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## Could Reducing Ventilation Rates to Meet Energy Requirements, Result in Changes in Infection Transmission?

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### Abstract:

The fate (whether airborne or surface residing) and spatial distribution of hazardous aerosols in an indoor environment, are strongly dependant on the airflow within that environment. Many indoor environments are mechanically ventilated; therefore it is the ventilation rate and regime which primarily determine the room's airflow patterns and hence the transport of aerosols. Many high risk indoor environments such as hospital rooms are looking to reduce ventilation rates in an attempt to reduce energy use. This study experimentally examined the effect of reducing ventilation rates, on the size, concentration and spatial distribution of aerosolised bioaerosols. It is essential to further our understanding of the relationship between ventilation and the fate of hazardous aerosols, in order to mitigate the risk of exposure for building occupants.

Experiments were carried out in a 32m<sup>3</sup> class 2 aerobiological test chamber. The temperature, humidity, ventilation rate and ventilation regime within the chamber were externally controlled. A known concentration of *Bacillus Subtilis* was continually introduced into the chamber via a six-jet Collision Nebuliser. A Geo- $\alpha$  particle counter and a 6-stage Andersen Impactor were constantly sampling at the ventilation exhaust. The concentration and spatial distribution of the airborne bioaerosols were determined using both an Aerodynamic Particle Sizer (APS, also determines size distribution) and an All Glass Impinger (AGI), by sampling through tubing located in the breathing zone at three pre-defined locations. TSA agar plates were placed on the chamber floor directly beneath the air sampling tubing, to assess the concentration and spatial distribution of deposited bioaerosols.

Comprehensive analysis of the data is currently underway and thus no absolute conclusions can be determined at the present time. However, initial analysis indicates that there are significant differences in the concentration of bioaerosols at the different locations and there appears to be no correlation in the concentration of bioaerosols in the air and deposited to the ground, at each location examined.