

Cost-Effectiveness of First-Line Nivolumab Combination Therapy vs Chemotherapy Alone for Advanced or Metastatic Esophageal Squamous Cell Carcinoma

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BACKGROUND

- Esophageal cancer is the sixth leading cause of cancer-related mortality globally^{1,2}
- In the U.S. in 2022, the incidence and death rates were 4.2 and 3.8 per 100,000 men and women per year, respectively³
- An estimated 40% of patients have distant metastases at diagnosis, and the 5-year relative survival is about 20%³
- Nivolumab combinations were recently approved as first-line treatment for patients with advanced or metastatic ESCC based on CheckMate-648 trial results⁴

OBJECTIVE

- To estimate the cost-effectiveness of nivolumab with chemotherapy or nivolumab with ipilimumab compared to chemotherapy alone as first-line treatment for advanced or metastatic ESCC in the overall population and population with PD-L1 expression of $\geq 1\%$ using a U.S. payer perspective

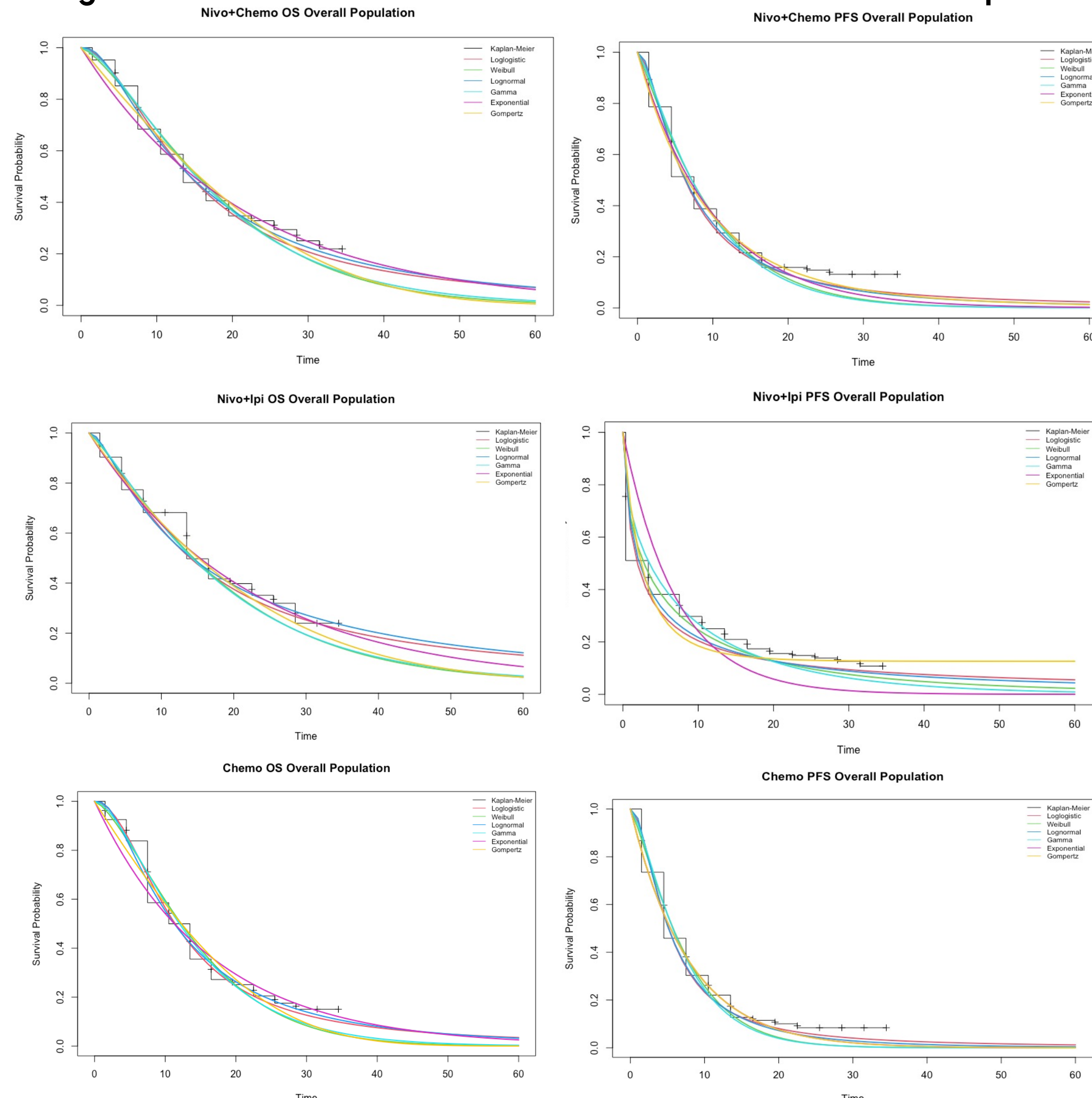
METHODS

- Patient Population:**
 - Patients with a median age of 64 years diagnosed with advanced or metastatic ESCC
- Model Structure:**
 - A partitioned survival model with a 4-week cycle length and a 5-year time horizon was developed in TreeAge Pro Healthcare software
