What Does Efficacy Cost?
Evidence for Relative Cost-Effectiveness of Biologic Therapies for Psoriasis

Despite high costs, evidence suggests that biologics are cost-effective options for moderate to severe psoriasis because of their efficacy.

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Approximately 20 percent of individuals with psoriasis have moderate to severe disease, which is associated with an immense economic burden that exceeds $110 billion each year in the United States.1,2 Most patients with psoriasis are prescribed ≥1 medications, thus supporting the need for cost-effective treatments for psoriasis.3

The development of targeted biologics has transformed the treatment landscape of moderate to severe psoriasis. Biologic therapies inhibit the activity of cytokines or signaling molecules in the immune system that contribute to inflammatory responses. These drugs target cytokines, such as tumor necrosis factor α and interleukin (IL) 12, IL-23, and IL-17.4 Biologics can be advantageous to patients with complex medical histories who take multiple medications because they have no relevant drug–drug interactions and fewer safety issues than systemic therapies.5

The proportions of patients achieving 75 percent improvement from baseline in psoriasis area severity index (PASI 75), PASI 90, and PASI 100 are considered the gold standard for measuring therapeutic success in the treatment of moderate to severe psoriasis.6 In a meta-analysis of 40 clinical trials that measured PASI 75 as a primary end point, biologics were generally highly effective for the treatment of moderate to severe psoriasis.7 Specifically, treatment with biologics targeting IL-17 (ie, brodalumab, secukinumab, ixekizumab) results in equivalent or better PASI 75, PASI 90, and PASI 100 rates than those seen with other biologics and small-molecule drugs.7

Although biologics can offer effective treatment of psoriasis, they may be perceived as expensive. Analysis of cost per PASI may provide context for such assessment. Overall, biologic therapies targeting the IL-17 pathway are cost-effective treatment options for individuals with moderate to severe psoriasis. Of the biologics described here, brodalumab was the most cost-effective option based on an analysis of cost per PASI.

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COST-EFFECTIVENESS STUDIES

Cost-effectiveness can be expressed as cost per PASI, determined by dividing the total healthcare costs of a drug by the rate of PASI response. In a network meta-analysis of the cost-effectiveness of biologics for the treatment of moderate-to-severe psoriasis, all biologics investigated (adalimumab, etanercept, ustekinumab, infliximab, ixekizumab, and secukinumab) were more cost-effective than the small-molecule inhibitor apremilast. Prior to the approval of brodalumab, multiple studies of IL-17 inhibitor biologics approved by the FDA showed that ixekizumab and secukinumab were among the most cost-effective options for the treatment of moderate-to-severe psoriasis. The costs per PASI 90 for secukinumab ($120,503) and ixekizumab ($117,709) were lower than for ustekinumab ($157,662) over a one-year period, whereas the cost per PASI 75 was similar for all three drugs. In a similar meta-analysis, the monthly costs per PASI 90/PASI 100 responder were lower with secukinumab ($15,603/$33,052) and ixekizumab ($15,753/$28,155) than with ustekinumab ($16,556/$45,717), adalimumab ($20,521/$70,128), and etanercept ($40,168/$151,440). Overall, biologic therapies—in particular, IL-17 inhibitors—have been shown to be cost-effective treatment options for patients with moderate to severe psoriasis.

IL-17–targeted antibodies were also shown to be cost-effective outside of the United States. In an analysis of psoriasis-associated costs in Japan, secukinumab had a lower cost per PASI 75 than adalimumab, ustekinumab, and infliximab. In that same analysis, cost per PASI 90 was lowest for secukinumab and adalimumab. Similarly, in Spain, secukinumab was associated with a lower cost per PASI 90 than adalimumab, ustekinumab, infliximab, and etanercept.

In addition to the biologic therapies previously described, brodalumab has recently been included in cost-effectiveness analyses of FDA-approved biologics. Unlike other biologics, brodalumab is an IL-17A receptor blocker and inhibits inflammatory signaling induced by multiple IL-17 cytokines whose levels are elevated in psoriasis.

