Povero M[1], **Pradelli L[1]**, Ghetti G[1], Franchi A[2], Bellucci S[2], Secchi O[2]

Economic evaluation of guselkumab and other IL-inhibitors for the treatment of adults with moderate-to-severe plaque psoriasis in Italy

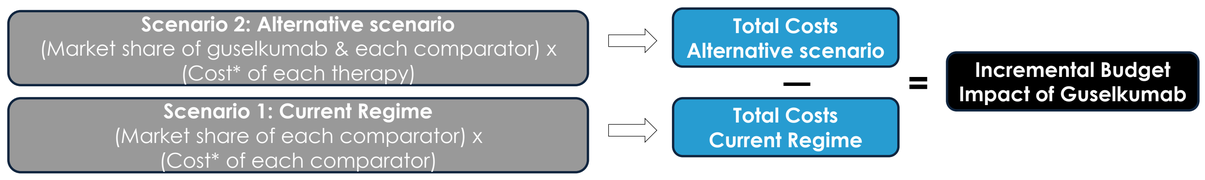
[1]AdRes HE, Turin, Italy [2]Janssen-Cilag SpA, Cologno Monzese, Italy

Objective

Guselkumab is a first in class interleukin (IL)-23 inhibitor recently approved in Italy, that showed higher efficacy in the treatment of moderate-to-severe plaque psoriasis (pPSO) in head to head studies vs other biologic classes [ECLIPSE trial vs the IL-17 inhibitor secukinumab; VOYAGE 1 and VOYAGE 2 trials vs the TNFa inhibitor adalimumab; NAVIGATE trial vs the IL-12/23 inhibitor ustekinumab]. The purpose of this study is to estimate the budget impact of the introduction of guselkumab from the perspective of the Italian National Health System (NHS) for patients eligible to receive IL inhibitor treatments indicated for moderate-to-severe pPSO.

Methods

- This budget impact analysis (BIA) is based on a 3-year horizon population-based model that was developed to compare costs in a scenario in which guselkumab is not yet available (current scenario) and a scenario that considers guselkumab as a treatment option reimbursed by the Italian NHS (alternative scenario).
- To estimate the likely budget impact of introducing guselkumab as a treatment for patients with moderate-to-severe pPSO, the following parameters were required:
  - Estimated number of patients eligible for IL inhibitor treatment (target population);
  - The current market shares of IL inhibitors available in Italy (ixekizumab, secukinumab, ustekinumab and brodalumab) and those expected to enter the market in the next months (tildrakizumab and risankizumab);
  - The estimated annual market uptake of guselkumab;
  - The changes in market shares of existing therapies after the entry of guselkumab.
- The process is represented in a simple model structure shown below:



*Total cost of treatment including drug acquisition, administration and disease management

- The patient flow algorithm, based on published literature and used to estimate the number of eligible patients, is detailed in Table 1.

Table 1 – Target population estimate

	2019	2020	2021	Source
Italian population (>18 years)	50,678,735	50,753,385	50,813,692	DemoISTAT 2019
Annual prevalence of PSO or psoriatic arthritis		1.8%		Lebwohl 2014
Proportion of PSO		63.9%		DERMBIO registry
Proportion of patients with moderate-to-severe pPSO		29.5%		Kimball 2014
Proportion of patients treated with biologics	9.3%	9.6%	9.7%	IQVIA analysis
Proportion of patients treated with IL inhibitor	58.9%	60.3%	63.2%	IQVIA analysis
Eligible population	**9,452**	**9,934**	**10,617**	

- Market shares in the two scenarios are shown in Table 2 and arise from an internal analysis conducted by Janssen (tildrakizumab and risankizumab should soon be available in Italy); guselkumab uptake rates were estimated at 4.1% in year 1, 11.6% in year 2, and 17.3% in year 3.

Table 2 – IL inhibitors market shares

	Current scenario			Guselkumab uptake from:			Alternative scenario		
	2019	2020	2021	2019	2020	2021	2019	2020	2021
Guselkumab							**4.1%**	**11.6%**	**17.3%**
Ixekizumab	10%	14%	18%	35%	35%	34%	8.4%	9.8%	11.6%
Secukinumab	32%	29%	26%	40%	37.3%	33.1%	30.8%	24.5%	20.1%
Tildrakizumab	1%	4%	5%	0%	2.8%	5%	1.4%	3.6%	3.7%
Ustekinumab	55%	47%	39%	25%	19.4%	17.9%	53.9%	44.6%	35.8%
Risankizumab	0%	3%	9%	0%	2.8%	5%	0%	2.4%	7.8%
Brodalumab	1%	4%	5%	0%	2.8%	5%	1.4%	3.6%	3.7%

Box — Yearly fraction of naïve patients i.e. patients starting their first year of treatment

Annual cost per patient was calculated considering both new patients (in their first year of treatment) and patients in maintenance treatment; the first year was more expensive due to induction dosing and more test/visits. The percentage of new patients was estimated for 2020 and 2021 assuming that only patients achieving PASI90 continued the treatment in the following years [Cameron 2018]. Efficacy of tildrakizumab and risankizumab, (not included in the analyses of Cameron et al.), was assumed to be the same as guselkumab, as they are in the same anti-IL23 class. drugs. At year 3 interruption in maintenance was also accounted for [Egberg 2018, Menter 2016]. For secukinumab and ustekinumab, available before 2019, the mean between 2020 and 2021 was assumed for all analysis horizons (value in table).

