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BACKGROUND

Atopic dermatitis (AD) is a chronic inflammatory skin disease causing significant burden in adults with moderate-to-severe disease. Two recently approved monoclonal antibodies — lebrikizumab (anti-IL-13) and nemolizumab (anti-IL-31Rα) — offer new targeted therapy options. However, no head-to-head trial exists, and their relative economic value at current US Wholesale Acquisition Cost (WAC) pricing remains undefined.

OBJECTIVES

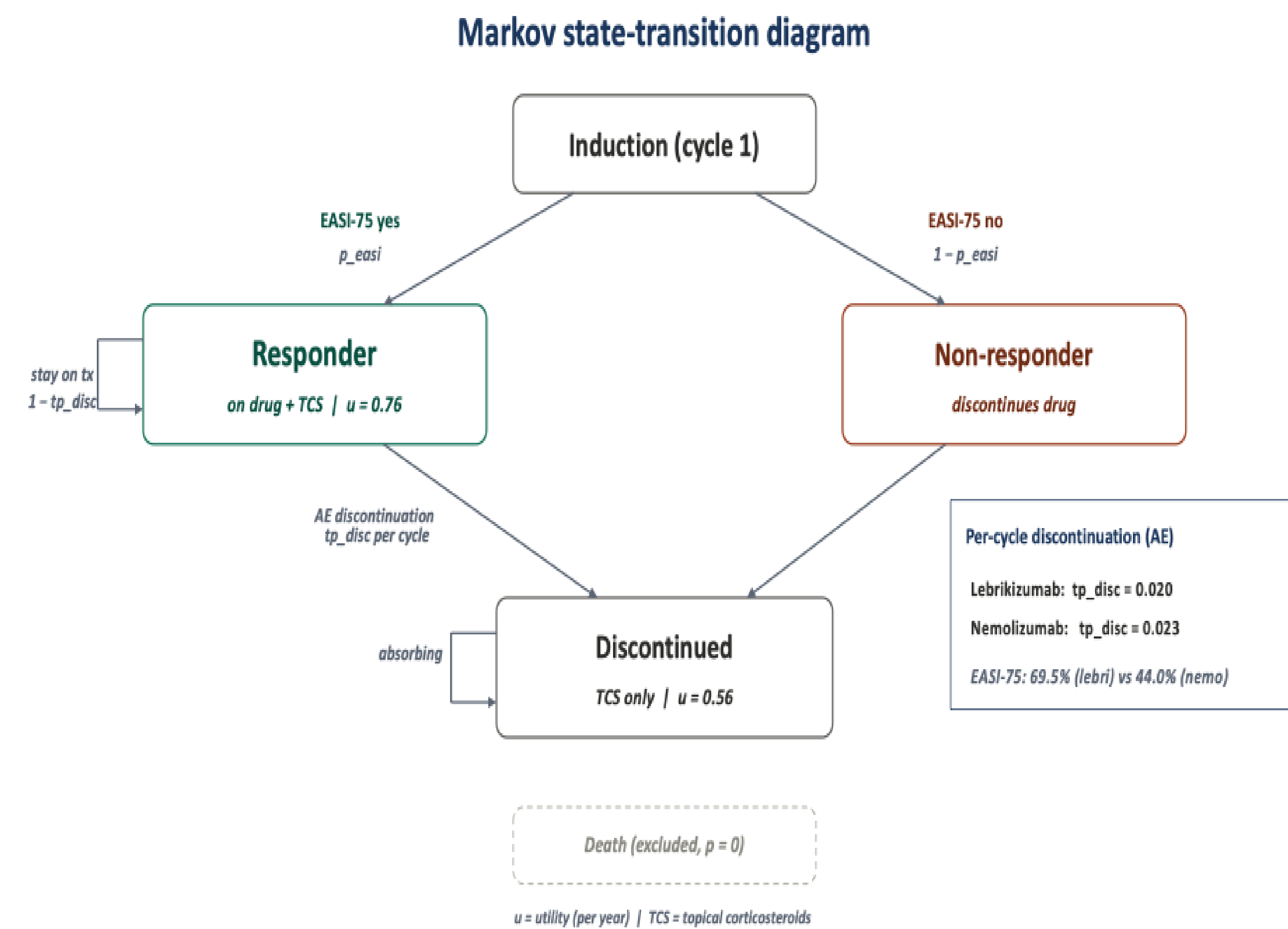
To estimate the cost-effectiveness of lebrikizumab compared to nemolizumab for adult patients with moderate-to-severe atopic dermatitis from a US payer perspective over a 10-year time horizon.

