A COMPARATIVE EVALUATION OF THE AEROSOLIZATION PERFORMANCES OF MARKETED FLUTICASONE MULTI-UNIT AND SINGLE-UNIT DRY POWDER INHALERS THE EFFECTS OF PRODUCT USE LIFE, SUBOPTIMAL AIRFLOW AND A HOT/HUMID ENVIRONMENT

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OBJECTIVES

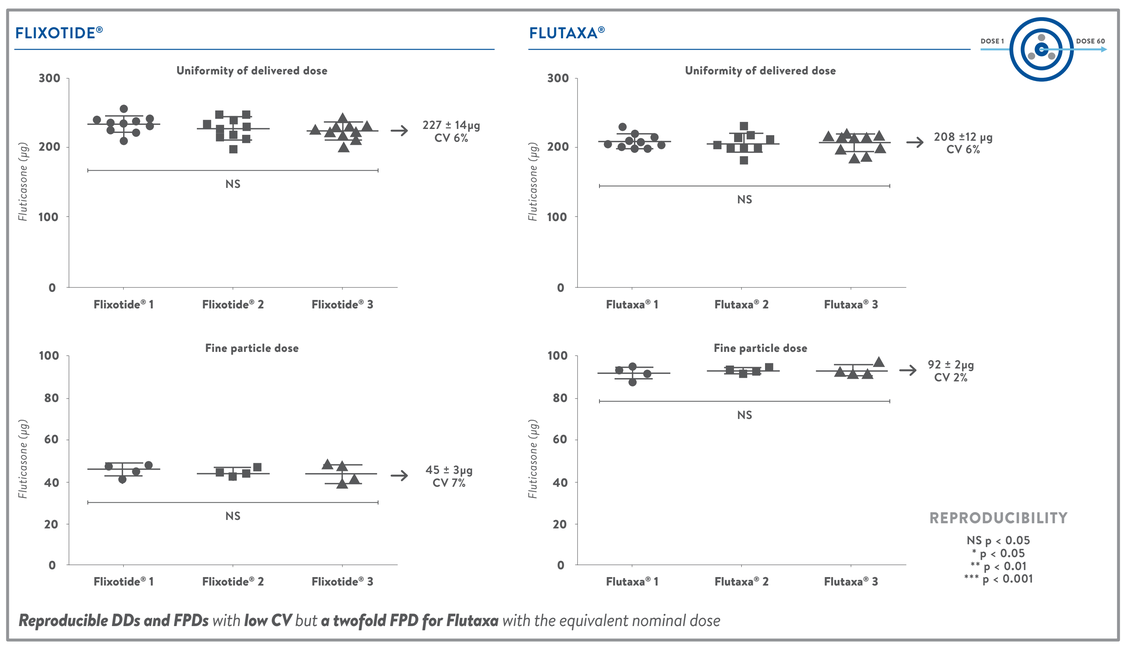
Inhalation products based on the corticosteroid fluticasone propionate are frequently prescribed for the maintenance treatment of asthma and chronic obstructive pulmonary disease (COPD). Different inhalation products are marketed as multi-unit or single-unit dry powders for inhalation (DPIs).

The aim of this study was to evaluate the **reproducibility** and **robustness** of the aerosolization performance of a multi-unit DPI and a single-unit DPI reported in the Table, using a dosage unit sampling apparatus for the delivered dose determination (n=10) and a next generation impactor (10 doses/test, n=4) to determine the fine particle dose (FPD, ≤ 5 µm):