	2019	2020	2021
Guselkumab	100%	75.9%	52.1%
Ixekizumab	41.6%	41.6%	41.6%
Secukinumab	22.8%	22.8%	22.8%
Tildrakizumab	100%	73%	30%
Ustekinumab	44.7%	44.7%	44.7%
Risankizumab	-	100%	79.1%
Brodalumab	100%	74%	32.1%

- Only direct health costs were considered in the analysis, including costs related to drug acquisition (Table 3), treatment administration, resource consumption (Table 4), and serious adverse events (SAEs) management.
  - Administration cost was estimated as 3 hours of a nurse in the first cycle of therapy to teach patients self-administration [ISTAT 2018]; for 5% of patients, the Lombardy tariff of € 13.37 was applied for each session [Ravasio 2015] since they were assumed to be unable to self-administer even after the nurse training.
  - Annual risk of SAEs was assumed to be 0.83% for each treatment: most frequent SAE are pneumonia (45%), cellulitis (39%), sepsis (17%) [PSOLAR registry]. Annual cost per SAE was € 5,654 (DRG-weighted for number of hospital discharges in Italy [SDO 2015]).

Table 3 – Drug costs (posology and cost from Informatore Farmaceutico 2019)

Treatments	Posology	Pack (mg)	Official price
guselkumab	100 mg (weeks 0, 4) then every 8	100	€ 2,285.85
ixekizumab	160 mg (week 0), 80 mg every 2 until week 12, then every 4	80	€ 1.066
secukinumab	300 mg (weeks 0, 1, 2, 3); then monthly	150	€ 525
tildrakizumab[1]	100 mg (weeks 0, 4); then every 8	100	€ 2,285.85
ustekinumab	45 mg[2] (weeks 0, 4); then every 12	45/90	€ 3,150
risankizumab[1]	100 mg (weeks 0, 4); then every 8	100	€ 2,285,85
brodalumab	210 mg (week 0,1,2); then every 2	210	€ 581,72

[1] Same price of guselkumab since not available in Italy at the moment of this analysis, [2]double dose if > 100 kg

Table 4 – Resources costs

Resources	Frequency[1]	Unit cost[2]
GP visit	4.9 per year	€ 20.66
Specialist visit[3]	4.9 per year	€ 20.66
Tine test	1 only first year	€ 4.18
Chest X-ray	1 only first year	€ 15.49
Hepatitis B	1 only first year	€ 10.01
CBC	2 per year	€ 5.75
Liver function	2 per year	€ 19.87
Renal function	2 per year	€ 10.26

[1] Pouilin 2012; [2] GU Serie Generale 23 (28-1-2013); [3] Dermatologist or rheumatologist; GP: general practitioner; CBC: complete blood count

Results

- In the next three years, 3,377 patients are expected to be treated with guselkumab in Italy: 388 in the first, 1,150 in the second and 1,838 in the third year of analysis (Table 5).
- Total and detailed costs for each year in both scenarios are reported in Table 6 and 7; acquisition cost accounts for >95% of the total economic impact in both scenarios.

Table 5 – Expected patients per treatment

	Current scenario			Alternative scenario		
	2019	2020	2021	2019	2020	2021
guselkumab				388	1,150	1,838
ixekizumab	925	1,371	1,859	789	969	1,234
secukinumab	3,067	2,864	2,742	2,912	2,434	2,134
tildrakizumab	134	386	483	134	354	391
ustekinumab	5,190	4,653	4,130	5,093	4,430	3,800
risankizumab	0	274	921	0	243	829
brodalumab	134	386	483	134	354	391

Table 6 – Population budget impact results for the current scenario without guselkumab

