Cost per response analysis of deucravacitinib and biologic treatments for moderate to severe plaque psoriasis from the perspective of the Brazilian Private Healthcare System.

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Background

- Psoriasis is a chronic, inflammatory skin disease affecting both genders, with plaque psoriasis being the most common form. [1]
- While biologic drugs are available in the Brazilian private healthcare setting, several important issues remain under-discussed. These include parenteral administration, immunogenicity, adverse effects, loss of efficacy, and the costs associated with maintaining the cold chain.
- Deucravacitinib is an orally administered medication with a differentiated mechanism of action, as it inhibits tyrosine kinase 2 (TYK2), which is involved in the pathophysiology of psoriasis. Deucravacitinib binds to the regulatory domain of TYK2, stabilizing an inhibitory interaction between the enzyme's regulatory and catalytic domains. This results in allosteric inhibition of TYK2 activation mediated by the receptor and its downstream functions in cells. TYK2 mediates the signaling of cytokines such as IL-23, IL-12, and type I IFN, naturally occurring cytokines involved in inflammatory and immune responses. Deucravacitinib inhibits the release of pro-inflammatory cytokines and chemokines.[2]
- Additionally, oral therapies offer several advantages, including easier administration, not disrupting patients' daily routines, reduced costs for patients and society, and serving as an alternative to alleviate the treatment burden for patients with venous access issues or those uncomfortable with parenteral administration. All the described points can optimize the clinical outcomes for patients.[3,4,5]
- Deucravacitinib has been approved in Brazil by the National Health Surveillance Agency (ANVISA) since November 2023 for the treatment of adult patients with moderate to severe plaque psoriasis who are candidates for systemic therapy or phototherapy.[6]
- Deucravacitinib has been evaluated and incorporated by the HTA agencies of the United Kingdom (2023), Scotland (2023), Quebec – Canada (2024), and France (2023).[7,8,9,10]
- This study aims to evaluate the cost per response between injectable biologics and deucravacitinib (oral administration). This options are recommended in the 2024 Brazilian Psoriasis Consensus, for the treatment of moderate-to-severe plaque psoriasis from the perspective of the Brazilian private market.[1]

Methods

Cost-per-response analysis

- A cost-per-response model was conducted to compare deucravacitinib with biologic treatments for moderate to severe plaque psoriasis, from the perspective of the Brazilian private healthcare market. The comparator drugs were based on the official list prices published by the Brazilian Price Chamber in November 2024, which include bimekizumab, secukinumab, etanercept, adalimumab, tildrakizumab, brodalumab, infliximab, risankizumab, ustekinumab, ixekizumab, and guselkumab.[11]
- The severity and body area affected by psoriasis are assessed using the Psoriasis Area and Severity Index (PASI) score, which considers erythema, infiltration, and scaling in four body regions. Improvements of 75% (PASI 75 response) and 90% (PASI 90 response) scores were used to evaluate treatment efficacy, with PASI 90 being established as a therapeutic goal for biologics by the Brazilian Society of Dermatology (SBD).[1] Therefore, the outcomes of interest were the costs per PASI 75 and PASI 90 responses long term (52 weeks).
- The probabilities of PASI 75 and PASI 90 responses in the long term were assessed by the Armstrong, et al. 2023 a network metanalysis.[12]
- The number needed to treat (NNT) for each medication was also evaluated, based on the proportion of patients who achieved PASI 75 or PASI 90 responses. The NNT was determined using the formula '1/PASI75 or PASI90', with the aim of reflecting the number of patients that need to be treated to achieve each desired outcome (**Table 1**).
- The direct cost considered in the model was the acquisition cost of each medication, based on the factory price (FP) listed in the table by the Drug Market Regulation Chamber (CMED), with the Circulation of Goods and Services Tax (18% FP, November 2024 value).[11] The treatment dose was estimated based on the posology of each evaluated medication, considering 70 kg patients as a reference, obtained from their prescribing information from ANVISA[6]. All calculations were performed in Microsoft Excel (**Table 2**). All calculations were performed in Microsoft Excel
- The treatment cost were (in BRL): 54,659 (deucravacitinib); 64,906 (tildrakizumab); 72,322 (certolizumab) ; 84,858 (ustekinumab); 90,192 (brodalumab); 105,915 (guselkumab); 123,887 107,776 (bimekizumab); 113,481 (risankizumab); 120,896 (ixekizumab); 129,767 (etanercept); 145,205 (secukinumab); 148,249 (adalimumab); 153,858 (infliximab) (Table 2).

