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Turbulent dispersivity under conditions relevant to airborne disease transmission between laboratory animals SIOBHAN HALLORAN, WILLIAM RISTENPART, Dept. Chemical Engineering & Materials Science, University of California, Davis — Virologists and other researchers who test pathogens for airborne disease transmissibility often place a test animal downstream from an inoculated animal and later determine whether the test animal became infected. Despite the crucial role of the airflow in pathogen transmission between the animals, to date the infectious disease community has paid little attention to the effect of airspeed or turbulent intensity on the probability of transmission. Here we present measurements of the turbulent dispersivity under conditions relevant to experimental tests of airborne disease transmissibility between laboratory animals. We used time lapse photography to visualize the downstream transport and turbulent dispersion of smoke particulates released from a point source downstream of an axial fan, thus mimicking the release and transport of expiratory aerosols exhaled by an inoculated animal. We show that for fan-generated turbulence the plume width is invariant with the mean airspeed and, close to the point source, increases linearly with downstream position. Importantly, the turbulent dispersivity is insensitive to the presence of meshes placed downstream from the point source, indicating that the fan length scale dictates the turbulent intensity and corresponding dispersivity.

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