Budget Impact (BI) of First-Line (1L) Cemiplimab Monotherapy for Advanced Non-Small Cell Lung Cancer (aNSCLC) With Programmed Cell Death-Ligand 1 (PD-L1) ≥50% in a Large US Health Plan: An Updated Analysis

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Background

- Until recently, pembrolizumab (anti–programmed cell death protein 1) and atezolizumab (anti–PD-L1) were the only approved monotherapies to treat aNSCLC expressing PD-L1 in ≥1% or ≥50% of tumor cells, respectively.[1–4]
- In February 2021, cemiplimab-rwlc monotherapy was approved for 1L treatment of patients with non-small cell lung cancer whose tumors have high PD-L1 expression (tumor proportion score ≥50%) as determined by a Food and Drug Administration–approved test, without epidermal growth factor receptor (*EGFR*)/anaplastic lymphoma kinase (*ALK*)/receptor tyrosine kinase (*ROS1*) mutations, and the tumor is locally advanced (where patients are not candidates for surgical resection or definitive chemoradiation) or metastatic.[5]
- A BI analysis was developed for cemiplimab monotherapy and was presented at the Academy of Managed Care Pharmacy (AMCP) – Nexus conference (2021).[6] Here, an updated analysis has been conducted using new market share data indicating higher usage of immunotherapy (IO) plus chemotherapy and a lower share of IO monotherapy compared to prior analyses in the high PD-L1 population. In addition, a cost comparison analysis was developed to assess the difference in drug costs, grade 3–4 adverse events (AEs), and administration costs for cemiplimab and pembrolizumab.

Objective

- To estimate the updated BI of introducing cemiplimab monotherapy for 1L treatment of aNSCLC with tumor PD-L1 expression ≥50% in the Unites States from the healthcare payers' perspective.

Limitations

- Assumptions made in this analysis are unlikely to be applicable to all health plans or payer types with different population distributions, formulary structures, and cost-sharing arrangements, but the model is flexible enough to be adapted to other plans.
- The model assumed that mean treatment duration is equal to median progression-free survival (PFS), but patients may discontinue treatment early due to toxicity or remain on treatment beyond progression.
- The use of medians may also provide an underestimation of time on treatment, as time-to-event data for treatment discontinuation are likely to have a right-skewed distribution due to a small number of patients remaining on treatment in later time periods.

Conclusion

- Cemiplimab monotherapy is likely associated with US healthcare payer budgetary savings for treatment of 1L aNSCLC with PD-L1 ≥50%.
- Greater budgetary savings are possible with increased adoption of cemiplimab (current BI analysis assumed 10% in Year 3, and did not account for additional discounts).
- Results from the cost-comparison analyses showed that pembrolizumab was associated with at least 8% higher costs compared to cemiplimab.

References

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Disclosures

Ruben GW Quek, **Yingxin Xu**, and **James Harnett** are employees and stockholders of Regeneron Pharmaceuticals, Inc. **Chloi Theriou**, **Caitlin Smare**, and **Sam Keeping** are employees of PRECISIONheor who received funding to produce this work. **Gerasimos Konidaris** and **Patrick R LaFontaine** are employees of Sanofi and may hold shares and/or stock in the company.

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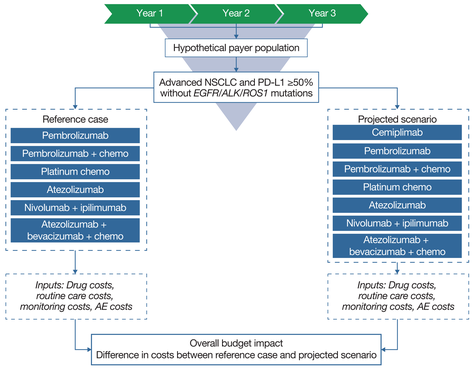
Methods

Model structure

- A simple decision analytic framework based on a hypothetical payer population of 1,000,000 patients over a 3-year time horizon was adopted (**Figure 1**).

Figure 1. Cemiplimab BIM structure



Key considerations: Model followed annual cohorts of eligible patients over the duration of their treatment (ie, initiation of therapy to treatment cessation) to assess costs at annual intervals.
Frequency of Grade 3–4 AEs was taken from the published trials relevant for each treatment included in the analysis, and costs of hospitalization for AEs were derived from the Healthcare Cost and Utilization Project National Inpatient Sample 2017, using International Classification of Diseases, Tenth Revision, Clinical Modification codes for each AE
AE, adverse event; *ALK*, anaplastic lymphoma kinase; BIM, budget impact model; *EGFR*, epidermal growth factor receptor; NSCLC, non-small cell lung cancer; PD-L1, programmed cell death-ligand 1; *ROS1*, receptor tyrosine kinase.

