Cost-effectiveness of Tildrakizumab in U.S. Patients with Moderate-to-Severe Plaque Psoriasis

Xiaoying Jia,[1] Yang Zhao,[2] Justin Carrico,[3] Thor-Henrik Brodtkorb,[4] Alan Mendelsohn,[2] Simon Lowry,[2] Steve R. Feldman,[5] Jashin J. Wu,[6] April Armstrong[7]

[1] RTI Health Solutions, Manchester, United Kingdom
[2] Sun Pharmaceutical Industries, Princeton, NJ
[3] RTI Health Solutions, Research Triangle Park, NC
[4] RTI Health Solutions, Ljungskile, Sweden
[5] Wake Forest School of Medicine, Winston-Salem, NC
[6] Dermatology Research and Education Foundation, Irvine, CA
[7] Southern California Clinical and Translational Science Institute, Los Angeles, CA

Background and Model Structure

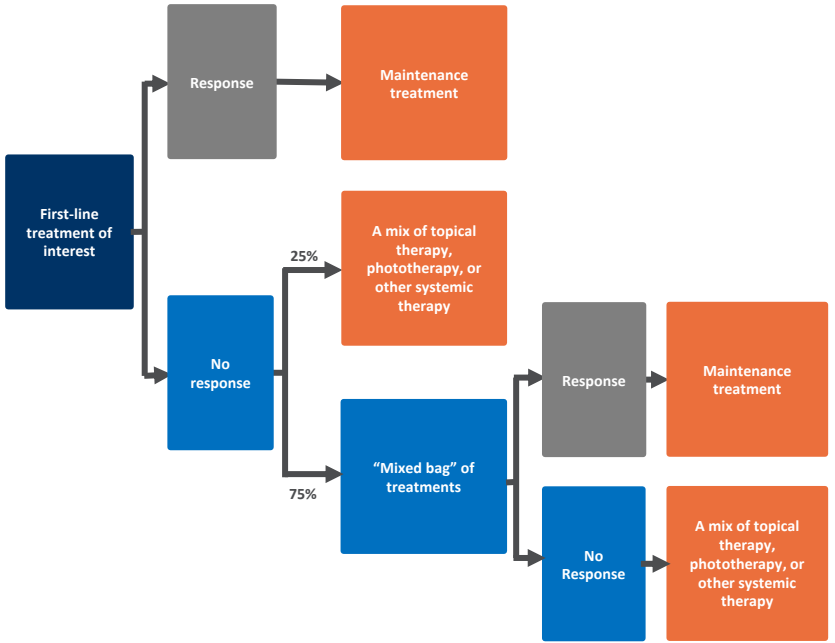
Background

- Moderate-to-severe plaque psoriasis affects 1.7 million insured patients in the United States (US),[1] is associated with decreased health-related quality of life,[2] and causes significant economic burden to patients and society[3]
- Tildrakizumab – a high-affinity, humanized, IgG1 κ, anti-interleukin-23 monoclonal antibody – was recently approved in the US to treat moderate-to-severe plaque psoriasis on the basis of two placebo-controlled, phase 3 trials with more than 1,800 patients[4]

Objective

- To evaluate the comparative cost-effectiveness of tildrakizumab, as well as adalimumab, apremilast, brodalumab, etanercept, guselkumab, infliximab, ixekizumab, secukinumab, and ustekinumab as first-line therapy for patients with moderate-to-severe psoriasis from a US health plan's perspective

Model Structure Diagram



Patients received one of the first-line treatments upon entry into the model. The model assumed that patients received full treatment during the initiation period (i.e., 10-16 weeks). Response was assessed after the induction period, at which point non-responders discontinued their current treatment: 25% received a mix of topical therapy, phototherapy, or other systemic therapy until the end of the 10 years or death, 75% received a second-line treatment (a basket of all treatments included in the first-line treatments) before receiving a mix of topical therapy, phototherapy, or other systemic therapy if not responding to the second-line treatment.

