

# Respiratory

## What You Should Know About Germs

**G**erms are everywhere. For people with cystic fibrosis (CF), some germs or *pathogens* can cause major respiratory or lung infections. This pamphlet explains how germs are spread. It also lists some of the germs a person with CF may get.

### How Do Germs Spread?

Germs, like *bacteria* and *viruses* that cause respiratory infections, can spread from one person to another in many ways. The three main ways that germs are spread are (1) by **contact**, (2) in a **droplet** or (3) through very small remains of droplets that float in the air. These ways are known as **routes of transmission**, or (1) **contact transmission**, (2) **droplet transmission** and (3) **airborne transmission**.

Contact transmission is the most common way that germs are spread. Sometimes this is called **direct** or **indirect contact transmission**. Direct contact transmission



happens when there is actual body contact and transfer of germs from one person to another, such as by handshaking, hugging or kissing. Indirect contact transmission involves touching something with germs on it, such as sharing a toothbrush or cup or touching a doorknob. Indirect contact transmission also happens when you touch something with germs on it and then transfer the germs to yourself by rubbing your eyes or nose. Germs that are spread from one person to another by contact transmission include viruses that cause common colds, **respiratory syncytial**

**virus (RSV)** and CF-specific germs like ***Pseudomonas aeruginosa*** (*Pseudomonas*) and ***Burkholderia cepacia* complex (*B. cepacia*)**.

Droplet transmission happens when germs are spread in a tiny drop of liquid. When a person talks, sings, coughs, sneezes or

laughs, many invisible droplets are made. These droplets may contain germs. Droplets can be spread as far as three feet through the air. Transmission occurs when the droplets containing germs land in another person's eyes, nose or mouth. The **flu** (influenza) and **whooping cough** (pertussis) are spread this way.

Airborne transmission is the spread of germs over long distances or for a long time through the air. This happens on dust particles or by tiny particles that are made when talking, singing, sneezing, coughing or laughing. These are germs that can float in the air for a long time. They also can be carried long distances by air currents. Infection occurs when someone breathes in the germs that are floating in the air. **Tuberculosis (TB)**, **measles**, **chickenpox** and **Aspergillus** can spread this way.

## Germs and CF Health

Germs are disease-causing organisms. Respiratory germs are divided into three major groups: bacteria, viruses and **fungi and molds**. Many CF germs are



### PREVENT INFECTIONS

- Do hand hygiene.
- Keep vaccinations up-to-date.
- Use and throw away tissues.
- Clean and disinfect nebulizers.
- Avoid people who are sick.
- Do not share eating utensils or cups.



### RECOMMENDED VACCINES

- Diphtheria, Tetanus, Pertussis (DPT)
- Haemophilus B (Hib)
- Hepatitis B
- Influenza (flu)
- Measles, Mumps, Rubella (MMR)
- Pneumococcal
- Polio
- Varicella (Chickenpox)

spread by contact and in droplets from coughing, sneezing and nose-blowing. See the table "Germs in CF" on pages 6 and 7 to learn about some of the germs that people with CF may get.

Some of these germs, especially viruses that cause colds, the flu and RSV, affect people both with and without CF. However, people with CF who get respiratory viruses may get sicker because of CF lung disease. Other germs, such as the bacteria *Pseudomonas aeruginosa* and *Burkholderia cepacia* complex, are a lot more common and more harmful in people with CF than they are in other people.

Why do people with CF get more and tougher respiratory infections? The altered gene that causes CF leads to abnormal movement of salt in and out of the cells that line the lungs. This causes thick, sticky mucus to collect. The germs that affect people with CF thrive in this thick mucus. When germs

are in the lungs, white blood cells in the body come to attack the germs, which also may harm the lungs. The airways swell because of **inflammation** and make more mucus. More

germs thrive and the cycle continues. This cycle can be slowed with treatments like airway clearance to help remove the lung mucus, mucus thinners, antibiotics to kill bacteria and anti-inflammatory medicines to lessen swelling.

## Germs: Home Sweet Home

Germs have many homes—in the air, in soil and in humans. Humans are the natural home for most **contagious** germs, but some CF germs also can thrive in moist places like soil and water. Equipment (like a nebulizer) that touches mucus or **mucous membranes**, such as the mouth, or that is not cleaned well can be a home for germs. CF medicines that are stored or used the wrong way also can be a home for germs. If you let CF germs visit, they will move in!

People with CF can get germs from others with CF. People with CF also can get germs from people without CF. So, try to avoid people who are sick. Other germs come from the environment. For example, *Aspergillus* can cause respiratory infections and can be found in dust at construction sites.