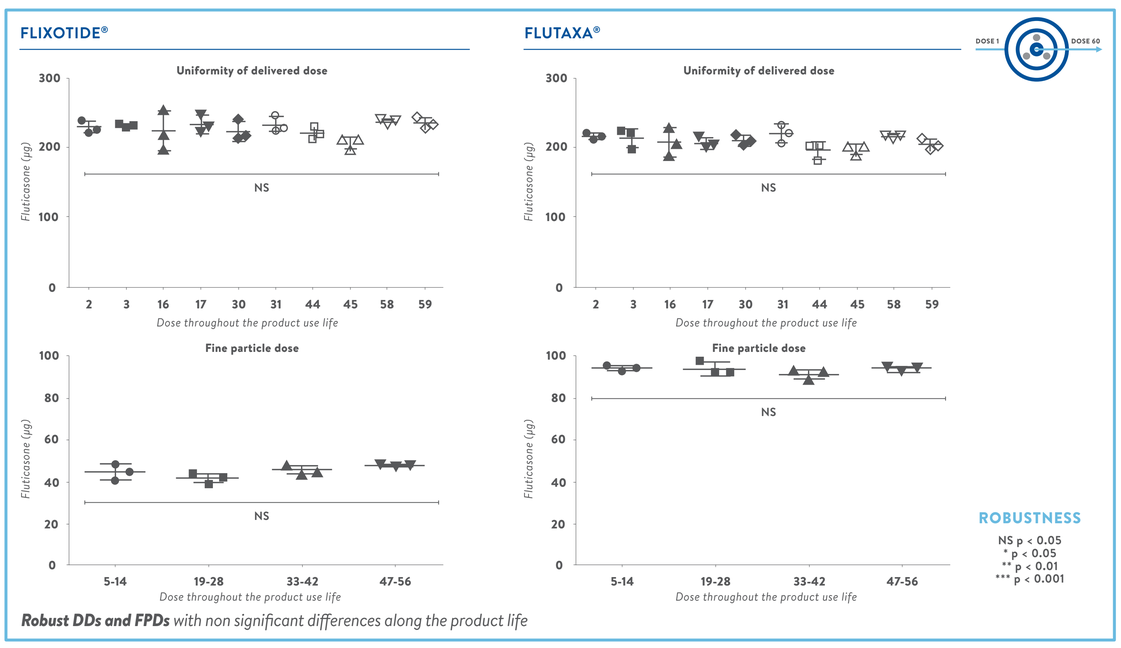
(i) throughout product use life using three marketed products of the same batch,
(ii) varied airflow conditions including suboptimal flows generated from asthmatic and COPD patients through Diskus and Aerolizer [1]. The latter presents a similar resistance and design as Axahaler,
(iii) exposure of preloaded doses (without mouth cap) in the device to hot and humid conditions.

	Flixotide® GSK	**Flutaxa® SMB**
		 **Flutixon® (Poland)**
Device (airflow)	Diskus or Accuhaler (84-87 L/min)	Axahaler (adjusted to 100 L/min)
Device type	Multi-unit DPI	Single-unit DPI
Powder packaging	Blister strip contained in the device	HPMC capsules in desiccant container
Excipients	Monohydrate lactose	Anhydrous and monohydrate lactose
Dosage	250 µg fluticasone propionate/nominal dose (60 doses)	