Table 1. NNT values for PASI 75 and PASI 90 in the long-term treatment (48-52 weeks) of moderate to severe plaque psoriasis

Medications	NNT	
	PASI 75	PASI 75
Bimekizumabe	1,2	1,3
Secukinumabe	1,3	1,6
Etanercpte	1,9	3,1
Adalimumabe	1,6	2,4
Tildrakizumabe	-	-
Brodalumabe	1,2	1,3
Infliximabe	1,8	2,5
Risankizumabe	1,1	1,2
Deucravacitinibe	1,5	2,2
Ustekinumabe	1,5	2
Ixekizumabe	1,2	1,4
Guselcumabe	1,1	1,3

Table 2. Treatment Costs 1 year (52 weeks) official list price factory price 18% (18% FP)

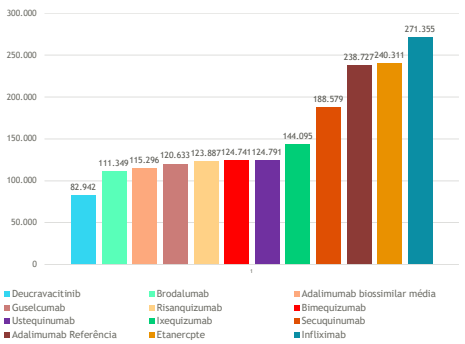
Medications	Dosage (12 months)	Total mg over 12 months	Factory Price (CMED 18%)	Annual cost of treatment
Bimekizumabe	320 mg (2 subcutaneous injections of 160 mg each) at weeks 0, 4, 8, 12, 16, and every 8 weeks thereafter	2880	BRL 11.975,1	107.775,90
Secukinumabe	300 mg (subcutaneous injection with initial administration during weeks 0-4, followed by every 4 weeks maintenance administration	4800	BRL 9.075,37	145.205,92
Etanercepte	50 mg, subcutaneous injection administered once a week	2600	BRL 9.982,13	129.767,69
Adalimumabe	40 mg, subcutaneous injection administered as a single dose every 14 days	1080	BRL 10.981,43	148.249,31
Tildrakizumabe	100 mg, subcutaneous injection administered at week 0, 4, and every twelve weeks	500	BRL 12.981,24	64.906,20
Brodalumabe	210 mg administered by subcutaneous injection at weeks 0, 1, and 2 followed by 210 mg every 2 weeks.	5670	BRL 6.680,91	90.192,29
Infliximabe	Intravenous infusion of 5 mg/kg, administered over a minimum period of 2 hours, followed by additional infusion doses of 5 mg/kg at weeks 0, 2 and 6 after the first infusion, and then every 8 weeks thereafter.	2800	BRL 5.494,93	153.858,04
Risankizumabe	50 mg, administered by subcutaneous injection at week 0, 4 and every 12 weeks thereafter	750	BRL 22.696,17	113.480,85
Deucravacitinibe	6 mg, orally, once a day	2184	BRL 4.204,54	54.659,02
Ustekinumabe	45 mg, subcutaneous injection administered at Weeks 0 and 4, and then every 12 weeks thereafter	225	BRL 16.971,59	84.857,95
Ixekizumabe	160 mg by subcutaneous injection (two injections of 80 mg) at week 0, followed by one injection of 80 mg at weeks 2, 4, 6, 8, 10, and 12, and then 80 mg every 4 weeks.	1360	BRL 7.111,52	120.895,84
Guselcumabe	100 mg by subcutaneous injection at Week 0, 4 and every 8 weeks	700	BRL 15.130,81	105.915,67

Results

PASI75 cost-per-response, 1 year (52 weeks) long term.

