# Cost-Effectiveness Analysis of Belimumab for the Treatment of Adults With Active Lupus Nephritis in China

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Treatment with belimumab plus standard therapy is cost-effective for patients with active lupus nephritis in China, relative to standard therapy alone

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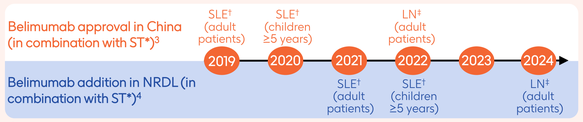
## Background

- LN is a severe complication of SLE, that leads to kidney dysfunction and develops in approximately 40–60% of patients with SLE during the course of the disease[1,2]
- Belimumab was the first biologic approved for the treatment of patients with SLE and LN in China




*ST: inclusive of corticosteroids, immunosuppressants, and antimalarials; †autoantibody positive SLE with high disease activity; ‡for patients with active disease.

- Currently, there is a lack of published health economic evidence assessing belimumab in patients with active LN in China

## Aim

To evaluate the cost-effectiveness of belimumab plus ST versus ST alone for the treatment of adults with active LN in China from a public medical insurance payer's perspective

## Study design

- For the analyses, a model previously submitted for a national HTA was adapted, using Chinese data where available, to reflect the Chinese population and perspective. It is based on a Markov model with health states for renal function, dialysis and transplantation
- All information on inputs, including the BLISS-LN data, is captured in the CEM parameters section and health state inputs
- Model costs were evaluated using CNY¥ 2022 currency. Cost data are also shown for USD, using a 2022 CNY¥ to USD exchange rate of 0.1487

## CEM parameters

**Target population***
Adults with active LN (consistent with BLISS-LN[5] trial population: biopsy-proven active LN class III±V, IV±V, V, requiring induction therapy)

**REGION**
Asia: 47.3%

**SEX**
Female: 88.1%

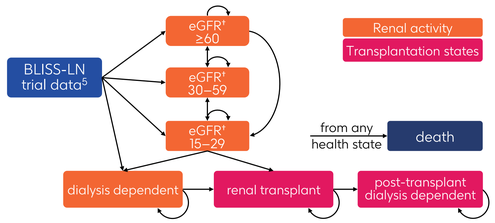
**MEAN AGE**
Years: 33.4
SD: 10.68

**MEAN WEIGHT**
59 kg ♀ 69 kg ♂
SD: 9.47 SD: 9.79

**MEAN DISEASE DURATION**
**SLE**: 5.32 years **LN**: 2.31 years
SD: 6.1 SD: 4.2

**Analyses**
Base case deterministic analyses, OWSA, PSA, scenario analyses

**Time horizon**
Lifetime




**Model inputs**
Patients' characteristics, transition probabilities, clinical efficacy, utility, HCRU, costs, duration of treatment, discontinuation rate

**Model adaptation and data sources**
Local expert opinion based on RWD (demographics, HCRU, drug administration, transplant costs), China-centred LN literature review (PubMed, China National Knowledge Infrastructure, WangFang, National Bureau of Statistics etc.), parameters in global CEM (clinical efficacy, utilities), local health economic expert consultation and validation

**Discount**
Cost and effectiveness: 5%

*Target population consistent with BLISS-LN[5] trial population: inputs illustrate baseline characteristics for the overall population in base case; †Expressed in ml/min/1.73 m².

## Conclusions

The ICER in the base case, PSA, and scenario analyses demonstrates that belimumab plus ST is a cost-effective option (ICER lower than 1–3 times GDP per capita in China) for the treatment of patients with active LN in China, relative to ST alone

The impact of extra-renal disease and steroid-sparing outcomes were not considered in this study; results may therefore underestimate the incremental QALY and cost-effectiveness of belimumab for active LN

## Results

### Base case

- The base case analysis demonstrated that belimumab plus ST was more effective (incremental QALY: 0.21) and more costly (incremental cost: CNY¥ 15,927 or USD 2,368) than ST alone (**Table 1**)
  - This resulted in a mean ICER (total cost/total QALY) of CNY¥ 76,817 or USD 11,423 (**Table 1**), equal to 0.896× China's 2022 GDP per capita of CNY¥ 85,698 or USD 12,743
- Based on a WTP threshold of CNY¥ 257,094/QALY or USD 38,230/QALY (1–3× GDP per capita), belimumab plus ST was considered cost-effective versus ST alone

