Number Needed to Treat and Cost per Additional Responder of Biologic Therapies in Adults with Moderate-to-Severe Atopic Dermatitis

Jules Tavi[1], Kerry Noonan[2], Andreas Kuznik[3], Zhixiao Wang[3]

[1]Sanofi, Gentilly, France; [2]Sanofi, Cambridge, MA, USA; [3]Regeneron Pharmaceuticals Inc., Sleepy Hollow, NY, USA

Conclusion

- **Dupilumab had a lower NNT and a 1.5- to 2-fold lower annual CPR than tralokinumab and lebrikizumab, making it the most efficient and cost-effective treatment option.**
- **Achieving the same number of additional responders at Week 16 was less costly with dupilumab than with tralokinumab or lebrikizumab.**
- **These findings highlight the clinical and economic benefits of dupilumab in the management of AD compared with other biologics.**

Objective

To compare the NNT and CPR of dupilumab, tralokinumab, and lebrikizumab in adult patients with moderate-to-severe AD from a US payer's perspective.

Background

- Dupilumab, tralokinumab, and lebrikizumab are the approved biologic therapies in the United States for adolescents (12 years and older) and adults with moderate-to-severe atopic dermatitis (AD) who either are ineligible for or have had an inadequate response to topical therapies.[1–4]
- Additionally, dupilumab is approved for children aged 6 months and older who are candidates for systemic therapies.[5]
- Currently, no direct head-to-head clinical trials have been conducted to compare the efficacy of these biologics. However, findings from a recent indirect treatment comparison (ITC) suggest that dupilumab demonstrates better efficacy among the three therapies in adult patients with AD.[1]
- The number needed to treat (NNT) and cost per additional responder (CPR) are valuable metrics that help contextualize the clinical and economic benefits of treatments. These measures are increasingly used to support payers' decision-making by combining treatment benefits and cost-effectiveness.[6]

Methods

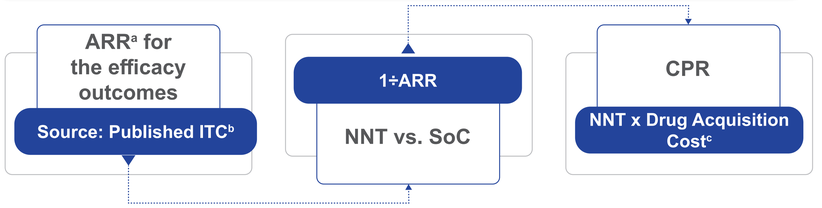
NNT Model

- An Excel-based model was developed to estimate the NNT and the incremental cost per responder (iCPR) per year using the comparative efficacy data on systemic therapies for AD from Silverberg et al. (2021)[1] and Guyot et al. (2024)[2] **(Figure 1)**.
- The model compared dupilumab, tralokinumab, and lebrikizumab, each in combination with topical therapy, over a 16-week treatment period.

Efficacy Outcomes

- Treatment response was defined as a ≥75% reduction from baseline in the Eczema Area and Severity Index (EASI-75) score at Week 16.
- The NNT was calculated as the inverse of the absolute risk reduction (ARR) versus the standard of care for each biologic **(Figure 1)**.

Figure 1: NNT model structure



[a]Difference in response rates versus SoC; [b]ITC studies using comparative efficacy data from Silverberg et al. (2021) and Guyot et al. (2024) on systemic therapies for AD; [c]Source: Drug prices were obtained from RED BOOK (IBM Micromedex, 2024).
AD, atopic dermatitis; ARR, absolute risk reduction; CPR, cost per additional responder; ITC, indirect treatment comparison; NNT, number needed to treat; SoC, standard of care.

Drug Costs and Data Sources

- The CPR analysis considered the drug acquisition costs as per the US list prices provided in the RED BOOK (IBM Micromedex, 2024). The per vial list prices for drug acquisition were $1,901.6 for dupilumab, $1,919.5 for tralokinumab, and $3,500.0 for lebrikizumab.
- Sensitivity analyses with a 10% discount rate for tralokinumab and lebrikizumab were performed to assess the robustness of the analysis.

