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*Original Research*

# Cost-Utility and Budget Impact Analyses of Tumor Necrosis Factor Inhibitor Biologics and Biosimilars Versus Rituximab in Thai Patients with Active Rheumatoid Arthritis

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## INTRODUCTION

Rituximab and its biosimilars are considered the first treatment for active rheumatoid arthritis (RA) with high disease activity despite at least three conventional disease-modifying antirheumatic drugs (DMARDs) in Thailand. The annual direct medical costs of rituximab seem to be lower than other biologic DMARDs. This option contrasts the recommendations in other countries, as tumor necrosis factor inhibitors (TNFi) are the first treatment.

## OBJECTIVES

This study aims to assess the cost-effectiveness and budget impact of TNFi and biosimilars compared to rituximab and its biosimilar.

## METHODS

### Study Design and Participants

A Markov model **(Figure 1)** was employed to estimate lifetime societal costs, life years (LY), and quality-adjusted life years (QALY) for RA patients with Disease Activity Score of 28> 5.1 (DAS28). Efficacy data were sourced from a systematic review, network meta-analysis, and existing literature(1). Costs and health outcomes were discounted at an annual rate of 3% reported.

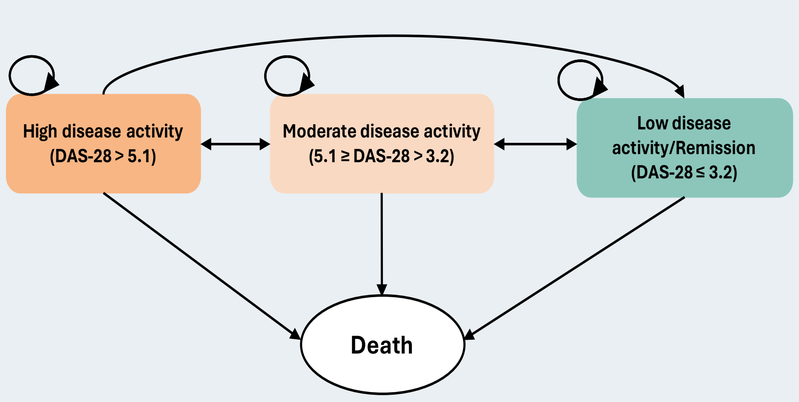


**Figure 1 Markov transition model**

### Treatment Options

We compare the effectiveness of six TNFi due to Thai FDA approval (etanercept, infliximab, golimumab, two infliximab biosimilars; Remsima and Ixifi, and an adalimumab biosimilar: Amgevita) with rituximab or its biosimilar, Truxima.

### Model Inputs

Transitional probabilities of disease progression and treatment response were derived from a re-analysis of Thai retrospective study that collected clinical outcome data of RA patients with high disease activity in three tertiary hospitals(2). Direct non-medical care costs, resource utilization and unit costs of treatment were calculated from the Thai RA clinical practice guidelines, and the Thai standard costing menu. The medication price were obtained from the reference price provided by Drug and Medical Supply Information Center, Ministry of Public Health. The utility values of Thai RA patients were from a published study(3).

### Analyses

Incremental cost-effectiveness ratio (ICER) was calculated against a threshold of 160,000 THB or US $4,597 per QALY gained (1 USD = 34.81 THB in 2023). Probabilistic and one-way sensitivity analyses are conducted to assess parameter uncertainties(2).

## RESULTS

All TNFi options yielded comparable LY and QALY to rituximab. While etanercept incurred higher costs and inferior health outcomes, golimumab was not cost-effective despite improved QALY. In contrast, infliximab and its biosimilars exhibited lower costs and comparable outcomes. Adalimumab biosimilar was the only TNFi considered cost-saving with superior outcomes compared to RTX biosimilar **(Figure 2)**. Potential savings from using adalimumab biosimilar over rituximab could be range from 12 to 221 million THB per year. The one-way sensitivity results were sensitive to efficacy of TNFi at 24 months. The PSA demonstrated that adalimumab biosimilar was cost-effective at Thai ceiling threshold **(Figure 3).**

