COST-EFFECTIVENESS ANALYSIS OF BRODALUMAB IN MODERATE-TO-SEVERE PLAQUE PSORIASIS IN CANADA

PSS12

Xue, W.[1], Gray, E.[1], Khoudigian-Sinani, S.[2], Barbeau, M.[3], Frieder, D.[3]

[1]IQVIA, London, UK, [2]IQVIA Mississauga, ON, Canada, [3]Valeant Canada LP, Laval QC, Canada

BACKGROUND

- Plaque psoriasis is a chronic, immune-mediated inflammatory skin disorder[1,2]. Approximately 500,000 Canadians suffer from psoriasis; 25% of cases are moderate-to-severe. The annual societal cost of moderate-to-severe psoriasis in Canada was estimated at $1.7 billion in 20082.
- Although there are biologic therapies available in Canada for the treatment of moderate-to-severe psoriasis, a significant proportion of patients continue to experience loss of response, adverse events, or sub-optimal response to these therapies and there continues to be a significant unmet need for effective treatment options[3].
- Brodalumab is a new IL-17 Receptor A inhibitor that effectively addresses the several key concerns with existing biologic therapies, especially speed of onset and complete skin clearance in both bio-naïve and bio-experienced patients[4,5].

OBJECTIVES

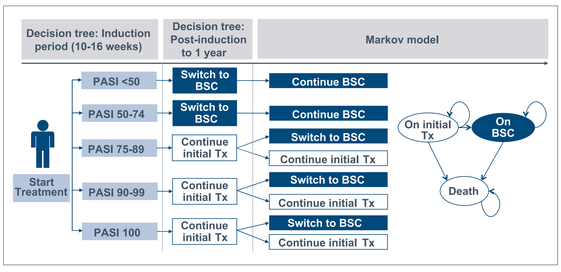
- To assess the cost-effectiveness of brodalumab versus available biologics and best supportive care (BSC) in adult patients with moderate-to-severe plaque psoriasis in Canada.

METHODS

Model Structure

- A decision tree and Markov state-transition model was developed over a 10-year time horizon from a public payer perspective using Microsoft Excel® 2013.
- The model is composed of three time periods and five health states defined by the Psoriasis Area Severity Index (PASI) response, one death state and two treatment status (Figure 1).
- Brodalumab 210 mg was compared to etanercept 50 mg BIW, adalimumab 80 mg/40 mg EOW, infliximab 5 mg/kg, ustekinumab 45 mg, ustekinumab 90 mg, secukinumab 300 mg, ixekizumab 160 mg/80 mg EOW, infliximab subsequent entry biologic (SEB) and BSC.
- PASI response was assessed at the end of the induction period (10-16 weeks). Responders who achieved at least PASI 75 continued initial therapy and maintained their PASI response until treatment discontinuation or death. Non-responders were switched to BSC.

Figure 1: Decision analytic model over a 10-year time-horizon



Abbreviations: PASI = Psoriasis area and severity index; Tx = treatment; BSC = Best supportive care.

Model Inputs

- A systematic review and network meta-analysis were conducted to inform the efficacy inputs in the model (Table 1).

Table 1: PASI distribution estimated from the random effects multinomial Network Meta Analysis (NMA)

Treatment	PASI < 50	PASI 50-74	PASI 75-89	PASI 90-99	PASI 100
Placebo	85.1%	10.0%	4.1%	0.7%	0.1%
Brodalumab 210 mg	3.5%	8.0%	21.2%	29.8%	37.4%
Ustekinumab 45 mg	12.4%	17.1%	29.0%	25.5%	16.3%
Ustekinumab 90 mg	9.8%	15.1%	28.1%	27.0%	20.0%
Secukinumab 300 mg	6.6%	12.0%	25.8%	29.0%	26.6%
Etanercept 50 mg BIW	25.8%	22.8%	27.7%	16.8%	6.9%
Infliximab 5 mg/kg	5.3%	10.5%	24.3%	29.6%	30.3%
Adalimumab 80 mg/40 mg EOW	18.6%	20.4%	29.2%	21.1%	10.7%
Ixekizumab 160 mg/80 mg EOW	3.3%	7.8%	20.8%	29.8%	38.4%

PASI: Psoriasis area and severity index; kg: kilograms; mg: milligrams; EOW: every other week. Note: Discontinuation rate was assumed 20% after first year.

