

# The Cost-effectiveness of Tradition Chinese Medicine Icaritin versus Cinobufotalin in Patients with Unresectable Advanced Hepatocellular Carcinoma in China

Jiayu Guo <sup>1</sup>, Tianxiang Zhang <sup>2</sup>,Jianwei Xuan <sup>3</sup>

<sup>1</sup>Shanghai Centennial Scientific, Shanghai, <sup>2</sup>East China Pharm, Hangzhou, China,  
<sup>3</sup>Health Economics Institute, School of Pharmaceutical Sciences, Sun Yat-Sen University, Guangzhou,China

## Objective

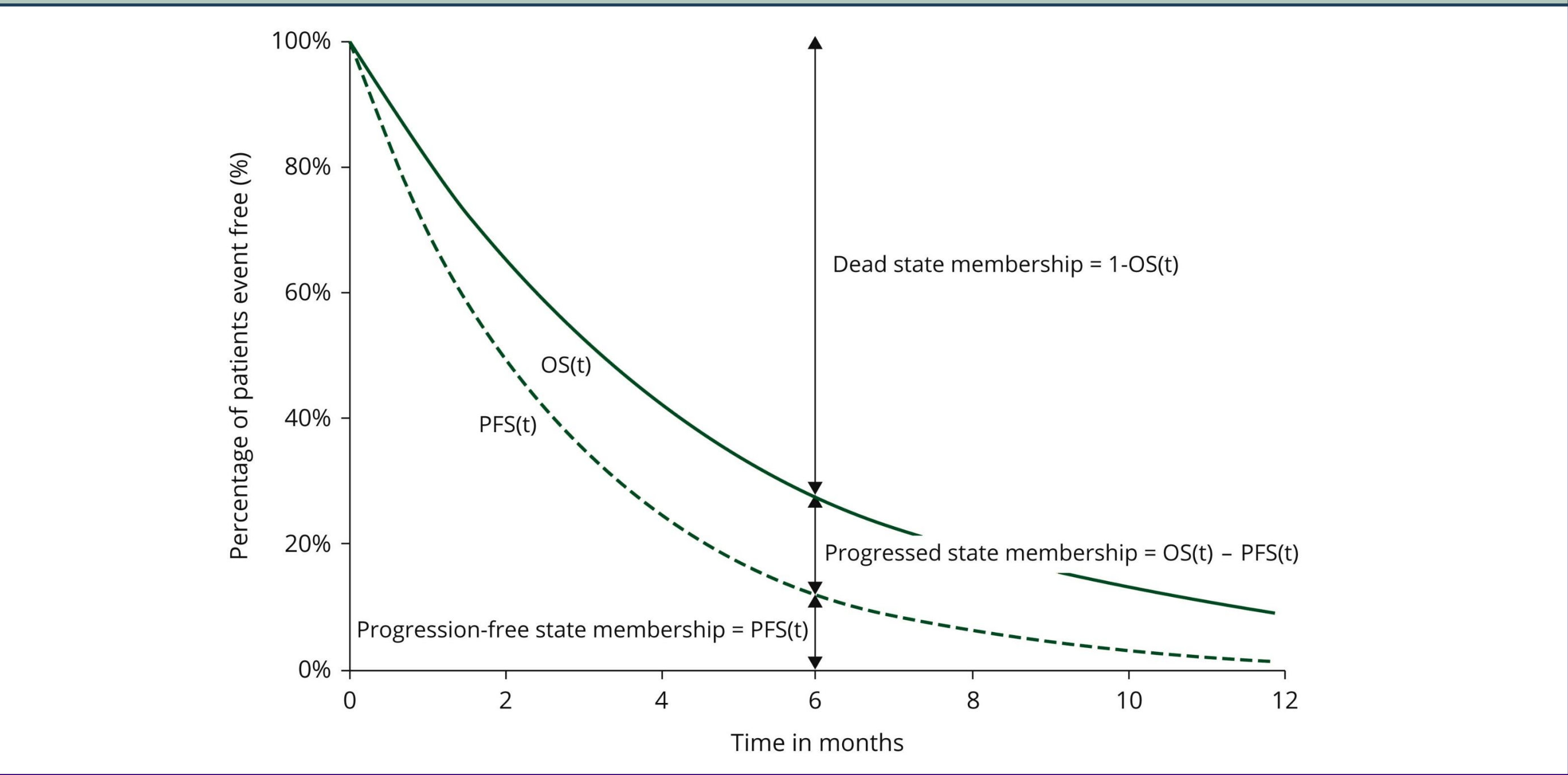
- To evaluate the cost-effectiveness of patients with unresectable advanced hepatocellular carcinoma using traditional Chinese medicine Icaritin versus Cinobufotaline in China from societal perspective.