Model inputs

- **Study population**: An incidence-based approach estimated the annual number of patients with aNSCLC and PD-L1 ≥50%, and without *EGFR*/*ALK*/*ROS1* mutations.
- **Market distribution:** Patients were allocated to alternative treatments over time based on both real-world data and market research (**Figure 2**).
  - **Reference case**: Current market mix of active treatments (excluding cemiplimab).
  - **Assumed scenario**: Anticipated market mix of active treatments (including cemiplimab).
- **Treatment duration**: Inputs were based on median PFS from the EMPOWER-Lung 1 trial for cemiplimab and chemotherapy[7] and published data from relevant pivotal trials for the remaining comparators (**Table 1**).
  - For pembrolizumab, PFS was reported separately for the KEYNOTE-024 and KEYNOTE-042 trials. Therefore, the weighted median PFS from the two trials was applied in the model.
- **Costs**: Drug acquisition, drug administration, monitoring, AE, and routine care costs were included (US$, 2021). It was assumed that 77% of patients were under Medicare or Medicaid and 23% were under private health insurance. Drug dosage and treatment costs are presented in **Table 1**.

Figure 2. Market share change for current NSCLC treatments and cemiplimab over 3-year modeling scenario

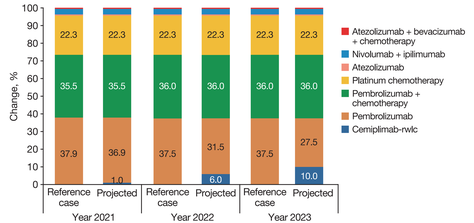


Table 1. Treatment costs and duration used for BIM[†]

Intervention	Treatment arm	Dosage, administration (dose per patient)	Vial size, mg	Cost per pack, US$[‡]	Time on treatment, months	Source
Cemiplimab		350 mg, Q3W	350	9,421.23	8.2	EMPOWER-Lung 1 trial
Pembrolizumab		200 mg, Q3W	200	10,268.72	8.2	KEYNOTE-024 and KEYNOTE-042 trials
Pembrolizumab + chemotherapy	Pembrolizumab	200 mg, Q3W	200	10,268.72	9.4	KEYNOTE 189 trial
	Pemetrexed	905 mg, Q3W	500	3,848.28		
	Cisplatin	2,263 mg, Q3W	50	20.40		
Platinum chemotherapy	Pemetrexed	905 mg, Q3W	500	3,848.28	5.7	EMPOWER-Lung 1 trial
	Gemcitabine	2,263 mg, Q3W	200	6.00		
	Paclitaxel	362 mg, Q3W	30	12.00		
	Cisplatin	136 mg, Q3W	50	20.40		
Atezolizumab		1,200 mg, Q3W	1,200	9,469.85	7.3	IMpower110 trial
Nivolumab + ipilimumab	Nivolumab	212 mg, Q2W	240	6,779.34	6.7	CheckMate 227 Part 1a trial
	Ipilimumab	71 mg, Q6W	50	7,728.14		
Atezolizumab + bevacizumab + chemotherapy	Atezolizumab	1,200 mg, Q3W	1,200	9,469.85	12.6	IMpower150 trial
	Bevacizumab	1,058 mg, Q3W	3	61.00		
	Paclitaxel	362 mg, Q3W	30	12.00		
	Carboplatin	750 mg, Q3W	150	27.48		

[†]Drug acquisition costs are based on the wholesale acquisition cost from ProspectoRx (Elsevier), November 2021. PFS was used as a proxy for treatment duration in the absence of published treatment duration for all therapies.
BIM, budget impact model; PFS, progression-free survival; Q2W, every 2 weeks; Q3W, every 3 weeks; Q6W, every 6 weeks.

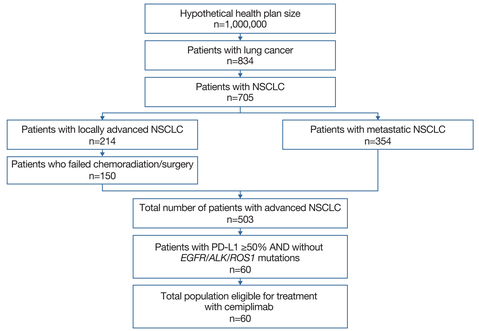
- **Sensitivity analysis**: Univariate sensitivity analysis.
  - Inputs varied by ±20% to model the impact on total incremental costs over 3 years.
- **Cost-comparison analysis**: An additional analysis was developed to assess the difference in drug, grade 3–4 AEs, and administration costs for cemiplimab and pembrolizumab, assuming equal efficacy between the two treatments.
  - Two different scenarios were run: the first assumed a treatment duration of 8.2 months for both cemiplimab and pembrolizumab while the second assumed a duration of 24 weeks.
  - For each scenario, two different sets of drug acquisition costs were explored: wholesale acquisition costs (WAC)[8] and average sales price (ASP)[9] (**Supplementary Table 1**).

