Purpose

- This in vitro study reports estimates of lung delivery of the two asthma medications Xopenex HFA and Flovent HFA delivered via Vortex and AeroChamber holding chambers. Such information is useful in guiding clinicians’ choice of a holding chamber for a specific MDI.

Methods

- Figure 1 shows the experimental setup. Xopenex HFA (45 micrograms levalbuterol, Sepracor) and Flovent HFA (110 micrograms fluticasone propionate, GlaxoSmithKline) were tested with and without Pari Vortex and AeroChamber Plus holding chambers. Each device was mounted onto an aluminum idealized mouth-throat replica (the Alberta Geometry) with downstream low resistance filter (Respirgard II, Vital Signs Inc., USA). The mouth-throat geometry was coated with silicone release spray to avoid particle bounce.

- Inhalation was simulated using a breathing machine downstream (with an initial flow acceleration of 1 l/s² reaching a subsequently constant flow rate of 28.3 l/min after 0.47 sec for 3 liter of total inhaled volume). Five inhaler actuations were used in each test, with 43 seconds intervals between actuations.

Results

- After completion of each test, the mouth-throat replica and each filter were extracted three times and assayed using UV spectroscopy. Statistical significance was assumed if p<0.05.

Conclusions and Clinical Implications

- Both tested holding chambers reduced mouth-throat deposition significantly, from nearly half of the label dose with MDI-alone to zero with the application of a holding chamber. This is important with a corticosteroid such as Flovent HFA since it reduces side effects associated with oropharyngeal deposition, including adverse events such as oral candidiasis that may occur upon prolonged use of Flovent HFA.

- The Vortex holding chamber gives significantly higher delivery distal to the mouth-throat than the AeroChamber Plus for both tested MDIs.

- In vivo studies would be useful to confirm the presented in vitro findings that the Vortex holding chamber gives increased lung deposition compared with the AeroChamber Plus.

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References