

IN VITRO PERFORMANCES OF A VALVED HOLDING CHAMBER WITH DIFFERENT INHALED CORTICOSTEROIDS

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Introduction

In children with asthma who do not have optimal coordination when actuating a pressurized metered dose inhaler (pMDI), spacers and valved holding chambers (VHCs) are recommended for use with inhaled corticosteroids.

The objective of this study was to evaluate the performances of a valved holding chamber with different inhaled corticosteroids.

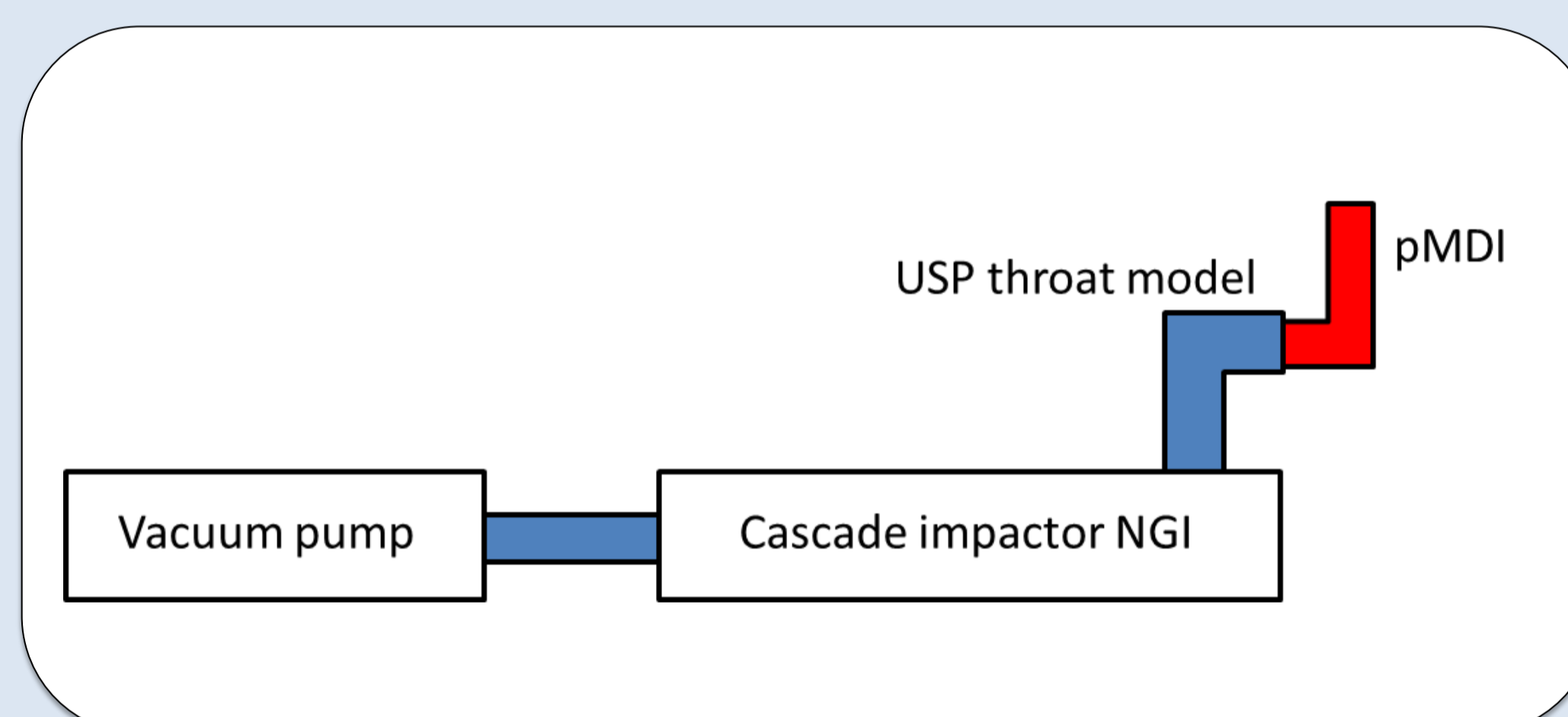
Materials

The valved holding chamber (VHC) called Tipshaler® (Protec'som, France) was evaluated with beclomethasone (QVAR®, 100µg/dose, MEDICIS, Canada) and ciclesonide (Alvesco®, 200µg/dose, Takeda, Canada).



Method

- In this study, the first method, according to the European Pharmacopoeia, used a constant flow rate (30 L/min). Particle size distribution was measured using a NGI cascade impactor (Copley Scientific, Nottingham, UK).



