Deucravacitinib, an oral, selective, allosteric tyrosine kinase 2 inhibitor, in moderate to severe plaque psoriasis: correlations between patient-reported outcomes and clinical responses in the phase 3 clinical trials POETYK PSO-1 and POETYK PSO-2

April W. Armstrong,1 Kim A. Papp,2 Joe Zhuo,3 Brandon Becker,3 Yichen Zhong,3 Jennifer L. Beaumont,4 Michael DeRosa,4 Renata M. Kisa,3 Subhashis Banerjee,3 Bruce Strober5,6

Keck School of Medicine, University of Southern California, Los Angeles, CA; Bristol Myers Squibb, Princeton, NJ; and Clinical Outcomes Solutions, Inc., New Haven, CT.

The analysis populations for the PSSD and DLQI included all patients from the full analysis set who completed 1 item on the respective questionnaire at baseline and at least 1 post-baseline visit.

At Week 16, change from baseline in relative PASI score was correlated with changes in the PSSD total score (r = 0.536) and DLQI total score (r = 0.540) in the total study population.

Higher PASI 50 or sPGA response was associated with greater PSSD and DLQI response at Week 16 in both treatment arms (Table 1). Specifically, 37.5% of patients who did not achieve PASI 75 and 75.0% of patients who did not achieve sPGA 0/1 did not achieve PSSD 30 or DLQI 45 (40.5% of patients who did not achieve PASI 75 and 41.7% who did not achieve sPGA 0/1). This correlation is consistent with that determined in other studies4-7

Among patients who achieved PASI 75 response, 41.0% of patients who did not achieve sPGA 0/1 and 46.9% of patients who did not achieve PASI 75 (≥2 points) and sPGA 0/1 did not achieve sPGA 0/1 compared with patients who received placebo (31.6% of patients who achieved PASI 75 and 75.0% of patients who achieved sPGA 0/1) (Table 1).

Conclusions

- Patients who experience symptom relief and improved patient quality of life were more likely to report improvement in clinical response.

- Higher clinical response was associated with greater PRO measure response.

- PRO measures capture patient-perceived treatment benefits that may not be detectable by measuring change in objective clinical assessment scores.

- Patients report symptom relief, which may be associated with enhanced patient assessment.

- Active patient involvement in decision making is necessary in order to measure treatment efficacy.

- Active patient involvement improves clinical response and self-reported symptom relief, quality of life, and overall treatment satisfaction.

- Patients treated with deucravacitinib under real-world conditions are likely to report meaningful improvements in PROs compared with patients who received placebo.

Table 1. PSSD response at Week 16 in patients who achieved clinical response

<table>
<thead>
<tr>
<th>Clinical Response</th>
<th>PSSD Symptom Score (≥25-point reduction), n/N</th>
<th>PSSD Sign Score (≥25-point reduction), n/N</th>
</tr>
</thead>
<tbody>
<tr>
<td>PASI 75 and sPGA 0/1</td>
<td>223/361 (61.8) 8/27 (29.6)</td>
<td></td>
</tr>
<tr>
<td>PASI 75 and sPGA 0/1</td>
<td>248/361 (68.7) 10/27 (37.0)</td>
<td></td>
</tr>
</tbody>
</table>

Table 2. DLQI response at Week 16 in patients who achieved clinical response

<table>
<thead>
<tr>
<th>Clinical Response</th>
<th>DLQI Symptom Score (≥25-point reduction), n/N</th>
<th>DLQI Sign Score (≥25-point reduction), n/N</th>
</tr>
</thead>
<tbody>
<tr>
<td>PASI 75 and sPGA 0/1</td>
<td>223/361 (61.8) 8/27 (29.6)</td>
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<tr>
<td>PASI 75 and sPGA 0/1</td>
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<td></td>
</tr>
</tbody>
</table>

References

2. Papp KA, et al. [poster] Presented at the 30th Congress of the European Academy of Dermatology and Venereology (EADV); September 29–October 2, 2019.

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Disclosures

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Corrections and additions

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This study was sponsored by Bristol Myers Squibb.

