

Soaps or Santinizers

The Great Debate

By Aniruddha Seal

Alcohol-based sanitizers are also effective, but washing hands with soap remain the gold standard for hand hygiene and killing the virus when it's on your skin.



(Source: <https://www.su.edu/blog/2020/03/hand-sanitizer-is-not-a-substitute-for-hand-washing/>)

Almost every news organization in the country, from major television networks to small-town newspapers, has published its very own instructional guide explaining “How to Wash Your Hands” within the past week. This seems odd. You can’t, even for a million dollars, get a drug for the coronavirus – but the bar of soap by your sink kills the deadly virus.

So why does soap work so well on the Sars-CoV-2, the coronavirus and indeed most viruses? The short story: because in soap lather, a combination of molecules which assemble into bubble-like structures that trap viral matter and other biomaterials and rinse them down the drain.

SARS-CoV-2 spreads through the air in the form of small particles that an infected person near you breathed, sneezed, coughed, or let loose while talking. When you cough, or especially when you sneeze, tiny droplets from the airways can fly up to 10 metres. The larger ones are thought to be the main coronavirus carriers and they can go at least two metres.

These droplets end on surfaces and often dry out quickly. But the viruses remain active for hours, even days when they land on objects made of plastic, metal, and cardboard.

They can enter your body through the eyes, mouth, or nose. Because the virus can also be contracted by transporting germs from such contaminated objects into your body after you touch your face, public health officials have pushed hand-washing as one of the best ways to protect against COVID-19.

But it has to be done the right way. The gold standard involves scrubbing your hands thoroughly with soap and clean water for at least 20 seconds.

The cheap soap by your sink is an “amazing weapon”

That’s because of simple chemistry. The soap forms lather that contains pin-like molecules with two ends - one that loves water and the other end that hates water and loves lipids & fats.

The outer layer of the virus has a weakness for the water-hating, fat-loving side of the soap molecule. The coronavirus' outer layer – scientists call it a membrane of lipid molecules – is no match for soap. The soap molecules attempt to evade water and in-process wedge themselves into the membrane and pries it apart, exposing the water-soluble inside of the virus. Eventually, soap forms a bubble around the bad viral stuff. Add more water, and it all washes away.

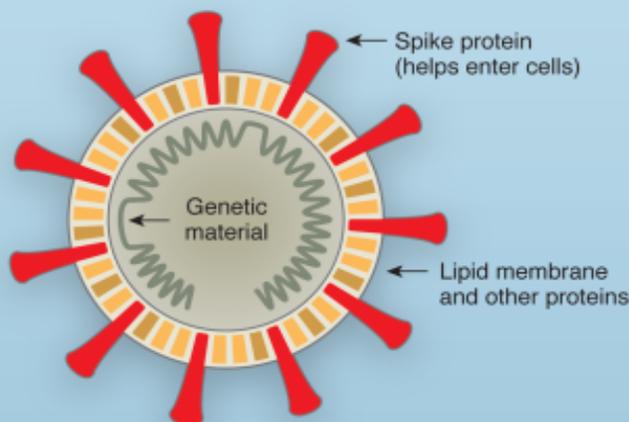
So why 20 seconds?

Viruses like to get in the lines of your hands—palms, wrinkles, fingernails, between fingers, under rings, bandaids, or splints you may have on an injured finger. The more time spent with soap, the more time to clean those cracks. If you are doing it right, 20 seconds allows for enough time to be thorough, and for soap molecules to do their job on the entire hand.

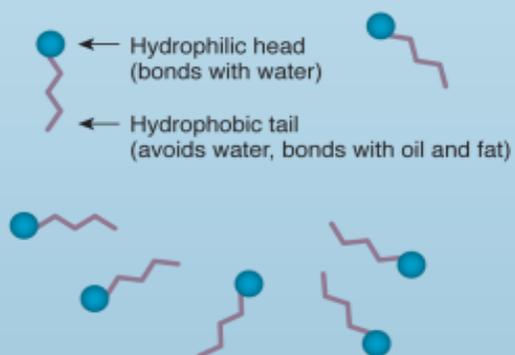
How Soap Works

Washing with soap and water is an effective way to destroy and dislodge many microbes, including the new coronavirus.