- EQ-5D utility values associated with each health state were derived from the AMAGINE-1 study using a Canadian value set[5] (Table 2).

Table 2: Change in EQ-5D utility values from baseline

Health States	Base-Case Value	Source
PASI < 50	-0.0008	AMAGINE-1 patient level data
PASI 50 -74	0.074	
PASI 75 – 89	0.128	
PASI 90 – 99	0.146	
PASI 100	0.153	

Abbreviations: PASI = psoriasis area and severity index.

- A pragmatic literature review was conducted to identify the resources used among patients with moderate-to-severe plaque psoriasis in Canada.
- In addition to treatment costs, costs associated with the following healthcare services were also included in the model: dermatological consultations, laboratory tests and diagnostic tests. All costs were reported in 2017 CAD dollars.
- The unit cost of brodalumab 210 mg and comparators were obtained in December 2017 from a number of sources (Ontario Drug Benefit, Taltz™ and Brenzys™ Common Drug Review reports, and McKesson Price file).

Table 3: Dosage units administered for each biologic

Treatment	Total dose during induction period (mg)	Total dose during post-induction to end year 1 (mg)	Total dose during subsequent annual period (mg)
Brodalumab 210 mg	1,470	4,200	5,460
Adalimumab 80 mg/40 mg EOW	320	800	1,040
Etanercept 50 mg BIW	1,200	2,000	2,600
Infliximab 5 mg/kg*	1,500	2,500	3,250
Ixekizumab 160 mg/80 mg EOW	640	800	1,040
Secukinumab 300 mg	1,800	3,000	3,600
Ustekinumab 45 mg	90	135	202.5
Ustekinumab 90 mg	180	270	405

*mg = milligram. *Brand and SEB were modelled with the same dosing schedule*

- Dosing schedules (Table 3) used to calculate total treatment costs were based on the recommendations from Canadian guidelines for psoriasis or product monographs (if not available in guidelines)[1].

METHODS (Continued)

Analysis Plan

- The base-case analysis was conducted from a public payer perspective and a 1.5% annual discount rate for costs and outcomes was utilized.
- Probabilistic analyses were conducted for both the base-case and all scenario analyses.

RESULTS

Base-case

- For all comparators, treatment costs were determined to be the key driver of the total cost (Table 4).

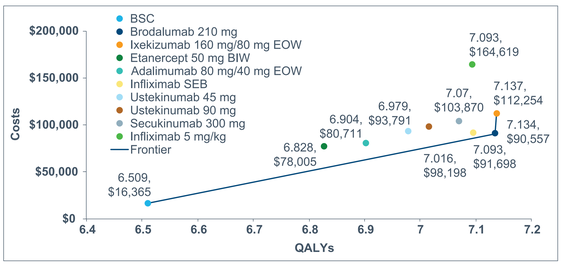
Table 4: Cost breakdowns (base-case)

Treatment	Treatment cost	Treatment cost	Total Cost
Brodalumab 210 mg	$88,594	$1,964	$90,557
BSC	$13,812	$2,553	$16,365
Adalimumab 80 mg/40 mg EOW	$78,551	$2,160	$80,711
Etanercept 50 mg BIW	$75,766	$2,239	$78,005
Infliximab 5 mg/kg	$162,621	$1,998	$164,619
Ixekizumab 160 mg/80 mg EOW	$110,292	$1,962	$112,254
Secukinumab 300 mg	$101,853	$2,017	$103,870
Ustekinumab 45 mg	$91,694	$2,096	$93,791
Ustekinumab 90 mg	$96,134	$2,064	$98,198

BIW: twice weekly; EOD: every other week

- Brodalumab 210 mg accrued $90,557 with 7.134 QALY gains over the 10-year time horizon. $88,594 was associated with treatment costs and $1,964 were associated with monitoring costs. Therefore, the base case analysis demonstrated that brodalumab 210 mg had an ICER of $118,741 per quality-adjusted life year versus BSC (Figure 2 and Table 5).

