

Study compares fabrics to find the most effective for face masks

■ Researchers at Argonne National Laboratory say cotton, natural silk, chiffon best

By Hannah Herrera Greenspan
Chicago Tribune

CHICAGO — Starting May 1, Illinois will require everyone over age 2 to wear a mask when they can't maintain a 6-foot social distance in public. Other areas of the country already have mandated this.

N-95 masks, which are in short supply, are best reserved for health care workers, who come into direct contact with COVID-19 patients.

So what fabric or combination of fabrics is best for homemade masks?

A new study conducted by University of Chicago professor Supratik Guha and colleagues at Argonne National Laboratory in Lemont looked at more than 15 common household fabrics to see which were best in protecting against the coronavirus.

More specifically, this study investigated the fabric's filtration efficiencies against the tiny droplets that are how the coronavirus and other respiratory illnesses spread.

Wearing a mask or a cloth facial covering reduces the transmission of these respiratory droplets from an infected person, according to Guha.

The most effective fabrics are cotton, natural silk and chiffon; synthetic silk and satin did not provide as much protection. Hybrid combinations, such as high thread cotton, along with silk, chiffon and flannel also supplied broad filtration coverage.

The study notes, "Fabric with tight weaves and low porosity, such as those found in cotton sheets with high thread count, are preferable. For instance, a 600 TPI (thread per inch) cotton performed better than an 80



Kevin Houston uses a bandana to cover his face in Evanston, Illinois. The city joined other Chicago suburbs in requiring masks or face coverings to be worn in public.

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— **Supratik Guha, Argonne National Laboratory**

TPI cotton. Fabrics that are porous should be avoided."

Guha says chiffon and other materials that have electrostatic properties can actually act as a barrier to the tiny droplets.

"What we found was that some of these materials are pretty good," he said. "Using a combination of cotton and

these materials is the best. A quilt, a mixture of polyester and cotton, also had excellent filtration."

Two chambers at Argonne were used to conduct the study. In the first chamber, Guha and his team produced aerosols with dry particles of sodium chloride, a standard method in respirator testing. From there, a PVC pipe led to the collection chamber, which is where the fabric was held in place by clamps. The collection chamber had a fan that sucked the air, so it flowed from the generation chamber to the collection chamber. Guha said they used specialized equipment that measured the density of the particles upstream and downstream of the fabric.

"What was unique in our work was the equipment used to measure particles of 10 nanometers, which is about a few thousand atoms," he says. "We were able to measure the filtration efficiency at different particle sizes, going all the way from a few thousand atoms to 6 micrometers range. A human hair is roughly 75 micrometers in diameter, so 6 is a little less than one-tenth of that."

Something that surprised Guha during this study was the effect of gaps in masks. He says that if a mask doesn't fit properly, it's not much use. Masks should fit with minimal gaps, but not too tightly because the exhaled breath must come out or else you'll breathe in carbon dioxide.

Food doesn't pose a risk for spreading virus

By Genevieve Ko
Los Angeles Times

Since writing about how to wash produce during the pandemic, I've gotten questions from readers asking if cooking food kills any possible coronavirus on it. I also have received requests for "100%-certain facts."

Given the novelty of this outbreak, research is ongoing and information evolving, so to find answers to readers' queries, I reached out to an expert in infectious disease, Dr. Stephen Berger. Berger is board-certified in both infectious diseases and clinical microbiology and is a co-founder of GIDEON, the Global Infectious Diseases and Epidemiology Network. Here are his insights into the connections between coronavirus and food. The interview has been condensed and edited.

Q: Can COVID-19 be transmitted through food? If so, how?

A: There have been no cases of COVID-19 associated with ingestion of food, but the question is well-founded. COVID-19 is, after all, caused by a virus which enters the body through the nose or mouth. Food items are, after all, objects which may be contaminated with the virus and placed in the mouth — but like many other viruses, bacteria and parasites, these will be swallowed and most likely destroyed by stomach acids. Should the virus survive into the intestine, there is no pathway which will carry it to the lungs.

Q: Can COVID-19 be transmitted in the process of consuming food or only through the respiratory system?

A: The virus of COVID-19 must enter the respiratory system to produce disease. There is the possibility that material could travel from the mouth through the larynx and into the lungs. It is thought that acquisition of COVID-19 through this route rarely, if ever, occurs.

Q: If COVID-19 is on food, can it be killed by cooking? If so, at what temperatures?

A: SARS virus, a close relative of the virus of COVID-19, is inactivated at temperatures of 56 to 65 degrees Celsius (132.8 to 149 degrees Fahrenheit).

(One aside, before we get back to the questions: An instant-read thermometer will tell you the temperature of your food; most cooked food is in or above that temperature range.)

Q: Does it die more easily than the bacteria that can last on our food?

A: Unlike viruses, bacteria can multiply in food and many species are highly resistant to heat and dryness.

Q: Is there anything specific about COVID-19 that makes it harder to eliminate from our food?

A: Not really. Routine practices of hygiene, storage, cleansing and cooking which are already practiced in commercial shops and restaurants will also help eliminate this virus from our food.

Q: So can you acquire COVID-19 from food?
A: The bottom line answer is ... no.

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