Efficiency of Respirator Filters Against A Viral Aerosol

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The growing threat associated with the avian flu virus (H5N1) and other virulent pathogens presents a unique challenge to emergency responders, healthcare workers, and the civilian population. The use of National Institute for Occupational Safety and Health (NIOSH)-approved particulate respirators, if used according to recommended practices, provides protection against infectious airborne agents in various workplace settings. Currently, NIOSH certifies respirators based on an inert aerosol test at a constant flow rate of 85 L/min. However, it has not been well established that these filters provide protection against biological aerosols, especially with regard to viral aerosols. This study investigated the performance of NIOSH-approved P100 and N95 particulate respirator filters and filtering facepiece masks against the virus MS2 phage, a bacteriophage that is non-pathogenic to humans, aerosolized from a liquid suspension. Tests were performed under two cyclic flow conditions (minute volumes of 85 and 135 L/min) and two constant flow rates (85 and 270 L/min). In addition, the measured efficiencies were compared to those measured under similar test conditions with non-biological (inert) test aerosols. The results suggest that testing with inert particles in the most penetrating particle size range provides a conservative estimate of MS2 phage penetration.