- The PASI75 cost-per-response were (in BRL): 82,942 (deucravacitinib); 111,349 (brodalumab); 120,633 (guselkumab); 123,887 (risankizumab); 124,741 (bimekizumab); 124,791 (ustekinumab); 144,095 (ixekizumab); 188,579 (secukinumab); 238,727 (adalimumab); 240,311 (etanercept); 271,355 (infliximab) as show in the (**Figure 1**).

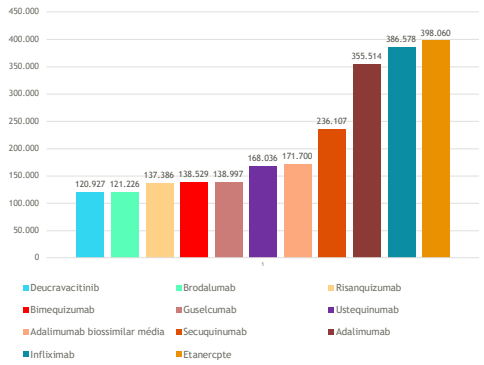
Figure 1. PASI75 cost-per-response, (52 weeks) long term.



PASI90 cost-per-response, 1 year (52 weeks) long term.

- For the PASI90 outcome, the results were: 120,927 (deucravacitinib); 121,226 (brodalumab); 137,386 (risankizumab); 138,529 (bimekizumab); 138,997 (guselkumab); 168,036 (ustekinumab); 236,107 (secukinumab); 355,514 (adalimumabe); 386,578 (infliximab); 398,060 (etanercept) as show in the (**Figure 2**).

Figure 2. PASI90 cost-per-response, (52 weeks) long term.



Discussion

- Anti-TNFs are associated with a higher incidence of systemic adverse events and less sustained treatment responses, which can negatively impact adherence and clinical outcomes for patients with moderate to severe plaque psoriasis.[15,16] It is worth noting that psoriasis is a chronic autoimmune inflammatory disease requiring lifelong treatment.[17]
- Additionally, biologics such as anti-TNFs and interleukin inhibitors are associated with loss of efficacy over time, high costs, the risk of immunogenicity, and increased risk of infections.[18,19]
- Against this backdrop, deucravacitinib has emerged as a promising therapeutic option, as long-term clinical trials (POETYK PSO-1, PSO-2, and LTE trials) have demonstrated that it provides consistent maintenance of therapeutic response over four years, contrasting with the loss of efficacy observed in other treatments, especially biologics. [12,13,14]
- Furthermore, its simplified oral dosing offers an advantage for deucravacitinib since evidence indicates that patients often prefer oral treatments over parenteral routes due to convenience, higher acceptance, and less interruption in therapy, factors that directly impact adherence and clinical outcomes.[20,21]

Conclusions

- The introduction of deucravacitinib, a new advanced oral drug, on the psoriasis care pathway can help providing a different administration route and reducing costs with logistics and administration.
- Deucravacitinib presented the lowest cost-per-response amongst all treatments available for moderate to severe plaque psoriasis in the Brazilian private setting. These findings are significant, especially with PASI75 and PASI90 outcomes and with the convenience of oral therapy. Additionally, this analysis may be useful as a valuable tool in the decision-making process for private payers in the selection of treatments for patients with moderate to severe plaque psoriasis.
- In this study, injectable biologics showed the highest annual costs, whereas deucravacitinib demonstrated the lowest costs, standing out as a more financially accessible alternative for patients with psoriasis.
- The present study has some limitations, such as the exclusion of infusion costs for intravenous medications, lack of a sensitivity analyses and the costs associated with managing adverse events, which may impact the economic evaluation.

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Conflict of interest

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