## Methods

### Model Structure

- ◆ A partitional survival model was conducted strictly followed by *China Guidelines for Pharmacoeconomic Evaluations* to evaluate the incremental cost-effectiveness ratio (ICER) of two medicine with a lifetime horizon.
- ◆ To fit parametric models, an exponential distribution was generated for overall survival and log-normal distribution for progression free survival.

Figure 1 | Model structure



### Model Parameter

- ◆ The efficacy data input was collected from clinical trial SNG1705ICR-1. The utility data, probability of treatment related adverse events were collected from the literature.
- ◆ Cost inputs were derived from public database and the literature. Model robustness was assessed via one-way sensitivity and probabilistic sensitivity analyses.

## Results

### Base Case result

- ◆ Comparing with Cinobufotaline, Icaritin had a higher cost (¥249,829 versus ¥35,716) and longer life year (1.26 versus 0.77), quality-adjusted life years (QALY) gained of 0.586 (1.158 versus 0.571) over a lifetime horizon. Key drivers were the lower probability of adverse events and better clinical efficacy of Icaritin. (Table 1)
- ◆ At a willingness-to-pay of ¥85,698/QALY (1 times of GDP-per-capita in China), the ICER of the baseline result was ¥365,319 per QALY gained.

Table 1 | The cost, effectiveness and incremental cost-effectiveness ratios (ICERs)

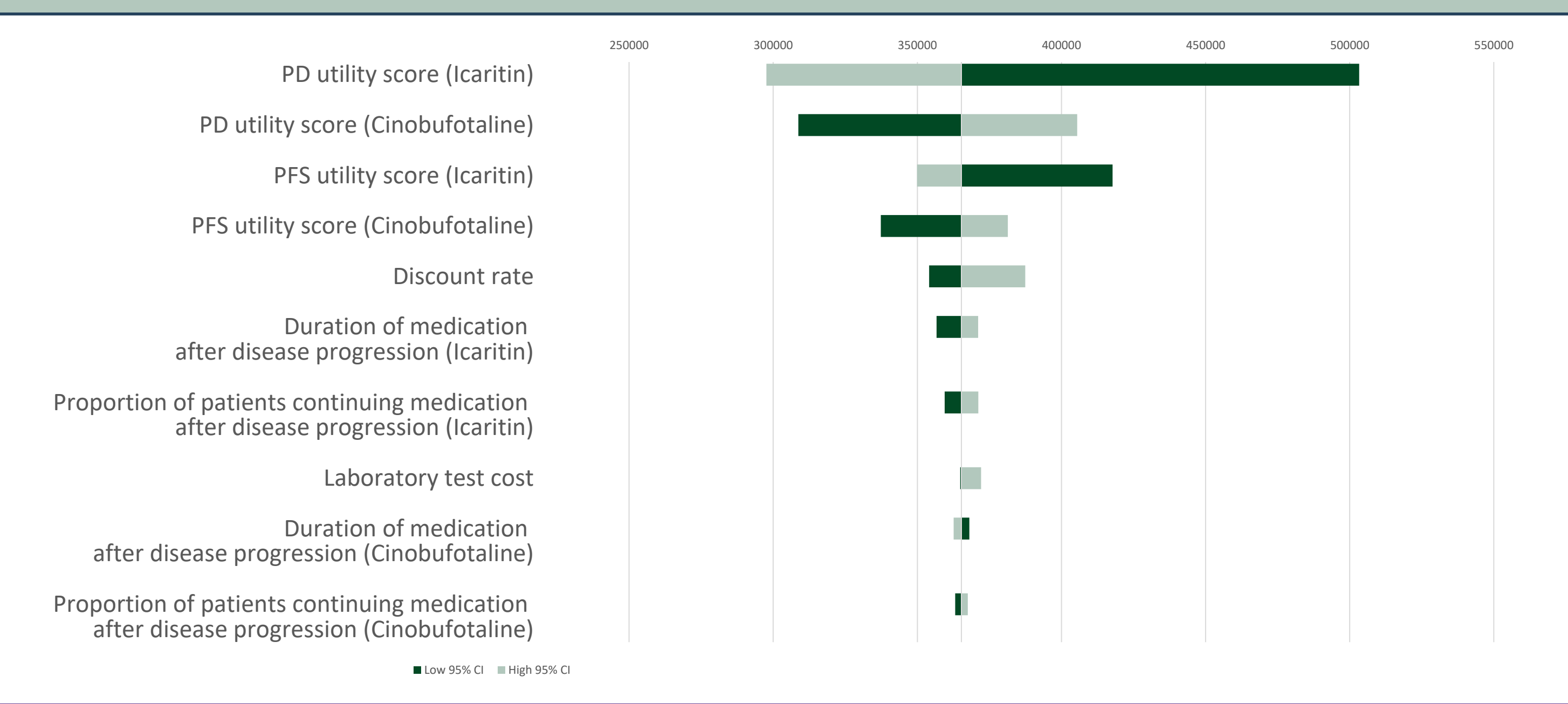
	Icaritin	Cinobufotalin
Total Costs	¥249,829	¥35,716
PFS Costs	¥175,731	¥11,841
PD Costs	¥66,515	¥15,940
Hospice Care Costs	¥7,583	¥7,936
Total QALYs Gains	1.158	0.571
PFS-QALYs	0.288	0.178
PD-QALYs	0.810	0.375
ICER	¥365,319	