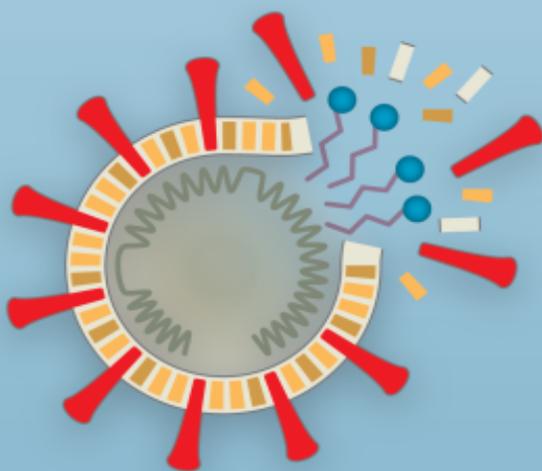
THE CORONAVIRUS has a membrane of oily lipid molecules, which is studded with proteins that help the virus infect cells.



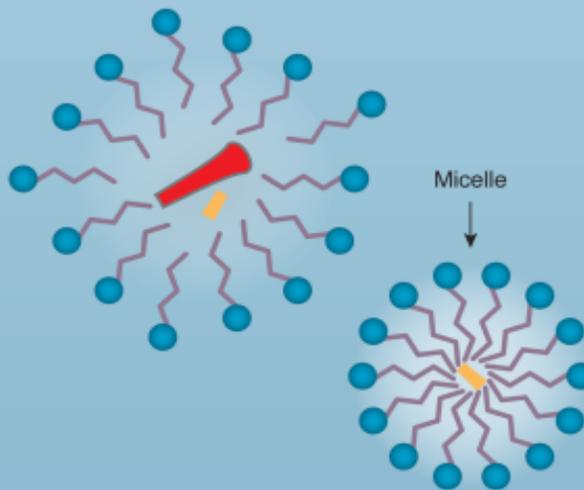
SOAP MOLECULES have a hybrid structure, with a head that bonds to water and a tail that avoids it.



SOAP DESTROYS THE VIRUS when the water-shunning tails of the soap molecules wedge themselves into the lipid membrane and pry it apart.



SOAP TRAPS DIRT and fragments of the destroyed virus in tiny bubbles called micelles, which wash away in water.



(Source: <https://www.nytimes.com/2020/03/13/health/soap-coronavirus-handwashing-germs.html>)

Supermarkets are running out of hand sanitizer as people rush to protect themselves from COVID-19. But does it beat soap and water?

Alcohol-based disinfectants containing a high-percentage alcohol solution kill the viruses in a similar fashion as soap and water. Alcohol attacks and destroys the envelope protein that surrounds some viruses, including coronaviruses. But what they don't is that they don't remove the carcasses of the virus from your skin.

There are two main types of hand sanitisers: alcohol-based and alcohol-free. Alcohol-based hand sanitisers contain different types of alcohol and in varying amounts, often between 60% and 95%. Alcohol-free hand sanitizer can reduce microbes but are less effective than alcohol.

Not all hand sanitizers work against it - here's what you should use.

A hand sanitiser needs to be at least 60% alcohol in order to kill coronaviruses.

Hand sanitisers with less than 60% alcohol were also found to be less effective at killing bacteria and fungi and may only reduce the growth of germs rather than killing them. And even hand sanitisers containing 60% alcohol can't remove all types of germs.

A summary of how handwashing with soap and water is more effective than hand sanitisers.

1. Soap is better because you only need a fairly small amount of soapy water, which, with rubbing, covers your entire hand easily. Whereas you need to literally soak the virus in ethanol for a brief moment, and wipes or rubbing a gel on the hands does not guarantee that you soak every corner of the skin on your hands effectively enough.
2. Using soap and water to clean because if there is any dirt or anything visible on your skin, you can see how long it takes to remove it and the foam gives some sort of prominent visual message which is absent if you're using a sanitizer.
3. Sneezing or coughing into your hands also requires more than just a pump of hand sanitiser to disinfect them. This is because if your hands are contaminated with mucous, the hand sanitiser might not work as well because mucous acts to protect microbes.

So, soap is the best but do please use alcohol-based sanitiser (with at least 60% alcohol) when soap and water aren't available.

References

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