METHODS

A Markov model with 16-week cycles was constructed in TreeAge Pro, simulating transitions between Responder, Non-Responder, and Discontinued health states (Fig. 1). Both arms include a topical corticosteroid (TCS) background.

- Comparators: lebrikizumab + TCS vs. nemolizumab + TCS
- Clinical inputs: indirect comparison of ADhere (lebri, EASI-75: 69.5%) and ARCADIA-1/2 (nemo, EASI-75: 44.0%)
- Lebrikizumab responders assumed to switch to Q4W maintenance (per label)
- Costs: WAC, IBM Micromedex Red Book (2025); reported in 2025 USD
- Discounting: 3% annually for both costs and QALYs (Second Panel on Cost-Effectiveness)
- Half-cycle correction applied; background mortality excluded (AD is non-fatal)
- Outcomes: total costs, QALYs, ICER, and net monetary benefit (NMB)
- Deterministic and probabilistic sensitivity analyses (PSA; 10,000 Monte Carlo simulations) conducted

Fig. 1 — Markov State Transition Diagram



RESULTS

INCREMENTAL COST \$74,355 <i>Lebri vs. Nemo</i>	INCREMENTAL QALYs +0.39 <i>Over 10 years</i>	ICER \$188,784 <i>per QALY gained</i>	PSA AT WTP \$100K 89.55% <i>Nemo optimal</i>
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Base-Case Cost-Effectiveness

Strategy	Total Cost	QALYs	Incr. Cost	Incr. QALY	ICER
Nemolizumab + TCS	\$197,243	6.12	—	—	—
Lebrikizumab + TCS	\$271,598	6.51	\$74,355	0.39	\$188,784/QALY

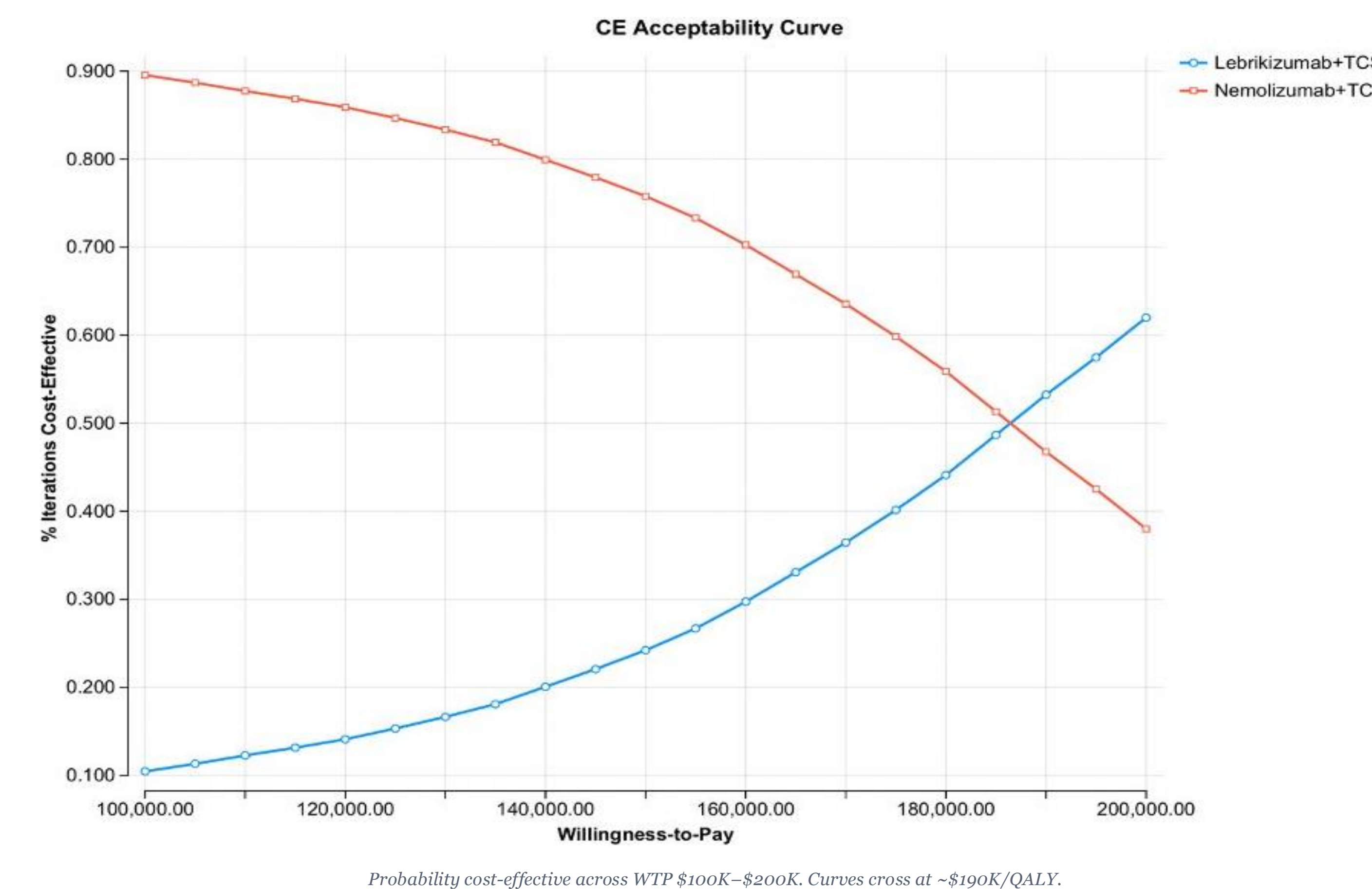
Table 1. Base-case 10-year discounted costs, QALYs, and ICER (Lebrikizumab + TCS vs. Nemolizumab + TCS).

