COST-EFFECTIVENESS OF DACOMITINIB VS. GEFITINIB AS FIRST-LINE TREATMENT FOR EGFR-MUTATION POSITIVE ADVANCED NON-SMALL-CELL LUNG CANCER IN CHINA

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Background

Epidermal growth factor receptor (EGFR) tyrosine kinase inhibitors have been the standard treatment options for EGFR mutation positive advanced non-small cell lung cancer (NSCLC).

In an international, phase III, randomised study（ ARCHER1050), dacomitinib showed significant efficacy improvements over gefitinib for the first-line treatment of locally advanced or metastatic NSCLC with EGFR activating mutations.

However, the economic impact of dacomitinib was unknown.

Therefore, this study aimed to compare the cost-effectiveness of dacomitinib versus gefitinib for the first-line treatment of patients with EGFR mutation positive advanced NSCLC in China from healthcare systems perspective.

Objective

It was aimed to establish the cost-effectiveness of dacomitinib compared to gefitinib in treating patients with advanced non-small cell lung cancer from Chinese healthcare system perspective.

Methods

Model structure

A partitioned survival analysis was undertaken to examine the cost-effectiveness of dacomitinib utilising the individual patient data (IPD) from the pivotal RCT (ARCHER 1050). Three health states modelled were progression-free, progressed disease and death. Parametric survival distributions were fitted to the IPD against the Kaplan-Meier survival curves corresponding to progress-free survival (PFS) and overall survival (OS) outcomes by randomised groups.

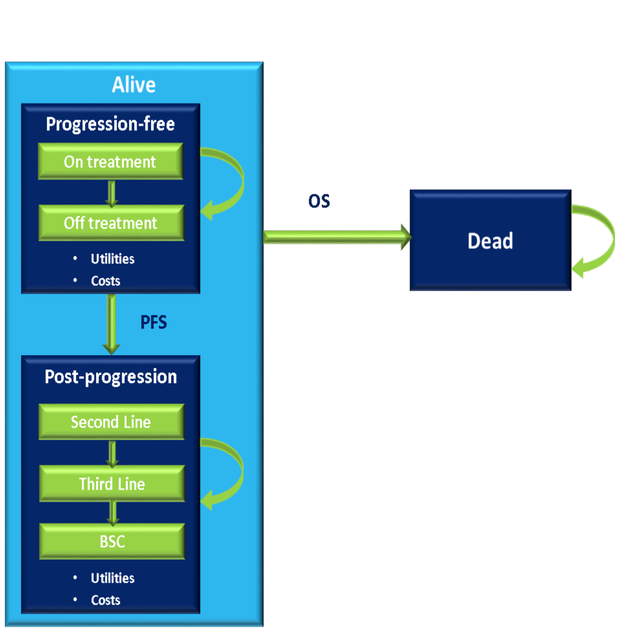

Figure 1. Model Structure

Population

The model target population consists of patients with locally advanced or metastatic EGFR mutation-positive NSCLC eligible for dacomitinib (ARCHER 1050):

Newly diagnosed stage IIIB/IV or recurrent NSCLC;

Tumor with pathologically confirmed EGFR-activating mutation;

Mutation status: EGFR exon 19 deletions (Exon 19) and EGFR exon 21 L858R substitution (Exon 21)

Data resource

Efficacy data

Comparisons of clinical efficacy of dacomitinib vs. gefitinib were derived from the ARCHER 1050 trial.

Utility

Utility weights were sourced from pivotal trial and other published literatures. (table 1)

Table 1. Utilities

Health state	Utility	Reference
Progression- free with dacomitinib	0.780	Wu et al 2017[1]
Progression- free with gefitinib	0.828	Wu et al 2017[1]
Progressed with second-line TKI treatment	0.805	Bertranou et al 2018[2]
Progressed with second-line chemotherapy	0.778	Bertranou et al 2018[2]
Progressed with third-line TKI treatment	0.62	Chouaid et al 2013[3]
Progressed with third-line chemotherapy	0.62	Chouaid et al 2013[3]
Progressed with best-support care	0.47	Nafees et al 2008[4]

Cost data

Costs (expressed in Chinese yuan valued in 2018) were considered including drug acquisition cost， outpatient management (outpatient consultation and examinations), best supportive care, terminal care and AE costs.[5-9]

