Evaluating the Cost-Effectiveness of Eptinezumab in Migraine Prevention

Cheng-Shen Chan[1,2], Ping-Hsuan Hsieh[1], Fu-Chi Yang[3,4]

1. School of Pharmacy, National Defense Medical Center, Taipei, Taiwan, R.O.C.
2. Department of Pharmacy, Tri-Service General Hospital, National Defense Medical Center, Taipei, Taiwan, R.O.C
3. School of Medicine, National Defense Medical Center, Taipei, Taiwan, R.O.C.
4. Division of Neurology Division, Department of Internal Medicine, Tri-Service General Hospital, Taipei, Taiwan, R.O.C

Background and Aims

- Globally, migraines are the second leading cause of disability, Around 9.1% of individuals over 15 experience migraines, particularly women, adolescents (5-7%), and the elderly (3%).

- Eptinezumab, a recently approved CGRP inhibitor, has demonstrated significant effectiveness compared to traditional treatments, potentially reducing the financial strain on Taiwan's healthcare system. Its approval in other countries and potential to boost market competition underscore the importance of further evaluation within Taiwan.

- **The study aims to evaluate the cost-effectiveness of eptinezumab for preventing migraine from societal and Taiwan's health payer's perspectives.**

Methods

Model Structure and Data

- A Markov model (Figure 1) was developed to evaluate the cost-effectiveness of eptinezumab versus placebo over a three-month horizon, with 12-week cycles based on clinical trials. Patients were classified into episodic (0–14 MMD) and chronic migraine (15+ MMD) groups, with state transitions estimated via bootstrapping.

- HRQoL was estimated using EQ-5D-3L utility values from fremanezumab studies. Costs included eptinezumab and direct medical costs, alongside productivity losses based on Taiwan's labor data.

- One-way sensitivity analysis adjusted costs by ±20% and utilities by ±10%, respectively. Probabilistic sensitivity analysis used Monte Carlo simulation (10,000 iterations) to generate cost-effectiveness acceptability curves. The willingness-to-pay threshold was set at $32,327 per QALY gained (one GDP per capita).
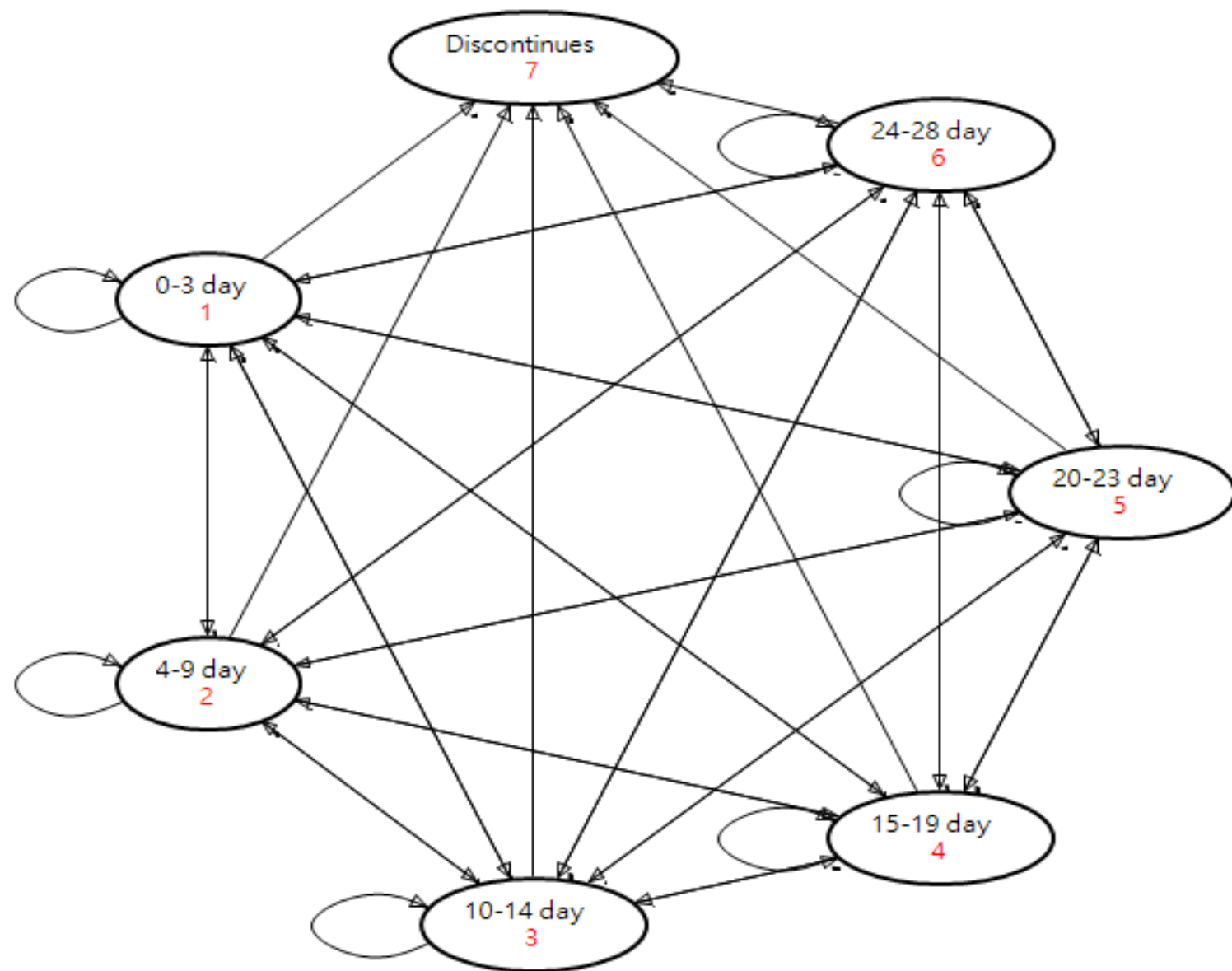