DRUG DELIVERY AND AERODYNAMIC PERFORMANCE THROUGHOUT THE PRODUCT USE LIFE

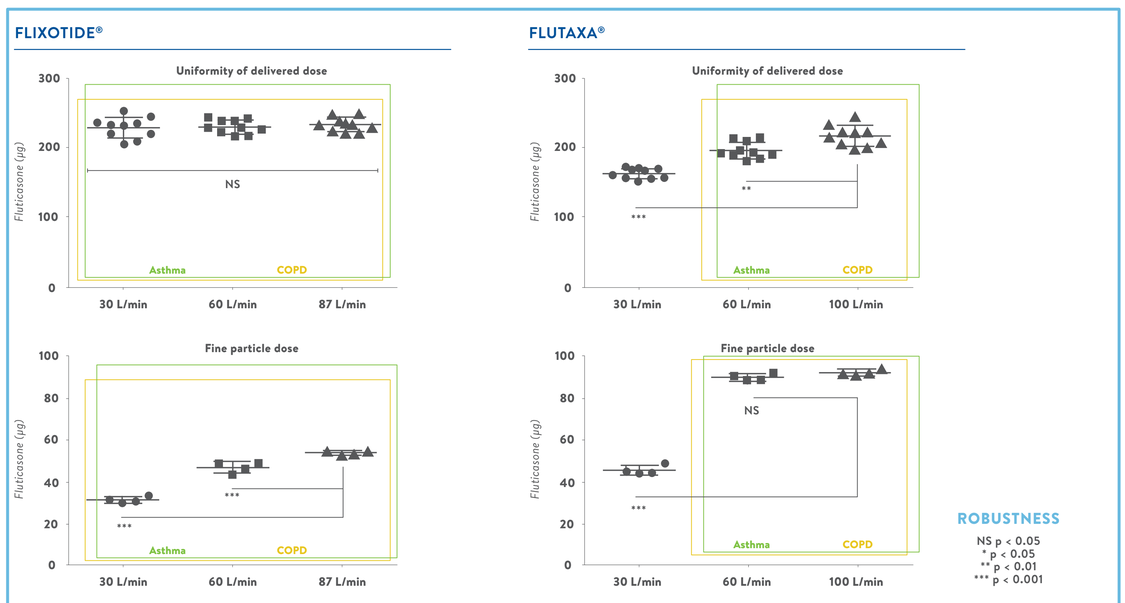


***Reproducible DDs and FPDs** with **low CV** but **a twofold FPD for Flutaxa** with the equivalent nominal dose*



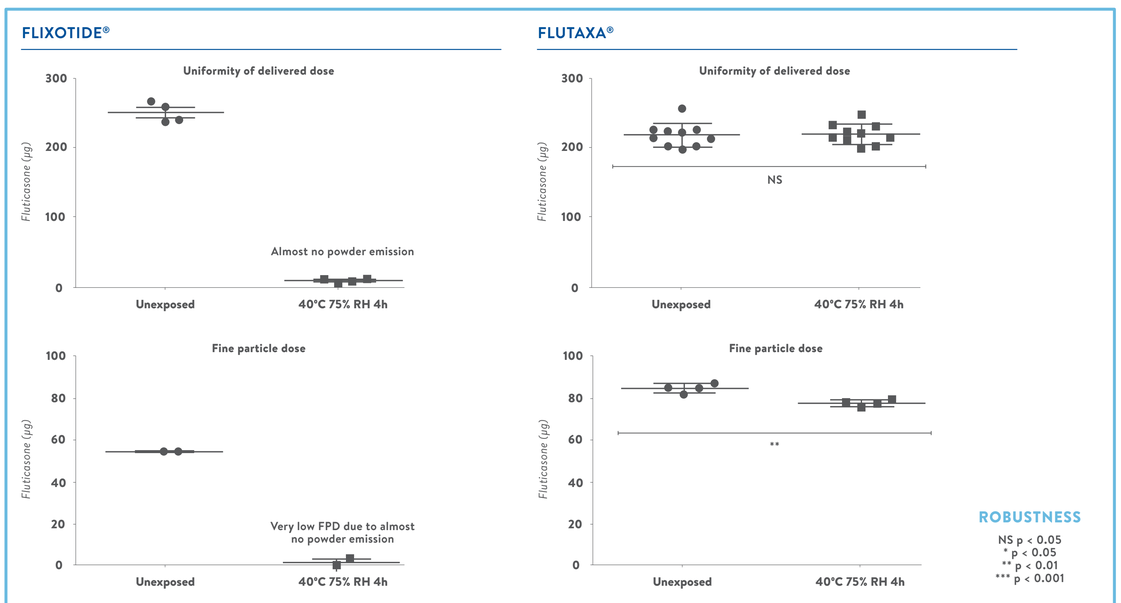
***Robust DDs and FPDs** with non significant differences along the product life*

DRUG DELIVERY AND AERODYNAMIC PERFORMANCE AT DIFFERENT AIRFLOWS



*Flixotide® showed **robust DDs** but **significant difference for FPDs** at asthma and COPD patients' suboptimal flow*
*Flutaxa® showed **significant difference for DDs** but **robust FPDs** at asthma and COPD patients' suboptimal flow*

DRUG DELIVERY AND AERODYNAMIC PERFORMANCE IN DRASTIC CONDITIONS



*Flutaxa® showed **a slight but significant FPD decrease** from preloaded doses stored in drastic conditions*
*Flixotide® showed **almost no powder emission** from preloaded doses stored in drastic conditions*

CONCLUSIONS

Both DPIs showed reproducible and robust DDs and FPDs along the product use life. Flutaxa® delivered double the FPD with less variability compared to Flixotide®, whilst it delivered a slightly lower DD. Moreover, FPDs from Flutaxa® - unlike Flixotide® - were robust at suboptimal airflows – typical of those generated by asthmatic and COPD patients. Finally, Flutaxa® showed a slight decrease contrary to almost no powder emission when preloaded doses were exposed to a hot/humid environment.

REFERENCES

[1] Azouz, W., et al., The inhalation characteristics of patients when they use different dry powder inhalers. J Aerosol Med Pulm Drug Deliv, 2015. 28(1): p. 35-42.

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