Table 2 — Input Parameters and Sources

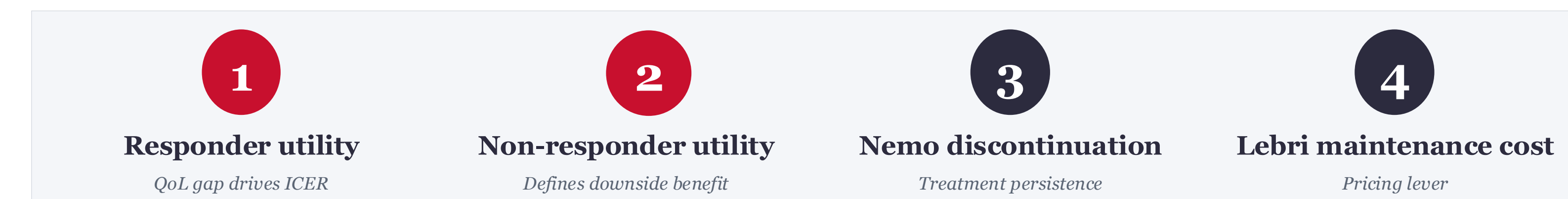
Parameter	Base	Range	Dist.	Source
EASI-75 response, lebrikizumab	0.695	0.59–0.80	Beta	Simpson 2023 (ADhere) ¹
EASI-75 response, nemolizumab	0.440	0.37–0.51	Beta	Silverberg 2024 (ARCADIA) ²
Discontinuation — lebrikizumab AE	0.020/cy	0–0.02	Beta	Simpson 2023 (ADhere) ¹
Discontinuation — nemolizumab	0.023/cy	0–0.023	Beta	Silverberg 2024 (ARCADIA) ²
Induction cost — lebrikizumab	\$35,000	0–\$35,000	Gamma	Red Book 2025 ³
Maintenance cost — lebrikizumab	\$14,000/cy	\$11,200–\$16,800	Gamma	Red Book 2025 ³
Induction cost — nemolizumab	\$21,200	0–\$21,200	Gamma	Red Book 2025 ³
Maintenance cost — nemolizumab	\$16,960/cy	0–\$16,960	Gamma	Red Book 2025 ³
TCS cost (clobetasol 0.05%)	\$300/cy	\$0–\$300	—	Red Book 2025 ³
Utility — responder (EASI-75)	0.76	0.68–0.84	Beta	Zimmermann 2018 ⁴
Utility — non-responder	0.56	0.45–0.67	Beta	Zimmermann 2018 ⁴
Discount rate (costs, QALYs)	3%/yr	0–5%	—	Sanders 2016 ⁵

Table 2. Model inputs with PSA distributions and source citations (see references).

Fig. 2 — Cost-Effectiveness Acceptability Curve



Key Drivers of Decision Uncertainty



Top 4 ICER-influencing parameters from tornado analysis; 3 of 4 are quality-of-life parameters, not costs.

PROBABILISTIC SENSITIVITY ANALYSIS

Across 10,000 Monte Carlo simulations at WTP \$100,000/QALY, nemolizumab was the optimal choice in 89.55% of iterations. Lebrikizumab was consistently more effective and more costly — no simulation showed it both cheaper and less effective.

