EE398

Health impact projection of Anti-PD-(L)1 inhibitors in 10 cancer indications in Japan

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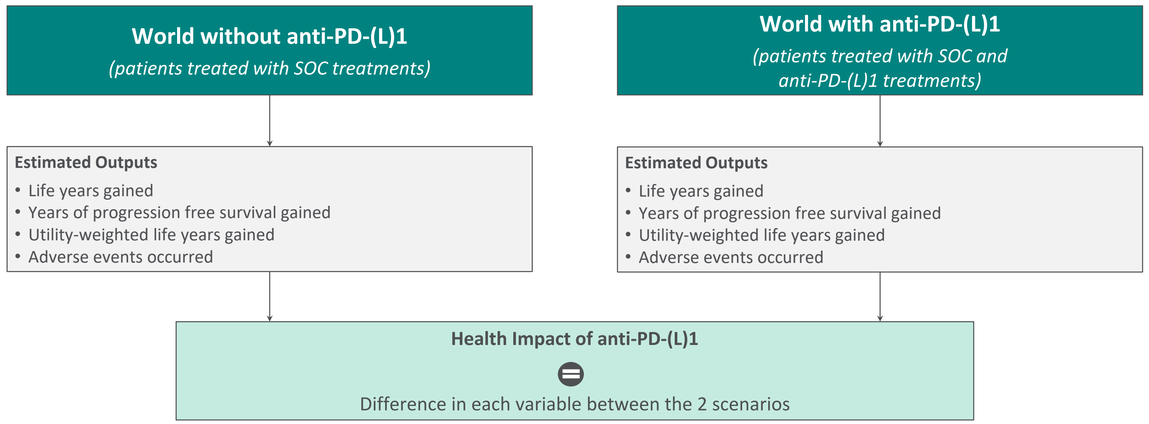
Background and objectives

- The development of immunotherapy and in particular antibodies targeting programmed death-ligand one (PD-(L)1) has transformed cancer care, through clinical improvements in a wide range of tumor types.[1,2] The anti-PD-(L)1 class provides new options to treat cancer effectively by prolonging survival, with more favorable tolerability.[3,4] Clinical trials in key indications have shown patients have benefitted from a significant decrease in the relative risk of progression.
- In 2020, there were 1,028,658 new cases of cancer and 420,124 cancer-related deaths in Japan.[5] Generally, the Japanese population have high life expectancy and low mortality. Since the 1960's, the Japanese population has shown a shift in the overall age distribution due to increased life expectancy. This, in consequence, has been found to be correlated with an increase in cancer-related deaths.[6]
- The Japanese government implemented a comprehensive ten-year strategy for cancer control in 1984, and this was followed by two further ten-year strategies. The 2006 Cancer Control Act was introduced focusing on more frequent planning through "Basic Plans to promote cancer control".[7]
- The objective of this project was to estimate the impact in health outcomes that anti-PD-(L)1 inhibitors had in Japan among patients with cancer who initiated treatment between 2017-2021 across 10 indications: adjuvant and metastatic melanoma, metastatic NSCLC (first and second lines), urothelial (second line), head and neck, renal cell carcinoma, gastric, esophageal and colorectal cancers.

Figure 1. Model approach



anti-PD-(L)1: Anti-programmed death-ligand 1; SOC: standard of care
1L: First-line, 2L: Second-line, NSCLC: Non-small cell lung cancer

Methodology

- A model was developed to estimate key health outcomes for patients initiating treatment with anti-PD-(L)1 class retrospectively between 2017-2021 following the approval of the anti-PD-(L)1 class in the Japanese market in two compared worlds: one with and one without anti-PD-(L)1 inhibitors (see Figure 1).
- A partitioned survival model was used to estimate key survival outcomes, including life years (LYs), progression-free survival (PFS) and quality-adjusted life years (QALYs). Overall survival, PFS curves and utilities were derived from published Phase III clinical trials.
- The model adopted a one to five-year time horizon, where a new cohort joined in each of the years and was structured in weekly cycles. The time horizon was extended to show the results of year six onwards, capturing outcomes as an aggregated result for "2022+" which modelled the health outcomes for each of the cohorts captured within the model for a full five years after treatment commencement.
- The incidence of each cancer type was based on data from the Japanese National Cancer Registry database.[8]
- Other Japanese-specific data sources were used to derive other epidemiology inputs (e.g., stage at diagnosis, recurrence rates, treatment rates per line, etc.) and the market uptake to reflect the proportion of patients receiving an anti-PD-(L)1 rather than standard of care (SOC).[9-16]
- The hypothetical world without anti-PD-(L)1 considers the treatments recommended before their approval (among others: chemotherapies, waiting or tyrosine-kinase inhibitors depending on the indications).

Results

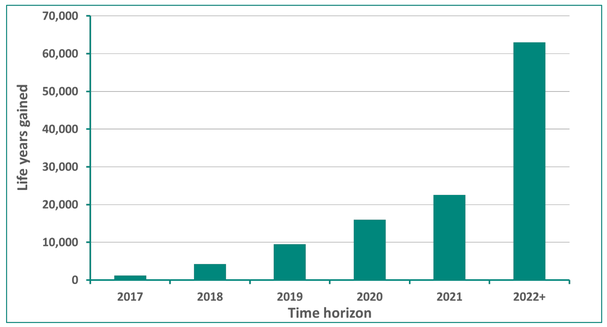
- The model estimated that 590,546 patients would be eligible for treatment with anti-PD-(L)1s, 182,432 of them would have actually initiated treatment with an anti-PD-(L)1, across the 10 indications between 2017-2021.

Figure 2. Absolute and relative health outcomes results across all indications over 2017-2021+

Absolute gains	Changed with Anti-PD-(L)1	Relative gains
116,407	Life years gained	+18%
103,852	QALYs gained	+11%
94,377	PFS life years gained	+35%
49,905	AE avoided	-14%

Anti-PD-(L)1 : anti-programmed death-ligand 1, QALY: quality-adjusted life year, PFS: progression-free life year, AE: adverse event

Figure 3. Absolute life years gained across all indications over 2017-2021+



- The absolute gain in life years increases over 5 years of follow up per cohort (2017-2021+) as more patients get treated with anti-PD-(L)1s over time, and they experience longer overall survival in the world with the anti-PD-(L)1 class versus those in the world without the anti-PD-(L)1 class.
- The model predicts a decrease in the number of AEs by 49,905 events across the 10 indications (-14%).

Conclusions

- Due to the favorable efficacy profile of anti-PD-(L)1 drugs, treated patients experience increased overall survival (116,407), increased progression-free life years (94,377) and increased quality of life (103,852). The increased quality of life is a result of the increased time patients spend progression-free.
- Lower levels of toxicity in anti-PD-(L)1 therapies compared to SOC treatments result in 14% of AEs being avoided (49,905 in total).
- Following the approval of anti-PD-(L)1 inhibitors, patients with cancer initiating treatment with anti-PD-(L)1 inhibitors between 2017-2021 across the included indications experienced significant gains in life expectancy, PFS and quality of life, demonstrating the benefit brought by anti-PD-(L)1 inhibitors to patients with cancer in Japan.

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