

Allertech Laboratory, INC. Gives Opinion on Operational Characteristics of Air Supply® Ionic Technology Products

Allertech Laboratory, INC.

I have been asked to render my opinion on studies examining the operational characteristics of Air Supply ionic technology products, including the **AS180i Minimate personal** wearable device and the **Vortex VI-3500** room air purifier. I have reviewed these from the standpoint of their potential effectiveness in the management of allergies and asthma.

Avoidance of airborne allergens remains the cornerstone of management of inhalant allergies and asthma. Individuals sensitized to airborne allergens will experience manifestations of allergic inflammation in the upper airways (sinuses and nasal passages) and/or the lower airways. The severity of allergic sinusitis, allergic rhinitis and allergic asthma is, in large part, a function of levels of allergen exposure. A reduction in exposure levels is generally accompanied by a commensurate reduction in symptoms of allergic disease and the need for treatment. Interventions that reduce the levels of airborne allergens may be therefore be expected to result in symptomatic improvement.

Allergy & Asthma: Information and Technology: Meeting the Challenge

I have reviewed studies performed by Dr. S.A. Grinshpun of the Aerosol Research and Exposure Assessment Laboratory in the Department of Environmental Health of the University of Cincinnati. Dr. Grinshpun has authored 79 publications in leading peer-reviewed journals as well as 59 book chapters and full-length papers and proceedings. The results of studies of studies on Air Supply technologies have been published in the Journal of Aerosol Science 32 (SI), 2001.

The studies of this technology have addressed several relevant aspects, namely (i) the degree to which the devices remove airborne particles of varying diameters (ii) the effect of ionic perturbation of micro-organisms as expressed by viability and (iii) the adjuvant effect of the Air Supply devices on protection afforded by standard filtration masks.

Using aerosolized liquid polystyrene particles and sodium chloride test particles as universally accepted airborne pathogenic simulants, the Wein® AS180i* reduced close to 95% of particle mass concentrations after 1.5 hours in both calm air conditions and mixing air conditions. Test particles ranged in size from 0.4 – 1.0 um, representing the aerodynamic size range of microbial fragments, single bacteria, most of the fungi and their aggregates.

Studies of the AS180i* unit were undertaken in a setting designed to replicate the aircraft seating microenvironment. Using a 2.6M³walk-in chamber at 33 cfm of air mixing, the particle removal efficiency for particles in the range of 0.3 -3.0 um was found to be 50% within 15 minutes, 80% at 30 minutes and about 90% at 40 minutes.

A second Air Supply unit, the Vortex VI-3500* showed extremely high particle removal efficiency of 90% in 40 – 50 minutes, reaching about 95% in 60 minutes for all the tested particle size fractions.

Ionic air purifiers produce high electric charges on viable airborne microorganisms, leading to microbial stress, which may reduce the viability of microbes in the breathing zone. The bactericidal effect of the AS180i* unit was tested on representative gram-negative and gram-positive bacteria, namely pseudomonas spp., E.coli and S. epidermidis. At a relative humidity of $17 \pm 5\%$ and temperature of $26 \pm 2^\circ\text{C}$, mean bacterial inactivation values at one minute (as measured by CFU/ml on nutrient agar plates) were: S. epidermidis: $53 \pm 20\%$; Pseudomonas spp.: $71 \pm 11\%$ and Escherichia coli: $93 \pm 2\%$.

In studies performed by Dr. Donald Dennis (Head, Atlanta ENT Centre) using the Air Supply Vortex VI-3500* unit, airborne mold spore counts dropped over the course of 6 days from “too numerous to count” to zero in a mould colony count room.

Further studies undertaken by Monitoring Instruments for the Environment (MIE Inc.) on the AS180i* device assessed efficiency of airborne allergen removal by nephelometry. Results showed that under standardized conditions 85 – 91% of cat epithelium, 85 – 86% of alternaria and cladosporium (major outdoor moulds) and 71% of dust mite allergen were removed from an 8 ft³walk-in chamber in one minute.

The filtration performance of surgical masks operating with or without the Air Supply Vortex VI-3500* units was assessed. The initial protection factor of the 3M-1838 surgical masks was in the range of 3.5 – 4.0. The protection factor increased to 30 at 9 minutes when the Vortex VI-3500* unit was operating. The effective filtration of the surgical mask, used in conjunction with the Vortex VI-3500* unit, was comparable to that of an N95-level respirator in terms of collection characteristics.

In my opinion, these data suggest that the Air Supply technology used in the AS180i* and Vortex VI-3500* units will remove airborne allergens (including animal danders, dust mite allergens and moulds) thereby reducing exposure in sensitized individuals. This reduction in allergen exposure should be reflected by a corresponding improvement in symptoms and a reduction in the need for treatment.

The Bactericidal effect of the Air Supply ionic technology on airborne bacteria and the marked enhancement of the filtration efficiency of standard surgical masks by adjunctive use of the Vortex VI-3500* unit should afford significant protection against airborne pathogens in bioaerosols.