Figure 1. Six health states included in the Markov model

Results

Base Case Analysis

- Patients treated with eptinezumab had a 2-day greater reduction in MMDs compared to placebo, with an additional cost of $2,835 and a QALY gain of 0.18. The ICER was $15,475 per QALY.

Table 1. Costs, effectiveness, and incremental cost-effectiveness ratios of eptinezumab versus placebo.

Strategy	Cost ($)	Incr. Cost ($)	Effect (QALYs)	Incr. Effect (QALYs)	ICER ($)
Eptinezumab	6,453	2,836	1.40	0.18	15,475
Placebo	3,617		1.22		

One-way sensitivity analysis

- The one-way sensitivity analysis identified key parameters affecting the ICER of eptinezumab versus placebo. For patients with 4-9 MMDs, a decrease in utility values raised the ICER to $24,000, highlighting the importance of treatment effectiveness.

- The most significant factor influencing the ICER in the sensitivity analysis was the change in QALY. Despite these variations, the ICER remained below the willingness-to-pay threshold.
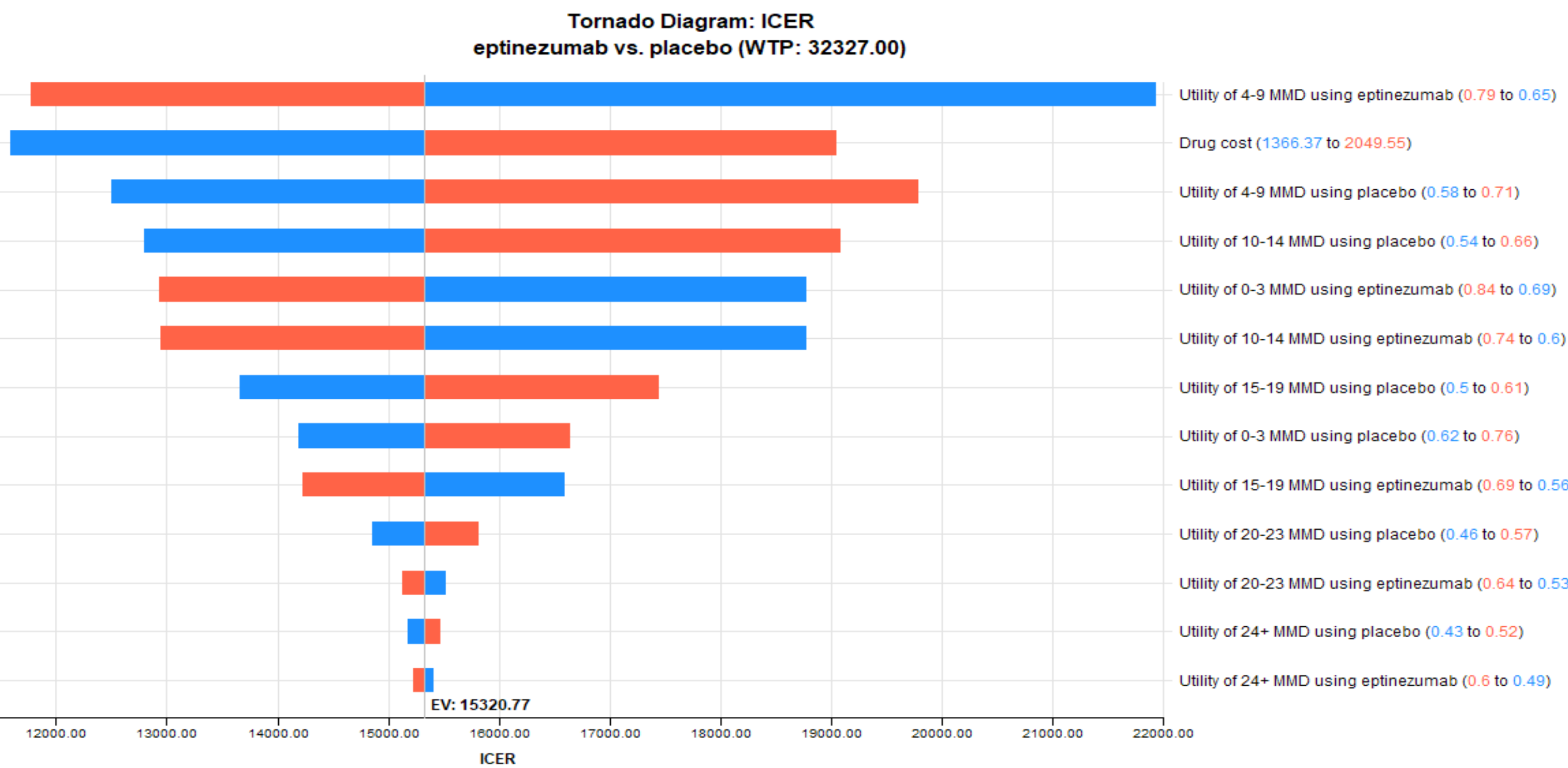

Figure 2. One-way sensitivity analysis tornado diagram comparing eptinezumab and placebo