- Interventions/Comparator:**
 - Nivolumab + fluorouracil + cisplatin
 - Nivolumab + ipilimumab
 - Fluorouracil + cisplatin
- Health States:**
 - Progression-free survival (PFS), progressed and death
- Clinical Data:**
 - Overall and progression-free survival data was extracted from CheckMate-648 trial results. In the base case analysis, a loglogistic distribution was used based on visual inspection and lowest AIC values
- Cost and Utilities:**
 - Cost, utility and disutility values were obtained from UpToDate and published literature. A 3% discount rate per year was applied to costs and outcomes
- Analyses:**
 - ICER per QALY was calculated for the interventions compared to chemotherapy alone. One-way and probabilistic sensitivity analysis were performed

Table 1. Input Parameters for Base Case Analysis

Parameters	Estimates
Medications and Administration Costs (2022 USD)	
Nivolumab ⁵	\$16,928
Ipilimumab ⁶	\$12,865
Fluorouracil ^{7,9}	\$1,245
Cisplatin ^{8,9}	\$1,110
Adverse Events Management Costs (2022 USD)	
Nivo+Chemo ¹⁰⁻¹²	\$18,259
Nivo+Ipi ¹⁰⁻¹²	\$11,011
Chemo ¹⁰⁻¹²	\$18,075
Progressed Disease ¹³	\$26,687
Utility Values	
PFS state ¹⁴	0.75
PD state ¹⁴	0.60
Disutility Values	
Nivo+Chemo ^{15,16}	-0.24
Nivo+Ipi ^{15,16}	-0.28
Chemo ^{15,16}	-0.29