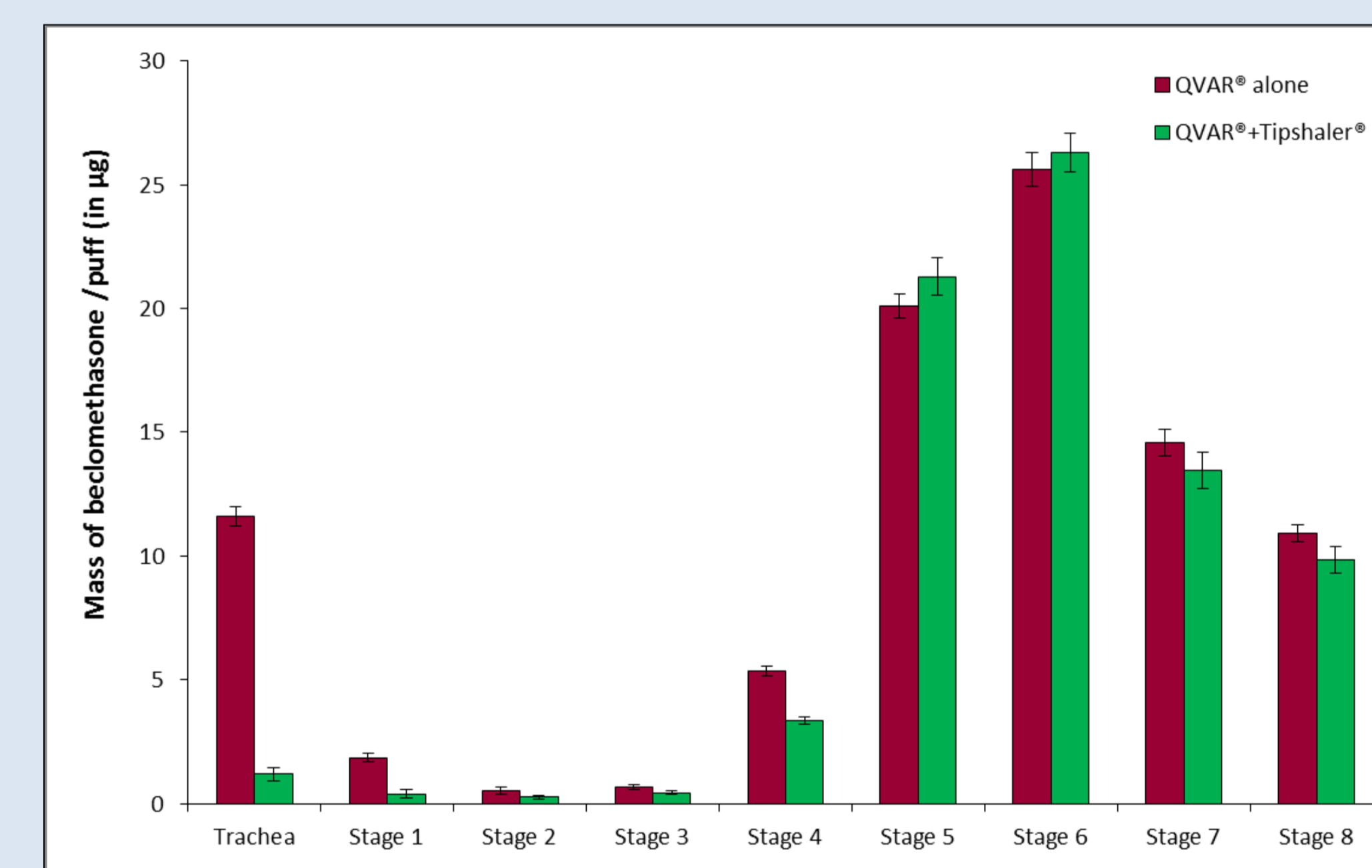
- Prior to the experiment, pMDI was primed with 10 actuations. The VHC was connected to the NGI via the USP induction port (Copley Scientific, Nottingham, UK).

- The pMDI was shaken during 5 s then discharged into the throat. This procedure was repeated 10 times (10 actuations). After the end of the procedure, all samples deposited in model throat and in each stage were collected by the addition of 20 ml of methanol.

- The beclomethasone and ciclesonide concentrations were assayed by spectrophotometry at 239 nm and 243 nm respectively. Values, expressed as mean +/- SEM, were compared using one-way ANOVA.