Table 1: **Deterministic base case analysis results (discounted)**

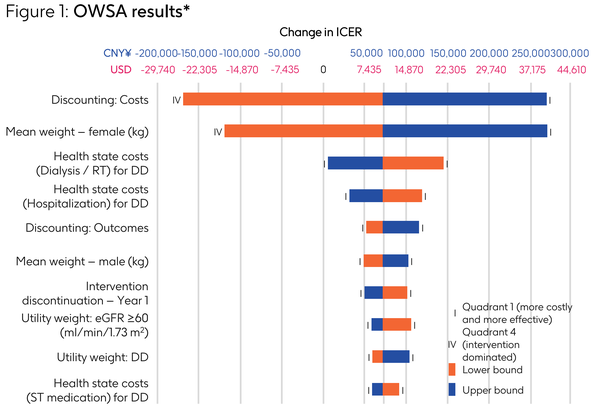
| Outcome | Belimumab + ST | | ST alone | | Incremental | |
|---|---|---|---|---|---|---|
| Costs | CNY¥ | USD | CNY¥ | USD | CNY¥ | USD |
| Drug acquisition cost | 149,113 | 22,173 | 0 | 0 | 149,113 | 22,173 |
| Administration costs | 340 | 51 | 0 | 0 | 340 | 51 |
| Health state costs | 1,401,907 | 208,464 | 1,529,021 | 227,365 | -127,114 | -18,902 |
| Flare costs | 53,774 | 7,996 | 59,682 | 8,875 | -5,908 | -879 |
| End-of-life costs | 12,932 | 1,923 | 13,436 | 1,998 | -504 | -75 |
| **Total cost** | **1,618,066** | **240,606** | **1,602,139** | **238,238** | **15,927** | **2,368** |
| QALYs | Belimumab + ST | | ST alone | | Incremental | |
| eGFR* ≥60 | 3.83 | | 3.48 | | 0.35 | |
| eGFR* 30–59 | 3.95 | | 3.76 | | 0.20 | |
| eGFR* 15–29 | 2.24 | | 2.10 | | 0.14 | |
| Dialysis dependent | 0.81 | | 1.11 | | -0.31 | |
| Renal transplant | 0.30 | | 0.43 | | -0.12 | |
| Post-transplant dialysis dependent | 0.17 | | 0.23 | | -0.07 | |
| Flare disutility | -0.19 | | -0.21 | | 0.02 | |
| **Total QALYs** | **11.11** | | **10.90** | | **0.21** | |

*Expressed in ml/min/1.73 m².

### OWSA

- OWSA revealed that the discounting rate for costs, mean weight of females, and health state costs for dialysis and hospitalization for patients in the "dialysis-dependent" health state had the greatest impact on ICER (**Figure 1**)

Figure 1: **OWSA results***

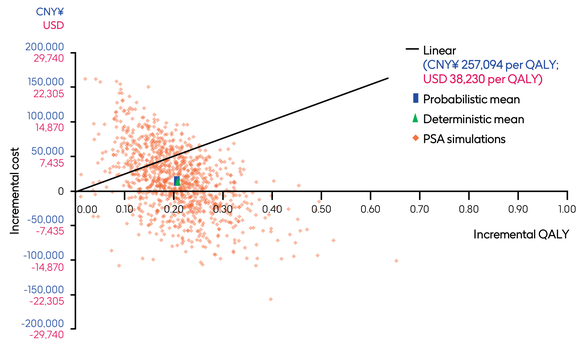



*Top 10 parameters influencing change in ICER.

### PSA

- PSA demonstrated that the probabilistic mean ICER for belimumab plus ST lies under the WTP threshold of CNY¥ 257,094/QALY (or USD 38,230/QALY) (**Figure 2**), with a 73.7% probability of being cost-effective
  - Out of 1000 iterations, 63.1% lie in the north-east quadrant (higher cost and more effectiveness)

Figure 2: **PSA results**




### Scenario analyses

- Based on the WTP threshold, belimumab plus ST was a cost-effective treatment under all scenarios, apart from the 8% discount rate (**Table 2**). Variations in discount rates had a substantial impact on the mean ICER value
  - Belimumab plus ST was the dominant treatment when the discount rates of cost and outcomes were both 3%

Table 2: **Impact of different scenarios on ICER**

| Scenario | Scenario description | ICER (CNY¥ or USD/QALY) | | ICER Δ* (CNY¥ or USD/QALY) | |
|---|---|---|---|---|---|
| | | CNY¥ | USD | CNY¥ | USD |
| Base case | - | 76,817 | 11,423 | - | - |
| Scenario 1 | Discount rate of 3% (for both cost and outcomes) | -115,960 | -17,243 | -192,777 | -28,666 |
| Scenario 2 | Discount rate of 8% (for both costs and outcomes) | 413,540 | 61,493 | 336,723 | 50,071 |
| Scenario 3 | HUI-3 utilities (unadjusted)[6] | 88,314 | 13,132 | 11,497 | 1,710 |
| Scenario 4 | TTO utilities[6] | 61,870 | 9,200 | -14,947 | -2,223 |
| Scenario 5 | Use an overall discontinuation rate between years 3-5 of 18.6%, informed by a RWS[7] | 73,069 | 10,865 | -3,748 | -557 |

*Defined to be the difference between the base case ICER and the scenario ICER.

## Abbreviations

CEM, cost-effectiveness model; CNY¥, Chinese Yuan; DD, dialysis-dependent; eGFR, estimated glomerular filtration rate; GDP, gross domestic product; HCRU, healthcare resource utilization; HTA, Health Technology Assessment; HUI-3, health utility index-3; ICER, incremental cost-effectiveness ratio; LN, lupus nephritis; NRDL, National Reimbursement Drug List; OWSA, one-way sensitivity analysis; PSA, probabilistic sensitivity analysis; QALY, quality-adjusted life year; RT, renal transplant; RWD, real-world data; RWS, real-world study; SLE, systemic lupus erythematosus; ST, standard therapy; TTO, time trade-off; USD, United States dollar; WTP, willingness-to-pay.

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## Disclosures

BW and NG have no conflicts of interest. XH, ZT, AM and MB are employees of GSK and hold stocks and shares in the company. KC is an employee of RTI Health Solutions, an independent nonprofit research institute retained by GSK for research services. ZT did not contribute to the development of the poster.



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