Table 1. PSSD response at Week 16 in patients who achieved clinical response

<table>
<thead>
<tr>
<th>Treatment</th>
<th>PASI 90</th>
<th>PASI 75</th>
<th>PASI 50</th>
<th>PASI 30</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deucravacitinib</td>
<td>80.9%</td>
<td>84.7%</td>
<td>83.3%</td>
<td>69.0%</td>
</tr>
<tr>
<td>Placebo</td>
<td>62.3%</td>
<td>72.7%</td>
<td>71.0%</td>
<td>58.8%</td>
</tr>
</tbody>
</table>

Table 2. DLQI response at Week 16

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Week 16</th>
<th>Week 24</th>
<th>Week 52</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deucravacitinib</td>
<td>74.9%</td>
<td>72.7%</td>
<td>72.9%</td>
</tr>
<tr>
<td>Placebo</td>
<td>63.6%</td>
<td>63.2%</td>
<td>63.6%</td>
</tr>
</tbody>
</table>

Figure 4. DLQI change from baseline by sPGA change group (treatment arms)

Figure 2. DLQI Change from baseline by PASI response group (treatment arms)
In the phase 3 clinical trials POETYK PSO-1 and PSO-2, deucravacitinib was compared for efficacy and safety with placebo and apremilast in the treatment of patients with moderate to severe plaque psoriasis\textsuperscript{1}.

- Deucravacitinib is an oral, selective, allosteric tyrosine kinase 2 (TYK2) inhibitor approved by the US Food and Drug Administration for the treatment of adults with moderate to severe plaque psoriasis who are candidates for systemic therapy or phototherapy.

- In each clinical trial, greater proportions of patients who received deucravacitinib achieved ≥75% reduction from baseline in the Psoriasis Area and Severity Index score (PASI 75)\textsuperscript{1} and static Physician’s Global Assessment scores of 0 or 1 (sPGA 0/1),\textsuperscript{1} and showed meaningful improvements on Psoriasis Symptoms and Signs Diary (PSSD) total scores (≥25 points)\textsuperscript{2} and Dermatology Life Quality Index (DLQI) total scores (≥4 points)\textsuperscript{2} compared with patients receiving placebo or apremilast.

- In this post hoc analysis of data pooled from both trials, clinical and patient-reported outcomes (PROs) were found to be correlated.

- When analyzed by the deucravacitinib or placebo treatment arm, greater proportions of patients who received deucravacitinib reported symptom reduction and improved quality of life, both in patients who did and who did not achieve PASI 75 and sPGA 0/1 responses.

Objective

To explore the correlations between responses on clinical and PRO measures in pooled data from POETYK PSO-1 and PSO-2.

Methods

- In POETYK PSO-1 (N = 666) and PSO-2 (N = 1020) adults (aged ≥18 years) with moderate to severe psoriasis were randomized 2:1:1 to deucravacitinib 6 mg once daily, placebo, or apremilast 30 mg twice daily.

- At Week 16 in each trial, patients who received placebo crossed over to deucravacitinib.

- Using data pooled from both trials, we evaluated the correlation between responses measured by PASI and sPGA on one hand, and the PRO measures PSSD (≥25 points)\textsuperscript{2} and DLQI (≥4 points)\textsuperscript{2} on the other.

- The analysis populations for the PSSD and DLQI included all patients from the full analysis set who completed ≥1 item on the respective questionnaire at baseline and ≥1 post-baseline visit.

- Spearman correlation coefficients between clinical and PRO score changes from baseline to Week 16 were calculated with all treatment groups combined.

- Mean PSSD and DLQI scores were determined within relative PASI and sPGA response levels.

- The proportions of patients achieving meaningful improvement (ie, response) in PSSD total scores and on the DLQI were summarized by whether they did or did not achieve PASI 75 and sPGA 0/1, and were further analyzed by treatment arm.

- Results are reported for patients receiving deucravacitinib or placebo.

Outcome measures

- PASI

- Clinician evaluated.

- Range: 0-72, with higher scores indicating more severe disease.

- sPGA

- Clinician evaluated.

- Range: 0 (clear) to 4 (severe).

- PSSD

- Patient rated.

- 5 skin symptoms (itch, tightness, burning, stinging, and pain) and 6 skin signs (dryness, cracking, scaling, shedding/flaking, redness, and bleeding) associated with psoriasis were rated 0 (absent) to 10 (worst imaginable); averages within each domain were multiplied by 10, then averaged across both domains to obtain a total score.

- Range: 0-100, with higher scores indicating heavier disease burden.

- DLQI

- Patient rated.

- 10 questions that assess the extent to which skin disease affects patients’ lives.

- Range: 0-30, with higher scores indicating more severe impact of disease.

Results

Correlations between clinical and PRO measures

- At Week 16, change from baseline in relative PASI score was correlated with changes in the PSSD total score (Spearman’s rank correlation coefficient \( r_s = 0.536 \)) and DLQI total score \( r_s = 0.421 \) in the total study population.
Correlations between clinical and PRO measures

- Higher PASI or sPGA response was associated with greater PSSD and DLQI responses at Weeks 16, 24, and 52 in the total study population (Figures 1-4)

Figure 1. PSSD total score change from baseline by PASI response group (treatment arms and trials pooled, n = 1536)

![Figure 1](chart1.png)

Figure 2. DLQI change from baseline by PASI response group (treatment arms and trials pooled, n = 1643)

![Figure 2](chart2.png)

Figure 3. PSSD change from baseline by sPGA change group (treatment arms and trials pooled, n = 1536)

![Figure 3](chart3.png)
Deucravacitinib, an oral, selective, allosteric tyrosine kinase 2 inhibitor, in moderate to severe plaque psoriasis: correlations between patient-reported outcomes and clinical response.

