STANDARD DEVIATIONS: Necessity, the Mother of Invention

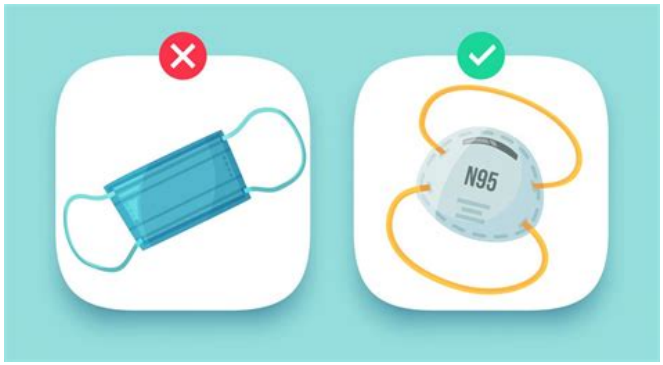
Greetings,

We live in a wondrous age of rapidly advancing technology that makes us safer. In a field of health science rife with risk, that's good. While we will never be free of the threats we face from pathogens, chemicals, and the hazards of our profession, we are becoming safer through technological progress.

Our buildings are constructed better. Engineering makes our environment safer. Research constantly upgrades our understanding of the pathogens that plague our patients and threaten us. Automation now removes us from many tasks and that reduces the burden of risk. And we use protective equipment that has changed and improved over time.

Lab coats are woven from new, stronger, more resistant and durable materials. Gloves use compounding that provide superior protection and even chemical resistance without allergens. Protective eyewear is becoming ubiquitous with good, safe lab technique. Slowly but surely we are working in safer labs.

Masks, until now the step-child of our PPE arsenal, are also undergoing a kind of renaissance in their construction, design, and utility (and acceptance). With all our reluctance and procrastination in embracing the value of mask protection in the lab, we are suddenly face-to-face (eyeball-to-eyeball?) with a mandate to wear respiratory PPE. It only makes sense that improvements would follow the mass rush on mask manufacture and marketing.



From the classic beak of the Plague Doctor to the BSL-4 hermetically contained suit, a lot of thinking has gone into the way we breathe the foul airs of illness and pathogens. Today, the N95 is our standard for safe and efficient protection in the clinical space. Surgical and cloth masks, neckerchiefs, and the deluge of models seen in response to respiratory pandemic are reducing threat for the vast majority; but our stringent requirements in the face (Ha!) of certain exposure have made the N95 more popular than ever.

{ALERT: Not all physicians are bird-brained.}

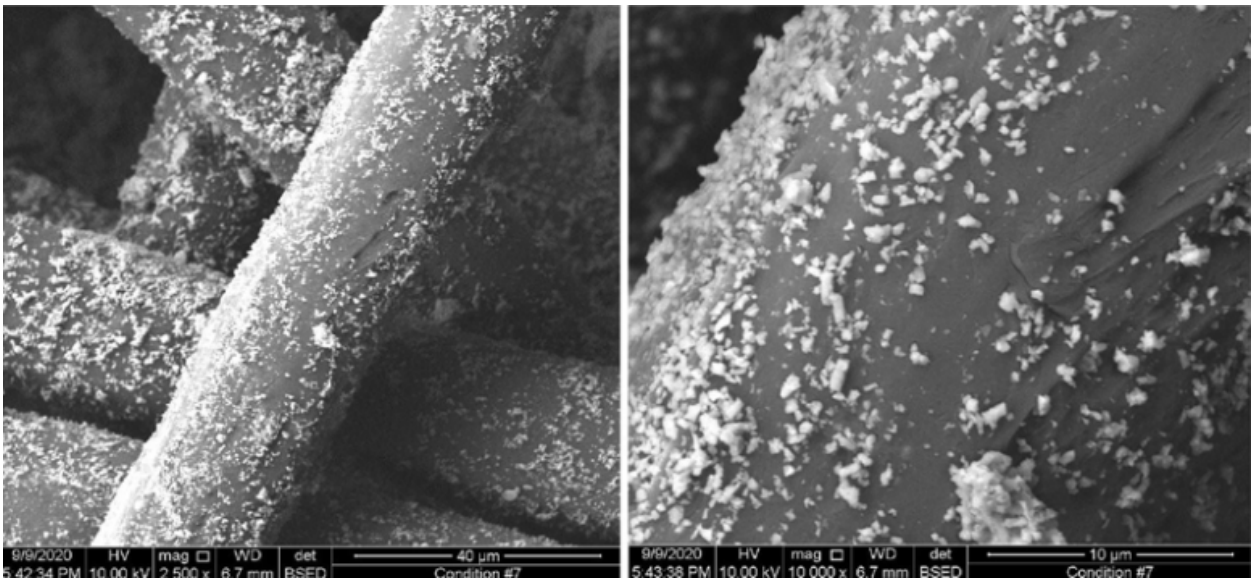
3M, the largest supplier, will produce 2 **billion** N95 masks in 2020. And they are working around the clock to keep up with demand. Every other manufacturer is also maximizing production to meet needs (Honeywell, Kimberly-Clark, BD, Shanghai Dasheng, etc.).