Results

- The NNT to achieve one additional responder vs. standard of care (SoC) was lower with dupilumab (NNT: 3) than with tralokinumab (NNT: 4) and lebrikizumab (NNT: 6), respectively, considering EASI-75 as the response measure **(Figure 2)**.

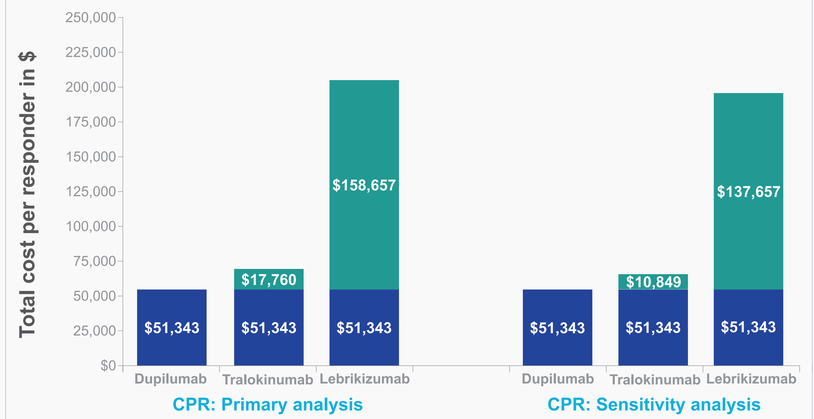
Figure 2: NNT for dupilumab versus tralokinumab and lebrikizumab

Response criteria	Response rates	NNT
EASI 75	Dupilumab: 65.0%	3.0 Dupilumab
	Tralokinumab: 52.0%	4.0 Tralokinumab
	Lebrikizumab: 43.7%	6.0 Lebrikizumab
	Placebo: 27.0%	

EASI, eczema area and severity index; NNT, number needed to treat.

- The CPR to achieve EASI-75 was lower for dupilumab than tralokinumab ($51.3K vs. $69.1K) and lebrikizumab ($51.3K vs. $210.0K), respectively **(Figure 3)**.

Figure 3: CPR of dupilumab, tralokinumab, and lebrikizumab



CPR, cost per additional responder; iCPR, incremental cost per additional responder.
*sensitivity analysis with a 10% discounted price for tralokinumab and lebrikizumab; Number of doses considered till Week 16: 9 for Dupilumab and Tralokinumab; 10 for Lebrikizumab.

- Study limitations include reliance on indirect treatment comparisons (ITCs) rather than head-to-head randomized controlled trials (RCTs) and the use of list prices, which may not accurately reflect the actual net costs.
- Dupilumab was $17,760 and $158,657 less expensive per additional responder than tralokinumab and lebrikizumab, respectively. These results were consistent across the sensitivity analyses **(Figure 3)**.

References:
1. Silverberg JI, et al. J Eur Acad Dermatol Venereol. 2021;35(9):1797-1810. DOI: 10.1111/jdv.17351
2. Guyot P, et al. Br J Dermatol. 2024;191(Suppl_2):ljae266.049. DOI: 10.1093/bjd/ljae266.049
3. Simpson EL, et al. N Engl J Med. 2016;375(24):2335-2348. DOI: 10.1056/NEJMoa1610020.
4. Blauvelt A, et al. Br J Dermatol. 2023;188(6):740-748. DOI: 10.1093/bjd/ljad022
5. Paller AS, et al. Lancet. 2022;400(10356):908-919. DOI: 10.1016/S0140-6736(22)01539-2.
6. Weston G, et al. CO183 Value Health. 2023;26(Suppl 6):S49.

Funding:
This study was sponsored by Sanofi and Regeneron Pharmaceuticals Inc

Acknowledgment:
Medical writing support was provided by Dr. Kaushik Subramanian, PhD, from Sanofi.

Disclosures:
JT and **KN** are employees of Sanofi and may hold stocks and/or stock options in the company.
AK and **ZW** are employees of Regeneron Pharmaceuticals Inc. and hold stocks and stock options in the company.

Poster Code: **EE264**

Presented at the International Society for Pharmacoeconomics and Outcomes Research (ISPOR) 2025: Montreal, QC, Canada; May 13–16, 2025