

Comparison of the in vitro performances of two valved holding chambers

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INTRODUCTION

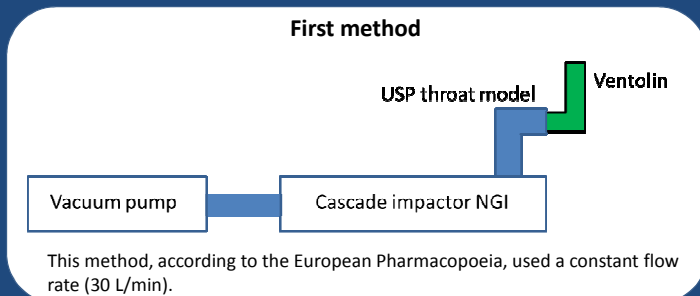
The objectives of this study were to compare the performances of two valved holding chambers having the same shape and to evaluate the influence of the material.

METHODS

- In this study, measurements of the particle size of salbutamol and fluticasone were performed using pMDIs (Ventolin 100 µg/dose or Flixotide 50 µg/dose, GSK, France) with VHC. We tested two VHCs with Ventolin and Flixotide: an avoid VHC1 (Itinhaler, Protec'Som Laboratory, Valognes, France) made in silicone and an ovoid VHC2 (Tipshaler, Protec'Som Laboratory, Valognes, France) made in plastic.



- The European Pharmacopoeia method was used to determine the distribution of particles.
- 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.

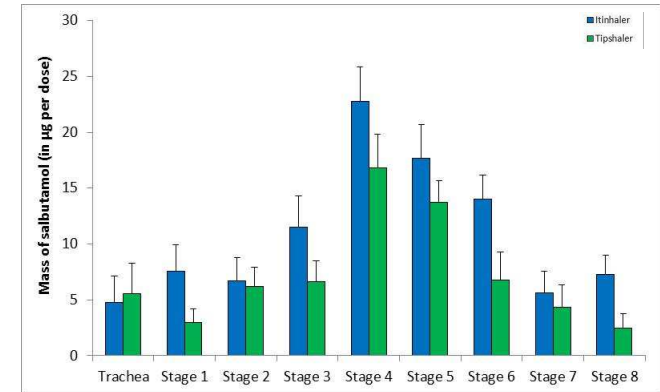


- The salbutamol and fluticasone concentrations were assayed by spectrophotometry at 240 and 236 nm respectively (Lightwave II, Biochrom, UK). For each condition, the 6 replicate measures were performed.

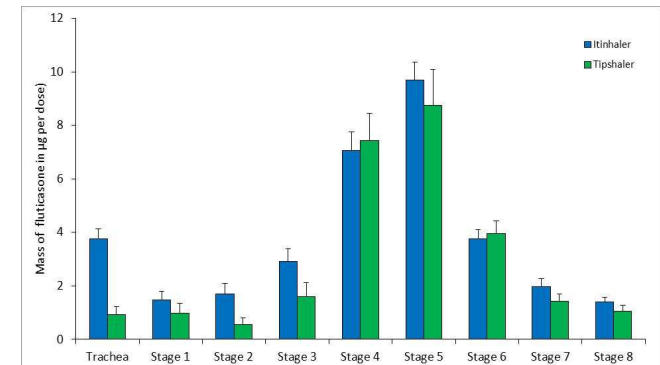
RESULTS

- Results demonstrate a similar amount of salbutamol mass deposited in the trachea with Itinhaler and Tipshaler ($5 \pm 2 \mu\text{g}$ vs $5,5 \pm 2 \mu\text{g}$). In addition, deposition of fine particles of salbutamol was higher with Itinhaler compared to Tipshaler ($73 \pm 11 \mu\text{g}$ vs $51 \pm 2 \mu\text{g}$, $p < 0.05$) with the method of the European Pharmacopoeia.

A) Mass of salbutamol (in µg per dose) deposited in the NGI in accordance with European Pharmacopoeia method.



B) Mass of fluticasone (in µg per dose) deposited in the NGI in accordance with European Pharmacopoeia method.



- Concerning fluticasone, in the trachea, the mass of fluticasone was lower with Tipshaler compared to Itinhaler ($0,9 \pm 0,3 \mu\text{g}$ vs $4 \pm 0,3 \mu\text{g}$, $p < 0.05$). However, the fine particle dose was similar between the two inhalation chambers ($27 \pm 2 \mu\text{g}$ vs $25 \pm 1 \mu\text{g}$). With the two valved holding chambers, 50% of particles were deposited in the lungs.

DISCUSSION

	Itinhaler		Tipshaler	
	Salbutamol	Fluticasone	Salbutamol	Fluticasone
Trachea	$5 \pm 2 \mu\text{g}$	$4 \pm 0,3 \mu\text{g}$	$5,5 \pm 2 \mu\text{g}$	$0,9 \pm 0,3 \mu\text{g}$
FPD	$73 \pm 11 \mu\text{g}$	$27 \pm 2 \mu\text{g}$	$51 \pm 2 \mu\text{g}$	$25 \pm 1 \mu\text{g}$

- The particle size distribution depend on the pMDI used and the material type. The efficiency of Itinhaler is better with salbutamol compared with fluticasone. The efficiency of Tipshaler is similar with salbutamol and fluticasone.

CONCLUSIONS

- Valved holding chamber performances depends of pMDI used.
- Material type influence the valved holding chamber performances.