In each clinical trial, greater proportions of patients who received deucravacitinib achieved PASI 75, 75% reduction from baseline in Psoriasis Area and Severity Index score; PSSD, Psoriasis Symptoms and Signs Diary; sPGA 0/1, static Physician’s Global Assessment score of 0 or 1.

PSSD Response by Clinical Response

- At Week 16, PASI 75 was reported by 64.8% and 65.3% of all patients across both trials who achieved PASI 75 (356/549) and/or sPGA 0/1 (330/505), respectively (Table 1)
  - Greater proportions of patients who received deucravacitinib and achieved clinical response reported PASI 75 total score response (68.6% of patients who achieved PASI 75 and 67.8% of patients who achieved sPGA 0/1) compared with patients who received placebo (31.3% of patients who achieved PASI 75 and 37.0% of patients who achieved sPGA 0/1) (Table 1)
  - On the PSSD Itch item, meaningful improvement (≥2 points) was reported by 80.8% of patients receiving deucravacitinib who achieved PASI 75 and 80.1% of deucravacitinib-treated patients who achieved sPGA 0/1, compared with 43.8% of patients receiving placebo who achieved PASI 75 and 48.1% of placebo-treated patients who achieved sPGA 0/1 (Figure 5)

- At Week 16, 27.9% and 29.8% of all patients across both trials who did not achieve PASI 75 (188/674) and/or did not achieve sPGA 0/1 (214/718), respectively, nonetheless reported PSSD total score response
  - Greater proportions of patients who received deucravacitinib and did not achieve clinical response nonetheless reported PSSD total score response (41.8% of patients who did not achieve PASI 75 and 44.1% of patients who did not achieve sPGA 0/1) compared with patients who received placebo (10.4% of patients who did not achieve PASI 75 and 10.3% who did not achieve sPGA 0/1)
  - On the PSSD Itch item, meaningful improvement was reported by 54.9% of patients receiving deucravacitinib who did not achieve PASI 75 compared with 22.0% of patients receiving placebo who did not achieve PASI 75

Table 1. PSSD response at Week 16 in patients who achieved clinical response

<table>
<thead>
<tr>
<th>PSSD Domain</th>
<th>Total patients</th>
<th>Deucravacitin n = 755</th>
<th>Placebo n = 383</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total score (≥25-point reduction), n/N* (%)</td>
<td>356/549 (64.8)*</td>
<td>330/505 (65.3)*</td>
<td>264/385 (68.6)</td>
</tr>
<tr>
<td>Symptom score (≥25-point reduction), n/N* (%)</td>
<td>323/549 (58.8)*</td>
<td>296/505 (58.6)*</td>
<td>240/385 (62.3)</td>
</tr>
<tr>
<td>Sign score (≥25-point reduction), n/N (%)</td>
<td>383/549 (69.8)</td>
<td>354/505 (70.1)</td>
<td>284/385 (73.8)</td>
</tr>
</tbody>
</table>

*Not all patients who achieved clinical response compared in this trial at baseline due to a prior PSSD baseline.

Figure 5. PSSD individual item response at Week 16 in patients who achieved clinical response
• At Week 16, DLQI response (≥2-point reduction from baseline) was reported by 83.3% and 82.5% of all patients across both trials who achieved PASI 75 (553/664) and/or sPGA 0/1 (496/601), respectively (Table 2)
  — Greater proportions of patients who received deucravacitinib and achieved clinical response reported meaningful DLQI improvement (84.7% of patients who achieved PASI 75 and 83.3% of patients who achieved sPGA 0/1) compared with patients who received placebo (72.7% of patients who achieved PASI 75 and 70.6% of patients who achieved sPGA 0/1)
  • At Week 16, 54.7% and 57.3% of all patients across both trials who did not achieve PASI 75 (444/811) and/or did not achieve sPGA 0/1 (501/874), respectively, nonetheless reported DLQI response
  — Greater proportions of patients who received deucravacitinib and did not achieve clinical response nonetheless reported meaningful DLQI improvement (67.1% of patients who did not achieve PASI 75 and 70.8% of patients who did not achieve sPGA 0/1) compared with patients who received placebo (40.5% of patients who did not achieve PASI 75 and 41.7% who did not achieve sPGA 0/1)