Fig. 3 — PSA Outputs (NMB distribution + ICE scatter)

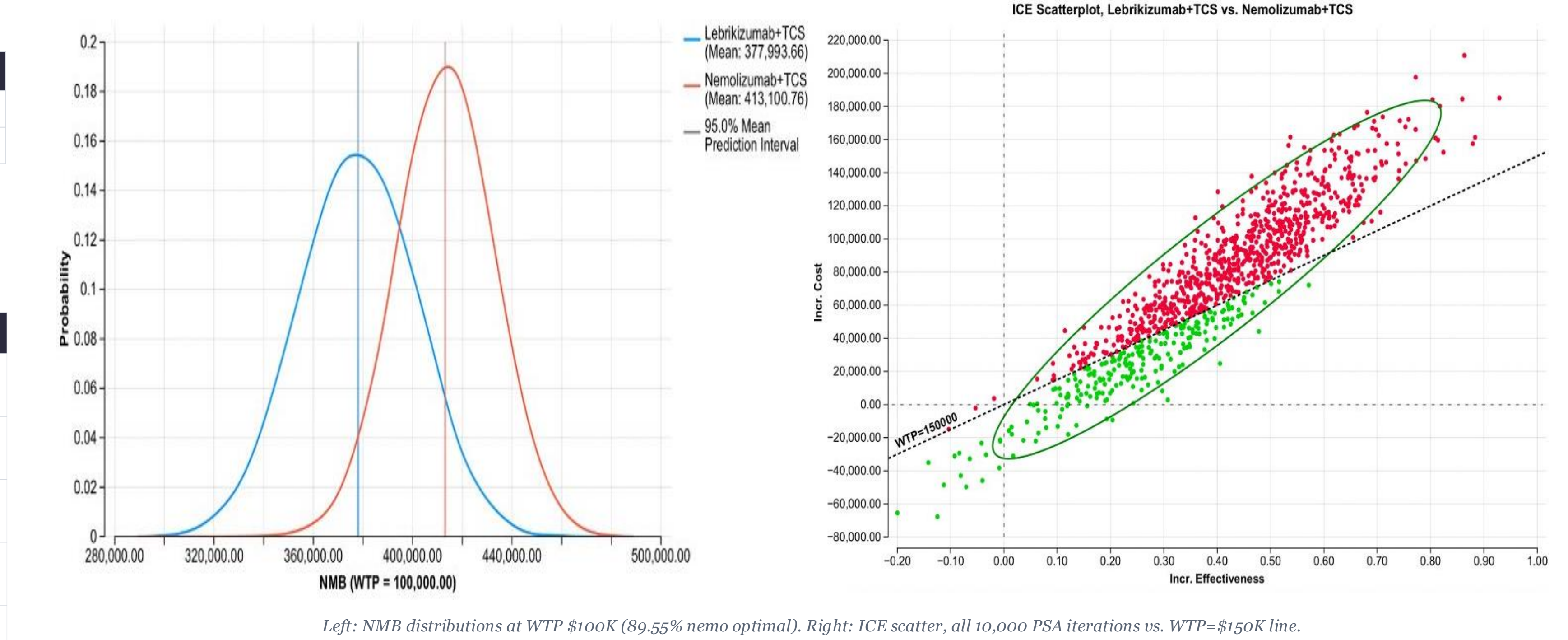
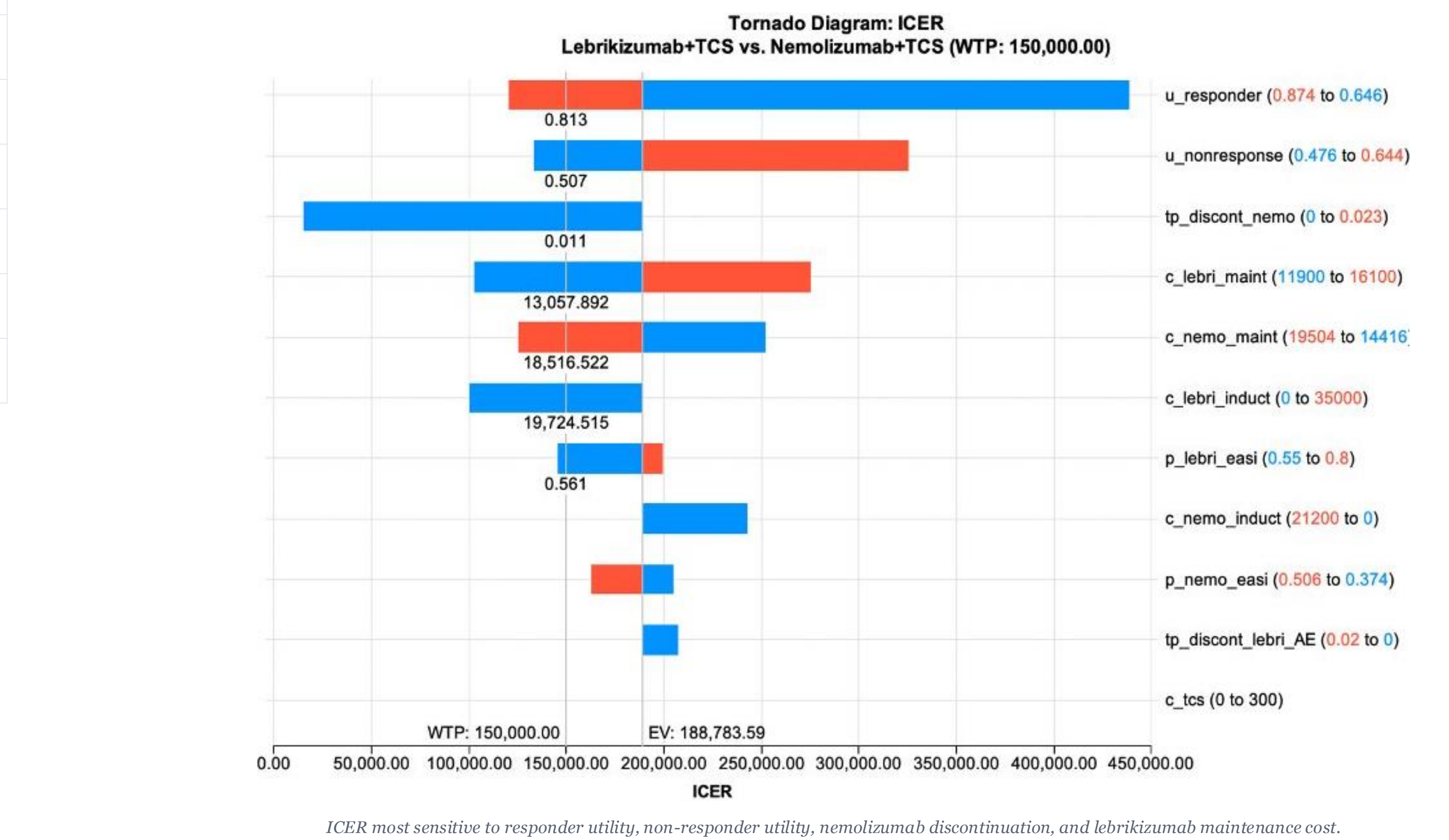