Figure 2: Cost-effectiveness frontier (base case)



BIW: twice weekly; EOD: every other week

- BSC, brodalumab 210 mg and ixekizumab 160 mg/80 mg EOW lie on the frontier (Figure 2), therefore were considered cost-effective options at different willingness-to-pay (WTP) thresholds.
- Comparators that do not lie on the frontier are subject to dominance or extended dominance since they are more costly and less effective than at least one other comparator (Figure 2).

Table 5: Sequential analysis of cost-effectiveness (base case)

Treatment	ICER	Sequential ICER
BSC	Reference	
Brodalumab 210 mg	$118,741	$118,741
Ixekizumab 160 mg/80 mg EOW	$152,703	$6,948,457
Etanercept 50 mg BIW	$193,053	Subject to extended dominance through BSC and Adalimumab
Adalimumab 80 mg/40 mg EOW	$162,814	Subject to extended dominance through BSC and Brodalumab
Ustekinumab 45 mg	$164,817	Dominated by Infliximab SEB
Ustekinumab 90 mg	$161,398	Dominated by Infliximab SEB
Secukinumab 300 mg	$156,029	Dominated by Infliximab SEB
Infliximab 5 mg/kg	$253,642	Dominated by Ixekizumab

QALYs: quality-adjusted life years; ICER: incremental cost-effectiveness threshold; BSC: best supportive care

Scenario Analyses

- The results presented in the base-case analysis were robust across a range of scenario analyses (Table 6).

Table 6: Summary of ICERs for each scenario

Scenario analyses	Change in settings from base case analysis	ICER of brodalumab 210 mg vs. BSC
1	Inclusion of costs associated with subcutaneous/intravenous treatment administration	$118,715
2	Societal perspective – include societal costs	$117,831
3	Time horizon = 5 years	$116,884
4	Discount rate for both cost and benefits = 0%	$118,788
5	Discount rate for both cost and benefits = 3%	$118,346
6	Discount rate for both cost and benefits = 5%	$118,548
7	Treatment efficacy = NMA fixed effect model – Mixed population	$119,279
8	Full treatment response defined as achievement of PASI 90	$107,764
9	Inclusion of the risk of suicide	$120,510
10	Real world treatment discontinuation rates[6]	$114,613

CONCLUSION

- Brodalumab is the most cost-effective option compared with publicly funded biologics for the treatment of moderate-to-severe plaque psoriasis in Canada. As such, the reimbursement of brodalumab will benefit the Canadian public by introducing a highly effective and most likely costs-savings alternative to the public payer system.

REFERENCES

1. Papp K, Gulliver W, Lynde C, Poulin Y, Ashkenas J. Canadian guidelines for the management of plaque psoriasis: overview. J Cutan Med Surg. 2011;15(4):210-9.
2. Levy AR, Davie AM, Brazier NC, et al. Economic burden of moderate to severe plaque psoriasis in Canada. International journal of dermatology. 2012;51(12):1432-40.
3. Feldman SR, Goffe B, Rice G. et al. The Challenge of Managing Psoriasis: Unmet Medical Needs and Stakeholder Perspectives. American health & drug benefits. 2016;9(9):504-13.
4. Lebwohl M, Strober B, Menter A. et al. Phase 3 studies comparing brodalumab with ustekinumab in psoriasis. New England Journal of Medicine. 2015;373(14):1318-28.
5. Papp KA, Reich K, Paul C. et al. A prospective phase III, randomized, double-blind, placebo-controlled study of brodalumab in patients with moderate-to-severe plaque psoriasis. British Journal of Dermatology (no pagination), 2016 Aug;175(2):273-86.
6. Menter A, Papp KA, Gooderham M. et al. Drug survival of biologic therapy in a large, disease-based registry of patients with psoriasis: results from the Psoriasis Longitudinal Assessment and Registry (PSOLAR). J Eur Acad Dermatol Venereol. 2016;30(7):1148-58

MOBILE FRIENDLY E-PRINTS

2 ways to instantly download an electronic copy of this poster to your mobile device or e-mail a copy to your computer or tablet.

Scan the QR code on the right side or visit website: http://ispor.multilearning.com/ispor/2018/eposters/212717/

Presented at ISPOR 23rd Annual International Meeting, May 19-23, 2018; Baltimore, MD, USA.