IMPACT OF DIFFERENT CAPSULES FOR DRY POWDER INHALERS ON THE AERODYNAMIC PERFORMANCES OF FORMOTEROL-BASED BINARY AND TERNARY BLENDS

Nathalie Wauthoz1*, Ismaël Hennia1, Susana Ecenarro1 and Karim Amighi1
1 Laboratoire de Pharmacie Galénique et de Biopharmacie, Université libre de Bruxelles (ULB), Brussels, Belgium
2 Qualicaps Europe S.A.U., Alcobendas, Madrid, Spain

*Email: nawautho@ulb.ac.be

INTRODUCTION
In the case of capsule-based DPIs, the capsule plays a role not only in the packaging of the formulation, but also in powder aerosolization and the dispersion of the micronized drug from the carrier during inhalation [1]. Therefore, the choice of the capsule could be an important parameter in the performance of dry powder inhalers. However, few studies have been conducted on the impact of the important parameter in the performance of dry powder inhalers. In the case of capsule-based DPIs, the capsule plays a role not only in the packaging of the formulation, but also in powder aerosolization and the dispersion of the micronized drug from the carrier during inhalation [1]. Therefore, the choice of the capsule could be an important parameter in the performance of dry powder inhalers. However, few studies have been conducted on the impact of the important parameter in the performance of dry powder inhalers.

EXPERIMENTAL METHODS

RESULTS AND DISCUSSION

Similar trends were observed for the DD, FPD and formoterol capsule retention for both the binary and ternary dry powder mixtures. The highest DD and FPD and the lowest formoterol capsule retention for both the binary and ternary dry powder mixtures (p < 0.05, one-way ANOVA with Newman-Keuls post-hoc test) were observed for HPMC capsules (Quali-V®-I, Vcaps® Plus) in comparison with gelatin capsules (Quali-G™ and HGC). More specifically for Blend A, significantly higher FPDs (p < 0.01, one-way ANOVA with Newman-Keuls post-hoc test) and lower capsule retentions (p > 0.05, one-way ANOVA with Newman-Keuls post-hoc test) were observed for HPMC capsules (Quali-V®-I, Vcaps® Plus) in comparison with gelatin capsules (Quali-G™ and HGC, Vcaps®) and second-generation HPMC capsules, respectively. To be representative of the kind of dry powder found in the market for low-content drug formulations [2], two dry powder formulations for inhalation were produced using the same micronized formoterol, but with different lactoses for inhalation: milled lactose presenting a broad particle size distribution (PSD) to be used in a binary mixture, and sieved lactose presenting a narrow PSD with the addition of 10% of fine lactose to be used in a ternary mixture.

CONCLUSIONS

Although similar trends were observed for the DD, the FPD and formoterol capsule retention for both the binary and ternary dry powder mixtures packaged in the different capsules, the best results were obtained with HPMC (Quali-V®-I and Vcaps®). Therefore, the choice of the kind of capsule used to package the dry powder formulations has an influence on the DDs and FPDs, key parameters in the evaluation of dry powder aerodynamic performance. Further investigations are needed to better understand the varying aerodynamic performances observed among the different capsules.

REFERENCES

27TH DRUG DELIVERY TO THE LUNGS, EDINBURGH, SCOTLAND UK, DECEMBER 7-9, 2016