## Sensitivity Analysis

### One-way Sensitivity Analysis

- ◆ Key drivers were the utility of Cinobufotaline after PD, utility of Icaritin after PD, treatment adherence, and utility of Cinobufotaline after PFS. (Figure 2)

Figure 2 | The tornado graphs



### Probabilistic Sensitivity Analysis

- ◆ Under the condition of cost follows Gamma distribution, AE follows Beta distribution, At a willingness-to-pay of ¥85,698/QALY (1 times of GDP-per-capita in China), the probability of Icaritin being cost-effectiveness versus Cinobufotaline. (Figure 3 & 4)

Figure 3 | Cost effectiveness plane

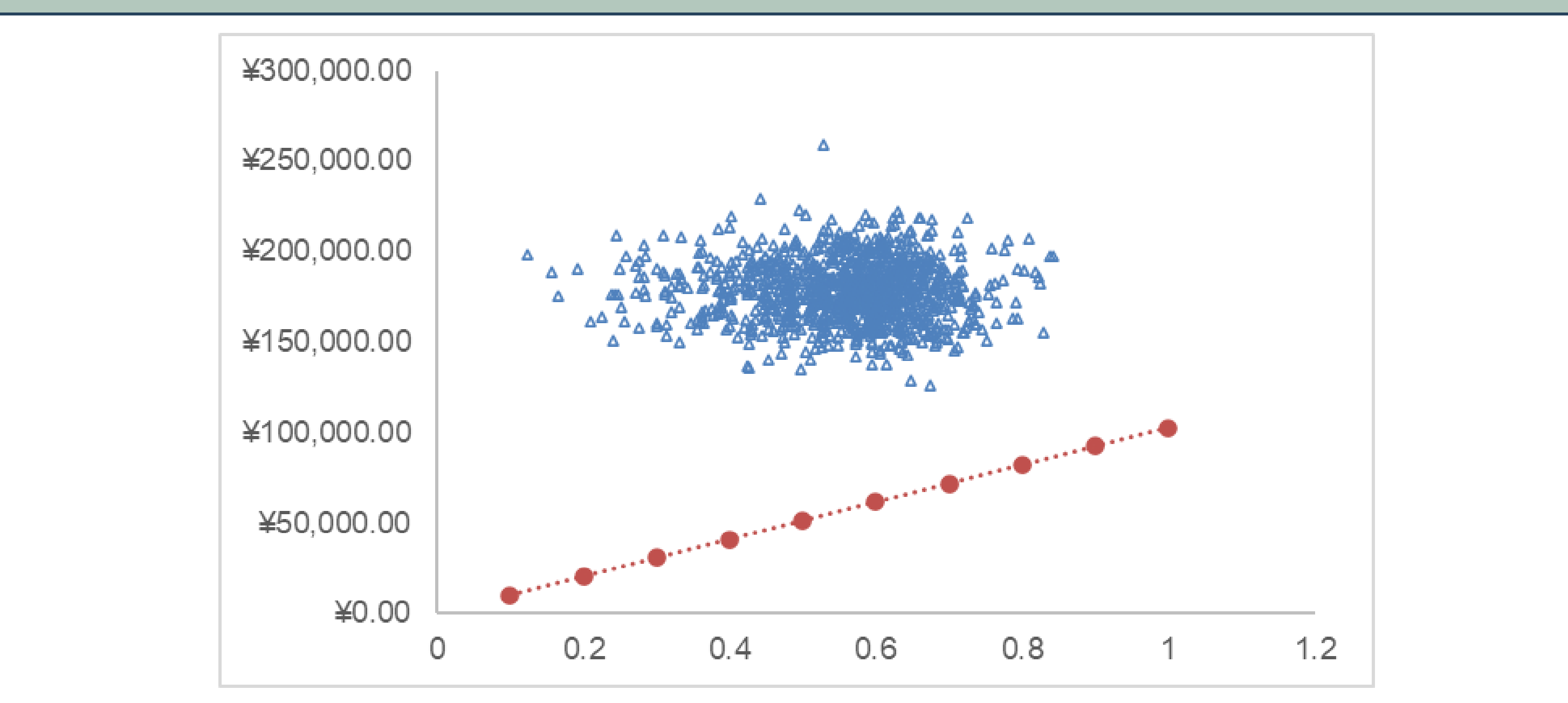
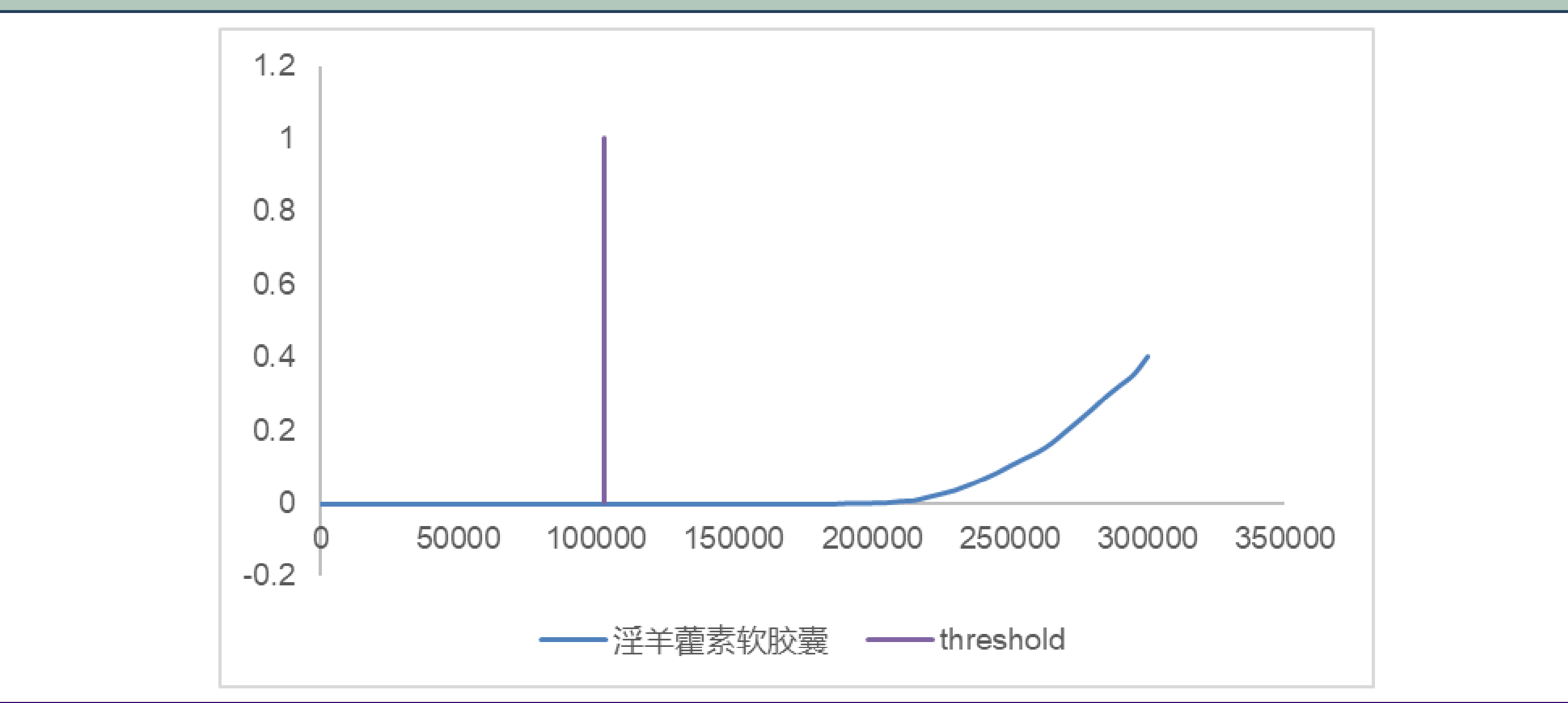


