



COLDS AND FLU, CORONAVIRUS COVID-19, PREVENTION

MY ADVICE ON MASKS FOR CORONAVIRUS

MARCH 16, 2020 RICHARD SAINT CYR MD 18 COMMENTS

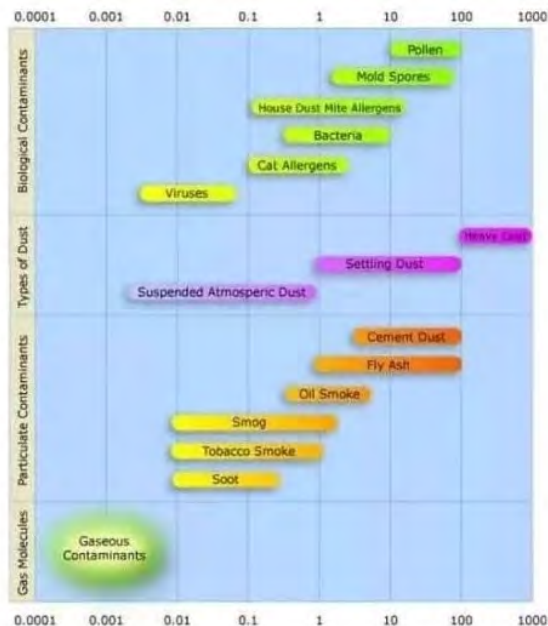


This is part of a series of articles on Covid-19, [please click here](#) to see all of them...

Does wearing a mask actually stop you from getting Covid-19? The short answer is *an N95 mask helps healthy people to not get ill from sick people, and the surgical mask helps sick people not make others sick*. But even if you had a bunch of N95s, and assuming that you were properly wearing it, almost everyone should *not* be wearing these all the time. I'd like to explain why, this will take a bit but I have a lot of experience with masks during my ten years in Beijing, and *I have written hundreds of articles* about N95 masks and air pollution, including for [the New York Times](#) in China. So in terms of Covid-19, here's my take.

What Does N95 Mean?

A true N95 mask, technically called a "respirator", has a strict definition from NIOSH, the [National Institute for Occupational Safety and Health](#), which rates masks in the USA: *N95 must filter at least 95% of airborne particles larger than 300 nanometers (0.3 microns, or micrometers)*. That includes everything floating in the air, including bacteria, carbon soot, pollen, diesel exhaust, viruses, etc. By the way, there are N99 and N100 masks, which do even better (for a price). Here's a nice image showing particle sizes:



This 0.3 nm size is hard to imagine, but for comparison, the width of a human hair is 70 microns, over 200 times larger than 0.3 micron. In the air pollution field, we talk a lot about PM2.5, meaning particles of 2.5 micrometers, 20 times larger than NIOSH's 0.3 micron cutoff. A well fitted N95 mask can easily filter out typical PM2.5 particles, since it's been proven in tests to filter out 95% of particles 20 times smaller. We worry about PM2.5 because they are tiny enough to drift in the air, straight down our airways and deep into lung tissue, instead of getting stuck in our upper airways and coughed out.

So that's some groundwork data; what about Covid-19? Do masks work or not?

How large is Covid-19?

A [recent medical Q&A on Covid-19](#) mentions that Covid-19 is 125 nanometers, or 0.125 microns in size. Apparently it's a bit larger than the influenza virus. So we've arrived at an important data point: the Covid-19 virus at .125 microns is *smaller* than that 0.3 micron cutoff that NIOSH uses in their testing. This means those N95 masks in theory *may or may not* be as effective for Covid-19 as for PM2.5, because they didn't test for particles that small. They *may* work, but it's not something I think people should stake their life on.

All of this is theory anyway, I write an evidence-based blog and I want real world data, not just tests on a mannequin head. What would be *most* reassuring would be to see specific results against Covid-19 — but I haven't seen anything yet. If anyone has, please let us know! Now we must rely on the next best option: research from other viral studies. (I'll get to those in a minute).

There actually is a special test called [viral filtration efficiency](#), or VFE, where the person wearing the mask speaks for 2 minutes, and the machine checks the percentage of a test virus inside the mask compared to particles outside the mask. (there's also a bacterial filtration efficiency test). I didn't have enough time to review VFE for this article, but I would love to see a list of masks approved by VFE.

What About Surgical Masks?

I want to stress first that a surgical mask is *much less effective* than an N95 against PM2.5 and for viruses. I did my own fit testing for PM2.5 while in China and my surgical mask was only 63% effective! Surgical masks generally only stop droplets, usually clumps of particles larger than 5 microns. Smaller particles like one Covid-19 virus can sneak right through the fabric and into your body. That's why a surgical mask is mostly for sick patients, not healthy people. But having said all this, at this exact moment, healthcare workers are allowed to use surgical masks if we don't have N95 in stock. One reason is shortages of N95; another reason is partly from a big [gap](#), which I'll get to in a minute.

What About Published Real World Studies For N95 and Viruses?