### CLEANING WITH HAND GELS

1. Put a nickel-sized amount in the palm of one hand.
2. Rub your hands together. Make sure *all parts* of your hands, fingers and nails are rubbed with the gel.
3. Briskly rub your hands together until dry, often about 15 seconds.
4. Do not rinse or dry hands with a towel.

### WHEN TO CLEAN YOUR HANDS

- At a doctor's office, in the waiting room or in a lab;
- After coughing, sneezing and nose blowing;
- After using automated teller machines (ATMs), handrails, elevator buttons, public telephones, countertop pens and grocery carts;
- At shared play areas and gymnasiums.

## What Can I Do?

**EVERYONE** should get the **vaccinations** or shots recommended by the **Centers for Disease Control and Prevention (CDC)**. These **vaccines** help prevent illness. It is vital for you or your child to get all recommended shots. The relatives, day-care and health-care staff and close friends of those with CF also should get regular vaccines to prevent the flu and other infections. Ask your doctor which vaccines you or your child needs. Also, keep a record of what shots you and your child receive.

**Hand hygiene** or hand cleaning is the most important way to prevent the spread of germs that cause infections. **Airway clearance techniques (ACT)**, antibiotics and other medicines help to clear the lungs of mucus and treat the infection, but hand hygiene is the **BEST**

way to stop the spread of germs.

There are two ways to clean hands. The first is to wash your hands with soap and water (see "Hand-washing Steps"). **Antibacterial** soap is the best to use. The second is to use **hand gel**, also called antiseptic hand-rubs or **hand sanitizers** (see "Cleaning With Hand Gels"). A

hand gel with 60 percent or more of the active ingredient ethyl alcohol works the best to kill germs. Most hand gels are alcohol-based and clean hands quickly. They can work better than soap and water to kill germs. They do not work well if you can see dirt or **debris** on your hands. In that case, you must clean with antibacterial soap and water. To decide which method to use, follow this rule: If you see dirt or debris on your hands, wash with soap and water; if you do not see dirt or debris, use hand gel. It is a good idea to carry hand gel with you to use before eating and after blowing your nose, coughing, sneezing or shaking hands (see “When to Clean Your Hands”).

Everyone should use a tissue when coughing or sneezing. Always throw used tissues away in a trashcan. Remember, coughing can spread germs up to three feet (about an arm’s length). Stay at least three feet away from people who are sick or who have CF. Avoid being in enclosed or poorly ventilated areas with other people who have CF, such as in a car. Also, do not share respiratory equipment. Be careful in public exercise facilities.

### HANDWASHING STEPS

1. Wet hands with warm water.
2. Apply soap. Liquid, antibacterial soap is best.
3. Rub hands together to lather.
4. Scrub hands well, back and front, up to wrist, and between fingers. Clean under nails. This should take 15 seconds to complete.
5. Rinse in warm, running water.
6. Use a clean towel to dry your hands. Paper towels are best.
7. Turn off the faucet using the paper towel.

### B. CEPACIA POLICY

The CF Foundation has a policy that states that people with CF who have *B. cepacia* should not attend events sponsored by the CF Foundation (see CF Foundation *B. cepacia* Policy at [www.cff.org](http://www.cff.org)) because of the increased risk of spreading the germ.

Properly clean, disinfect and air-dry your or your child’s nebulizers. See “Respiratory: Stopping the Spread of Germs” on the CF Foundation Web site ([www.cff.org](http://www.cff.org)) to learn how to disinfect your nebulizers and other tips. You or your child also should avoid doing airway clearance in the same room with another person who has CF. Remember, germs are spread when coughing. Another way to avoid the spread of germs is to not share eating utensils, cups or soda or water bottles with anyone.

You cannot avoid germs. However, there are ways to lower the risk of catching and spreading germs. First, do good hand hygiene. Second, make sure you and your child get the recommended

vaccinations. Don’t forget to get a flu vaccine every year (see “Prevent Infections”). Your CF care team is a good resource for questions about how these germs may affect you, and research on these germs and their treatments. Ask your CF care team what else you and your family can do to avoid the spread of germs.