A Japanese physicist has developed a new production method that uses a candy floss machine and 3D printing to make them lighter, more efficient, and make them faster.

{Yum?}

At North Carolina State University, researchers have created a new protective material that is lighter, more efficient, and has a more stable electrostatic charge than the spunbound and meltblown material of the conventional mask.

Just in the last few weeks, Sintx Technologies Inc., a Salt Lake City, Utah-based maker of silicon nitride ceramics for industrial and biomedical applications, received a patent for the antibacterial properties of its silicon composites.



{Silicon nitride coating mask fibers. SINTX Technologies, Inc.}

Some things have not changed about N95s, the need to be fit-tested for the proper mask and the correct use by the wearer. N95 mask protection requires that the mask fit the face of the user. Proper donning and ensuring a good seal compliment the fitting. All the technology and production is futile if the mask doesn't function properly.

N95 respirator refers to an N95 filtering facepiece respirator (FFR) that seals to the face and uses a filter to remove at least 95% of airborne particles from the user's breathing air. Healthcare workers should be fit tested, medically evaluated, and trained routinely (annually) on its use.

Three key criteria are required for a respirator to be effective:

- The respirator filter needs to be highly effective at capturing particles that pass through it,
- The respirator must fit the user's face snugly (i.e., create a seal) to minimize the number of particles that bypass the filter through gaps between the user's skin and the respirator seal; and
- The respirator must be donned and doffed correctly before and worn throughout any exposure.

Fit test methods are classified as either qualitative or quantitative. A qualitative fit test is a pass/fail test that relies on the individual's sensory detection of a test agent, such as taste, smell, or involuntary cough. A quantitative fit test uses an instrument to numerically measure the effectiveness of the respirator. OSHA required respirator fit testing both annually and when physical changes have occurred (e.g., facial scarring, dental changes, cosmetic surgery, or an obvious change in body weight). Fit is also brand and type specific!

A fit tested mask is only as good as long as it fits. Every time a mask is donned, users must perform a seal test to make sure the fit is right and the mask is working. **Here's the basic seal checklist:**

Cup Style Respirator

- After applying mask, place both hands completely over the mask being careful not to disturb the position.
- Inhale and exhale forcefully. If air leaks round the nose, adjust the nosepiece.
- If air leaks around the edges, adjust the side panel and straps along the sides of your head.
- Repeat seal test after adjusting the mask.

Duckbill Style Respirator

- After applying mask, forcefully inhale and exhale several times.
- Mask should collapse slightly when inhaling and expand when exhaling.
- No air should be felt leaking between your face and the mask.
- Adjust mask until leakage is corrected, and repeat seal test.

Over 3 million United States employees, in approximately 1.3 million workplaces, are required to wear respiratory protection. **In April OSHA suspended annual fit testing due to pandemic concerns.** That's risky but tolerable for many industrial employees but frightening to the folks (like me) who look at risk in healthcare.

Our safety in the laboratory is dependent on our diligence and consistency. Fit testing and training for effective use of N95 masks is fundamental to lab safety. **Now is the time to ensure that your staff are fitted, trained and proficient in mask usage.** Do you have new employees, annual testing needs, staff with altered physical conditions, or a change in mask supply? These are necessary considerations for N95 safety that we all need to … well…. face.

Have a great week and be safe,

Bryan

p.s. The EU uses a different nomenclature for masks. They assign a factor to types of masks that indicate the level of protection, FFP1, FFP2, FFP3. FFP stands for Filtering half Face Masks, each mask conforms to the EU regulation *EN 149: 2001* the masks are then split into 3 categories determined by their protection level: FFP1, FFP2 and FFP3.

{EU FFP3 mask, N95 compliment. Protection from a variety of toxins, such as asbestos, bacteria, viruses and used by healthcare professionals}