Results

Base case analysis

- The model estimated the BI for a hypothetical payer with 1,000,000 covered patients and population growth of 0.60% over subsequent years (**Figure 3** and **Table 2**).

Figure 3. Flow of patients eligible for cemiplimab



Numbers may not add up due to rounding to the nearest integer.
ALK, anaplastic lymphoma kinase; *EGFR*, epidermal growth factor receptor; NSCLC, non-small cell lung cancer; PD-L1, programmed cell death-ligand 1; *ROS1*, receptor tyrosine kinase.

- The cumulative cost saving associated with drug acquisition, administration, treatment monitoring, routine care, and AEs over 3 years was $0.0029 per member per month (**Table 2**).
  - The cumulative incremental costs related to drug administration and routine care costs were $45 and $127, respectively (**Table 2**).
- Assuming a 10% share, the 3-year cumulative incremental BI of introducing cemiplimab monotherapy was –$106,172, representing an approximately 0.4% saving in the healthcare payer's budget.

Sensitivity analysis

- Results were most sensitive to variation in the treatment duration for pembrolizumab and cemiplimab, where a ±20% change in the treatment duration led to a ±252% and ±233% change to the BI, respectively.
  - Changes to all other inputs by ±20% had ≤20% impact on the results.

Cost-comparison analyses

- Assuming an equivalent treatment duration of 8.2 months, treatment with pembrolizumab was associated with an additional $10,504 per patient in comparison to treatment with cemiplimab, a cost increase of 9.21% when using WAC prices (**Table 3**). A total difference of $9,107 (8.23% increase) was observed with ASP pricing.
- Assuming an equivalent treatment duration of 24 weeks, treatment with pembrolizumab was associated with an additional $7,211 per patient in comparison to treatment with cemiplimab, which reflects a cost increase of 9.39% when using WAC prices (**Table 4**). When using ASP pricing, the cost to the payer alone was $73,104 for cemiplimab and $78,944 for pembrolizumab, resulting to a total difference of $6,271 (8.41% increase) when accounting for AE and administration costs.

Table 2. Summary of eligible population and BI of cemiplimab introduction

	2021	2022	2023	Cumulative
Size of population (number of covered lives), including growth	1,000,000	1,006,000	1,012,036	3,018,036
Total of eligible patients, n[†]	60	61	61	182
Patients starting treatment with cemiplimab, n	1	4	6	10
Total incremental acquisition cost, US$	–5,881	–35,499	–59,520	–100,900
Total incremental administration cost, US$	3	16	27	45
Total incremental monitoring cost, US$	–58	–350	–587	–995
Total incremental AE cost, US$	–259	–1,565	–2,625	–4,449
Total incremental routine care cost, US$	7	45	75	127
Total cost of adding cemiplimab, US$	–6,189	–37,354	–62,630	–106,172
Total incremental cost per patient treated per month, US$	–9	–51	–86	–49
Total cost per member per month, US$	–0.0005	–0.0031	–0.0052	–0.0029
BI of adding cemiplimab, %	–0.067	–0.399	–0.664	–0.378

[†]Out of 503 patients with aNSCLC included in the analysis, an estimated 60 patients would be eligible to receive cemiplimab in 2022, increasing to 61 patients in 2023.
AE, adverse event; aNSCLC, advanced non-small cell lung cancer; BI, budget impact.

Table 3. Cost-comparison analyses, assuming a mean treatment duration of 8.2 months

	Cemiplimab	Pembrolizumab
Using WAC pricing		
Total drug costs, US$	111,972	122,045
AE costs, US$	271	702
Administration costs, US$	1,763	1,763
Total difference, US$	–	10,504
Difference, %	–	9.21
Using ASP pricing		
Total drug costs, US$	108,606	117,282
AE costs, US$	271	702
Administration costs, US$	1,763	1,763
Total difference, US$	–	9,107
Difference, %	–	8.23

AE, adverse event; ASP, average sales price; WAC, wholesale acquisition cost.

Table 4. Cost-comparison analyses, assuming a mean treatment duration of 24 weeks

	Cemiplimab	Pembrolizumab
Using WAC pricing		
Total drug costs, US$	75,370	82,150
AE costs, US$	271	702
Administration costs, US$	1,186	1,186
Total difference, US$	–	7,211
Difference, %	–	9.39
Using ASP pricing		
Total drug costs, US$	73,104	78,944
AE costs, US$	271	702
Administration costs, US$	1,186	1,186
Total difference, US$	–	6,271
Difference, %	–	8.41

AE, adverse event; ASP, average sales price; WAC, wholesale acquisition cost.

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