1. Armstrong AW, Koning JW, Rowse S, et al. *Dermatology Ther*. 2017;7(1):97-109. 2. Grozdev I, Kast D, Cao L, et al. *J Invest Dermatol*. 2012;132(4):1111-6. 3. Schaefer CP, Cappelleri JC, Cheng R, et al. *J Amer Acad Dermatol*. 2015;73(4):585-93. 4. Reich K, Papp KA, Blauvelt A, et al. *Lancet*. 2017;390(10091):276-88

Model Assumptions and Inputs

Model Structure

- A Markov model that consists of 4 health states based on Psoriasis Area Severity Index (PASI) response rate categories and death

Key Assumptions

- Patients could not transition between PASI improvement levels
- Second-line treatment was assumed to be an average of all treatments of interest included in the first line
- Mortality risk was based only on the US general population mortality rate by age

Analysis

- Conducted over a 10-year time horizon from a US health plan's perspective
- Assessed the incremental cost per quality-adjusted life-years (QALYs) gained for each first-line treatment compared with a mix of topical therapy, phototherapy, or other systemic therapy
- The base case included only direct medical costs
- Scenario analyses examined the impact of including adverse event costs (hospitalizations due to severe infection, nonmelanoma skin cancer, and other malignancies), indirect costs, and different treatment pathway for nonresponders to the first-line treatment, respectively

Data Inputs

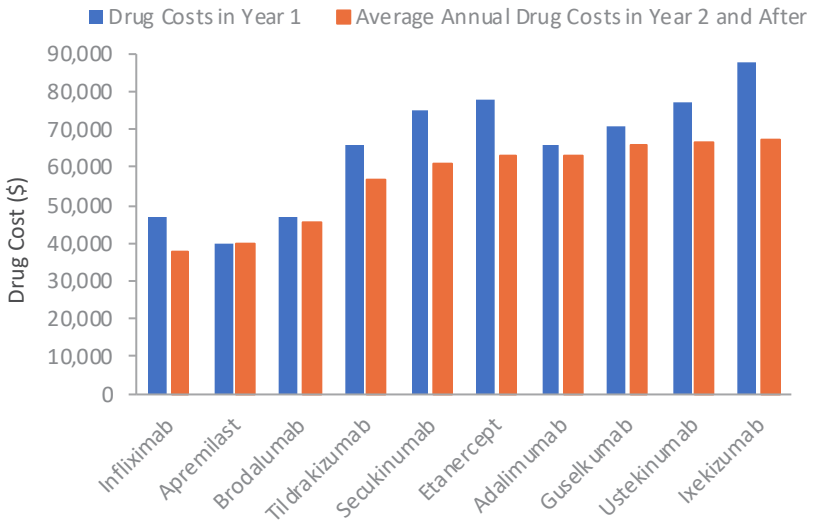
- PASI response categories were used to estimate QALYs
- The health-state utility weights (PASI 0-49: 0.751; PASI 50-74: 0.835; PASI 75-89: 0.868; PASI 90-100: 0.861; receiving a mix of topical therapy, phototherapy, or other systemic therapy: 0.642) were derived from the secukinumab submission to the National Institute for Health and Care Excellence. [1]
- The model estimated that the utility weight for patients receiving second-line treatment was 0.855
- Direct medical costs included drug and administration costs, laboratory costs, and clinic visit costs
- Drug costs were calculated based on the wholesale acquisition cost[2]
- Administration costs, laboratory costs (i.e., latent tuberculosis screen, active tuberculosis screen, complete blood count, hepatitis B screen, liver function test, and renal function test), and clinic visit costs were estimated based on the unit costs from the Centers for Medicare & Medicaid Services physician fee schedule[3]

PASI=Psoriasis Area Severity Index; QALY=quality-adjusted life-year

1. National Institute for Health and Care Excellence (NICE). TA350. 2015. Available at: https://www.nice.org.uk/guidance/ta350. 2. Micromedex. Red Book Online. Accessed through Micromedex 2.0. Thomson Reuters; 2018. 3. Centers for Medicare & Medicaid Services (CMS). Physician fee schedule. 2017. Available at: https://www.cms.gov/apps/physicianfee-schedule/.