Probabilistic Sensitivity Analysis

- To assess uncertainty, we conducted 10,000 Monte Carlo simulations, shown in the probabilistic sensitivity analysis in Figure 3. The diagonal line represents a willingness-to-pay threshold of $32,327 per QALY, indicating that eptinezumab is cost-effective in 98% of scenarios at this threshold.
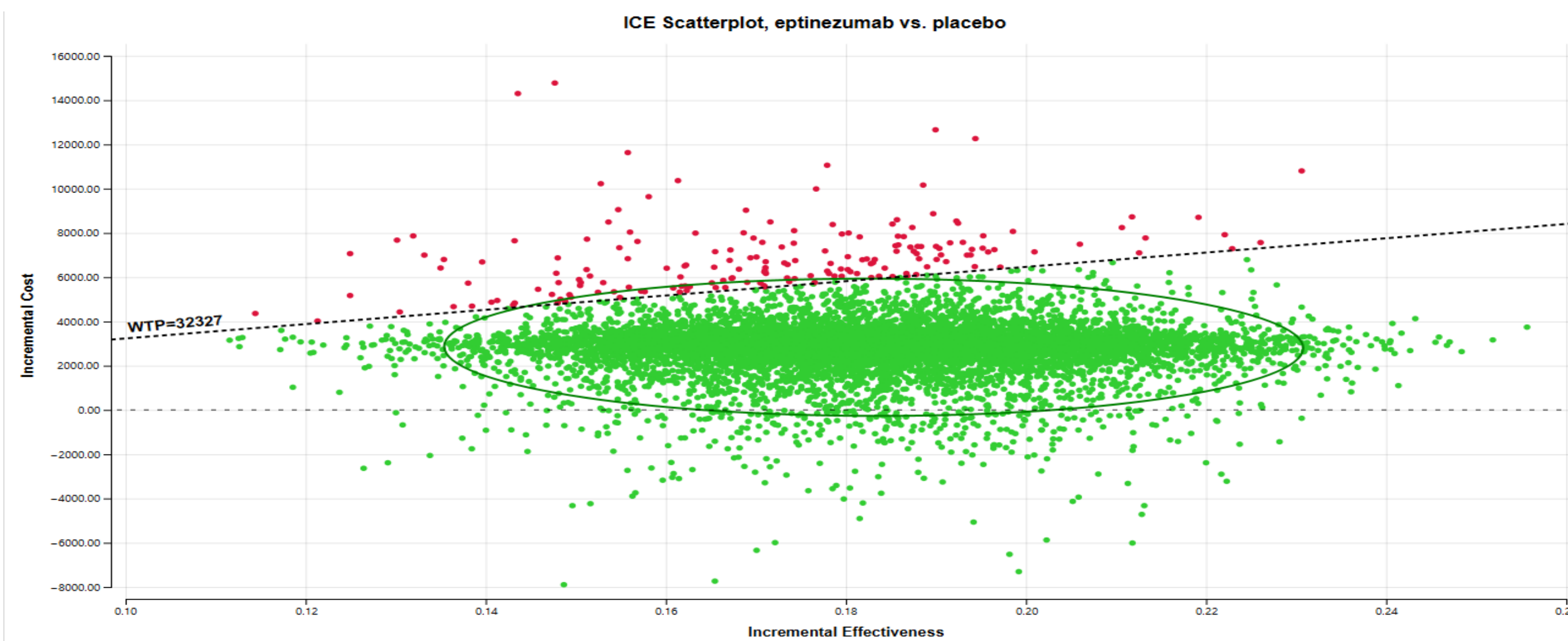

Figure 3. Scatter plot of cost-effectiveness results using eptinezumab compared with placebo