Figure 1. Parametric Distributions for OS and PFS in Overall Population



RESULTS

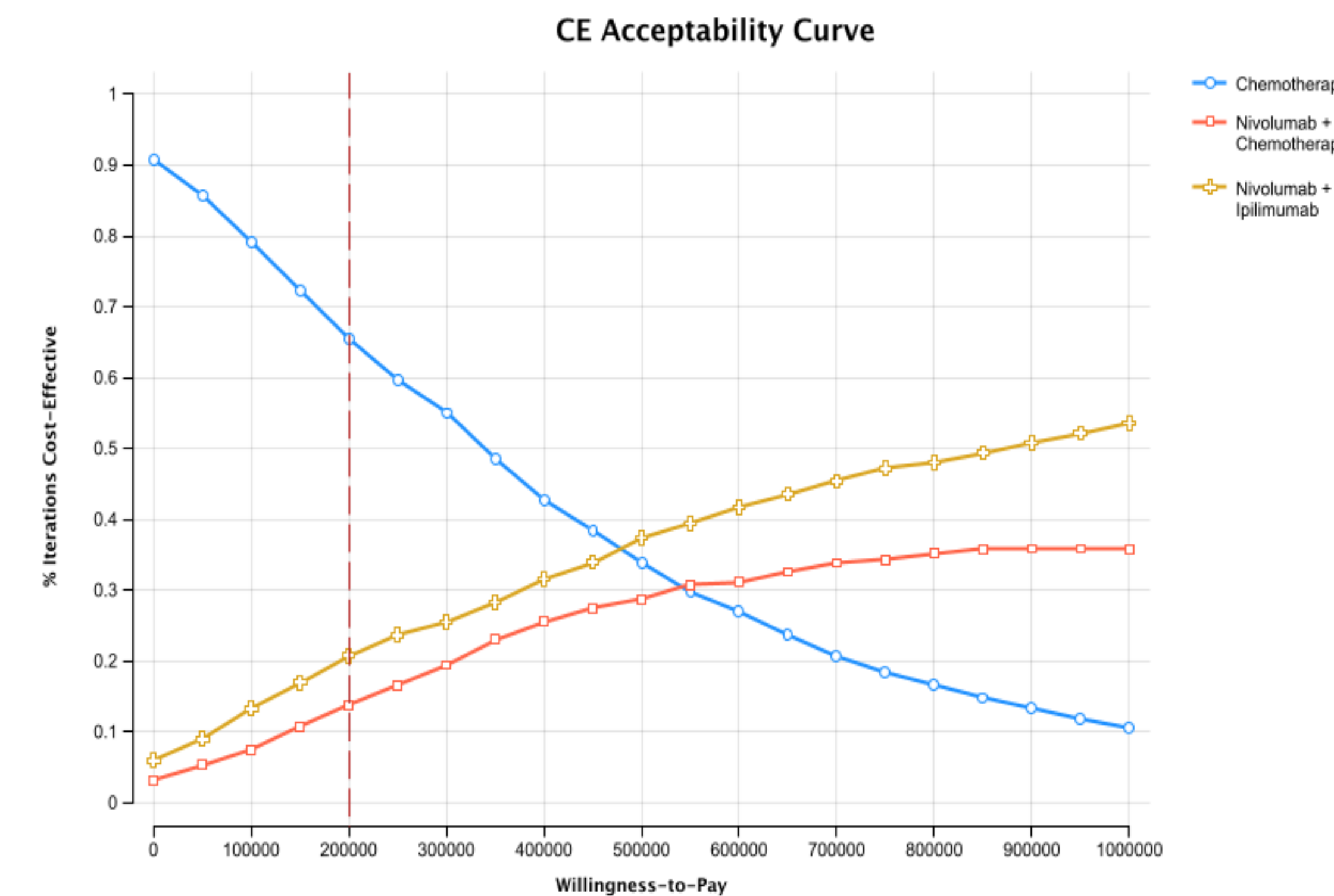
Table 2. Base Case Results

Strategy	Cost	Incremental Cost	QALY	Incremental QALY	ICER
Overall Population					
Chemo	\$307,484		0.84		
Nivo+Chemo	\$438,775	\$131,291	1.06	0.22	\$597,522
Nivo+Ipi	\$514,202	\$206,718	1.15	0.31	\$666,832
Population with PD-L1 Expression $\geq 1\%$					
Chemo	\$301,785		0.77		
Nivo+Ipi*	\$440,639	\$138,854	1.06	0.28	\$488,045
Nivo+Chemo	\$483,543	\$181,756	1.22	0.44	\$409,108