Table 2. Summary of cost parameters

Treatment	Cost per cycle
TKI treatments	
Dacomitinib (with PAP)*	¥7,418
gefitinib[5]	¥6,608
Erlotinib[5]	¥5,460
Afatinib[5]	¥5,600
Osimertinib[5]	¥14,280
Chemotherapy administration[6]	
Platinum-based therapy	￥18,174.39
Single agent CT	￥7,241.69
Management [6]	
Outpatient consult	¥382.68
CT	¥242.46
MRI	¥550.67
Ultrasound	¥201.37
Best support care	¥1902.33
Terminal care costs (one off cost) [7]	
Terminal Care	¥17,423.00
AE events	**Cost per events[8,9]**
Decreased appetite	￥101.43
Dermatitis acneiform	￥5.82
Diarrhoea	￥45.27
ALT Increasing	￥295.84
Paronychia	￥352.90
Rash	￥10.89
Stomatitis	￥9.79

Cost-effectiveness analysis

The primary outcome measure was the quality-adjusted life year (QALY). The incremental cost-effectiveness ratio (ICER) representing ratio between the incremental costs and incremental QALYs was calculated. All the costs and QALYs were accrued over 15-year time horizon given the relatively poor prognosis of the modelled population. The Cycle length is 28-day.

In the absence of official willingness-to-pay (WTP) per QALY threshold in China, the 3-fold of Gross Domestic Production (GDP) per capita (CNY 64644×3) from 2018[10] was adopted to examine the cost-effectiveness of dacomitinib. All the costs and benefits were discounted at a 3% rate per annual.

Sensitivity analysis

Both deterministic and probabilistic sensitivity analyses (DSA and PSA) were undertaken to test the robustness of base care results

Results

Long-term extrapolation

The goodness-of-fit statistics for each of the parametric survival distributions were tested. In consultation with clinical experts together with the AIC, BIC values and visual inspection, and following the NICE DSU recommendations that the same type of distribution for both arms of each endpoint is preferred, the Weibull distribution was chosen to extrapolate the PFS and OS curve regardless of treatment groups.

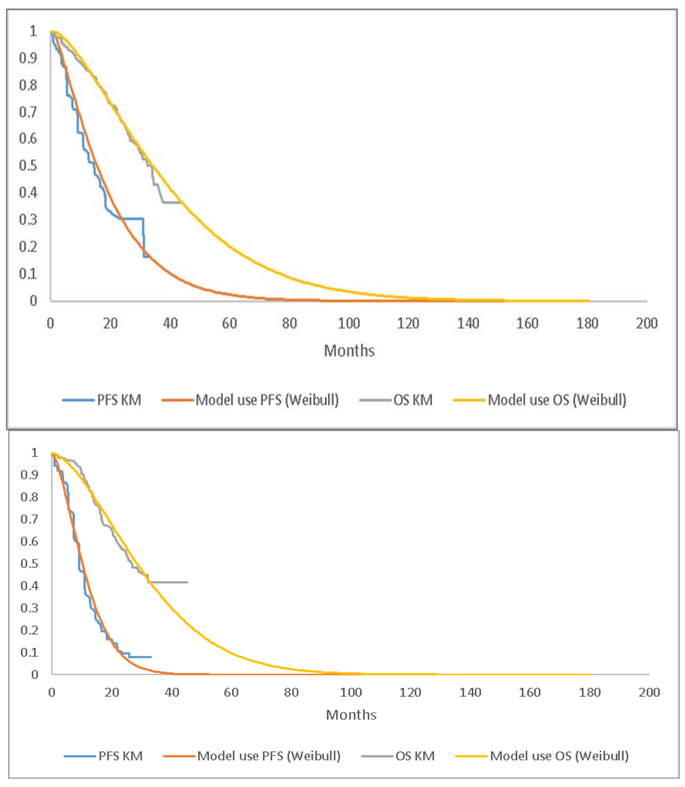

Figure 2. Parametric Fitting (Weibull) Compared to Observed KM Data: PFS (based on independent review committee) and OS for dacomitinib (upper) and gefitinib (lower)

Base case result

Over 15-year time horizon, dacomitinib (CNY 273,150 and 2.00 QALY) was associated with both higher costs and QALY gains compared to gefitinib (CNY 251,925 and 1.66 QALY), resulting in an ICER of CNY 62,852/QALY. Using the empirical WTP/QALY threshold, it is considered dacomitinib a cost-effective treatment strategy for patients with EGFR-mutation positive advanced NSCLC.