Cost-Effectiveness Acceptability Curves

- Varying thresholds lead to different cost-effectiveness levels, as illustrated in the cost-effectiveness acceptability curves in Figure 4. When the willingness to pay reaches around $15,000 per QALY, the acceptability curve exceeds 50%. If the willingness to pay exceeds $20,000 per QALY, eptinezumab becomes the most cost-effective strategy.
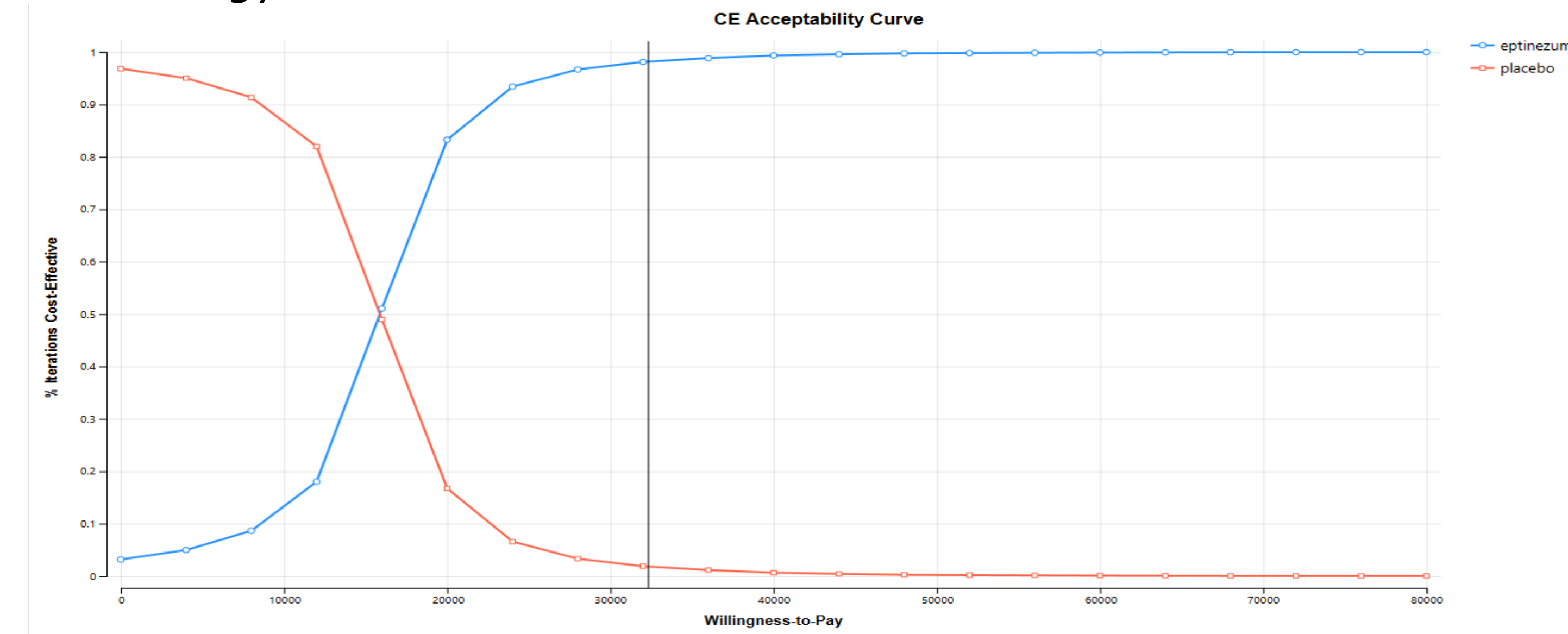

Figure 4. Cost-effectiveness acceptability curves for eptinezumab versus placebo

Summary of results

- Eptinezumab reduced MMDs by 2 days compared to placebo, with an additional cost of $2,835 and a QALY gain of 0.18, resulting in an ICER of $15,475 per QALY.

- The ICER could rise to $24,000 with lower utility values for patients with 4-9 MMDs, although stayed below the willingness-to-pay threshold.

Reference: 1. Headache disorders. World Health Organization. , 2016 2. Wang SJ, Fuh JL, Young YH, Lu SR, Shia BC. Prevalence of migraine in Taipei, Taiwan: a population-based survey. Cephalalgia 2000; 20(6): 566-72. 3. Wang SJ, Liu HC, Fuh JL, et al. Prevalence of headaches in a Chinese elderly population in Kinmen: age and gender effect and cross-cultural comparisons. Neurology 1997; 49(1): 195-200.

Conclusions

- Eptinezumab has demonstrated significant cost-effectiveness in preventing migraines, showing substantial improvements in QALYs compared to placebo, despite its higher cost. The present economic evaluation confirmed its economic viability, supported by sensitivity analyses under various scenarios.

- As the market introduces more competing drugs, potential price reductions could make treatment more affordable. Future research should explore long-term outcomes to refine cost-effectiveness assessments and guide healthcare decision-making.