

Cost effectiveness analysis of pembrolizumab monotherapy in advanced PD-L1 $\geq 50\%$ non-small cell lung cancer (NSCLC) in the Irish setting



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Background

- Pembrolizumab (PEM) is an immunotherapy indicated for the treatment of advanced non-small cell lung cancer (NSCLC)
- Superior survival and quality of life outcomes compared with traditional chemotherapy (Chemo)
- Concerns regarding cost effectiveness due to increased costs: Irish list price of PEM (€3232/100mg) vs docetaxel (€75/100mg)

Objective

- To assess the cost effectiveness of PEM monotherapy in the first line treatment of advanced programmed death ligand 1 (PD-L1) $\geq 50\%$ NSCLC in the Irish health care setting
- Outcome: Incremental cost effectiveness ratio (ICER) measured as cost (€) per quality adjusted life year (QALY)

Materials & Methods

Model Structure: De novo 3 state partitioned survival model

Intervention: PEM monotherapy 200mg IV Q3W until disease progression or intolerable side effects

Comparator: Weighted average of the five chemo regimens used in the KEYNOTE-024¹ phase III clinical trial

Model Inputs

- Survival and quality of life outcomes from KEYNOTE-024
- Irish Costs

Progression free survival modelling

- Chemo: Data fully mature, no modelling required

Materials & Methods – cont.

- PEM: Piecewise approach using available data and Bayesian average of best fitting parametric extrapolation
- Overall survival modelling**
- Bayesian average of best fitting parametric extrapolations used to model both treatment arms
- Time horizon:** 20 years **Discount rate:** 4%
- Analysis**
- Base case:** includes PEM 2 year treatment cap (as per indication)
 - Scenario analyses:** PEM no treatment cap, 2yr treatment cap on maintenance chemo, Nafees *et al*² utility values, 10% PEM treatment waning effect post treatment discontinuation at 2yr cap
 - Probabilistic (PSA) (1000 Monte Carlo simulations) and one-way sensitivity analyses (OWSA) (all parameters $\pm 20\%$) were conducted to assess the robustness of the model

Results

Base Case:

- ICER €58,881/QALY (Table 1)
- Main cost drivers: drug acquisition cost of PEM, subsequent treatment cost in chemo arm

Scenario analyses: All scenarios estimated an increased ICER; removal of the PEM treatment cap caused the largest increase (€152,291/QALY) (Table 1)

PSA Average:

- ICER: €61,126/QALY (Table 1)
- 4% chance of meeting Irish cost effectiveness threshold of €45,000/QALY (Figure 1)

References

¹Reck M, Rodríguez-Abreu D, Robinson AG, Hui R, Csösz T, Fülöp A, Gottfried M, Peled N, Tafreshi A, Cuffe S, O'Brien M. Five-year outcomes with pembrolizumab versus chemotherapy for metastatic non-small-cell lung cancer with PD-L1 tumor proportion score $\geq 50\%$. *Journal of Clinical Oncology*. 2021 Apr;JCO-21.

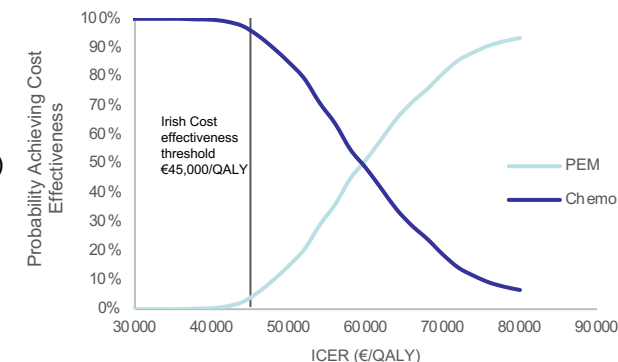
²Nafees B, Stafford M, Gavriel S, Bhalla S, Watkins J. Health state utilities for non small cell lung cancer. *Health and quality of life outcomes*. 2008 Dec;6(1):1-5.

Results – cont.

Table 1 : Base case, scenario analyses and PSA ICERs

	Incremental Cost	Incremental QALY	ICER
Base Case	€79,086	1.34	€58,881/QALY
PEM No treatment Cap	€204,547	1.34	€152,291/QALY
10% Treatment waning effect	€79,969	0.65	€123,115/QALY
Nafees <i>et al</i> ¹ utility values	€79,086	1.01	€78,661/QALY
Maintenance chemo 2 year treatment cap	€79,326	1.34	€59,061/QALY
PSA Average ICER	€79,037	1.33	€61,126/QALY

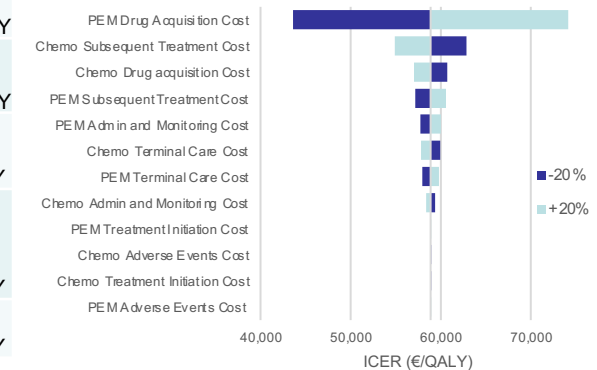
Fig 1. Cost effectiveness acceptability curve



Results – cont.

OWSA: Model was most sensitive to changes in PEM drug acquisition cost and chemo subsequent treatment costs (Figure 2)

Fig 2. One-way sensitivity analysis results



Conclusion

- PEM monotherapy for advanced NSCLC is not cost effective in the Irish setting at a cost effectiveness threshold of €45,000/QALY at the current list price

This project has been updated since the original abstract submission, though these changes have not altered the conclusion of the analysis

- Comparator is now weighted average of all chemo regimens used in KEYNOTE-024 rather than assuming carboplatin with pemetrexed only
- Time horizon reduced from 30 to 20 years
- Additional scenario analyses added