What about for masks for Covid-19 prevention in our communities? The best study I've seen is from a [2012 study in PLOS One](#), following healthy college students in ~~petri dishes~~ dorms for 6 weeks during flu season, and giving masks and/or hand sanitizer. The mask-only group did *not* have less flu than the control group (which had no masks or sanitizer), while the mask+sanitizer group had a very impressive 75% reduction in flu cases! That difference I feel is very important, it suggests that hand washing is *much* more effective than masks for prevention.

What about healthcare workers, what's the best data? The best study was [published just last year in JAMA](#). They tested 2,800 healthcare staff at the front lines of a clinic for four flu seasons, giving them either an N95 or a surgical mask when seeing sick patients. The final data showed *no* real difference between the groups. This could mean that in real-world use, even though N95 clearly is more efficient in clinical tests, in the real day-to-day world the benefits are a wash. This is partly why right now healthcare workers are allowed to use surgical masks as a backup plan.

My Own Real World N95 vs. Surgical Mask Results

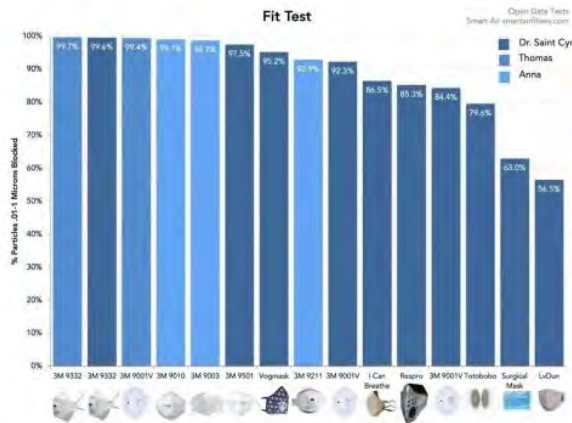
In all of my public health blogging, I've always stressed real data and not theory or anecdotal testimonials, and sometimes you have to do the tests yourself if no one else is. In 2014 I was deeply frustrated with the lack of clarity on whether masks helped against air pollution, so I did my own tests. I visited 3M's testing lab in Beijing and did [my own quantitative fit testing](#), testing nine popular masks, including one surgical mask.



It's a pretty cool test, you make a tiny hole in the masks and measure air particles inside and outside the mask, then you spend a few minutes doing real-world tests including reading a poem, turning head left and right, and bending over. I was really impressed at how well an N95 mask did, filtering as much as 97.5% of tiny particles. An N99 mask did even better, exactly as expected with 99.6%. Here's the data, also showing that poor 63% result with a surgical mask. The worst was Ludun, which horrified me because this brand was hugely popular in China, including for kids, and I was stunned how many millions of Ludun wearers were falsely reassured, spending hours outside thinking they were safe when clearly they were not.

Manufacturer	Model	Type	Certification	Cost (RMB)	FR Factor	% efficiency
3M	9332	fold, disposable; headband	FFP3	38	250	99.6
3M	9501	fold; disposable; earband	KN95	6	40	97.5
Vogmask	Adult, no valve	fold, washable; earband			21	95.2
3M	9001V	fold; disposable; earband	KN90	8	13	92.3
I Can Breathe	Honeycomb	fold; replaceable filters; earband		180	7.4	86.5
Respro	Techno Gold	fold; replaceable filters; headband	FFP1	349	6.8	85.3
3M	9001V	fold; disposable; earband	KN90	8	6.4	84.4
Totobobo	adult headband	filters; headband		188	4.9	79.6
Wenjian 经纬	surgical 医用护理	earband	YY0469	1	2.7	63.0
Ludun 绿盾	adult 成人	foldable; replaceable filters; earband		32	2.3	56.5

In an interesting followup, the good folks at Smartair in China also [did their own tests](#) and put together a graph showing all of our results put together. Again, this is real world testing on real faces, and again the N95 masks did great. Don't forget that all this data is for PM2.5, not for viruses.



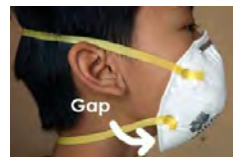
So who *should* be wearing these?

Let's hear directly from the [World Health Organization](#):

Wearing medical masks when not indicated may cause unnecessary cost, procurement burden and create a false sense of security that can lead to neglecting other essential measures such as hand hygiene practices. Furthermore, using a mask incorrectly may hamper its effectiveness to reduce the risk of transmission.

As for me, I am *not* wearing a mask, of any kind, in my daily routine outside of work. I am definitely focused on prevention that has the best evidence: hand washing, social distancing, not touching surfaces and face if possible. I have a box of nitrile gloves in my car which I could use at the market or public places. I still go to my local coffee shop but am more careful in the bathrooms, using the paper towel or toilet paper on the door handle and faucets.

I am also super focused on keeping my immune system in tip top shape, as I detailed [in my article last week](#) which I urge you to read if you haven't, it's filled with empowering and positive yet effective evidence-based tips.



As always, I hope I've shared credible information that helps you to stay healthy and feel more empowered. There's a lot we can do to fight this! Please feel free to leave comments below.

Follow me on Facebook: [@BainbridgeBabaDoc](#)
Photography: www.richardsaintcyr.com

Related Posts: