# Cost-Utility Analysis of Risankizumab Versus Ustekinumab for Biologic-Failed Moderate-to-Severe Crohn's Disease in China

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## Background

- Moderate-to-severe Crohn's disease is chronic and relapsing. After biologic failure, treatment choice must balance durable disease control with long-term costs.

## Objective

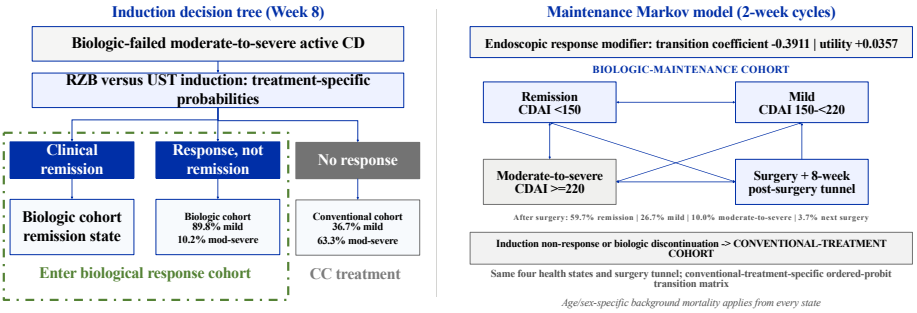
- To assess the cost-effectiveness of Risankizumab (RZB) versus Ustekinumab (UST) in Chinese adults with biologic-failed moderate-to-severe active Crohn's

## Methods

- **Model design**
  - **Population:** Chinese adults with moderate-to-severe active CD after biologic failure
  - **Structure:** Week-8 induction decision tree followed by maintenance Markov model
  - **States:** remission (CDAI<150), mild (150-<220), moderate-to-severe (>=220), surgery/post-surgery, death
  - 2-week cycles; lifetime horizon; 5% annual discounting of costs and outcomes
  - Chinese healthcare system perspective; direct medical costs only
- **Structural assumptions**
  - Treatment-specific transitions estimated with an **ordered probit model** using **FORTIFY IPD** (725 observations), then calibrated to SEQUENCE Week-48 remission
  - **Endoscopic response** changes long-term transition probabilities and adds utility; NMA supplies induction response rates
  - Biologic discontinuation moves patients to a conventional-treatment transition matrix
  - Surgery occurs only from moderate-to-severe disease; 8-week surgery/post-surgery tunnel before redistribution
  - Background mortality uses the 2023 China life table; no excess CD mortality assumed
- **Analysis**
  - **Base case:** lifetime; threshold CNY 95,479/QALY (2024 1x GDP)
  - **DSA:** efficacy/utility 95% bounds; costs +/-20%
  - **PSA:** 1,000 simulations; Beta utilities and Gamma costs
  - **Scenarios:** **10-year horizon** and removal of **long-term endoscopic benefit**

## Model structure and inputs

**Figure 1. Decision-tree induction and long-term Markov structure**




✓ Ordered probit model from FORTIFY IPD (725 observations), calibrated to treatment-specific Week-48 remission in SEQUENCE. Direct medical costs and QALYs accrue in every 2-week cycle.

**Table 1. Key model inputs and uncertainty ranges**

| Clinical input | RZB baseline (DSA bounds) | UST baseline (DSA bounds) |
|---|---|---|
| Clinical response, Week 8 | **60.8% (54.9-66.9)** | 51.3% (45.3-57.3) |
| Clinical remission, Week 8 | **38.8% (33.0-45.0)** | 34.0% (28.3-39.7) |
| Endoscopic response, induction | **31.4% (24.4-38.4)** | 23.0% (13.4-33.6) |
| Remission at Week 48 among W8 responders | **74.2% (67.3-81.1)** | 60.3% (52.1-68.5) |
| Discontinuation per 2-week cycle | **0.43% (0.34-0.51)** | 1.31% (1.05-1.57) |

**Health-state utilities and AE decrements**

| Utility input | Mean (SE) |
|---|---|
| Remission | 0.792 (0.005) |
| Mild | 0.673 (0.008) |
| Moderate-to-severe | 0.546 (0.005) |
| Surgery | 0.546 (0.005) |
| Endoscopic response increment | +0.036 (0.015) |
| Serious infection decrement | -0.520 (0.010) |
| Hypersensitivity / skin decrement | -0.110 / -0.030 |

**Selected direct medical costs**

| Input (2025 CNY) | Base case |
|---|---|
| RZB 600 mg / 360 mg | Model WTP price* |
| UST 130 mg / 90 mg | 2,151.55 / 6,826.76 |
| Conventional treatment, 2 weeks | 710.67 |
| IV / SC administration, dose | 10.14 / 3.73 |
| Remission management, 2 weeks | 758.31 |
| Mild management, 2 weeks | 864.37 |
| Moderate-to-severe management, 2 weeks | 3,822.70 |
| Surgery, event | 83,138 |
| Serious infection management, event | 10,967 |

*Values in parentheses are DSA bounds. Clinical inputs: SEQUENCE and NMA. Utilities: SEQUENCE IBDQ mapped to EQ-5D. Costs: 2025 CNY; +/-20% in DSA and Gamma in PSA.*

## Results

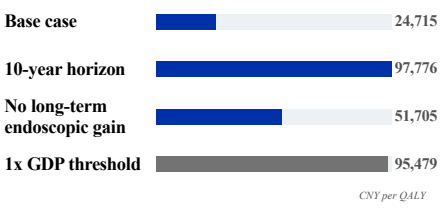
ICER:

**24,715** CNY/QALY

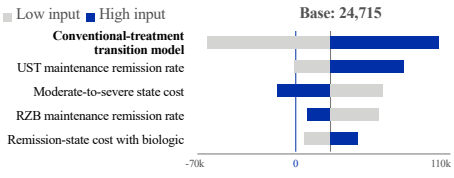
26% OF THRESHOLD | EUR 3,169/QALY

ΔQALYs +0.971 ΔCost +CNY 23,689

**Scenario analysis: reported ICERs**




**DSA tornado: ICER (CNY/QALY), top 5 drivers**




**Probabilistic sensitivity analysis**

**>90%**



**Probability that RZB is cost-effective at standard willingness-to-pay thresholds**

The conclusion remained favorable after removing the long-term endoscopic-response benefit. The 10-year ICER was close to the 1x GDP benchmark and remained far below commonly applied higher thresholds.

*Scenario, DSA, and PSA findings are reported in the Europe ISPOR abstract.*

## Conclusion and limitations

- RZB was **highly cost-effective** versus UST from the Chinese healthcare system perspective, with gains driven by more durable remission, lower discontinuation, and endoscopic benefit.
- **Key limitations:**
  - Week-8 induction inputs may underestimate the full RZB induction effect; biologic failure is simplified to conventional treatment; utilities were mapped from non-Chinese trial data; and the supplied report did not disclose the RZB acquisition-price input.

## Reference

1. Peyrin-Biroulet L et al. N Engl J Med. 2024;391:213-223.
2. Ferrante M et al. Lancet. 2022;399:2031-2046. 3. Economic model and NMA, data on file.