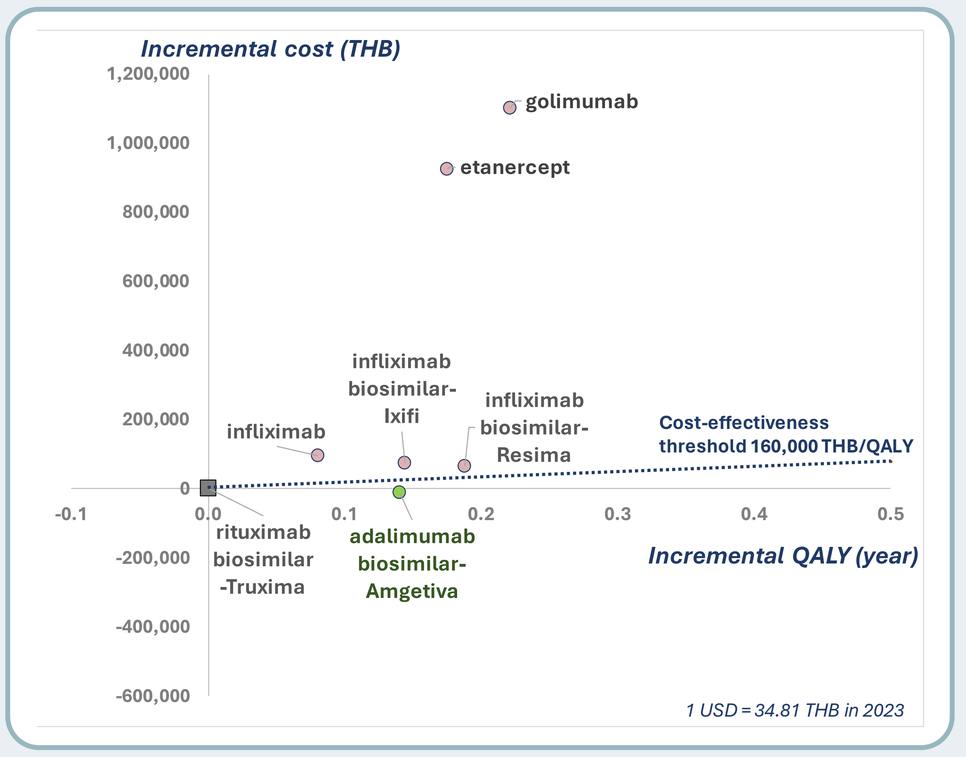


**Figure 2 Cost-effectiveness plane**
(rituximab biosimilar as a comparator)

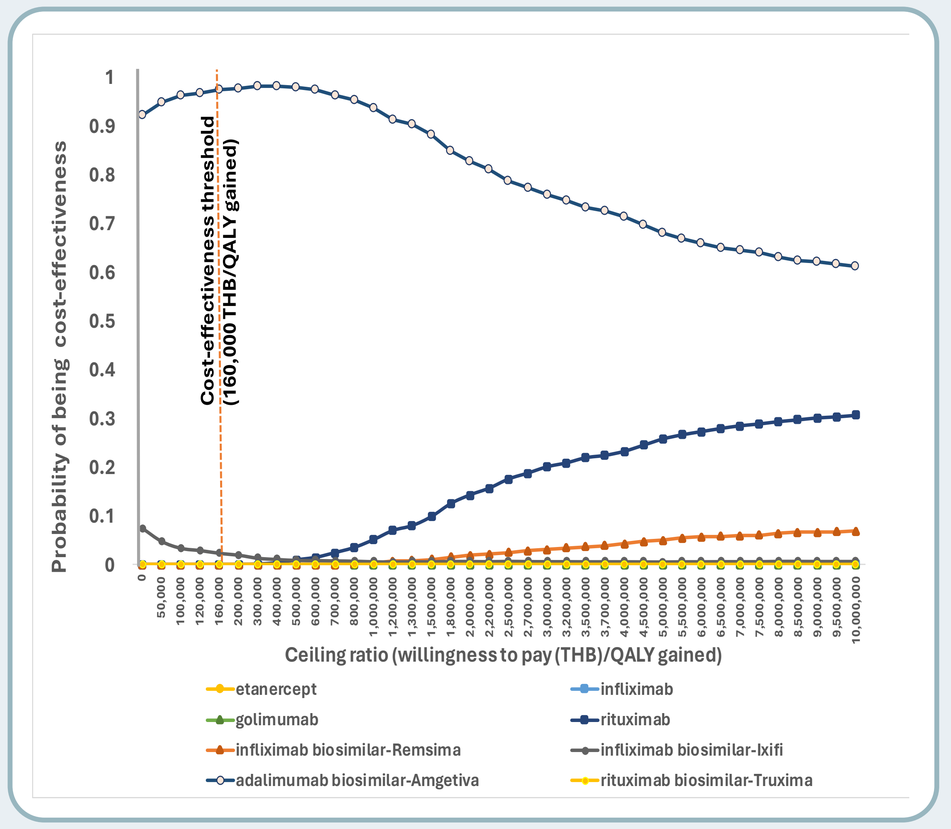


**Figure 3 Cost-effectiveness acceptability curve of probabilistic sensitivity analysis**
(rituximab biosimilar as a comparator)

## CONCLUSIONS

For RA patients with high disease activity eligible to a biologic DMARDs in Thailand, adalimuimab biosimilar-Amgetiva should be considered the first option over rituximab, regarding the potential budget savings and enhanced patient outcomes.

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