

N95 Decontamination Options

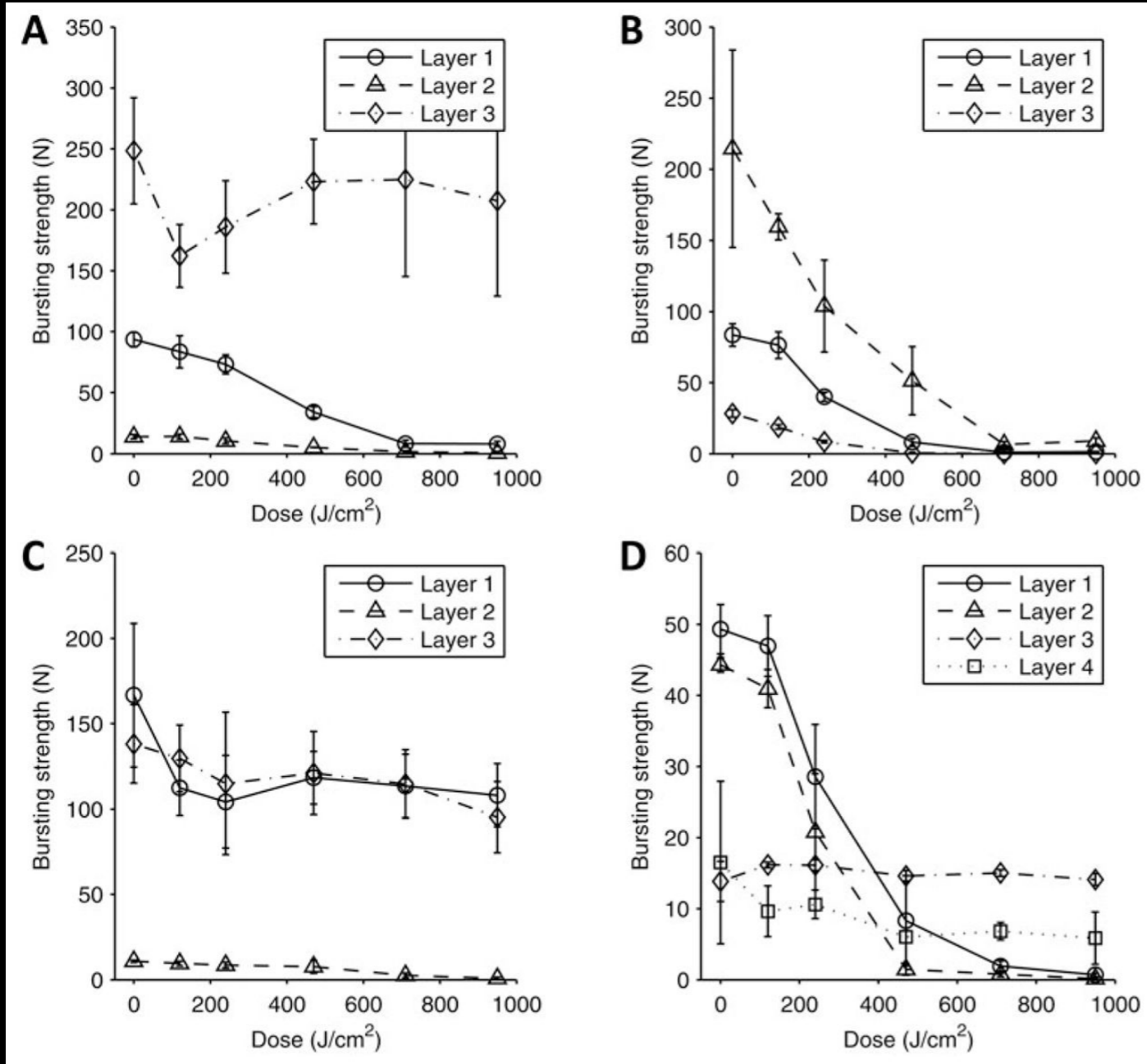
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- 95% at NaCl 0.075 um (general use mask is 78%) - Coronavirus is 0.08-0.12 um in size; FE is actually higher than 95% at time of manufacture (~99%), declines over time of storage
- Electrostatic charge of the mask is important - increases FE from 25% to 95% for each internal layer; alcohol and certain other solvents may remove this semi-permanent charge
- UVC - works by direct RNA damage - induces dimers; may decrease electrostatic charge and change FE (Lindsley paper addresses this - no significant decrease)
- Dry heat - 70C x 30 min - no change in electrostatic charge (Tsai - 70C x 24h equivalent to 5 yrs shelf storage 25C - only loss 0.5% FE)
- Steam - 125C x 3 min - no decrease in electrostatic charge (Tsai - reference?)
- Vaporized H₂O₂ - 30-35% solution, mechanically vaporized - may need special PPE to wear in decontamination room - tested through 50 cycles - strap goes bad at 20-30, filter good through all 50

UVC Device

- Vioguard Cubby+
- 110 mW/cm² for a cycle - length of time adjusted by dosimeter and software
- Need at least 2.4 mW/cm² for 3 log (1000x) reduction in active virus - times vary by manufacturer
- PP of inner layers of mask weakens with UVC

Integrity with UVC exposure



Time of UVC needed

Table 5. Calculated α_{IFM} exposure times and log reductions (LRs) for D_{IFM} of 1000

Model	A	B	C	D	E	F
α internal filtering medium	0.25	2.18	6.11	8.5	30.01	31.38
Time (min)	266	32	10	7	2	2
LR	3.0*	3.3†	2.9‡	3.5*	3.6*	3.1§

Reported LRs are for measured doses as indicated.

*Dose, 1125 J m⁻².

†Dose, 1000 J m⁻².

‡Dose, 917 J m⁻².

§Dose, 941 J m⁻².

Online resources

- Nebraska team - <https://www.nebraskamed.com/sites/default/files/documents/covid-19/n-95-decon-process.pdf>
- <https://www.fda.gov/media/136386/download> this is the testing protocol for H₂O₂, but it used spores instead of virus for filtration testing
- [https://www.safety.duke.edu/sites/www.safety.duke.edu/files/N95 Decontamination Procedure.pdf](https://www.safety.duke.edu/sites/www.safety.duke.edu/files/N95%20Decontamination%20Procedure.pdf) - this is the Duke protocol - they use spores for quality assurance of process

- Lindsley WG, Martin SB, Thewlis RE, et al. Effects of Ultraviolet Germicidal Irradiation (UVGI) on N95 Respirator Filtration Performance and Structural Integrity. *J Occup Environ Hyg* 2015;12:509-17
- Darnell MER, Subbarao K, Feinstone SM, Taylor DR. Inactivation of the coronavirus that induces severe acute respiratory syndrome, SARS-CoV. *J Virol Meth* 2004; 121:85-91.
- Fisher EM, Shaffer RE. A method to determine the available dose for the decontamination of filtering facepiece respirators. *J Appl Micro* 2010; 110:287-295.