Introduction

It is important to understand the proportion of patients with chronic obstructive pulmonary disease (COPD) who are able to achieve the peak inspiratory flow rate (PIFR) required to use a dry powder inhaler (DPI).

Two clinical trials (RES1311/RES117178) have demonstrated a strong correlation between PIFR measured by spirometry (PIFRspiro) and PIFR achieved through the moderate-resistance Ellipta DPI (PIFREllipta) in patients with COPD of all severities. Across these studies, patients with very severe COPD had on average, the lowest PIFRspiro values, with the broad recorded PIFRspiro with maximum inspiratory effort ranging from 1.6 to 43.5 L/min depending on device configuration. Subsequently, in vitro studies using the Electronic Lung (a breathing simulator designed for inhaler characterization) or standard test conditions (Real Generation Impactor) have demonstrated a consistent dose delivery of full-faceformulated medicinalinhaler (FT/IMVIC) via the Ellipta DPI with PIFRspiro values ranging from 30 to 130 L/min. However, in vitro and clinical trial settings are not reflective of real-world settings and as such, their results may not always be applicable to clinical practice. This analysis compared spirometry data from two recent replicate studies (207602/207609) (see Ferguson et al. Poster 806) against a real-world, managed care organization database (Kaiser Permanente Northwest [KPNW]) in patients with COPD.

Methods

Studie 207602/207609

KPNW database

Patients

Methods

PIFRspiro was measured during a forced inspiration maneuver starting at residual volume and ending at total lung capacity. The distribution of spirometry PIFR at screening in the 207602/207609 studies was evaluated post hoc: Patients’ most recent spirometry PIFR recorded during 2015–2017 was used for the KPNW cohort.

Using COPD data from RES1311/RES117178 studies (n=452) and the relationship between two-strip PIFRspiro and PIFRspiro measurements were derived to describe the relationship for both the average and 85th lower tolerance bound of PIFRspiro values from PIFRspiro data. The lower tolerance bound equation was used to predict PIFRspiro for patients in the 207602/207609 studies.

Results

PIFRspiro values were recorded in 1951 patients at screening in the pooled 207602/207609 population and 3282 patients in the KPNW population (Figure 1).

- 1460 patients were included in the 207602/207609 pooled intent-to-treat (ITT) population (FPV/UMEC/VF n=729; BUD/FOR + TIO n=731).
- Nearly all patients had a PIFRspiro greater than 30 L/min, which correlates to an estimated PIFRspiro value shown to be adequate for appropriate dose delivery via the Ellipta DPI.
- Patients with PIFRspiro ≥30 L/min, which correlates to an estimated PIFRspiro ≥30 L/min, a value shown to be adequate for appropriate dose delivery via the Ellipta DPI. Patients with a PIFRspiro of ≥30 L/min, which correlates to an estimated PIFRspiro ≥30 L/min, a value shown to be adequate for appropriate dose delivery via the Ellipta DPI.
- Those with a PIFRspiro of ≥30 L/min, which correlates to an estimated PIFRspiro ≥30 L/min, a value shown to be adequate for appropriate dose delivery via the Ellipta DPI.

Conclusions

- Despite patients enrolled in 207602/207609 having more severe COPD than those in the KPNW database, considerable overlap between PIFRspiro values was seen between the two populations. These results suggest that patients enrolled in the 207602 and 207609 studies could generate inspiratory flow rates comparable to those observed in the real-world COPD population.
- Nearly all patients (99.7%) from the 207602/207609 studies and the KPNW population had PIFRspiro ≥30 L/min, which correlates to an estimated PIFRspiro ≥30 L/min, a value shown to be adequate for appropriate dose delivery via the Ellipta DPI. 1, 2, 3, 4

References

3. Ferguson et al. Poster 806) against a real-world, managed care organization database (Kaiser Permanente Northwest [KPNW]) in patients with COPD of all severities. The lower tolerance bound (PIFRspiro)* was used to predict PIFRspiro values from PIFRspiro data. The lower tolerance bound equation was used to predict PIFRspiro for patients in the 207602/207609 studies. The lower tolerance bound equation was used to predict PIFRspiro for patients in the 207602/207609 studies.

Table 1. Patient demographics and baseline characteristics

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>207602/207609</th>
<th>KPNW</th>
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<tbody>
<tr>
<td>Age, years, mean (SD)</td>
<td>65.2 (9.1)</td>
<td>68.4 (9.9)</td>
</tr>
<tr>
<td>Female, n, (%)</td>
<td>720 (45.2)</td>
<td>1533 (46.7)</td>
</tr>
<tr>
<td>BMI, kg/m², mean (SD)</td>
<td>26.5 (7.1)</td>
<td>30.1 (7.6)</td>
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<tr>
<td>Current smoker, n, (%)</td>
<td>714 (49.9)</td>
<td>1198 (38.5)</td>
</tr>
<tr>
<td>COPD exacerbations in the previous 12 months, n (%)</td>
<td>670 (46.2)</td>
<td>2458 (74.9)</td>
</tr>
<tr>
<td>0 moderate/severe</td>
<td>694 (47.0)</td>
<td>764 (22.3)</td>
</tr>
<tr>
<td>≥1 moderate</td>
<td>175 (12.0)</td>
<td>60 (1.8)</td>
</tr>
<tr>
<td>≥1 severe</td>
<td>223 (15)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Screening lung function, mean (SD)</td>
<td>1455</td>
<td>1.9 (2.7)</td>
</tr>
</tbody>
</table>

KPNW Managed Care Population

*As some patients in 207602/207609 recorded both moderate and severe exacerbations in the prior 12 months, the total percentage exceeds 100%; 0=non-exacerbations, 1=moderate exacerbations, 2=severe exacerbations, 3=very severe exacerbations. 1, 2, 3

*As some patients in 207602/207609 recorded both moderate and severe exacerbations in the prior 12 months, the total percentage exceeds 100%; 0=non-exacerbations, 1=moderate exacerbations, 2=severe exacerbations, 3=very severe exacerbations.

*Spriometry values were recorded in 1951 patients at screening in the pooled 207602/207609 population and 3282 patients in the KPNW population (Figure 1).

Conclusions

- Despite patients enrolled in 207602/207609 having more severe COPD than those in the KPNW database, considerable overlap between PIFRspiro values was seen between the two populations. These results suggest that patients enrolled in the 207602 and 207609 studies could generate inspiratory flow rates comparable to those observed in the real-world COPD population.

Prepared for the American Thoracic Society Annual Meeting (2020)