Table 2. DLQI response at Week 16 in patients who achieved clinical response

<table>
<thead>
<tr>
<th>Outcome measures</th>
<th>Total patients</th>
<th>Deucravacitinib</th>
<th>Placebo</th>
</tr>
</thead>
<tbody>
<tr>
<td>PASI 75, n/N (%)</td>
<td>553/664 (83.3%)</td>
<td>393/464 (84.7%)</td>
<td>32/64 (72.7%)</td>
</tr>
<tr>
<td>sPGA 0/1, n/N (%)</td>
<td>496/601 (82.5%)</td>
<td>359/431 (83.3%)</td>
<td>24/34 (70.6%)</td>
</tr>
</tbody>
</table>

Conclusions

• Psoriasis skin clearance, symptom reduction, and improved patient quality of life were correlated in the POETYK PSO-1 and PSO-2 trials
  — This correlation is consistent with that determined in other studies

• Higher clinical response was associated with greater PRO measure response

• PRO measures capture patient-perceived treatment benefits that may not be ascertained by measuring rates of skin clearance with clinical assessments alone
  — Psoriasis bears symptoms, such as pruritus, for which there are no validated objective measures, or which are best assessed by patients themselves in order to evaluate treatment efficacy

• Among patients who achieved PASI 75 at Week 16, 80.8% of patients who received deucravacitinib reported meaningful itch improvement on the PSSD compared with 43.8% of patients who received placebo

• Among patients with and without clinical response, greater proportions of patients treated with deucravacitinib reported measurable improvement in their self-reported symptoms, signs, and quality of life compared with patients treated with placebo

References

2. Papp KA, et al. [Poster] Presented at the 50th Congress of the European Academy of Dermatology and Venereology (EADV), September 29–October 2, 2021; virtual meeting.

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• CL: Consultant (honoraria): AbbVie, Amgen, Genentech, Gilead Sciences, Inc., Janssen, Kyowa Hakko Kirin, Leo Pharma, Merck Sharp & Dohme, Novartis, Pfizer, Sanofi Genzyme, and Valeant
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• JZ, BB, YZ, RNK, and SB: Employees and shareholders of Bristol Myers Squibb

• JLB and HD: Employees of Clinical Outcomes Solutions, which has received consulting fees from Bristol Myers Squibb
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Presented at the Fall Clinical Dermatology Conference; October 2022, Las Vegas, NV

Results

• PSSD
• sPGA

April W. Armstrong,1 Kim A. Papp,2 Joe Zhuo,3 Brandon Becker,3 Yichen Zhong,3 Jennifer L. Beaumont,4 Michael DeRosa,4 Renata M. Kisa,3 Subhashis Banerjee,3 Bruce Strober5,6

—

Patient rated 5 skin symptoms (itch, tightness, burning, stinging, and pain) and 6 skin signs (dryness, cracking, Range: 0 (clear) to 4 (severe)

—

—

were found to be correlated

In POETYK PSO-1 (N = 666) and PSO-2 (N = 1020) adults (aged

In the phase 3 clinical trials POETYK PSO-1 and PSO-2, deucravacitinib was compared for efficacy and safety

Symptoms and Signs Diary (PSSD) total scores (treatment arms and trials pooled, n = 1536)

At baseline, 1659 patients had a DLQI score recorded and 1553 had a PSSD score recorded

3 compared with patients receiving placebo or apremilast

≥

—

= 0.421) in the total

At baseline, 1345 patients in the total study population had an sPGA score of 3, and 340 had an sPGA score of 4. One patient had an sPGA score of 2; this patient was randomized but not treated. The mean

DLQI change from baselinea

PSSD change from baselinea

Figure 3. PSSD change from baseline by sPGA a change group (treatment arms

Figure 2. DLQI Change from baseline by PASI response group (treatment arms

(≥2 points)

PASI <50 PASI 50

PASI 50–100, 50%–100% improvement from baseline in the Psoriasis Area and Severity Index score; PSSD, Psoriasis Symptoms and Signs Diary.

Table 1. PSSD response at Week 16 in patients who achieved clinical response

PSSD Response by Clinical Response

DLQI, Dermatology Life Quality Index; sPGA, static Physician’s Global Assessment.

on the PSSD itch item, meaningful improvement (all patients across both trials who achieved PASI 75 (356/549) and/or sPGA 0/1 (330/505), respectively (44.1% of patients who did not achieve sPGA 0/1) compared with patients who received placebo

496/601 (82.5)

employees and shareholders of Bristol Myers Squibb

496/601 (82.5)

university

Acknowledgments

References