Prior to its approval, brodalumab was estimated to be the second most cost-effective IL-17–targeted antibody and fourth most cost-effective biologic overall. However, the actual total annual costs for brodalumab to a health plan (eg., drug cost, adverse event [AE] monitoring, additional office visits) per patient was $38,538, which was lower than for adalimumab ($51,246), ixekizumab ($65,484), secukinumab ($57,510), or ustekinumab ($57,013). This suggests brodalumab is the most cost-effective biologic, overall, when considering straight wholesale acquisition price. In addition, brodalumab was more cost-effective

**Figure 1.** Annual cost-effectiveness of biologic treatments for moderate to severe psoriasis in the United States for PASI 75, PASI 90, and PASI 100. PASI 75, 90, and 100, psoriasis area and severity index 75%, 90%, and 100% improvement.

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**DID YOU KNOW?**

In August 2018, the Institute for Clinical and Economic Review released a report analyzing the medical benefits of biologics, stating that brodalumab or infliximab is most likely to be a cost-effective, first-line treatment for patients with moderate to severe psoriasis.
The emergence of targeted biologics has transformed the management of moderate to severe psoriasis. However, despite their high costs, evidence suggests that biologics are cost-effective options for moderate to severe psoriasis because of their efficacy, as demonstrated by higher rates of PASI 75, PASI 90, and PASI 100.

than other biologics, as determined by annual cost per PASI 75, PASI 90, and PASI 100 (Figure 1). The PASI 100 efficacy rate for brodalumab was 0.44; thus, the annual cost per PASI 100 was $87,585 ($38,538/0.44).

In a similar analysis, brodalumab was more cost-effective than ustekinumab across multiple patient subgroups, including those who were naive to, who were experienced with, or whose disease had previously failed biologic therapy. The calculations for these drug costs included wholesale acquisition costs, including drug dispensing fees, patient copays, and discounts (hypothetical estimate of 20 percent), as well as medical costs associated with psoriasis response and estimated AE monitoring costs. In August 2018, the Institute for Clinical and Economic Review released a report analyzing the medical benefits of biologics, stating that brodalumab or infliximab is most likely to be a cost-effective, first-line treatment for patients with moderate-to-severe psoriasis.

DISCUSSION

The emergence of targeted biologics has transformed the management of moderate to severe psoriasis. However, despite their high costs, evidence suggests that biologics are cost-effective options for moderate to severe psoriasis because of their efficacy, as demonstrated by higher rates of PASI 75, PASI 90, and PASI 100. New biologics targeting the IL-17 pathway (i.e., brodalumab, secukinumab, ixekizumab) appear to be among the most cost-effective options for treatment of moderate to severe psoriasis. Although brodalumab was predicted to be a relatively cost-effective option prior to its approval, the post-launch price of brodalumab was substantially lower than expected, resulting in cost-effectiveness that surpassed estimates. Indeed, new evidence suggests that, based on an analysis of cost per PASI 75, PASI 90, and PASI 100, brodalumab is the most cost-effective option for the treatment of moderate to severe psoriasis. This analysis helps to inform decisions on behalf of patients, physicians, and payers regarding the cost-effectiveness of biologics for treatment of moderate-to-severe psoriasis.

There are some limitations to these findings. Drug costs were presented as calculated or estimated models because obtaining exact data for drug costs, including discounts and rebates, is difficult. Moreover, long-term analysis of cost-effectiveness is lacking. The analyses presented here calculated cost per PASI using efficacy from clinical trials measured between 12 and 16 weeks of treatment. Because psoriasis is a chronic disease that requires long-term treatment, it is crucial that future cost-effectiveness analyses include long-term efficacy measurements or real-world patient efficacy data. In addition, patients whose disease is unresponsive to initial dosing typically require dose escalation, which can double the cost of biologic therapies such as ustekinumab. Real-world data in patients who require dose escalation would better inform future cost-effectiveness analyses and should consider the cost of switching biologics or changes to loading dose requirements.

Overall, biologic therapies targeting the IL-17 pathway are cost-effective treatment options for individuals with moderate to severe psoriasis. Of the biologics described herein, brodalumab was the most cost-effective option based on an analysis of cost per PASI, and it demonstrated cost-effectiveness in patient subgroups who were naive to, who were experienced with, or whose disease had previously failed biologic therapy. Prescribers should consider the multiple aspects of the value that different biologics may offer, including cost-effectiveness, when determining the optimal course of treatment.

Disclosures

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