Determing the Influence of Washing on the Aerosol Performance of an Anti-Static Valved Holding Chamber


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 (Figure 1; Diamond; Philips Respironics, Respironics New Jersey, Inc., Parsippany, NJ) is a compact, anti-static VHC designed to facilitate effective aerosol delivery to respiratory patients. This study compared the aerosol characteristics of an unwashed (‘out-of-the-box’) and prewashed preproduction Diamond VHC using three pMDI drug formulations.

Materials

Three pMDI drug formulations were used: Albuterol (ProAir HFA, 90 µg/dose, GlaxoSmithKline), Fluticasone propionate (T eva Specialty Care, 90 µg/dose, Teva Pharmaceutical Industries, North Wales, PA), and Ipratropium bromide (Atrovent HFA, 50 µg/dose, Boehringer Ingelheim). A total of 21 VHCs were used: 15 unwashed and 6 prewashed VHCs. To remove any charge from unwashed VHCs, these were washed three times in household detergent and air-dried for 24 hours prior to use. 6 x ProAir HFA, 90 µg/dose, Teva Specialty Pharmaceuticals. 10 x Fluticasone propionate, Teva Specialty Pharmaceuticals. 6 x Ipratropium bromide, GlaxoSmithKline.

Methods

Aerosol characteristics were determined using the following equipment: Copley High Performance Liquid Chromatography (30 L/min) Next Generation Impactor (NGI) (Tevatic, Inc., West Sussex, UK). All equipment and fluids were stabilized to ambient conditions. NGI leak tested. High Performance Liquid Chromatography. User should wash with ionic detergent frequently - unwashed - ve - ve - ve - ve. No need to wash before first use.

Results

The mean fine particle dose (amount of drug in NGI ≤ 4.7 µm) for the unwashed Diamond VHCs and prewashed Diamond VHCs is shown in Figure 4. Error bars denote standard deviation about the mean.

Discussion

Both the fine particle doses and MMADs for the three pMDI drug formulations were similar from unwashed and prewashed Diamond VHCs. The practical benefits of these results is that they show that users and car givers can use a new Diamond VHC for treatment as soon as is is removed from the packing without having to wash the device first, as is the case with conventional VHCs.

Conclusions

- There were minimal differences in the aerosol characteristics between the unwashed and prewashed pMDI VHC combinations with all of the drugs tested.
- The results indicate that the aerosol performance of the Diamond VHC is the same when used in either unwashed or prewashed states.

References


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Figure 1. The OptiChamber Diamond VHC can be used to optimize delivery from pMDIs.

Figure 2. Rationale behind the use of an anti-static VHC.

Figure 3. Experimental test method.

Figure 4. Mean fine particle dose (amount of drug in NGI ≤ 4.7 µm) from the unwashed Diamond VHCs and prewashed Diamond VHCs. Error bars denote standard deviation about the mean.

Figure 5. Mean MMAD (mass median aerodynamic diameter) from the unwashed Diamond VHCs and prewashed Diamond VHCs. Error bars denote standard deviation about the mean.