Table 3. Cost-effectiveness results of base-case analysis

Treatment	Cost（¥）	QALYs	Incremental Cost（¥）	Incremental QALYs	Incremental cost（¥）/QALY
Dacomitinib	273,150	2.00			
Gefitinib	251,925	1.66	21,225	0.34	62,852

Sensitivity analysis

The DSA identified that dacomitinib and gefitinib OS extrapolation, drug acquisition cost for dacomitinib and gefitinib, second-line treatment duration and probability post-gefitinib are the key determinants for the ICER. (Figure 3)

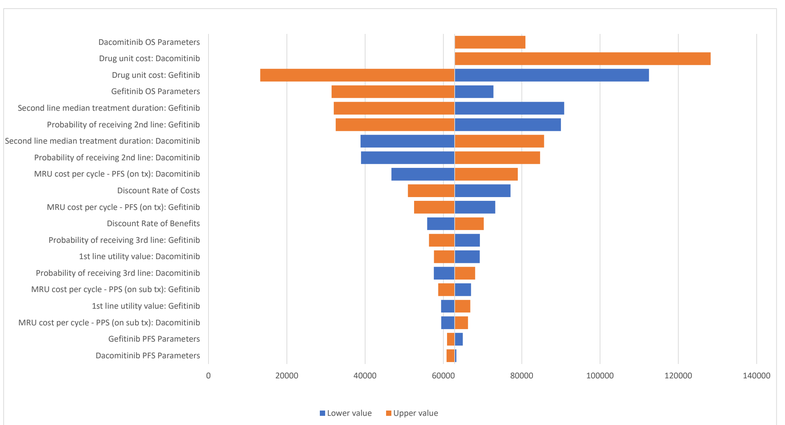

Figure 3. DSA Results: Dacomitinib vs. Gefitinib

The PSA showed that the majority of the results demonstrated that dacomitinib contributed to greater costs and QALYs, suggesting a probability of 97% being cost-effective in comparison to gefitinib (Figure4). The cost-effective acceptability curve is shown in Figure 5, which showed that when the WTP/QALY was over 3-fold of GDP/Capita in China, it becomes highly likely to be cost-effective (over 95%).

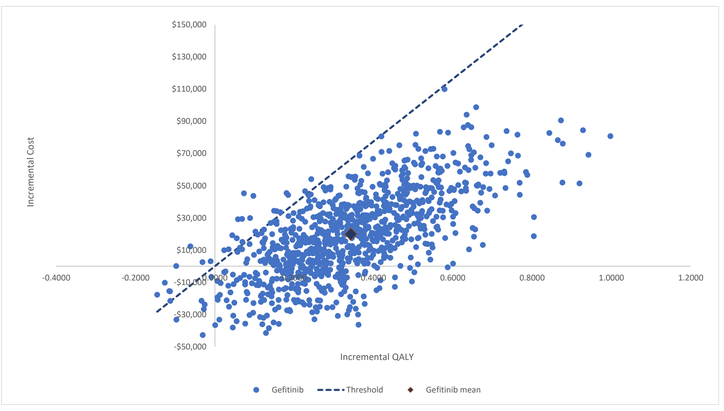

Figure 4. PSA Results: Dacomitinib vs. Gefitinib

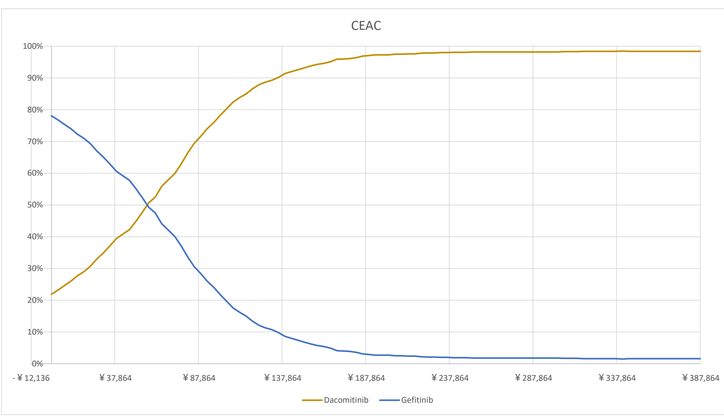

Figure 5. PSA Cost-effectiveness Acceptability Curve

Conclusion

Dacomitinib is a cost-effective treatment strategy in the treatment of patients with EFGR-mutation positive NSCLC at the WTP threshold of 3-fold of GDP per capita from Chinese healthcare system perspective.

Reference

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