## GLOSSARY

**Airborne transmission:** The spread of germs through the air

**Airway clearance techniques (ACT):** Methods to loosen and clear thick, sticky lung mucus so it can be coughed out, like chest physical therapy

**Antibacterial:** Something that kills bacteria or stops it from growing

**Aspergillus or Aspergillus fumigatus:** A fungus found in nature that can grow in the lungs

**Bacteria:** Tiny organisms that can cause infections; antibiotics can kill most bacteria

**Burkholderia cepacia complex** (bur-cold-AIR-ee-ah sa-PAY-sha) or **B. cepacia:** A group of bacteria that can be spread between people with CF and can cause serious lung infections

**Centers for Disease Control and Prevention (CDC):** A federal government agency that works to prevent disease and protect health and safety

**Chickenpox:** An illness caused by a virus that easily spreads between people, and causes itchy blisters on the skin; a shot can prevent chickenpox

**Contact:** The touching of two surfaces, like a hand touching a cup

**Contact transmission (direct and indirect):** Spreading germs by body contact (direct) or contact with a contaminated item (indirect) (see *Contaminated*)

**Contagious:** Able to be spread from person to person, like an illness

**Contaminated:** When an item has something, like germs, on or in it that can cause harm

**Debris:** Remains of something like dirt, sputum, medicine or dried blood

**Direct contact transmission:** The spread of germs when two people touch

**Droplet:** A tiny drop of liquid that comes from the mouth, nose or lungs

**Droplet transmission:** The spreading of germs by droplets, as with sneezing or coughing

**Flu (Influenza):** An illness caused by a virus that can infect the lungs and cause sore throat, cough, chills, fever, muscle pain and weakness; a yearly vaccine can prevent the flu

**Fungi and molds:** Tiny organisms, like *Aspergillus*, that sometimes can cause infections in people

**Germ:** Organisms that can cause infections, like bacteria, viruses and fungi

**Hand gel:** A substance that has alcohol to kill germs as it dries

**Hand hygiene:** A general term for cleaning hands; this includes the use of soap and water or an alcohol-based hand gel

**Hand sanitizer:** See *Hand gel*

**Indirect contact transmission:** The spreading of germs when an object that has germs on it touches a part of the body

**Inflammation:** Swelling of a part of the body where there is an infection or injury

**Measles:** An illness caused by a virus, spread by very small remains of droplets that are spread through the air; a shot can prevent measles

**Mucous membranes:** Places in the body that produce mucus; these are found in the nose, mouth, lungs, esophagus, stomach and intestine

**Pathogens:** Germs that cause illness

**Pseudomonas aeruginosa (sue-duh-MOAN-us a-roo-gi-NOH-sa) (Pseudomonas):** Bacteria often found in the lungs of people with CF; it is a cause of many chronic lung infections

**Respiratory syncytial virus (RSV):** A virus that can cause severe respiratory infections, especially in young children and the elderly

**Routes of transmission:** How germs get from one person to another; this is done by contact (direct or indirect), from droplets or through the air

**Tuberculosis (TB):** A serious respiratory infection, spread by very small remains of droplets that are spread through the air

**Vaccinations:** Giving vaccines (shots) to prevent illness

**Vaccine:** A solution put into the body to build a defense against a disease

**Viruses:** Tiny organisms that can cause infections

**Whooping cough (pertussis):** A contagious bacterial disease spread by droplets, also called pertussis; a shot can prevent pertussis

GERMS IN CF		
GERMS	HOW GERMS ARE SPREAD	WHERE GERMS MAY LIVE
<p><u>Influenza (flu)</u> – A virus that anyone can get, though people with CF can get sicker than people without CF. There is a safe, effective vaccine that is given every year. People with CF older than six months, their family and their friends should get the flu vaccine every fall.</p>	Droplet Transmission	In anyone who has the flu.
<p><u>Common cold viruses</u> – Several different viruses can cause colds. They usually affect the upper respiratory tract (nose, throat). People with CF are not more likely to get colds, but sometimes they may get sicker than someone without CF.</p>	Contact Transmission	In people who have colds or on items handled by them.
<p><u>Respiratory syncytial virus (RSV)</u> – A virus that can cause severe respiratory infection and make babies, young children and the elderly very sick.</p>	Contact Transmission	In anyone who has RSV. RSV can cause the “common cold” in older children and adults. The virus can live on surfaces for six hours.
<p><u>Staphylococcus aureus (S. aureus)</u> (STAFF-i-lo-kok-us OR-ee-us) and methicillin-resistant <i>S. aureus</i> (MRSA) – Bacteria that are often the first germs to be found in CF lungs. MRSA is more resistant to antibiotics and harder to treat.</p>	Contact Transmission	In people who have <i>S. aureus</i> or MRSA on their skin or in their nose or lung.
<p><u>Pseudomonas aeruginosa</u> (sue-duh-MOAN-us a-roo-gi-NOH-sa) (<i>Pseudomonas</i>) – Bacteria that cause many respiratory infections in people with CF. By 1 year of age, 30 percent of people with CF have it in their lungs. By age 18, 80 percent have it. Sometimes it is resistant to antibiotics.</p>	Contact Transmission	Where <i>Pseudomonas</i> lives is often unknown. It could be in other people with CF, the environment, on <b>contaminated</b> respiratory equipment and other contaminated objects. It can live on surfaces for hours.