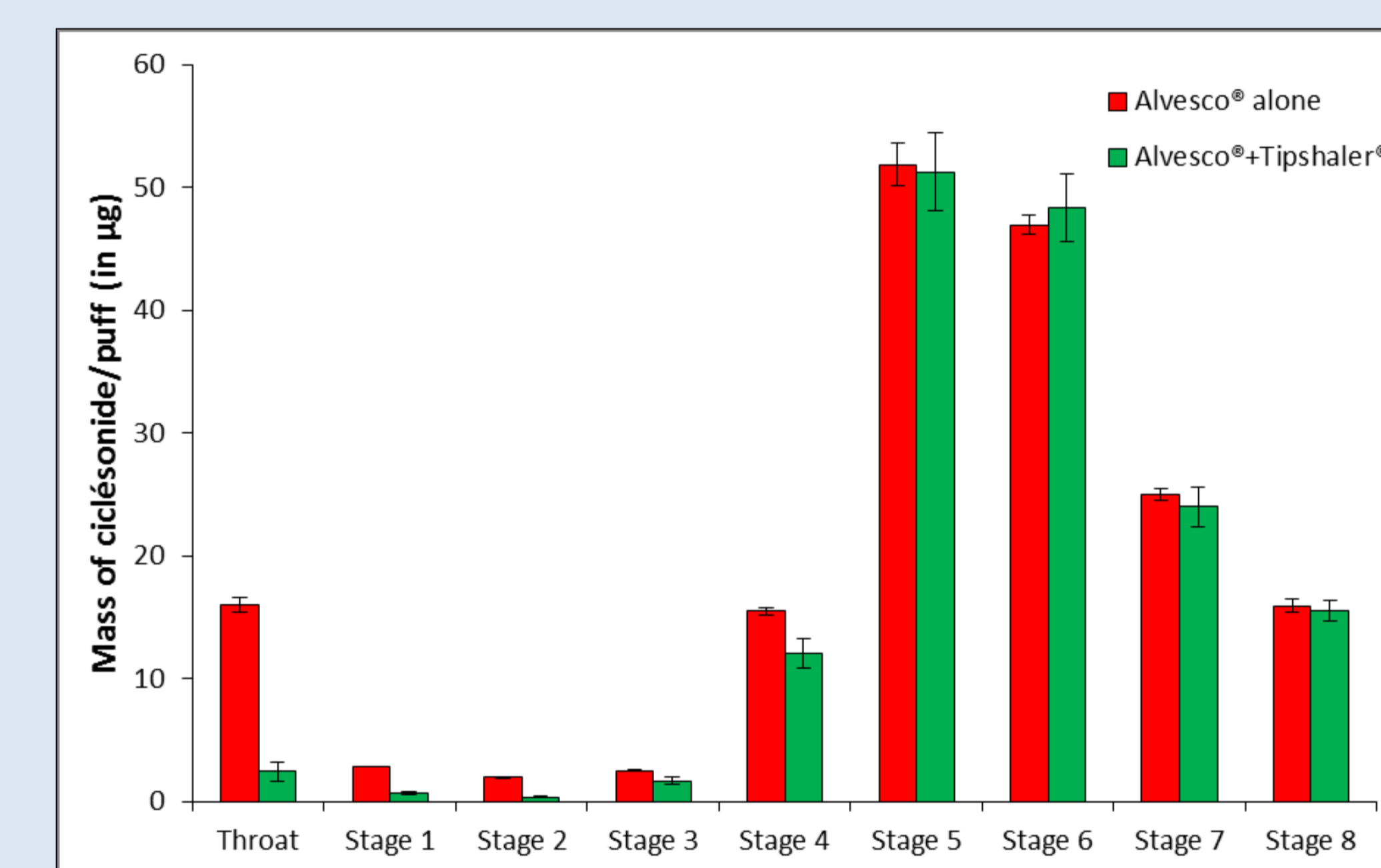
Results

In the trachea, the mass of beclomethasone was higher with pMDI alone in comparison with Tipshaler ($11,6 \pm 0,4$ vs $1,2 \pm 0,2$, $p < 0.05$). In addition, deposition of fine particles of beclomethasone was similar with pMDI alone compared to Tipshaler ($77 \pm 1 \mu\text{g}$ vs $75 \pm 1 \mu\text{g}$, $p < 0.05$).



Results

Concerning ciclesonide, in the trachea, the mass of drugs was lower with Tipshaler compared to pMDI alone ($2,4 \pm 0,7$ vs $16,0 \pm 0,6$, $p < 0.05$). However, the fine particle dose (FPD) was higher with the pMDI alone compared to Tipshaler ($158 \pm 1 \mu\text{g}$ vs $153 \pm 1 \mu\text{g}$, $p < 0.05$).



Discussion

In the trachea, the deposition of particles is higher with a pMDI alone compared to the use of a VHC, and this, even if the pMDI was designed to permit the emission of ultra-fine particles. However, the pMDIs tested with or without a VHC provide a similar deposition of particles in the distal lung.

Conclusion

In conclusion, the use of valved holding chamber reduces the deposition of ultra-fine particles of inhaled corticosteroids in the trachea and so, allows a more relevant deposition of drugs.