

Marvelous Masks

By Lori R. Stepan

Achoo! Imagine sneezing without catching it with a tissue, shirtsleeve, or mask. Drops of your saliva shoot out of your nose and mouth into the air. The drops eventually fall and land all over different surfaces and onto the floor. Some saliva remains in the air. A friend may even breathe in some of these tiny drops without realizing it. Gross!

As disgusting as sneezes may be, they serve an important purpose: to get whatever is irritating your nose, out! Breathing in pollen, dust, or pepper could make you sneeze. Having disease-causing viruses and bacteria in your nose could also make you sneeze. If you are carrying these, anyone who breathes in bits of your sneeze or who touches a place where parts of your sneeze landed (and then touches their eyes, nose, or mouth) may get sick. No wonder we were trained when we were little to cover our coughs and sneezes! Unfortunately, saliva and mucus also come out of our noses and mouths when we talk, sing, and even breathe.

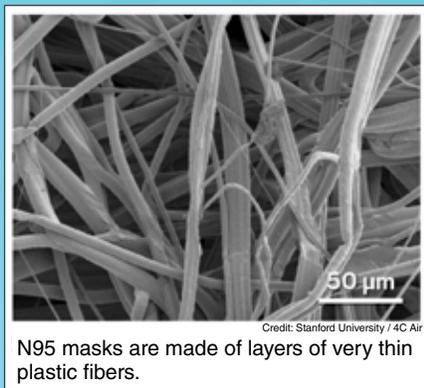
So how can we stay healthy? And how can we keep people around us healthy?

The power of masking

Many people choose to wear a fabric mask over their nose and mouth to prevent the spread of disease. Masks keep irritants (such as pollen) and germs (such as viruses and bacteria) from getting into our noses and mouths in the first place. They also keep our saliva and mucus contained so that the germs they may carry will not spread to other people.

Masks are simple forms of protection that are easy to use and inexpensive. They come in different colors, styles, and sizes, too. And many masks can be cleaned and reused. With all of these choices, how do you know if your mask is up to the task?

The way a mask is made affects how well it does its job. The tighter the fit, the better the mask. Particles and droplets should not be able to enter or escape around the edges of the mask. Tightly-woven fabric, where the fibers are very close together, increases a mask's effectiveness.



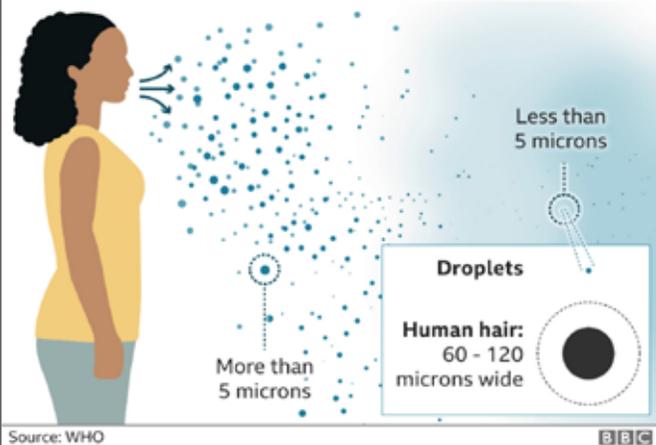
The difference between droplet and airborne transmission

Droplet transmission

Coughs and sneezes can spread droplets of saliva and mucus

Airborne transmission

Tiny particles, possibly produced by talking, are suspended in the air for longer and travel further



The Yuck Stops Here!

N95 masks are great at stopping sneezed droplets, blocking 95% of any droplet that's 0.3 microns or bigger

For example, the tight-fitting N95 mask effectively traps droplets and particles within its many layers of very thin nonwoven plastic fibers. These polypropylene fibers form a sort of net that catches droplets and stops them from passing through. In fact, these amazing masks block 95% of particles that are 0.3 microns or larger. To see how small this is, check out the picture above!

When a person wearing a mask sneezes, the droplets and particles are trapped inside the mask, protecting other people nearby. At the same time, when others sneeze, their saliva and mucus are trapped on the outside of the mask, protecting the person wearing the mask. This is why it's so important for health care workers to wear N95 masks: so they don't make the people they're people helping sicker, and also stay healthy themselves.

Other materials that masks are commonly made of include disposable paper, synthetic fabrics such as polyester and rayon, natural materials such as silk and cotton, and combinations of these and other fabrics. Researchers have found that many types of fabric masks that people wear block between 7% and 98% of droplets. One-layer masks block the fewest droplets. Layering fabrics together improves the particle-blocking power of a mask. Including different kinds of fabric in the layers improves the mask even more!

Masks really are marvelous, because they literally provide us with layers of protection from disease!

Lori R. Stepan, Ph.D. is an Associate Teaching Professor of Chemistry at Penn State University in State College, PA.