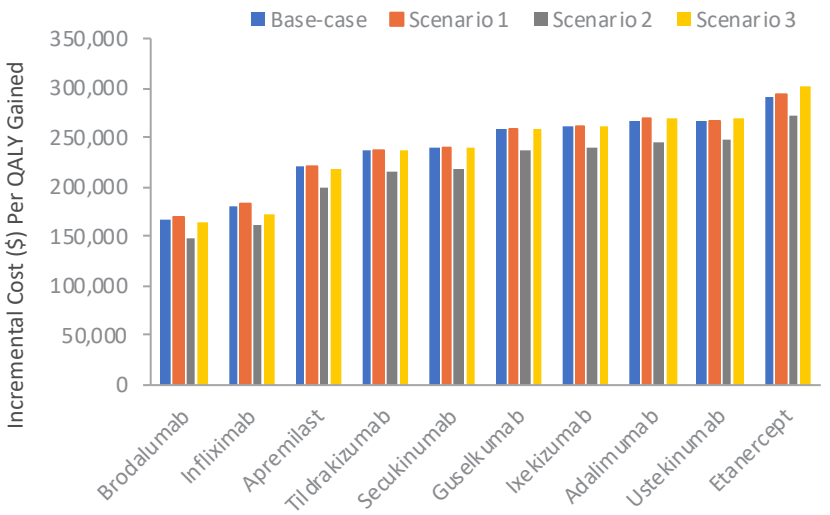
Results

Annual Drug Costs



- Infliximab, apremilast, and brodalumab had the lowest annual drug costs among all the first-line treatments included in the analysis
- Overall, tildrakizumab had the lowest annual drug costs among the other biologics

Incremental Cost ($) Per QALY Gained[a]



- Using brodalumab, infliximab, and apremilast as the first-line treatment provided the lowest incremental costs per QALY gained, followed by tildrakizumab and secukinumab
- The rankings of the first-line treatments were similar across multiple scenarios

The annual drug costs were estimated based on wholesale acquisition cost, without inclusion of copay and coinsurance. Ustekinumab: 50% received 90 mg and 50% received 45 mg

Scenario 1 included the costs of managing adverse events. Scenario 2 included indirect costs by considering productivity costs associated with the intravenous administration and productivity gain for PASI 75 responders. Scenario 3 assumed that 50% of non-responders received a second-line basket treatment and that the remaining 50% received a mix of topical therapy, phototherapy, or other systemic therapy after discontinuing the first-line treatment. [a]Compared with a mix of topical therapy, phototherapy, or other systemic therapy

Conclusion

- First-line treatment with tildrakizumab is among the most cost-effective options and is more cost-effective than treatment with guselkumab, secukinumab, ixekizumab, ustekinumab, adalimumab, or etanercept

Disclosures and Acknowledgements

- Ms. Jia, Mr. Carrico, and Dr. Brodtkorb are consultants for Sun Pharmaceutical Industries
- Drs Zhao, Mendelsohn, and Lowry are employees of Sun Pharmaceutical Industries
- Dr. Feldman has been an consultant, advisory board member, research grant recipient, and/or speaker for Celgene, Janssen, LEO Pharma, Eli Lilly, Novartis Pharmaceuticals, Ortho Dermatologics, and Sun Pharmaceutical Industries
- Dr. Armstrong has been an consultant, advisory board member, research grant recipient, and/or speaker for Abbvie, Boehringer-Ingelheim, Bristol-Myers Squibb, Celgene, Dermavant, Dermira, Eli Lilly, Genentech, GlaxoSmithKline, Janssen, Kyowa Hakka Kirin, LEO Pharma, Menlo Therapeutics, Merck, Modernizing Medicine, Novartis Pharmaceuticals, Ortho Dermatologics, Pfizer, Regeneron Pharmaceuticals, Sanofi Genzyme, Science 37, Inc., Sun Pharmaceutical Industries, UCB Biopharma, and Valeant.
- Dr. Wu is an investigator, consultant, or speaker for AbbVie, Almirall, Amgen, Bristol-Myers Squibb, Celgene, Dermira, Dr. Reddy's Laboratories, Eli Lilly, Janssen, LEO Pharma, Novartis, Promius Pharma, Regeneron, Sun Pharmaceutical, UCB, Valeant Pharmaceuticals North America LLC
- Asclepius Analytics LLC provided editing services for this poster, with funding from Sun Pharmaceutical Industries