Cost per Responder of Apremilast Versus Etanercept, Adalimumab, and Ustekinumab in Patients With Moderate to Severe Psoriasis

Steven R. Feldman, MD, PhD1; Tom Tencer, PhD2; Zoe Clancy, PharmD, MS2; Frank Zhang, MD, MPH2

1Wake Forest University School of Medicine, Winston-Salem, NC; 2Celgene Corporation, Warren, NJ

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Disclosures

• Dr. Steven Feldman has received honoraria and research grants as an investigator, speaker, and/or consultant for Abbott Labs, Amgen, Anacor Pharmaceuticals, Baxter, Caremark, Celgene, Galderma, Gerson Lehrman Group, Guidepoint Global, Hanall Pharmaceutical, Janssen, Kikaku, LEO Pharma, Lilly, Merck, Merz, Mylan, Novartis, Pfizer, Qurient, Stiefel/GSK, Suncare Research, Taro, and XenoPort; and has received royalties or owns stock in Causa Technologies, Informa Healthcare, Medical Quality Enhancement Corporation, UpToDate, and Xlibris.

• Dr. Tom Tencer, Dr. Zoe Clancy, and Dr. Frank Zhang are employees of Celgene Corporation.
Abstract

**Background:** In the United States, psoriasis is estimated to affect 7.4 million adults and to cost $112B annually (Rachakonda et al, 2014; Menter et al, 2008; Brezinski et al, 2015). It is becoming increasingly important to investigate the value of new treatment options in the management of psoriasis.

**Objective:** The purpose of this study was to estimate the cost per responder after 16 weeks of therapy for adult psoriasis patients in the United States treated with apremilast, etanercept, adalimumab, and ustekinumab.

**Methods:** Comparative efficacy data were obtained from a Bayesian network meta-analysis of 19 clinical trials as of October 2013 that included at least one treatment of interest (biologic or oral systemic drug) as monotherapy that reported one or more efficacy/safety endpoint. The primary outcome was a ≥75% reduction in the Psoriasis Area and Severity Index score (PASI-75) at the end of the trial period (12 or 16 weeks, depending on drug). Cost and efficacy comparisons were made at Week 16, and efficacy for drugs with a trial period of 12 weeks was assumed to be maintained through 16 weeks. The first 2 weeks of apremilast treatment (starter pack) are provided at no cost. US wholesale acquisition cost as of July 2014 and approved labeled dosing for induction of psoriasis treatment were used to derive drug treatment costs.

**Results:** At Week 16, the adjusted PASI-75 response rate was 31.9% for apremilast, 52.6% for etanercept, 65.9% for adalimumab, 68.6% for ustekinumab 45 mg, and 74.0% for ustekinumab 90 mg. The cost per PASI-75 responder at Week 16 was $18,938 for apremilast, $33,508 for etanercept, $20,294 for adalimumab, $21,497 for ustekinumab 45 mg, and $39,857 for ustekinumab 90 mg.

**Conclusion:** Apremilast had the lowest wholesale acquisition cost per PASI-75 responder and the lowest cost per PASI-75 response through 16 weeks in psoriasis patients as compared with etanercept, adalimumab, ustekinumab 45 mg, and ustekinumab 90 mg.
Background

- In the United States, psoriasis is estimated to cost $112B annually (total direct and indirect healthcare costs).¹
- It is becoming increasingly important to payers to investigate the value of new treatment options in the management of psoriasis.
- Due to the lack of head-to-head studies demonstrating the comparative effectiveness of treatments for psoriasis, indirect analyses may be used to aid in treatment decision making.

Objective

- The purpose of this study was to estimate the cost per responder after 16 weeks of therapy for adult patients with psoriasis treated in the United States with apremilast, etanercept, adalimumab, and ustekinumab.
  - Apremilast was approved by the FDA in 2014 and by the EC in 2015 for the treatment of psoriasis and psoriatic arthritis.\(^1,2\)

EC=European Commission; FDA=US Food and Drug Administration.

Methods

- Comparative efficacy data were obtained from a Bayesian network meta-analysis of biologic and oral systemic drugs as of October 2013.
- Response to therapy was assessed using 75% improvement in the Psoriasis Area and Severity Index (PASI) at the end of the clinical trial period (12 or 16 weeks, depending on the study drug).
- Published rates were extracted, with the primary outcome defined as a $\geq 75\%$ reduction in PASI score (PASI-75) at the end of the clinical trial period.
- Cost and efficacy comparisons were made at Week 16, and efficacy for drugs with a trial period of 12 weeks was assumed to be maintained through 16 weeks.
- Non-responders at Week 16 were assumed to discontinue treatment.
- US wholesale acquisition costs as of July 2014 and approved labeled dosing for induction of psoriasis treatment were used to derive drug treatment costs.
The Cost per Responder Model Calculates Expected Treatment Cost by Considering PASI-75 Response Rates

Legend
- Decision node
- Chance node
- Terminal node

Legend
- Decision node
- Chance node
- Terminal node

Apremilast

Biologic Comparator

Apremilast PASI-75 Response Rate

Biologic PASI-75 Response Rate

Responder

Non-Responder

Cost incurred by non-responder

Cost incurred by non-responder

Cost incurred by responder by Week 52

Cost incurred by responder by Week 52

Day 0
(Treatment initiation)

Trial Period
(Non-responders stop treatment)

52 weeks
(2nd comparing point)
Model Inputs: Treatment Efficacy

Treatment Efficacy

- Clinical efficacy data were obtained from an internal Bayesian network meta-analysis.
- At Week 16, the adjusted PASI-75 response rate was 32% for apremilast; the efficacy of comparator treatments is shown in Table 1.

