can result in hypothermia,” says Eldadah. “People can get hypothermic in the summertime because their air conditioners are set at a very low temperature.”

But everyone needs to be careful when the temperatures drop. You can get hypothermia in cool weather just because you’re wet from sweat or rain.

“Be on the lookout for the signs and symptoms of hypothermia,” Eldadah says. Low body temperature can become dangerous before you know what’s happening.

The best way to prevent hypothermia is to protect yourself from the cold—indoors and outdoors. Bundle up if you have to go outside in cold weather. And remember to stay warm indoors and keep your home at a safe temperature. See the Wise Choices box for more tips to stay safe in cold weather. ■



Wise Choices

Protect Against the Cold

- At home, wear socks, slippers, and a hat. Or stay covered up with a blanket.
- Keep your heat set to at least 68°F or higher during cold weather. If you need help paying your heating bills, see if you qualify for the energy assistance program at liheapch.acf.hhs.gov/help.
- Wear a windproof and waterproof jacket if you’re heading into cold, rainy, windy, or snowy conditions. Dress in layers.
- If someone is showing signs of hypothermia, act fast. Get them out of the cold and into a warm room. Remove any wet clothing. Warm them up gradually. Cover them with warm blankets. Offer them warm drinks, but not alcohol. Avoid hot baths or heating pads. And take their temperature. If it’s below 95°F, get medical help immediately.



Web Links

For more about hypothermia, see “Links” in the online article: newsinhealth.nih.gov/2023/12/hazards-hypothermia





Health Capsules

For links to more information, please visit our website and see these stories online.

App Aids Autism Screening

Autism spectrum disorder (ASD) affects how a person behaves, communicates, interacts with others, and learns. It's called a "spectrum disorder" because symptoms can vary widely. Early diagnosis can lead to early treatment and improved outcomes. But ASD can be hard to diagnose.

Kids are often screened for ASD before age 3 at well-child medical visits. Screening is usually based on a caregiver questionnaire. But scientists have been looking for ways to improve early detection.

An NIH-supported research team created a mobile app that might help. While a child watches videos on a tablet, the app collects a wide range of data. It tracks the child's eye gaze, head movements, expressions, blinking, and other behaviors linked to ASD.

The app was tested in 475 toddlers, ages 17 months to 3 years. It correctly identified nearly 90% of the children who were later diagnosed with ASD. The app also identified over 80% of the kids who did not have ASD. The researchers now have

a new study underway to see if parents can effectively use the app at home.

"This screening tool captures a wide range of behaviors that more accurately reflect the complexity and variability found in autism," says Dr. Geraldine Dawson, who co-led the study along with Dr. Guillermo Sapiro at Duke University. "This app could help clinicians focus on the areas in which the child needs help, as well as identify areas of strength." ■

Yoga for Health: A New e-Book

A growing number of Americans are rolling out their mats and engaging in the ancient practice of yoga. Yoga has spiritual origins. But in recent years, it has become a popular way to improve physical health and mental well-being.

Have you considered trying yoga? How can you know if it's right for you? To help you find answers, NIH has created a new 40-page e-book called "Yoga for Health." This free e-book gives an overview of what the science says about yoga and its

impacts on health. It also offers tips on how to practice yoga safely.

Research suggests that yoga may help some people manage certain symptoms of disease. Several studies have looked at yoga and cancer, especially in women who have breast cancer. The studies found evidence that yoga can help to improve quality of life and reduce fatigue, anxiety, and depression.

Other studies have found that yoga may have health benefits for people who have multiple sclerosis,

Parkinson's disease, asthma, and more.

When it's done under the guidance of a qualified instructor, yoga is generally considered to be a safe form of physical activity for healthy people. But as with any type of physical activity, it is possible to get hurt. The e-book includes tips for reducing your risk of injury.

To learn more about yoga and health, visit go.nih.gov/NIHNiHDec23YogaeBook. ■



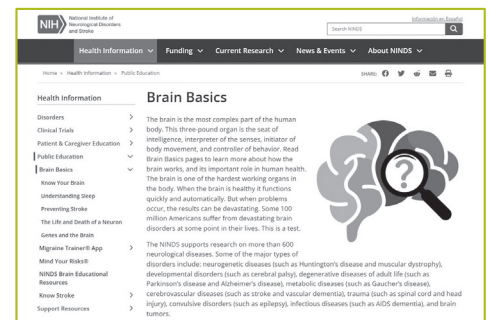
Featured Website

Brain Basics

go.nih.gov/NIHNiHDec23BrainBasics

The brain is the most complex part of the human body. It works quickly and automatically when it's healthy, but problems can be devastating. This web page can

help you learn more about how the brain works and its role in human health. Read about stroke, sleep, genes, and other factors that can affect the brain.



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