<p><u>Burkholderia cepacia</u> (bur-cold-AIR-ee-ah sa-PAY-sha) complex (<i>B. cepacia</i>) – A group of bacteria spread between people with CF. It can lower lung function quickly. In the United States, 3 to 4 percent of people with CF have this germ.</p>	<p>Contact Transmission</p>	<p>In other people with CF and on contaminated respiratory equipment.</p>
<p><u>Stenotrophomonas maltophilia</u> (<i>S. maltophilia</i>) – Bacteria resistant to many antibiotics that may cause respiratory infections in people with CF. The effect of an infection with <i>S. maltophilia</i> and how common it is in CF is being studied.</p>	<p>Maybe Contact Transmission but more research is needed.</p>	<p>Researchers are working to better understand <i>S. maltophilia</i>. It could be in the environment, contaminated respiratory equipment and other contaminated objects or in other people with CF.</p>
<p><u>Achromobacter xylosoxidans</u> (<i>A. xylosoxidans</i>) – Bacteria that may cause respiratory infections in people with CF. The effect of an infection with <i>A. xylosoxidans</i> and how common it is in CF is being studied.</p>	<p>Maybe Contact Transmission but more research is needed.</p>	<p>Researchers are working to better understand <i>A. xylosoxidans</i>. It could be in the environment, contaminated respiratory equipment and other contaminated objects or other people with CF.</p>
<p><u>Nontuberculous mycobacteria</u> (NTM) – A group of bacteria that may cause respiratory infections in people with CF. The effect of an infection with NTM and how common it is in CF is being studied.</p>	<p>Airborne Transmission</p>	<p>NTM is found in the environment or contaminated respiratory equipment.</p>
<p><u>Aspergillus fumigatus</u> – A fungus found in the lungs of people with CF. It can cause allergic bronchopulmonary aspergillosis (ABPA) in some people with CF.</p>	<p>Airborne Transmission</p>	<p>Found in nature, it gets into the air through building renovation, gardening, lawn cutting and water leaks that are not dried within 3 days.</p>

## Resources

The information in this pamphlet is based on “Infection Control Recommendations for Patients With Cystic Fibrosis: Microbiology, Important Pathogens, and Infection Control Practices to Prevent Patient-to-Patient Transmission” by Lisa Saiman, M.D., M.P.H.; Jane Siegel, M.D.; and the participants of the CF Foundation’s Consensus Conference on Infection Control. This document is available as a supplement to *Infection Control and Hospital Epidemiology (ICHE)*, May 2003, Volume 24, Number 5 ([www.ichejournal.com](http://www.ichejournal.com)) and as a supplement to *American Journal of Infection Control (AJIC)*, May 2003, Volume 31, Number 3 ([www.apic.org](http://www.apic.org)).

These Web sites have more information about stopping the spread of germs:

- The CF Foundation: [www.cff.org](http://www.cff.org). Contact the CF Foundation at (800) FIGHT CF or [info@cff.org](mailto:info@cff.org).
- Information about *B. cepacia* from the CF Foundation: [www.cff.org](http://www.cff.org)
- *Respiratory: Stopping the Spread of Germs*: [www.cff.org](http://www.cff.org)
- Teenagers & Germs: [www.kidshealth.org/teen/your\\_body/health\\_basics/care\\_about\\_germs](http://www.kidshealth.org/teen/your_body/health_basics/care_about_germs)

- Centers for Disease Control and Prevention (CDC): [www.cdc.gov](http://www.cdc.gov)
- Hand cleaning for adults and children: [www.cdc.gov/ncidod/op/handwashing](http://www.cdc.gov/ncidod/op/handwashing)  
[www.microbe.org/washup/importance](http://www.microbe.org/washup/importance)
- For hand cleaning tips, the Henry the Hand Foundation is a fun way to help children learn to clean their hands: [www.henrythehand.com](http://www.henrythehand.com)
- Vaccinations (Shots): [www.nlm.nih.gov/medlineplus/immunizationvaccination](http://www.nlm.nih.gov/medlineplus/immunizationvaccination)
- Infection Control: [www.nlm.nih.gov/medlineplus/infectioncontrol](http://www.nlm.nih.gov/medlineplus/infectioncontrol)

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