**Introduction**

The valved holding chamber (VHC) has been designed to help improve and optimize delivery for those using pressurized metered dose inhalers (pMDIs). The OptiChamber Diamond VHC (Diamond Philips Respironics, Respironics New Jersey, Inc., Parsippany, NJ) is a compact, anti-static VHC designed to facilitate effective aerosol delivery to respiratory patients. The in vitro aerosol characteristics of an HFA ipratropium bromide pMDI with a preproduction Diamond VHC were compared with those of the pMDI with an AeroChamber Plus Z-Stat (Z-Stat, Monaghan Medical Corp., Plattsburgh, NY) VHC and the preproduction Diamond VHC and the pMDI alone.

**Method**

The dose emitted from the AC+ VHC was slightly lower than the dose emitted from the anti-static VHCs. Although the emitted dose for the pMDI alone was greater than for the pMDI VHC combinations, Figure 3 shows that this difference was derived from a difference in particles > 4.7 µm in diameter. In fact the large particle dose was over twice as large as the fine particle dose for the pMDI alone. This implies that the VHCs retained a large proportion of particles over 4.7 µm in size, which would otherwise have been deposited in the throat and upper stages of the impactor.

The fine particle dose from the pMDI alone and pMDI VHC combinations was similar, but the emitted dose was higher. When the results are expressed in terms of fine particle fraction (the percentage of the emitted dose in particles ≤ 4.7 µm) as in Figure 4, aerosol delivery from the pMDI alone is shown to be less efficient than from the pMDI VHC combinations for the delivery of drug to the lungs. That is, the proportion of the total aerosolized drug that would be expected to penetrate the upper airways and deposit in the conducting and alveolated airways is higher for the pMDI VHC combinations compared with the pMDI alone. The fine particle fraction was higher using a pMDI VHC combination than the pMDI alone due to the VHC potentially retaining large particles, which could reduce the oropharyngeal deposition in patients using a pMDI.

The MMAD of aerosol from the pMDI alone and each pMDI VHC combination was similar. The fine particle fraction was higher using a pMDI VHC combination than the pMDI alone due to the VHC potentially retaining large particles, which could reduce the oropharyngeal deposition in patients using a pMDI.

The aerosol delivery characteristics were similar from the VHCs when washed before use and used to deliver HFA ipratropium bromide.

The fine particle fraction was higher using a pMDI VHC combination than the pMDI alone due to the VHC potentially retaining large particles, which could reduce the oropharyngeal deposition in patients using a pMDI.

**References**


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