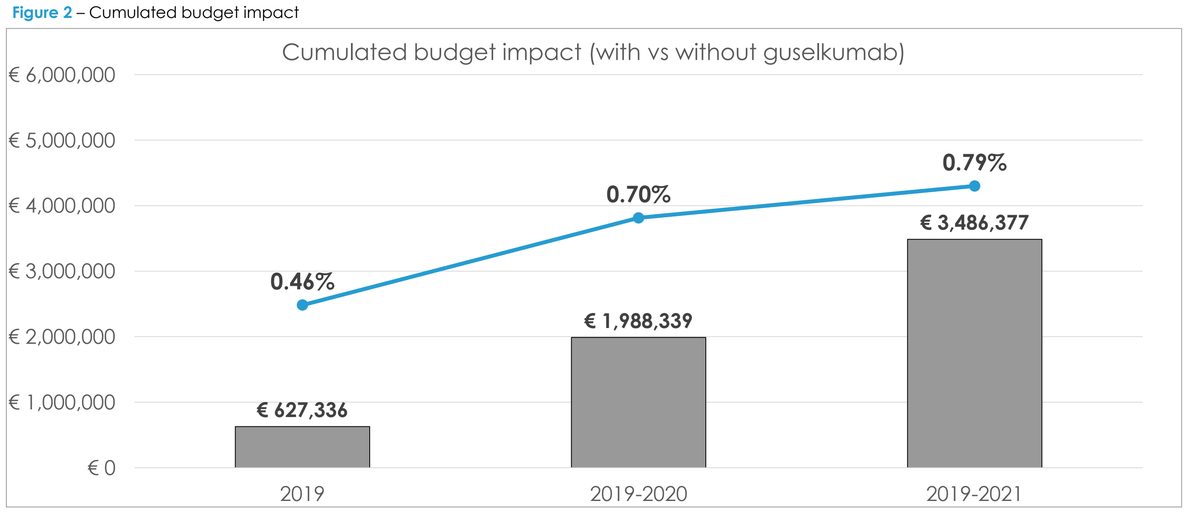
Current scenario	2019	2020	2021	Cumulative
Total	**€ 137,806,122**	**€ 146,566,183**	**€ 157,903,259**	**€ 442,275,565**
Drugs acquisition	€ 135,275,399	€ 143,875,798	€ 155,043,652	€ 434,194,848
Drugs administration	€ 342,910	€ 382,635	€ 397,867	€ 1,123,412
Resources consumption	€ 1,744,216	€ 1,841,541	€ 1,963,481	€ 5,549,238
Adverse events	€ 443,597	€ 466,209	€ 498,260	€ 1,408,066

Table 7 – Population budget impact results for the alternative scenario with guselkumab

Alternative scenario	2019	2020	2021	Cumulative
Total	**€ 138,433,458**	**€ 147,927,187**	**€ 159,401,297**	**€ 445,761,942**
Drugs acquisition	€ 135,879,759	€ 145,201,135	€ 156,525,072	€ 437,605,966
Drugs administration	€ 358,380	€ 405,542	€ 406,105	€ 1,170,026
Resources consumption	€ 1,751,723	€ 1,854,301	€ 1,971,861	€ 5,577,884
Adverse events	€ 443,597	€ 466,209	€ 498,260	€ 1,408,066

- The introduction of guselkumab into the Italian market for the treatment of moderate-to-severe pPSO shows a cumulative 3-year incremental budget impact of about € 3.5 million, corresponding to an increase in the total direct costs of less than 1% (see figure below).

Figure 2 – Cumulated budget impact



Conclusions

Treatment cost of moderate-to-severe pPSO depends almost completely on pharmacological therapy. Changes in the current prescription scenario with the adoption of guselkumab, can provide a more effective therapeutic option with negligible economic impact (lower than 1%) on the Italian NHS.

References

1. Demo ISTAT. Population Projection. Years 2017-2065. Available from: http://demo.istat.it/index_e.html. Accessed October 10, 2019
2. Lebwohl et al (2014). Journal of the American Academy of Dermatology
3. Kimball et al (2014). British Journal of Dermatology
4. Egeberg et al (2018). British Journal of Dermatology. DOI 10.1111/bjd.16102
5. Menter et al (2016). Journal of The European Academy of Dermatology and Venereology. DOI 10.1111/jdv.13611
6. Cameron et al (2018). Journal of Psoriasis and Psoriatic Arthritis. DOI 10.1177/2475530318818816
7. Cameron C et al (2018). Journal of Comparative Effectiveness Research. 10.2217/cer-2018-0065
8. Poulin et al (2012). Canadian Family Physician.
9. ISTAT. Wages according to collective labor agreements in Public administration. http://dati.istat.it/Index.aspx?DataSetCode=DCSC_RETRCASSCOMPPA
10. Decreto 10/2012 published in GU Serie Generale n.23 del 28-1-2013 (Tariffs and DRG). Ministero della Salute. Remunerazione prestazioni di assistenza ospedaliera per acuti, assistenza ospedaliera di riabilitazione e di lungodegenza post acuzie e di assistenza specialistica ambulatoriale.
11. Ravasio et al (2015). Global & Regional Health Technology Assessment.
12. Ministero della Salute. Rapporto annuale sull'attività di ricovero ospedaliero — Dati SDO 2015. http://www.salute.gov.it/portale/temi/p2_6.jsp?lingua=italiano&id=1237&area=ricoveriOspedalieri&menu=vuoto. Accessed October 10, 2018. Italian.

The present work was funded by Janssen-Cilag Italy