

Trevor Miller, Dept of Biology, Fairmont State University, Fairmont, WV, 26554, and Dr. Jamie Miller, Dept of Biology, Fairmont State University, Fairmont, W, 26554. Analysis of the Effectiveness of Masks at Blocking Bacterial Particulates.

In light of the recent pandemic, this study was conducted to determine the effectiveness of masks stopping bacterial particles. The Centers for Disease Control and Prevention (CDC) has recommended a multitude of varying face masks that are said to protect you and others from the spread of COVID-19 and other air-borne microbes. The main goal of this research was to test recommended masks and determine if they are as protective as everyone acknowledges them to be.

To evaluate the masks, multiple mathematical formulas were used to accurately imitate the average human cough. These calculations were used to build a machine that would expel air and a microbial solution through a mask. A bacterial sample was used to determine the effectiveness of microbe containment by the various masks due to the ability to obtain penetration measurements without the need of host cell infection. The machine constructed to mimic a human cough consists of a pressure regulator, “cough chamber”, and a mouth nozzle. The concentration of bacterial solution was factored into the amount of particulate that is expelled after an average cough. The standardized bacteria-containing cough solution was then dispersed through the mouth nozzle and a mask. Any particulate that passed through the mask was collected on a nutrient agar plate, which was used to quantify the number of microbial particles that breached the mask.

Preliminary data indicates that there is a difference in the effectiveness of the masks and some masks do not appear to be as effective as they are advertised to be. This calls into question the validity of the CDC’s recommendations for masks effective at preventing the transmission of air-borne microbes.