QALY = Quality-Adjusted Life Year; ICER = Incremental Cost-Effectiveness Ratio

* Nivo+ipi was extensively dominated

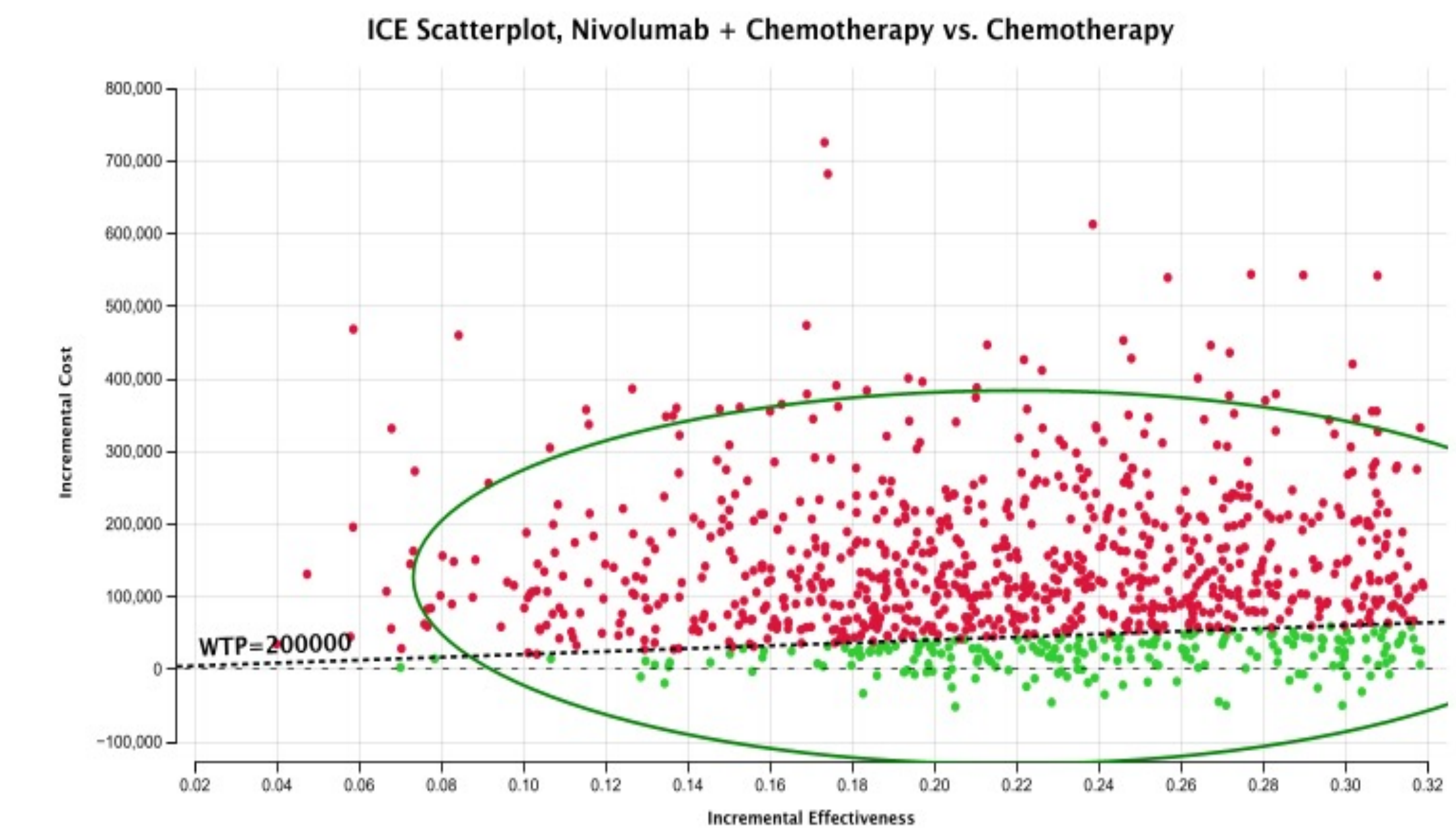
Figure 2. Cost-Effectiveness Acceptability Curve in Overall Population



CONCLUSION

- Nivolumab combination therapy showed better survival at significantly higher cost and is unlikely to be cost-effective as a first-line therapy for patients with advanced or metastatic esophageal squamous cell carcinoma in the U.S.

Figure 3. Cost-Effectiveness Plane



DISCUSSION

- At a willingness-to-pay threshold (WTP) of \$200,000, the probability of nivolumab with chemotherapy and nivolumab with ipilimumab not being cost-effective was 86.2% and 79.2% respectively
- Our results suggest that nivolumab with chemotherapy would be cost-effective at a WTP of \$550,000 per QALY or more while nivolumab with ipilimumab would be cost-effective at a WTP of \$475,000 per QALY
- One way sensitivity analyses showed that changes in the costs of nivolumab and ipilimumab, utility values for PFS, and cost of disease progression impact the results
- Limitations**
 - Clinical trial population may not truly represent the U.S. population
 - There was not real-world effectiveness data available, hence the analysis was based entirely on CheckMate-648 trial efficacy findings

REFERENCES



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