Table 1. Efficacy of Comparator Treatments for Psoriasis

<table>
<thead>
<tr>
<th>Treatment</th>
<th>PASI-75</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Etanercept</td>
<td>53%</td>
<td>Network meta-analysis</td>
</tr>
<tr>
<td>Adalimumab</td>
<td>66%</td>
<td>Network meta-analysis</td>
</tr>
<tr>
<td>Ustekinumab 45 mg</td>
<td>69%</td>
<td>Network meta-analysis</td>
</tr>
<tr>
<td>Ustekinumab 90 mg</td>
<td>74%</td>
<td>Network meta-analysis</td>
</tr>
</tbody>
</table>

Costs

- Drug costs were sourced from wholesale acquisition cost prices on November 15, 2014 (Table 2).

<table>
<thead>
<tr>
<th>Drug</th>
<th>Dosage Description</th>
<th>Trial Period</th>
<th>Pack Cost</th>
<th>First Month</th>
<th>Second Month</th>
<th>Third Month</th>
<th>Continued Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adalimumab</td>
<td>80 mg initial dose, then 40 mg every other week starting 1 week after initial dose</td>
<td>16 weeks¹</td>
<td>$1,350.16</td>
<td>$5,400.64</td>
<td>$2,700.32</td>
<td>$2,700.32</td>
<td>$2,700.32</td>
</tr>
<tr>
<td>Etanercept</td>
<td>50 mg twice weekly for 3 months, then 50 mg weekly</td>
<td>12 weeks²</td>
<td>$675.20</td>
<td>$5,401.60</td>
<td>$5,401.60</td>
<td>$5,401.60</td>
<td>$2,700.80</td>
</tr>
<tr>
<td>Apremilast</td>
<td>30 mg BID</td>
<td>16 weeks³</td>
<td>$30.82</td>
<td>$862.96</td>
<td>$1,725.92</td>
<td>$1,725.92</td>
<td>$1,725.92</td>
</tr>
<tr>
<td>Ustekinumab 45 mg*</td>
<td>45 mg dose at initiation, then at Week 4, then every 12 weeks</td>
<td>12 weeks⁴</td>
<td>$7,661.16</td>
<td>$15,322.32</td>
<td>-</td>
<td>-</td>
<td>$2,553.72</td>
</tr>
<tr>
<td>Ustekinumab 90 mg*</td>
<td>45 mg dose at initiation, then at Week 4, then every 12 weeks</td>
<td>12 weeks⁴</td>
<td>$15,322.28</td>
<td>$30,644.56</td>
<td>-</td>
<td>-</td>
<td>$5,107.43</td>
</tr>
</tbody>
</table>

¹Due to the dosing description, ustekinumab drug costs are calculated as 2 doses for the first month, and 1 dose divided over 12 weeks for continued use.

Results: Cost per PASI-75 Responder at Year 1

- The cost per PASI-75 responder at Week 16 was $18,938 for apremilast, $33,508 for etanercept, $20,488 for adalimumab, $22,336 for ustekinumab 45 mg, and $41,412 for ustekinumab 90 mg.
- The cost per PASI-75 responder at Year 1 was $34,472 for apremilast, $57,816 for etanercept, $44,791 for adalimumab, $45,319 for ustekinumab 45 mg, and $87,378 for ustekinumab 90 mg (Figure 1).

Figure 1. Cost per PASI-75 Responder at Year 1
Results

- The cost to achieve 100 responders at Week 16 was:
  - $1,893,761 for apremilast
  - $3,350,840 for etanercept
  - $2,048,801 for adalimumab
  - $2,233,574 for ustekinumab 45 mg
  - $4,141,157 for ustekinumab 90 mg
- In a scenario in which a payer has an annual budget of $1 million, the model calculated the number of treatable patients at Year 1 by dividing the annual budget by the annual cost of treatment (Figure 2A) and the number of responders out of the treatable patients at Year 1 (Figure 2B).
- Apremilast had the most treatable patients and responders at Year 1.
Results

Figure 2A. Treatable Patients With an Annual Funding of $1 Million at Year 1

<table>
<thead>
<tr>
<th>Psoriasis Treatment</th>
<th>Number of Treatable Patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apremilast 30 mg</td>
<td>91</td>
</tr>
<tr>
<td>Etanercept 50 mg</td>
<td>33</td>
</tr>
<tr>
<td>Adalimumab 40 mg</td>
<td>34</td>
</tr>
<tr>
<td>Ustekinumab 45 mg</td>
<td>32</td>
</tr>
<tr>
<td>Ustekinumab 90 mg</td>
<td>15</td>
</tr>
</tbody>
</table>
Results

Figure 2B. Number of Responders Out of Treatable Patients at Year 1

Psoriasis Treatment

- Apremilast 30 mg: 29
- Etanercept 50 mg: 17
- Adalimumab 40 mg: 22
- Ustekinumab 45 mg: 22
- Ustekinumab 90 mg: 11
Limitations

- There is a lack of evidence from long-term, randomized, controlled trials vs. placebo. Thus, 1-year cost per responder assumed that short-term response rates were maintained for the full year.
- Efficacy results used in the model were indirectly derived from a network meta-analysis. Although this is expected to reduce bias when making comparisons of treatment effect between treatments, unknown differences and cross-trial heterogeneity may confound these results.
- Additional head-to-head clinical trials would be required to account for unobserved confounding.
Conclusion

- Apremilast had the lowest wholesale acquisition cost per PASI-75 responder and the lowest cost to achieve PASI-75 responders at both Week 16 and Year 1 in psoriasis patients as compared with etanercept, adalimumab, ustekinumab 45 mg, and ustekinumab 90 mg.