Fig. 4 — Tornado Diagram: Drivers of ICER (WTP \$150K)



Thresholds where lebrikizumab becomes cost-effective at WTP \$150K/QALY

- Responder utility > 0.813 (base 0.76)
- Non-responder utility < 0.507 (base 0.56)
- Nemo discontinuation < 0.011/cy (base 0.023)
- Lebri maintenance < \$13,058 (base \$14,000) = ~7% price cut
- Lebri induction < \$19,725 (base \$35,000)
- Nemo EASI-75 > 56.1% (base 44.0%)

CONCLUSIONS

- At standard US WTP thresholds, nemolizumab + TCS is the optimal cost-effective choice in 89.55% of probabilistic simulations.
- Lebrikizumab provides incremental QALY benefit (+0.39) but at incremental cost (\$74,355) yielding ICER = \$188,784/QALY — above standard thresholds.
- Decision uncertainty is driven primarily by quality-of-life utilities, not drug pricing. Real-world utility data in EASI-75 responders would be the most decision-relevant new evidence.

References

1. Simpson EL, Gooderham M, Wollenberg A, et al. Efficacy and safety of lebrikizumab in combination with topical corticosteroids in adolescents and adults with moderate-to-severe atopic dermatitis (ADhere). *JAMA Dermatol.* 2023; doi:10.1093/jamadermatol.2022.25314
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4. Zimmermann M, Rind D, Chapman R, et al. Economic Evaluation of Dupilumab for Moderate-to-Severe Atopic Dermatitis. *J Drugs Dermatol.* 2018;17(7):759–756.
5. Sanders GD, Neumann PJ, Basu A, et al. Recommendations for Conduct, Methodological Practices, and Reporting of Cost-Effectiveness Analyses: Second Panel on Cost-Effectiveness in Health and Medicine. *JAMA.* 2016;316(10):1093–1103.