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Texas Tech professor researches effectiveness of face masks against particles similar in size to coronavirus

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Seshadri Ramkumar, left, and graduate student Mirza Khyum, right, in front of the Fractional Efficiency Tester. *Provided Photo*

On Tuesday, the Centers for Disease Control and Prevention (CDC) issued new mask guidelines, recommending that Americans resume wearing masks indoors in areas with high coronavirus transmission, regardless of vaccination status. While vaccinations reduce the risk of COVID-19 transmission, it is still possible for vaccinated individuals to spread the Delta variant to those who are unvaccinated.

Seshadri Ramkumar, professor of chemical countermeasures and advanced materials in Texas Tech University's Department of Environmental Toxicology, has gathered data on the effectiveness of face masks in reducing the spread of COVID-19.

"In areas where coronavirus variants are surging, it's in our best interests to protect the people surrounding us who aren't vaccinated – those who cannot be vaccinated for medical reasons or those for whom vaccinations are not yet approved," Ramkumar said. "It's in the public's best interest, for the safety of others, to voluntarily follow the guidelines established by the CDC."

The Fractional Efficiency Filter Tester, housed within The Institute of Environmental and Human Health (TIEHH), is a cutting-edge piece of equipment that measures a material's ability to filter out particles. Using this instrument, Ramkumar's team has demonstrated that three-ply masks filter out 60-80% of simulated viral particles between 150 and 30 nanometers in diameter, respectively; thus, commercially available three-ply masks are up to 80% effective in protecting individuals against smaller viral particles.

Ramkumar is also working on enhancing the filtration efficiency of cotton face masks – research that is especially important in light of the recent emergence of the Delta variant, which carries two to three times more viral loads per droplet than the original coronavirus strain and poses a much higher risk of infection.

In an article published last year, Ramkumar explained an efficient filter requires three Fs: filtration, fit and form or comfort. The ideal face mask has a high filtration capacity, fits securely

against the face without gaps and is comfortable enough to wear for long periods.

Ramkumar classifies face masks according to four different categories: filtration facepiece respirators (FFRs, or N95 masks); surgical masks; face covers; and face covers with enhanced filtration (FISORS). He originated the term FISORS to describe enhanced facial coverings.

Together with vaccinations, face masks are effective tools in combating coronavirus infection rates. While Tuesday's CDC announcement is a recommendation and not a mandate, Ramkumar's research demonstrates the life-saving potential of wider face mask usage.