Figure 4 | Cost-effectiveness acceptability curve



## Conclusion

- Overall, from the societal perspective, Icaritin is likely to be a cost-effective option compared with Cinobufotaline for Chinese unresectable advanced hepatocellular carcinoma patients s.
- Meanwhile, inclusion of broader evidence on clinical efficacy using first-line therapy from real-world studies among Chinese population is suggested, which could solidate the economic evidence and further improve the use of Icaritin.

## References

1. Hagiwara Y, Shirowa T, Taira N, et al. Mapping EORTC QLQ-C30 and FACT-G onto EQ-5D-5L index for patients with cancer. Health Qual Life Outcomes. 2020;18(1):354. Published 2020 Nov 3. doi:10.1186/s12955-020-01611-w
2. Ara R, Brazier JE. Populating an economic model with health state utility values: moving toward better practice. Value Health. 2010;13(5):509-518. doi:10.1111/j.1524-4733.2010.00700.x
3. Meng R, Cao Y, Zhou T, Hu H, Qiu Y. The Cost Effectiveness of Donafenib Compared With Sorafenib for the First-Line Treatment of Unresectable or Metastatic Hepatocellular Carcinoma in China. Front Public Health. 2022;10:794131. Published 2022 Mar 31. doi:10.3389/fpubh.2022.794131
4. Zhang H, Zeng X, Peng Y, Tan C, Wan X. Cost-Effectiveness Analysis of Hepatic Arterial Infusion Chemotherapy of Infusional Fluorouracil, Leucovorin, and Oxaliplatin Versus Transarterial Chemoembolization in Patients With Large Unresectable Hepatocellular Carcinoma. Front Pharmacol. 2022;13:849189. Published 2022 Apr 26. doi:10.3389/fphar.2022.849189
5. Sun KX, Cao SS, Shi FH, et al. First-line treatments for advanced hepatocellular carcinoma: a network meta-analysis and cost-effectiveness analysis in China and the United States. Therap Adv Gastroenterol. 2022;15:17562848221140662. Published 2022 Dec 9. doi:10.1177/17562848221140662
6. Zhou T, Wang X, Cao Y, et al. Cost-effectiveness analysis of sintilimab plus bevacizumab biosimilar compared with lenvatinib as the first-line treatment of unresectable or metastatic hepatocellular carcinoma. BMC Health Serv Res. 2022;22(1):1367. Published 2022 Nov 17. doi:10.1186/s12913-022-08661-4
7. Qin S, Kruger E, Tan SC, Cheng S, Wang N, Liang J. Cost-effectiveness analysis of FOLFOX4 and sorafenib for the treatment of advanced hepatocellular carcinoma in China. Cost Eff Resour Alloc. 2018;16:29. Published 2018 Aug 4. doi:10.1186/s12962-018-0112-0